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PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PROFESSIONALISM AND ETHICS IN CONSTRUCTION

The conference

The construction process involves several activities undertaken by many persons with different academic and practice backgrounds, from different companies, working to accomplish inter-related and inter-dependent tasks in an atmosphere of uncertainty and risk. Thus, it is necessary for participants at any stage of the process to be assured of the quality and efficacy of the work completed at earlier stages. Construction activity and its products relate to health and safety, and sustainability, and can have an impact on the lives and wellbeing of the community. There should be competence, professionalism and dedication to public interest on the part of all participants in order to attain the best offer to clients in terms of life-cycle value for money, sustainable development and improvement in quality of life.

The construction industry has a poor image in most countries from an ethical point of view. The issues include: corruption, malpractice and mismanagement on projects; predatory business practices; and poor responsibility towards the well-being of its own workforce and other stakeholders. It is estimated that up to one-third of the governments' investments in construction is lost through corruption and mismanagement. Collapsed buildings and disastrous fires are other examples.

There have been many studies of professionalism in construction. In practice, there have been arguments on which construction occupations are legitimate 'professions'. There have also been discussions on the current state and the future of construction professions. The issues of shortfalls in ethics and the loss of the public's trust have also been topical. Recent events, such as the Grenfell Tower fire in the UK, incidences of poor building work and collapse of built items in many countries, modern slavery and lack of safeguarding of workers have brought the issues to the public's attention.

Governments seek to regulate the professions and the construction process to protect society. Nations also have statutory and administrative provisions against corruption. Professional institutes have standards of performance and ethics. Society expects the construction professions to deliver the much-needed buildings and infrastructure with a focus on the well-being of the community.

It was considered to be appropriate and timely to explore and deliberate upon the state of professionalism and ethics in the construction industry around the world and consider actions for improving the situation. The conference was intended to bring together researchers and practitioners to jointly explore the issues.

Conference Aim and Objectives

The aim of the conference was to provide an Opportunity to review knowledge on professionalism and ethics and how it relates to the construction process in different countries, in order to make proposals of actions for improving the situation. The objectives of the conference were to:

- review the state of the construction professions, and the implications of this state of affairs
- consider the importance of ethics in construction, the current state of adherence to ethics in different countries and implications of the present situation
- discuss what can be done to develop the construction professions and practitioners to enhance the levels of professionalism and ethics to improve performance and enhance industry's social image.

Conference sub-themes

The papers submitted for the conference were to explore topics including the following:

- The state of the professions in the construction industry; the underlying factors and the implications
- Regulation and control, and continuous development of the construction professions
- Professionalism and current issues in construction such as leadership; sustainable development; stakeholder management; technology development; and innovation
- Project management and professionalism
- Ethics in construction and current issues relating to it such as modern slavery, responsible sourcing, considerate contracting
- Transparency and forms of open contracting
- Stakeholder management and citizen involvement in construction
- Education, training, and the development of professionalism and ethical awareness among students
- The future of the built environment professions.

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KEYNOTE PAPERS

LEADERSHIP AND ETHICS IN CONSTRUCTION: CULTURAL DIFFERENCES

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Leadership, professionalism and ethics in construction should come together in order to provide a safe and pleasant environment. However, cultural differences and context specific requirements should be taken into account. This paper presents a model of cultural differences, which can impact leadership styles and ethics and professionalism. In addition, this paper demonstrates how strong leadership can help construction firms in achieving high ethics and standards. People in our industry need to understand that leading by example will lead to such high ethics and professionalism. Bribery, malpractices, taxes evasion, unprofessional behaviour amongst many others should be eliminated from our industry as lives could be at risks in producing bad designs and structures. The Paper concludes with a set of recommendations to help construction firms develop appropriate leadership styles and approaches that cope with the challenges in a fast changing environment taking into account contexts and cultural differences.

Keywords: Leadership, Ethics, Cultural Differences, Construction

INTRODUCTION

The subject of ethics in construction has been addressed by many researchers (Fellows 2003, Toor & Ofori 2008, Mason 2009, Ofori & Toor 2009, Pearl et al 2009, Randeree & Chaudhry 2012, Saygong et al 2015). This current paper addresses a holistic perspective of leadership, ethics and professionalism taking into account cultural differences. In order to understand the importance of leadership, ethics and professionalism and how they should come together, it is important to cover some definitions and give some backgrounds about these three important areas.

The Cambridge English Dictionary defines ethics as the study of what is morally right and wrong, or a set of beliefs about what is morally right and wrong. On the other hand, professionalism is defined as the combination of all the qualities that are connected with trained and skilled people. With regards to leadership, it has been a hot topic for the last 40 years. According to Crainer (1995) there are over 400 definitions of leadership. Some notable definitions are: a) leadership is a matter of making a difference; leadership is a relationship through which one person influences the behaviour or actions of other people.

Leadership styles play a major role in influencing behaviours in the construction sector. High ethics and professionalism can only be achieved through strong Leadership. The recent collapse of the Ponte Morandi Highway Bridge during maintenance works in Genoa Italy with 43 deaths (<https://www.bbc.com/news/world-europe-45241842> retrieved October 2018) has raised many issues about ethical behaviour. This is just one example of many recent collapses in construction structures, which has been caused by poor workmanship, malpractices, and in some instances big question marks about bribery and corruption were raised.

There are various theories of leadership, some are explained as: a) Great Man Theory, which assumes that leaders are born, not made. Leadership consists of certain inherited characteristics like physical attributes, personality characteristics, social skills and speech fluency, intelligence and scholarship, cooperativeness, and insight; b) the functional approach: the emphasis is on the functions of leadership not the personality of the leader. One example of this approach is Action-centred Leadership, which focuses on what leaders actually do (Adair 1988, Bass & Bass 2008, Crainer 1995)). The second theory is more relevant and appropriate to the construction sector. In addition, there are different styles of leadership, they could be based around the autocratic, democratic, or laissez faire approaches. Alternatively, they could be described under the transactional, transformational or inspirational leadership styles. These approaches and styles affect the way people behave in our industry in relation to ethics and professionalism.

Understanding cultural differences is more important than ever before. This is particularly important for leaders in the 21st century where the complexity of dealing with people of different styles and cultural backgrounds is influencing issues like ethics and professionalism. This is particularly important in the East, as the construction sector is more reliant on imported management and work force. Effective leaders choose the right leadership style that fits a particular setting or region taking into account cultural traditions and values.

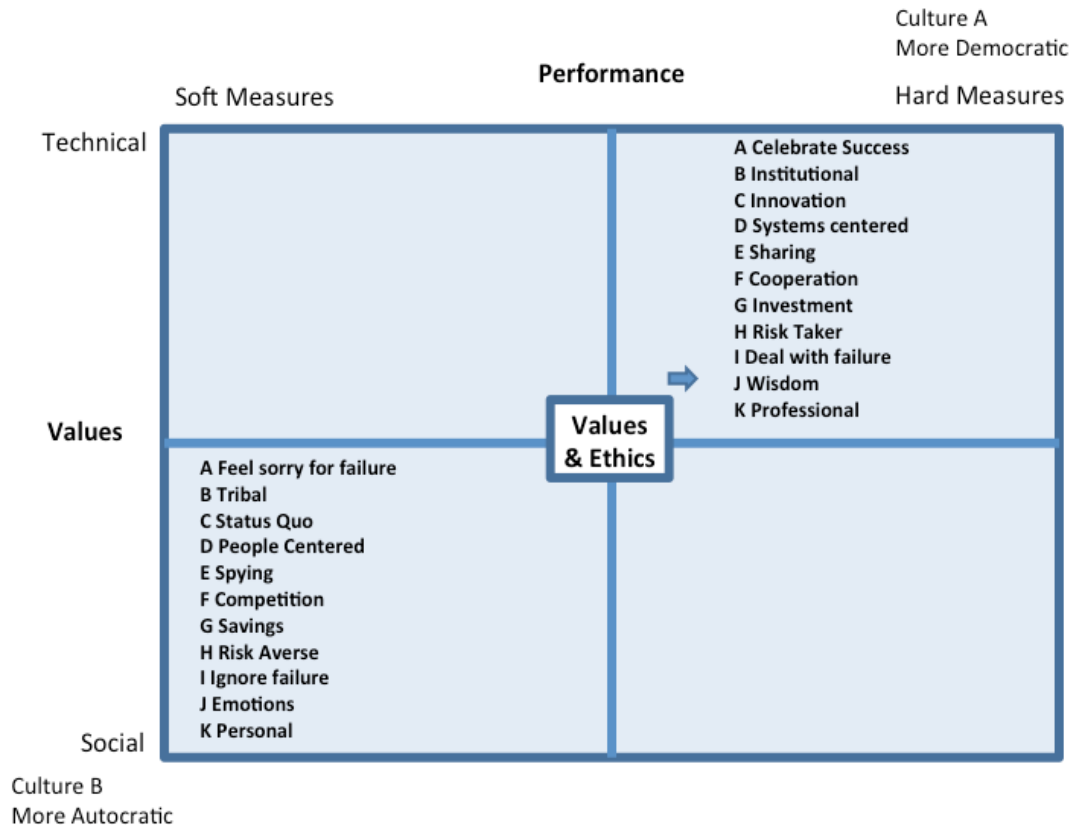
A true leader has core values such as clear vision, strong belief in quality, transparency, fairness, respect for people, integrity, strong principles, strong belief in excellence, and faith in her/his own people irrespective of their color, gender, race, religion, social status, nationality, etc. These values lead to a culture of high ethics and professionalism. These traits have been identified through the workshops described in the research methodology section.

RESEARCH METHODOLOGY

A draft framework for a model of cultural differences was initially developed and presented to MBA students at a private university in Kuwait (around 80 students and staff attended) who provided feedback for model improvement. This was followed by three presentations (workshops) about leadership, ethics and values that were held at various universities and companies in the Kingdom of Bahrain in order to assess leadership styles and to identify cultural differences in terms of values and ethics. In total 190 participants took place in the 3 workshops (CIOB Workshop: 60 participants, Petrochemical Company: 70 participants and a training organisation: 60 participants) including construction professionals, staff and students who have come from different cultures and backgrounds. In addition, various presentations of the developed model were made in the UAE and KSA at universities and companies in order to validate some of the results. 2 extreme cultures were identified; these are presented in the following Figures. 3 clusters are produced based on local context, social norms and values. Issues related to celebrating success and taking risks are usually associated with the local context of an organisation or a nation. The dimensions of cultural differences developed by Hofstede (Hofstede 2011 and Demler et al 2018), can play a major role in this area as issues such as power distance index, individualism vs. collectivism, uncertainty avoidance index, masculinity vs. femininity, long-term orientation, and indulgence versus restraint can influence many

aspects of the local context. Power distance has the biggest impact as this leads to a hierarchical authoritarian approach or a democratic flat management structure. This leads to the creation of 2 extreme cultures that have different set of values and principles. In Figure 2 issues related to social norms and habits are documented. Issues related to the identification of evidence are more dominant in some cultures. Finally, Figure 3 documents aspects related to values and quality. All the aforementioned aspects affect behavioural approaches, which have implications on ethics and professionalism in construction organisations.

Figure 1: Cultural Differences: Local Context

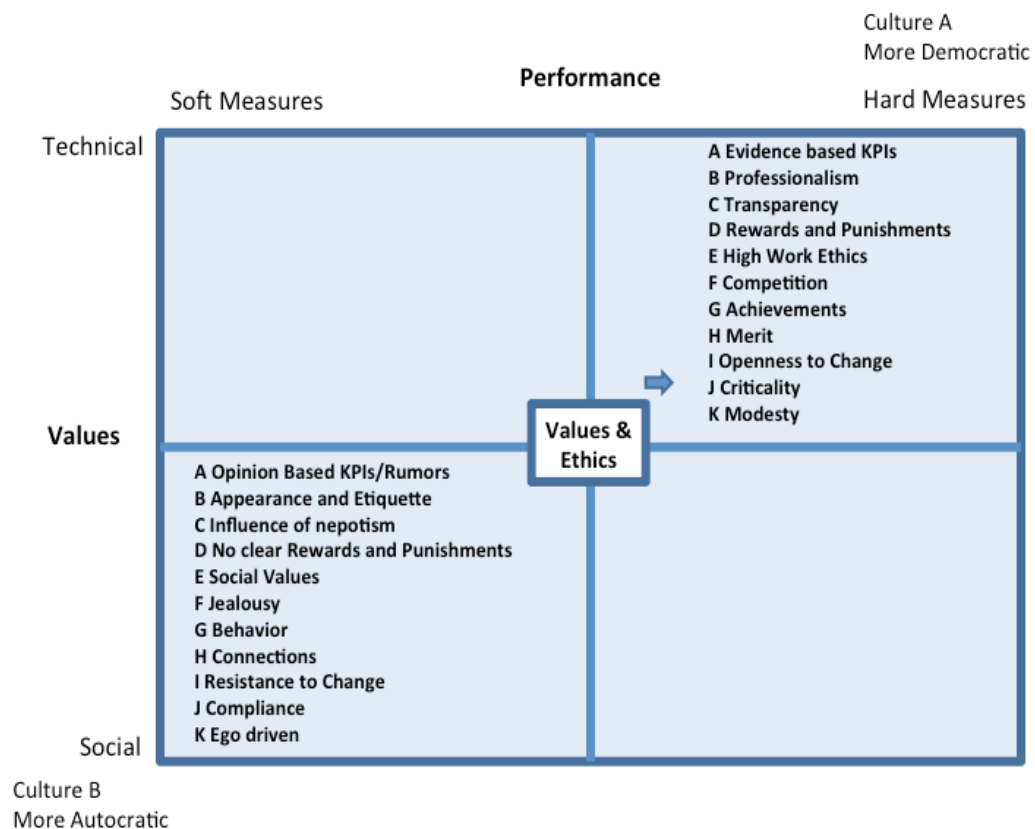


The 2 cultures have been mapped in terms of values and performance. It is evident from the research that high ethics and professionalism is influenced by cultural settings. However, it is clear that the 2 cultures can intersect and it is not one size fits all. It all depends on the construction firm and how a culture of excellence, quality, high ethics and values can co-exist. These cultures maybe influenced by regional settings and context, but they can exist in the Western or Eastern Worlds. These cultures are the results of the leadership style adopted. It is expected that a good leader in culture A will have core values such as clear vision, strong belief in quality, transparency, fairness, respect for people, integrity, strong principles, strong belief in excellence, and faith in her/his own people irrespective of their color, gender, race, religion, social status, nationality, etc. These values lead to a culture of high ethics and professionalism. It is important to create a culture of change and it has to be understood that people, not organisations or projects drive change. It is easy to show people how great the new opportunities are, but people have to be able to see these new opportunities as an exciting challenge. The democratic culture, which is the result of maturation over a long period of time, provides more opportunities for a

professional behaviour. This becomes the norm and all employees in a construction organisation embrace such professional behaviour.

Culture B which adopts the autocratic approach can only work in immature organisations as a set of parameters is needed to control the behaviour of individuals in such a culture. In culture A, it is expected to see more systems and processes and the Key Performance Indicators (KPIs) of the company as a whole or specific projects are clearly defined and measured.

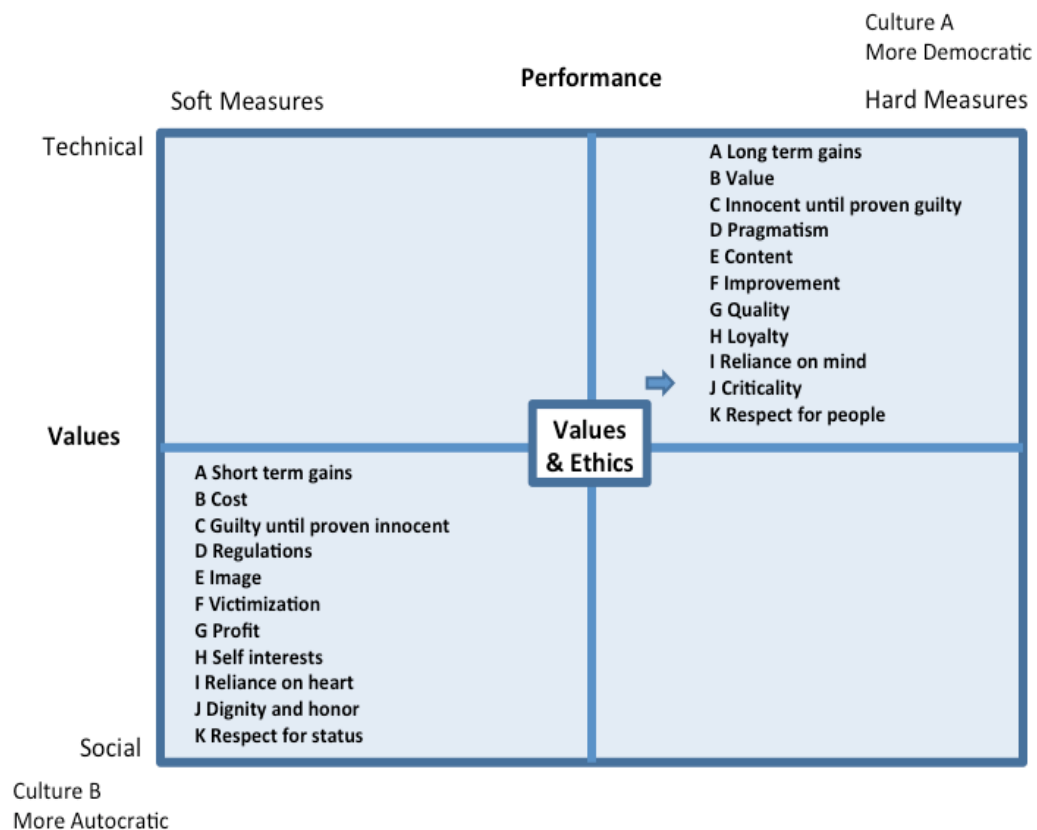
Figure 2: Cultural Differences: Social Norms



The 2 extreme cultures that are the results of various influences like level of maturity, local and regional setting, and traditions and habits have the biggest impact on ethics and professionalism. Of course, the leadership styles that are to be adopted have to take into account all these aspects.

In culture A, transparency is of paramount importance whereas the level of nepotism is high in culture B.

Figure 3: Cultural Differences: Values



It is evident from the models presented that a particular value parameter can have many implications on ethics and professionalism. For instance the concept of “innocent until proven guilty” or “guilty until proven innocent” as indicated in Figure 3 can influence the creation of a culture of victimisation or scapegoating. Most importantly is the coupling of various values. For instance, strong leadership create a dominant culture of quality, innovation, improvement, and respect. All these ingredients are essential to help the construction sector in addressing ethical and professional behaviours.

Strong ethics and professionalism are becoming essential requirements for the construction industry in the 21st century. Many aspects like bribery, corruption, and unethical behaviour still exist in some parts of the world due to nepotism and self interests. However, big improvements have take place and the philosophy of having zero tolerance when dealing with these issues should be incorporated in construction curricular, codes of ethics and cultures of construction organisations.

Leading by example is the essence of providing strong leadership. It is also the duty of the industry to produce more leaders and compliant followers. Lives could be at risks if lessons from malpractices are not learnt.

RECOMMENDATIONS

In an article published by Peiffer 2017 about 10 construction industry trends to watch in 2017, it was highlighted that construction firms will face increased scrutiny and prosecution of safety and fraud incidents. Many incidents have happened in many

parts of the world, which reflected the reality of this prediction. In order to provide a healthy and safe environment, it is important to address the following recommendations:

1. Code of ethics and professionalism should be established and disseminated to all workers at all levels
2. Leadership is an important factor and good leaders usually lead by example, they should practice what they preach
3. Technology, particularly social media which has a wider reach, should be used to disseminate good practices in order to learn from past mistakes
4. There should be zero tolerance when it comes to bribery and malpractices as lives could be at risks

The planning phase is important and we should adopt the following as a model, which is the result of performing in a string culture

Figure 4 Sequence of good planning



Unfortunately, in some cultures, the planning phase is not giving enough attention and the sequence adopted lead to many problems and malpractices.

Figure 5 Inappropriate sequencing of activities



CONCLUSIONS

This paper presented a model of cultural differences that should be taken into account when dealing with ethics and professionalism in construction. In addition, this paper highlighted the importance of leadership in creating a culture of excellence, high ethics and professionalism. It is concluded that the leadership of a construction organization irrespective of regional location or local parameters creates cultures that enable ethical behaviors. However, the context has to be taken into account when developing mechanisms to enable a health and safe construction environment. Let's conclude with a quote by Aristotle "He who has never learned to obey cannot be a good commander". It is also worth noting that there is a big difference between leadership and management. Leaders mainly focus on vision and people whereas managers focus on operations and procedures and both are needed to address the issue of professionalism and ethics in the construction sector.

The main reasons for not providing a complete ethical and professional environment in a limited number of instances within construction organisations are related to resistance to change, poor leadership, lack of skills, training, government policies, and the current curriculum. Of course, in cultures where ethics and professionalism are embedded in the values of these organisations, the problem is less severe.

It is important for the construction industry to embrace strong leadership in dealing with ethics, professionalism and the understanding of cultural differences. Strong leaders do the right thing, are interested in effectiveness, innovate, focus on people, rely on trust, align people with a direction, emphasise philosophy, core values, and shared goals, seek and inspire people to change, take risks, use person to person influence, focus on value, and balance external and internal activities. All these important ingredients will create a strong culture of ethics and professionalism.

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PROFESSIONALISM AND ETHICS

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Professionalism and ethics are the often-quoted prerogative of the professions if not the professional bodies themselves. But is this really the case? Can professionalism and ethics be for everyone?

For me being professional is not just about getting paid for what you do. I have seen amateurs do better than professionals. It is not about the capacity to be able to do the “professional foul”. How often have you heard that on Match of the Day when the analyst says he had no choice but to give away the foul and take one for the team (red or yellow card)?

Certainly, in this context professionalism and ethics seem a million miles away if you believe being ethical means no cheating.

Does being professional equate with a string of letters after your name. Are you more of a professional the more professional bodies you belong too? Does being a professional mean, you are part of a self-serving group looking after themselves at the expense of the public?

I think Mrs Thatcher took care of that when she took on the professions, ended their monopolies and also initiated some of the changes that have taken place particularly around the regulatory and disciplinary activities of certain professions who seemed keener to defend the indefensible. It was considered unacceptable to report a colleague. This was the default position in the legal profession and not just the police service. Finding a solicitor to act against another solicitor was extremely difficult.

So, in redefining professionalism it has meant that professionals have had to change their ways. The legal profession has statutory regulators as does the accountancy profession and the medical profession.

You will note that these are the high aspiration professions, the blue ribband group. All found seriously wanting and not serving the public interest as much as their own.

In the construction industry the professions by and large missed the reforms in the other sectors, perhaps because they thought they were not that important. The architects and the surveyors had to move away from scale fees and be more competitive but by and large things carried on as normal as they do to this day.

In the meantime, where has ethics been? Ethics has been, gone and might be making a comeback. Right from the start the professions have made some reference to ethics, usually in the context of respecting the client etc. So much attention is drawn to the clients’ needs that focus moved away from the needs of society, the very group that give a “licence” to the professions to operate.

The licence to operate is very generous. it confers a recognition of expertise in an area. In construction there are about 30 professional bodies and associations all claiming expertise is their own area and other areas as well as the boundaries blur.

Most statements on ethics sit in codes of conduct and professional behaviour. A recent survey done by the Edge¹ identified how similar most of the professional bodies codes of conduct were. In fact they were described as "template" codes.

Of course, when you have been around nearly 200 years it is hard to come up with anything new, and if you are a newer body then you look to those who have been around a bit and see what they have. So, it is understandable that there is some convergence of codes. Whether this convergence helps or hinders is another matter.

The challenge for the modern professional is most of their focus is on delivery and delivering to a very tight set of outcomes.

The full impact of such a focus is not seen or considered relevant. After all, in a longish supply chain it is wasted effort to consider all the implications even if one was aware of them. If anything, the professionals are forced to work in silos lest they stray.

Making decontextualized decisions means overall sight of the project is limited and the needs of some stakeholders override other equally legitimate stakeholders.

Doing the same thing time and time again indicates a lack of development or an interest in development and exploring the professional boundaries. Innovation is stymied, or they just want to play it safe.

Perhaps the most difficult is the view that if it is legal it must be OK. This is when professional skills become commoditised and are used on projects with unethical purposes or practices. Nowhere has this been more apparent in some of the Middle Eastern countries where program managers have exempted themselves from some of the labour exploitation issues because they claim, they are not directly part of the supply chain even if they share the same client with the supply chain.

This has also been seen much closer to home with some of the lamentable reporting required by S54 of the Modern Slavery Act. You often see the same report template being used time and time again by the same lawyers just to meet the compliance requirement about having to make a report, rather than addressing the underlying issues that require a report. And this is considered being professional.

Anyone who has studied the Hackett Report following the Grenfell House tragedy cannot but wince at the criticism of how professionals have behaved. Hackett clearly sets out the folly of decontextualized decision making, most notable in the criticism of value engineering. To reduce the costs to the client, one stakeholder, other stakeholders suffered.

Doing what has always been done especially in the interpretation of the Building Regulations and approved documents suggested that there was a way to achieve what's wanted. There was nothing new about the Grenfell project, no desire to do something different.

Finally, the cumulative effect of it all, everyone thinking they had done their job ok, led to a disaster when it became clear early on that busy as people might have been, they were going in the wrong direction. They did not recognise right from wrong.

Being a professional means being able to exercise professional judgement, knowing right from wrong and standing up and being accountable.

Why is ethics so important? It is not just a matter of what we do, but how we do it. This goes back to the previously mentioned professional foul. Winning by cheating feels hollow. It does not feel right. In construction our projects are very important. That say a lot about us as a society and what we care about. So building them well serves several interests after all and

we might become users of the buildings. Hospitals make us well when we are ill. Our children get educated in schools, we enjoy our leisure in shops and other facilities so know what we are building becomes very important. That understanding and the impact the buildings have, helps to deliver the job.

I remember one awards ceremony I attended, a gold medal winner became very emotional as he described how his team rebuilt a paediatric oncology unit around the existing facility. He had to come up with a programme to deliver the work, but through the programme he was directly enabling the continued treatment of the young patients. Without him and his team the doctors and nurses could not do their job.

There are times though when the individual cannot resolve an ethical dilemma on their own. When the whole society you are in operates in a way that challenges your moral stance it is easy to say I cannot do anything about it so just ignore it. This has been a long-standing problem with the middle east and migrant labour on construction projects. In addition to brutal working conditions, workers have had to pay recruitment fees, suffered wage cuts and housed in dreadful accommodation and usually end up with increasing debt with no way out. Some expats arrive see it and leave quickly others see it and go along with it. Either response is understandable.

But often ethics has taken a back seat or just gone missing as priorities have centred around sales or PBIT, with ethics being something for the corporate social responsibility team to dance around.

So why is it important to bring ethics back to the front stage. How do we change the thinking?

That might not be as difficult as you might at first assume. Millennials (people born after 1980) think and act differently. I know I have two of them.

These people are in a networked, interconnected, world accessible at their fingertips. They take positions based on a wealth of information and don't respect borders, and with a variety of devices it means they are connected 24/7. Global is now local and they don't need to be part of the formal structure of old.

The APM in their Road to Chartership² series produced an interesting report on Millennials. In the paper they describe their experiences of millennials. In terms of their professional development millennials would prefer:

To work in networks rather than hierarchies

Influence rather than dictate, command and control

Innovate with others from across the world through social media

Work beyond boundaries and be dynamic

Create value and be involved in decision-making rather than executing plans

Take an ethical approach to work and professional practice as means to competitiveness

As these millennials work their way through leadership positions we might return to a position where ethical working and practice returns to be the norm.

The professional body therefore has a unique role in developing the narrative that an individual cannot. Remember the individual working and being part of labour exploitation.

He would find it impossible to stand up and say something without suffering severe consequences. But banded together then the voice is stronger and has impact.

Institutions need to keep revisiting why they exist, what are they for, what do they seek to achieve. The answer might be different to that question 30 years ago and so it should and when the generation that succeed the millennials comes forward maybe the answers will be different again.

So, is ethics and professionalism just for the professions? No, it for all of us, in professions or not. The moral compass is more important than ever because what is legal is not always right and no one has a monopoly on that compass.

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PREVENTING CORRUPTION IN THE CONSTRUCTION SECTOR

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Corruption in the construction sector results in inadequate and defective infrastructure, increased costs, the theft of public funds, and injury or death. Such corruption can occur in any country and on any project. It can occur during any phase of a construction project and can involve any of the project participants. If there are inadequate controls, and if there is little risk of penalty, then it is more likely that there will be extensive corruption and substantial loss. Given the huge damage caused by corruption, it is essential that effective steps are taken to prevent it. This paper briefly examines the different types of corruption and how it takes place in the construction sector, the damage caused by corruption, the changes in attitude to corruption, some major international developments in dealing with corruption, and how corruption can be prevented. This paper also summarises the new anti-bribery standard ISO 37001, and the work of GIACC in publishing and promoting anti-corruption tools.

Keywords: Bribery, Corruption, GIACC, ISO 37001, PACS.

INTRODUCTION

WHAT IS CORRUPTION?

There is no international legal definition of corruption. In its narrowest sense, corruption is interpreted as referring to bribery only. In its wider sense, corruption can include bribery, extortion, fraud, cartels, abuse of power, embezzlement, money laundering and other similar activities. These activities will constitute criminal offences in most jurisdictions, although the precise definition of the offence may differ.

The wider definition is preferable as these corrupt acts normally:

- are criminal offences
 - involve deception
 - are concealed
 - have illegal profit as their objective
 - can occur together
 - result in financial loss/defective quality
 - require similar preventive/detection measures.
-

HOW DOES CORRUPTION TAKE PLACE?

Corruption can take place in many different ways on construction projects.

- The corrupt act could involve **bribery**:
 - Bribes may be paid to obtain planning permission, contract awards, approvals of work done, and release of project payments.
 - An equipment supplier may bribe the project design engineer to provide a design with which only that supplier can fully comply, so enabling the supplier to win with an inflated bid price. This could be by:
 - expressly naming the supplier's product in the specification; or
 - defining design parameters which competitors cannot meet.
 - A government official may require a personal payment in order to issue a customs clearance which is properly due.
- The corrupt act could involve **fraud**:
 - A tenderer may deliberately submit false information in its tender about its experience and resources.
 - A contractor may submit a claim to the client for payment for work which the contractor knows was not done.
 - A project supervising engineer may certify a contractor's works as being satisfactory, when the engineer knows or suspects that the works are defective.
 - A procurement manager may secretly own a supplier, and ensure that that supplier wins the tender.
- The corrupt act could involve a **cartel**. Bidders may secretly agree in advance as to which of them will win the tender. The winner as a result can submit a higher price.

There are numerous other examples which can be given in addition to the above. These corrupt acts can take place throughout the project cycle in both the public and private sectors, and can involve organisations or individuals at the top of the contractual chain right the way down to organisations or individuals at the bottom of the chain. There can be numerous different corrupt acts on the same project, which accumulate in cost and impact. Any business-related interface in the construction sector between two or more persons carries a corruption risk.

THE DAMAGE CAUSED BY CORRUPTION

- Corruption damages countries and their citizens:
 - Money which should be used for schools, hospitals, roads and other public sector works is stolen. The result, inevitably, is inadequate infrastructure and public services. People die as a result.
 - Safety rules are circumvented. Buildings collapse. People die as a result.
 - Defective quality products are provided. These products break down and need repairing or replacement. This wastes resources which could be better used elsewhere.

- Corruption damages ethical organisations working in the construction sector. Ethical organisations may lose work to unethical organisations as a result of corrupt tender processes. Ethical organisations and employees may face demands for bribes if they wish to receive certificates, permits and payments on projects.
- Corruption damages individuals working in the construction sector. They may be threatened if they do not make an illicit payment. They may fear that they will lose their job if they do not participate in their employer's corrupt practices. If they do participate, they face the risk of loss of employment and imprisonment if they are caught.

CHANGES IN ATTITUDE TO CORRUPTION

Corruption in the construction sector was previously widely tolerated as being necessary or unavoidable, but is now increasingly regarded as unacceptable. A significant reason for this change in attitude has been increasing awareness of the damage caused by corruption to countries, organisations and individuals. This change in attitude has resulted in calls both at national and international level for effective action to be taken to prevent it. As a result, a policy of zero-tolerance for corruption is increasingly being adopted by companies, governments, project owners and funders. The concern for these stakeholders is no longer whether they should seek to eliminate corruption in their organisations, projects or business dealings, but how to do so.

MAJOR INTERNATIONAL DEVELOPMENTS IN THE FIGHT AGAINST CORRUPTION

As a result of this change in attitude, there have been six major international developments which impact on the international construction sector:

- Several **international treaties** have been signed during the last 20 years which require member states to implement anti-corruption laws and procedures. For example, the United Nations Convention against Corruption (2003), and the OECD Convention on Combatting Bribery (1999).
- There have been significant **law changes** in many countries, which are designed to ensure that corruption is criminalised and can be effectively prosecuted. For example, all OECD countries have now made it a crime prosecutable in the home country for their nationals and organisations to bribe in another country. As a result, a person or organisation may be liable for bribery both:
 - In the country where the bribery took place; and
 - In the person or organisation's home country.
- Prosecution agencies in many countries are now **prosecuting organisations and individuals for corruption**. For example:
 - Odebrecht / Braskem were fined \$3.5bn by Brazilian, Swiss and US authorities for paying bribes of \$788m to secure business on three continents. The Odebrecht CEO and several executives were imprisoned.

- Siemens settled with German and US prosecutors for fines of \$1.6bn in relation to long-term corrupt conduct in many countries. Some Siemens executives were imprisoned.
- ABB was fined \$58m in the USA for bribes paid to officials of a Mexican state-owned electricity utility company, and for bribes paid to the former regime in Iraq to obtain contracts under the U.N. oil for food program.
- Alstom was fined \$772m by US authorities for paying \$75m in bribes via sham consultants to government officials to secure power and transportation projects in Indonesia, Egypt, Saudi Arabia, the Bahamas and Taiwan.
- Rolls-Royce entered into deferred prosecution agreements with authorities in UK, USA & Brazil, and paid fines totalling \$800m in relation to corruption in inter alia Thailand, Brazil, Iraq, China, India, Indonesia, Malaysia, Nigeria and Russia.
- Far-sighted **professional institutions** are taking steps to raise members' awareness of the damage and risks of corruption, and to ensure that their members comply with anti-corruption codes.
- **Ethical organisations** are now implementing **anti-corruption controls** within their organisation so as to help ensure that the organisation does not become involved in corruption in connection with its business activities. They treat corruption prevention in a similar manner to safety, quality and environmental management (i.e. as an integral and vital part of the organisation's management controls). In this respect, the publication of ISO 37001 anti-bribery management system standard (see below) is a major step forward.

However, despite the above major advances, existing anti-corruption mechanisms in many countries still do not effectively discourage, prevent or detect corruption, and do not adequately support the many organisations and individuals that wish to see a corruption-free environment.

HOW CAN CORRUPTION BE PREVENTED?

Preventing corruption requires five core elements:

- Leadership
- Awareness raising
- Transparency
- Controls
- Law and enforcement

Leadership requires leaders of governments, public sector bodies and private sector organisations to refuse to participate in any corruption personally, and to ensure that the government, organisation, department or people that they lead also do not participate.

Awareness raising involves educating those involved in the construction sector and the public about the costs and risks of corruption, and about their duty not to participate in it. This can take place by continually reinforcing the message about the importance of corruption prevention, and through formal training at universities, as part of professional development, and by organisations' in-house training.

Transparency involves public sector bodies routinely publishing on publicly accessible web-sites information in relation to public sector projects. In relation to each specific project, publication should include details of:

- the project;
- all major contracts in relation to the project, including the award process, price, contract terms, major sub-contracts, variations, payments and outcomes;
- project evaluations and audits.

Controls are the organisational controls which should be implemented by public sector and private sector organisations and which are designed to prevent corruption. These include, for example: assessing the corruption risk faced by an organisation in its activities; undertaking due diligence on business partners to ensure as far as reasonable that they will behave ethically; implementing effective financial, procurement, project management and other necessary controls; and undertaking monitoring and audit. (See in particular ISO 37001 below).

Law and Enforcement involves enabling and taking effective action against individuals and organisations if they become involved in corruption. This requires:

- enacting adequate criminal laws, ensuring that there are effective and confidential means by which suspected corrupt conduct can be reported, having effective investigation and prosecution processes, and imposing proportionate penalties, including fines and imprisonment for individuals and fines and debarment for organisations.
- adequate civil penalties and remedies, such as contractual provisions for termination of contract and dismissal from employment in the event of corrupt conduct, and civil legal remedies enabling proper compensation for individuals, organisations or government bodies which have been the victims of corruption.

ISO 37001 ANTI-BRIBERY MANAGEMENT SYSTEM STANDARD

In 2013, in response to a perceived international need for a standard which provided minimum requirements for an anti-bribery management system for organisations, the International Organisation for Standardisation (ISO) established a Project Committee to publish a new ISO anti-bribery standard, ISO 37001. The following countries were involved in the development of the new standard:

- Participating countries (37): Australia, Austria, Brazil, Cameroon, Canada, China, Colombia, Croatia, Czech Republic, Denmark, Ecuador, Egypt, France, Germany, Guatemala, India, Iraq, Israel, Kenya, Lebanon, Malaysia, Mauritius, Mexico, Morocco, Nigeria, Norway, Pakistan, Saudi Arabia, Serbia, Singapore, Spain, Sweden, Switzerland, Tunisia, UK, USA, Zambia.
- Observing countries (22): Argentina, Armenia, Bulgaria, Chile, Cyprus, Cote d'Ivoire, Finland, Hong Kong, Hungary, Italy, Japan, Korea, Lithuania, Macau, Mongolia, Netherlands, New Zealand, Poland, Portugal, Russia, Thailand, Uruguay.

ISO 37001 was published in October 2016. It focuses on bribery, but can be expanded to include other corruption offences. It is applicable to small, medium and large organisations in the public, private and voluntary sectors. Organisations can get certified to ISO 37001 in a similar way to ISO 9001 (quality management), ISO 14001

(environmental management) and ISO 45001 (safety management). The risk of corrupt or negligent certification is reduced by the use of well-known, accredited certifying organisations.

ISO 37001 is intended to help an organisation to implement an effective anti-bribery management system. It requires organisations to implement various anti-bribery measures on a reasonable and proportionate basis according to the type and size of the organisation, and the nature and extent of bribery risks faced. The following summarises the key measures:

- Implement an anti-bribery policy and supporting anti-bribery procedures (the ABMS). These procedures are listed below.
- Ensure that the organisation's top management has overall responsibility for the implementation and effectiveness of the anti-bribery policy and ABMS.
- Appoint a person(s) to oversee anti-bribery compliance by the organisation (compliance function).
- Allocate responsibilities for ensuring compliance with the anti-bribery policy and ABMS throughout the organisation. e.g.:
 - department heads are responsible for compliance in their department;
 - all personnel are responsible for their personal compliance.
- Ensure that controls are in place over the making of decisions in relation to more than low bribery risk transactions (e.g. appropriate seniority of decision maker, no conflicts of interest).
- Implement appropriate vetting and controls over the organisation's personnel designed to ensure that they are competent, and will comply with the anti-bribery policy and ABMS.
- Provide appropriate anti-bribery training and/or guidance to personnel on the anti-bribery policy and ABMS.
- Undertake periodic bribery risk assessments and appropriate due diligence on transactions and business associates.
- Implement appropriate financial controls to reduce bribery risk (e.g. two signatures on payments, restricting use of cash, etc.).
- Implement appropriate procurement, commercial and other non-financial controls to reduce bribery risk (e.g. separation of functions, two signatures on work approvals, etc.).
- Implement controls over gifts, hospitality, donations and similar benefits to prevent them from being used for bribery purposes.
- Ensure that all other organisations over which it has control implement reasonable and proportionate anti-bribery measures.
- Require, where practicable, any business associate which poses more than a low bribery risk to the organisation to implement anti-bribery controls which manage the relevant bribery risk.

- Ensure, where practicable, that appropriate anti-bribery commitments are obtained from business associates which pose more than a low bribery risk to the organisation.
- Ensure that the organisation does not participate in, or withdraws from, any transaction where it cannot appropriately manage the bribery risk.
- Ensure that resources (personnel, equipment, financial) are made available as necessary for effective implementation of ABMS.
- Produce and retain appropriate documentation in relation to the design and implementation of the anti-bribery policy and ABMS.
- Implement reporting (whistle-blowing) procedures which enable persons to report suspected bribery, or breach of the ABMS, to the compliance function or to appropriate personnel.
- Implement procedures to investigate and deal appropriately with any suspected or actual bribery or violation of the ABMS.
- Monitor, measure and evaluate the effectiveness of the ABMS.
- Undertake internal audits which assess whether the ABMS complies with ISO 37001 and is being effectively implemented.
- Undertake periodic reviews of the effectiveness of the ABMS by the compliance function and top management.
- Rectify any identified problem with the ABMS, and improve the ABMS as necessary.

ISO 37001 has an Annex which contains guidance to help an organisation implement an anti-bribery programme.

ISO 37001 cannot provide absolute assurance that no bribery will occur. But it can help establish that the organisation has implemented reasonable and proportionate anti-bribery measures.

The risk of bribery is reduced, and the playing field is levelled for organisations if proof of compliance with ISO 37001 is a project pre-qualification requirement.

The publication and use of ISO 37001 is therefore a major step forward in the fight against bribery.

For further information, see: www.giaccentre.org/ISO37001.php

THE WORK OF GIACC IN HELPING PREVENT CORRUPTION

The Global Infrastructure Anti-Corruption Centre (GIACC) was founded in May 2008. It is an independent, not-for-profit organisation based in the UK but operating internationally, which works in close collaboration with all types of stakeholder, in particular with construction professionals. GIACC has anti-corruption alliances with the World Federation of Engineering Organisations, the World Council of Civil Engineers, and three regional and 17 national professional engineering associations, and has affiliates in Germany, Italy, Tunisia, Zambia and Zimbabwe.

GIACC's objective is to promote the implementation of anti-corruption measures as an integral part of government, corporate and project management.

GIACC played a leading role in the development of ISO 37001, and its predecessor BS 10500.

The GIACC Resource Centre (www.giaccentre.org) is a web-resource published by GIACC which provides free-of-charge access to information, guidance and tools designed to help stakeholders understand, prevent and identify corruption. Resources include:

- detailed analysis of what corruption is, why corruption occurs, how corruption occurs, why to avoid corruption, liability for corruption, and cost of corruption
- examples of corruption
- anti-corruption programmes for governments, funders, project owners, companies and associations
- guidance on risk assessment, due diligence, gifts and hospitality, and other anti-corruption controls
- Project Anti-Corruption System (PACS)
- training modules
- advice on how to deal with corrupt situations
- information on anti-corruption standards, conventions, indices, surveys, forums and initiatives.

One of the anti-corruption tools developed by GIACC is the Project Anti-Corruption System (PACS), which is designed to be implemented on major construction projects. There are twelve PACS standards, each of which deals with a separate anti-corruption measure. A government or project owner can benchmark its project management practices against PACS, and improve its practices as necessary. The standards are as follows.

- **PS 1: Independent assessment:** an independent assessor should be appointed whose duty is, for the duration of the project, to monitor and assess the project for corruption and make appropriate reports.
- **PS 2: Transparency:** the project owner should disclose project information to the public on a website.
- **PS 3: Procurement:** the project owner should implement fair and transparent procurement procedures which do not provide an improper benefit or advantage to any individual or organisation.
- **PS 4: Pre-contract disclosure:** at tender stage, the project owner and each tenderer for a major contract should provide each other with relevant information which could reveal a risk of corruption.
- **PS 5/6: Project anti-corruption commitments:** the project owner, funders and each major project participant should provide anti-corruption contractual commitments.

- **PS 7: Government anti-corruption commitments:** relevant government departments should take steps to prevent and deal with corruption in the issuing of permits, licences and approvals.
- **PS 8: Raising awareness:** anti-corruption training should be provided to relevant project staff.
- **PS 9: Compliance:** major project participants should appoint a compliance manager who will take all reasonable steps to ensure anti-corruption compliance by the company and its staff.
- **PS 10: Audit:** financial and technical audits of the project should be carried out and published.
- **PS 11: Reporting:** systems should be established by which corruption on the project can be reported by the public, project staff, and independent assessor.
- **PS 12: Enforcement:** enforcement for breach of anti-corruption commitments should include civil enforcement (e.g. disqualification from tender, termination of contracts, damages and dismissal from employment) and criminal enforcement (e.g. fines and imprisonment).

CAN CORRUPTION IN THE CONSTRUCTION SECTOR BE PREVENTED?

Corruption in the construction sector can definitely be prevented. We know how corruption takes place. We know how to prevent it. It is now incumbent on leaders of governments, professional institutions, contractors, consultants and all organisations working in the sector to show the necessary leadership, and to implement the necessary preventive measures.

CONSTRUCTION IN A CHANGING WORLD

16 MEGA TRENDS AND IMPACTS ON BUILDING AND CONSTRUCTION- NEW CHALLENGES AND OPPORTUNITIES

Wim Bakens

Hereafter follows an elaboration of these megatrends. Per trend attention is given to possible new opportunities, for the building and construction industry, for the building and construction research community and/or for CIB.

SOCIETY

01 GOING EAST

- Prediction World Bank: China in 2025: >50% of world's new construction
 - . certainty?: expert predictions in 90's did not even include China
- India next?
- Increasing / threatening shortage in traditional construction materials

Opportunity: research to develop new / replacement construction materials, taking new requirements into account, like: energy, CO₂, intelligence

- this is to include the principle of designing for materials re-use and re-cycling.
- see the CIB W115 state-of-the-art reports and research roadmap

Opportunity: transfer of lessons learned, for example about huge capital waste due to quick and low quality production in Europe in 50's and 60's. Is there a role for the international research community?

Opportunity: In the past AEC students were send to the USA or to Japan for innovation inspiration. Will China be the next "innovation Walhalla"?



02 GETTING OLD

- Prediction for NW Europe: within 15 year >1/3rd will be >65: with different housing, health and mobility requirements
- Expectation: Increasing uncertain future requirements (age related and related to other demographic developments (international emigration) ask for more flexible buildings and built environment

Opportunity: development and application of new design concepts for buildings and built environment, including new city concepts. Research should be able to contribute here.



03 BEING RICH

looking at long-term developments, not incidental financial crisis of past years in some countries, including NWC Europe

not looking at top say 10%, but at the big “middle class”:

- Never in human history were we this rich and we are getting richer every year
- People are demanding quality in both process and product and are willing to pay for that

Opportunity: for the Industry: to develop and market products and services that focus on quality and not on lowest costs. This may turn around traditional business models in our Industry. Can Research make a contribution?



04 LIVING IN CITIES

- Already >50% and quickly increasing
- Prediction: in <20 year >50 mega cities (>10M), especially in Asia and Africa; none in Europe
- Example: Shanghai: expectation in 2000: >125M in 2025 for railway, expectation in 2015: >180M in Shanghai urban district
 - o How to call an urban conglomerate of >100M?
- Scenario: big cities develop into city states with their own culture, market, government and regulatory systems

Impacts, opportunities and maybe threats for Construction: ?? Need for future thinking. Scale of things is unknown in human history

Opportunity: big cities as clients for research

Opportunity: learning lessons from such developments in Asia. Can the international research community take the lead?





05 PREVENTING AND EXPECTING CLIMATE CHANGE

Both climate change prevention / reduction and adoption are now main stream strategic / political objectives

- SB > SBE Conference Series
 - o CIB, iiSBE, UNEP and FIDIC, since 2000 as co-owners
 - o 20 national / regional conferences in 2016 and SBE 2017 in Hong Kong
 - o some personal impressions: i) Sustainable Construction is now part of main stream Construction, ii) Zero Energy Buildings are quickly becoming part of main stream Construction and iii) Zero Energy Settlements / Cities are the next strategic objective R&D worldwide
 - Awareness of big potential impacts from climate change is growing:
 - o Disappearing island in the Pacific Ocean; flooding in Delta regions (like The Netherlands); extreme weather, draughts
 - o example: MIT prediction: in the middle of the century the Gulf States may have become too hot and dry to live in (in case of +2C)
 - o example: in 2017 35% less wine in Europe due to extreme weather in the South of Europe
 - o and what about The Netherlands (and other Delta regions)?
- (almost) no-one is doubting anymore.

Five Pacific islands lost to rising seas as climate change hits



- With a focus on prevention / reduction: COP21 December 2016 in Paris:
 - o National governments “commit” to <2C temperature increase
 - o Requires huge investments; how trustworthy?
 - o Are cities taking the lead?
 - o For the first time: Building day at COP

Opportunity: new and far-reaching R&D challenges with big potential for societal appreciation for deliverables, but with a need for cooperation between Research and Industry (or the Industry will by-pass the Research community)

Opportunity: redefinition of Sustainable Construction as guidance for new R&D, with a potential role for CIB Sustainable Construction Research Roadmap: for the CIB SC priority theme?



With a focus on expecting and preparing for climate change:

- Awareness of the need for urban resilience
- Complex: technical, non-technical, institutional, ... issues, but with a crucial role for buildings and the built environment
- Here cities worldwide have taken the lead
 - o Examples to be seen in joint CIB – UNISDR webinar series

Opportunity: societal relevant R&D in support of city initiatives: can national research institutes do that?

Opportunity: CIB priority theme: Urban Resilience, with TG to develop metrics and assessment models, but also the Disasters and the Built Environment Research Roadmap (in cooperation with UN-ISDR)



06 PREPARING FOR THREATS

Is the fear for terrorist attacks a temporary thing or is it there to stay?

- How to make – strategic – buildings and infrastructure resilient against attacks and what kind of attacks?
- There must be national research and maybe even national standardisation work. Is there a willingness to share and cooperate internationally?

Opportunity: Could developing an international Research Roadmap be useful and possible? Is this maybe already in process somewhere?



07 WORKING INTERNATIONAL

The building and construction market is both very local (= <national) and includes parts that are international, with international clients, projects, tendering procedures and AEC companies.

- The bigger AEC companies are becoming more international in scope, objectives, market, personnel, leadership, financing etc. They have a growing need for access to acknowledged / validated international newest technologies and best practices

- And even if AEC companies do have “only” a national focus, should they not be interested also in international newest technologies and best practices as to be able to best serve their clients and offer the highest possible value for money?

Opportunity: Could CIB, with its collaborating Members and international groupings of individual experts, provide worldwide access to such international validated knowledge and information on innovation and best practices, in ways that are attractive to such companies?

- The labour force is certainly becoming more international, resulting in having people with different geographical backgrounds and different languages, practices and cultures having to collaborate in the design, construction and maintenance of buildings and infrastructures. This must make design and construction management more challenging

Opportunity: Could CIB, with its large contingent of experts in this area of labour issues, play a role here?

- Research is for the most part national, with in addition some European research and some focussing on the federal USA level, in terms of programming, funding and execution.
 - o there are national research institutes with branches abroad, but that does not make them international institutes
 - o and there are international partnerships between national research institutes
- Would there be added value in having international research institutes / organisations?
 - o Could there be international research clients / funding organisations?
 - o How would an international research institute look like?

Opportunity: Could CIB be the platform to explore and develop this?



TECHNOLOGY

08 IT AND OTHER TECHNOLOGIES

Impacts from Today's IT applications go beyond what we could have predicted say ten years ago and most probable the same will be the case ten years from now.

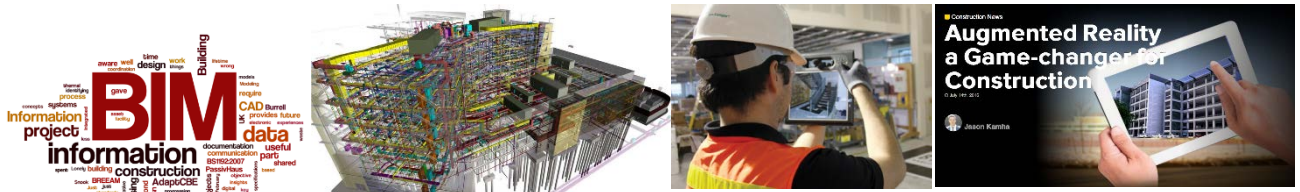
Example Impacts

- Intelligent buildings and infrastructure works monitor themselves for need for maintenance (cars do it!)
- Will construction workers wear a VR optical device on site?
- Will they be able to see mixed / augmented realities?
- Will we have libraries of BIM's?

Opportunities: Technology focussed CIB Research Roadmaps

- TG74 - New Production and Business Models
- TG88 - Smart Cities

- W098 - Intelligent Buildings



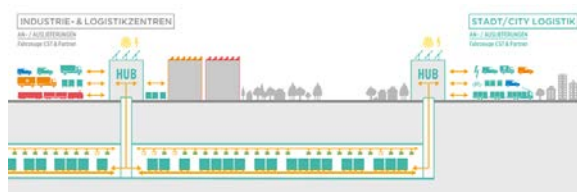
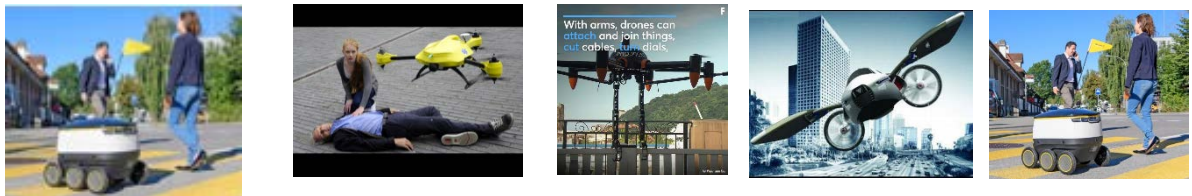
What will be the other big technology break troughs, most relevant to Construction:

- new, intelligent and responsive materials in construction
- new replacement construction materials
- new mobility concepts: see examples
- energy plus constructions (new and for renovation)
- small scale urban renovation concepts and technologies
- 3D Printing in Construciton
- intelligent buildings and structures

Examples of new Mobility Technologies

- concepts in development / pilot stage: self-driving cars (end of the private car?) / superfast trains
- new concepts: application of drones for smaller transport / self-flying taxis / hyperloop
- imaging (dream) a city without roads for cars

Opportunity: Research in support of developing new city concepts based on new mobility concepts



Underground logistics network in 2030?



Travelling in a Tube

THE TECHNOLOGY
A capsule, with passengers, travels at speeds of more than 1,200 km/h inside a vacuum tube. Vacuum tube has an area of LOW PRESSURE INSIDE IT.

INDIA PLANS
Hyperloop can be built in India in 36 MONTHS. Globally, 800 ENGINEERS working on the Hyperloop, of which 25 ARE FROM INDIA. It uses power from RENEWABLE ENERGY sources like solar energy, regenerative braking & wind power. These tubes stand on pylons that can WITHSTAND quakes & crashes.



WHAT IS ALREADY HAPPENING IN OUR INDUSTRY

09 MARKET: MAINTENANCE vs EXTENTION

Whether the emphasis in the construction market is on new or on existing buildings and infrastructure depends on the stage of development of the respective country and related demographic developments. Requirements for the AEC industry are very different in terms of: projects, technology, processes and people and also in terms of business models and strategies.

- It is said that in many developed countries (including NWC Europe) as concerns houses and buildings the emphasis is shifting from new construction to maintenance and renovation. This is a wrong interpretation of what is happening. In reality the emphasis is shifting from extending the building stock to maintaining and upgrading it, which includes new construction for replacement of existing buildings.

Opportunity: Some creative and future oriented strategic thinking is required to define new challenges and opportunities for the Construction Industry and possible new roles in the context of both known AEC activities and markets and of new business opportunities related to urban upgrading

- For example in Europe and North America challenges related to having an old and ageing infrastructure are being recognised. In terms of building up experience and designated best practices Europe may be a bit ahead in development.

Opportunity: International development and dissemination of new technologies and best practices for status monitoring, maintenance planning and in-use infrastructure maintenance and renovation offers possibilities.

Opportunity: the CIB Infrastructure Research Roadmap is being developed.



10 PROCESS: INTEGRATION vs FRAGMENTATION

The traditionally segmented organisation of building and construction is deeply embedded in organisational and institutional practices and has big impacts for how we define professions and roles in the Industry.

- It seems like that amongst both AEC professional and big and professional construction clients, there is a growing aversion against the traditional fragmented way of organising the AEC process. This is resulting in more integral models for procurement and process organisation, like the design-built and the design-built-manage models. In many countries governmental building agencies (for both buildings and infrastructure) are taking the lead and are combining this with PPP models.
- The application of BIM in the design, construction and management of buildings and infrastructure requires a more integral approach towards information handling and responsibilities and must be expected to have a big impact upon how professions and stakeholders cooperate.

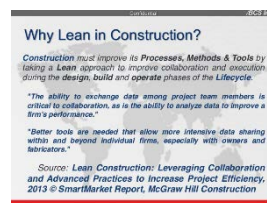
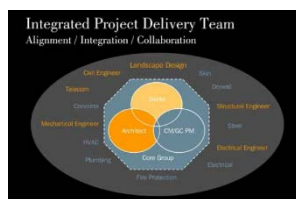
Opportunity: There is a growing need for a redefinition of professions, disciplines, tasks, roles and responsibilities - and related institutions - in building and construction processes. Depending on strategies and attitudes, the role in this of the industries educational system may be decisive.

Opportunity: It is worth exploring possible value towards more integral services and deliverables for a cooperation between or even integration of the AEC industry and both the Real Estate Sector and the Facilities Management Sector.

Opportunity: The concepts of performance measurement and value contracting offer possibilities towards more integral and quality-oriented building and construction processes.

Opportunity: BIM offers new possibilities for making information available to AEC professionals and other buildings and built environment stakeholders.

Can the new CIB Commission TG90 in Information Integration develop guidelines here?



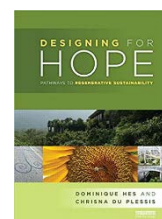
11 DESIGN: SUSTAINABLE vs FASHIONABLE

Sustainable construction is a CIB priority theme since 1995. Since 2000 the SBE (former SB) conferences series is 'the' platform for presenting latest developments, breakthroughs and challenges worldwide.

- Sustainable Construction has become part of main stream construction
- (Near) Zero Energy buildings are near to becoming main stream construction and Zero Energy Settlements are the next big thing in building and construction R&D
 - o in Europe the EU programs (for R&D and for regulatory development) are driving things
- The emphasis in R&D is shifting from technique and design to urban planning and management
- Last year's COP21 in Paris was important to national governments, but the big cities in the world are taking the lead

Opportunity: Sustainable Construction is being re-defined and may become more encompassing, more complex and much more ambitious, using terms like "regenerative design and development" and including a focus on things like the future adaptability of buildings and the built environment.

Opportunity: the CIB Sustainable Construction Research Roadmap



12 PRODUCTION: OFF-SITE vs ON-SIDE

Offsite construction has potential advantages in terms of: cheaper, safer, healthier and better to plan construction, with better quality control, less materials waste and less environmental pollution and less need for skilled construction workers. Offsite construction may range from the production of components in a factory setting combined with assemblage of such components on site to the offsite production of complete buildings, ranging from unique buildings to more-or-less standardized building concepts.

- Modern technology, production concepts and business concepts, make Today's offsite construction very different from the concept of factory building as was customary in the 50's and 60's.

Opportunity: For offsite construction of dwellings much can be learned from the Japanese experience concerning both technology application and new business models, but this can be relevant also for other types of buildings.

Opportunity: As concerns the issue of standardisation at component and/or building level, the concept of "Open Building" offers potential. (see CIB Commission W104).

Opportunity : As concerns how, new technological concepts may enable new business concepts: see the CIB Research Roadmap "Offsite Production and Manufacturing" (2013) and the new CIB Commission W121 "Offsite Construction".



MAKING A DIFFERENCE

13 ATTRACTING QUALITY PEOPLE

Worldwide the Construction Industry has a problem attracting high quality, motivated recruits. Sectors that offer high salaries and/or have a glamorous or high-tech image have a higher appeal to most promising students and potential workers.

Opportunity: Presenting the industry as one that delivers products and services that are most crucial to society may attract recruits who are driven by wanting to contribute to societal development and growth. This requires consistent communication by all stakeholders.

14 CO-DEVELOP AND OWN

We need a re-definition of what our product is. Instead of emphasizing that what we do is to build whatever a client wants and is willing to pay for, we should present ourselves as (co-) developers and (co-) owners of building and the built environment. To be able to deliver such integral product we need to have integral processes in place (see 10) based on very different business models

Example: The delivery of a building that can be a hospital for ten years and that we (what we used to call a construction company and for which we need a new name) take back and transform to house another function for another client.

- the “construction industry” as owner of the building that guarantees certain performances within a defined budget.

Example: A big “construction company” that co-develops a new city area applies the newest technologies, owns part of its buildings and infrastructure and guarantees their performances and all that together with a local government

- this requires business models and skills that now are part of different systems, like the AEC system, the Real Estate sector and Facility Management.

Is all of this only a potential for the big companies (constituting only a small part of the industry), or are there equivalents for the smaller projects and companies?

15 FIND NEW ETHICS

It is generally assumed that the dominant ethic among construction companies is characterised by a focus on realising a building or infrastructure work as efficiently and cheaply as possible, thus maximising the company’s profit.

For appreciation and consequent investments in the Building and Construction sector / system by people and by society in general a new set of ethics will be required; not by a few example people, companies and institutes, but replacement by the sector as a whole.

Example: **Go for Value:** A focus on creating maximal value to the client / to society and / or to the future, while aiming for a reasonable profit in a transparent way, would contribute to a far more positive image and a substantially enhanced relationship with the industries clients

Example: **Go for Quality:** the time has gone that in Building and Construction we should always go for the lowest price. More and more clients and users want quality and are willing to pay – extra – for that. That is: IF costs – quality ratios and the cost of extra quality are presented in a transparent and – for them – understandable way. Communication is crucial for this.

- Other sectors have developed the skills and tools for such communication. Our sector seems to have a big problem here. Or is this because a lack of trust?

Example: **Know Best Practices:** Clients and potential clients should be able to expect from all built environment professionals that these have access to and be informed about the world’s best practices and that it is considered normal in each situation to aim to apply a known best practice.

- Next to this being a matter of attitude amongst the built environment professionals, this requires a system of information (about ‘validated’ best practices) being available / accessible to all of them, including to the many very small firms in our industry, or should go far beyond the traditional guarantees for certain qualities (a building will not collapse) for a short

period (of a few years only). This should include qualities like: functional performances, maximised energy usage and maintenance costs. This should cover any period a client wants.

Example: **Accept Responsibility**: this includes for companies and for the sector as a whole to accept responsibilities towards our clients, toward the (first and future) users of the buildings that we construct, towards society as a whole and certainly also towards the people working in our sector.

16 RE-DEFINE THE INDUSTRY

In order to make a difference of such magnitude as indicated we need a different type of industry, or in other words: we need to re-engineer or re-define our industry

- see the earlier (2007 – 2010) CIB priority theme: Re-engineering Construction

Example: to redefine the industries capability (product) from being able to efficiently design and construct a unique building (or infrastructural work) to having building concepts with guaranteed performances for sale

Example: to re-define the industries product, not as a building, but as the capacity to host a certain function with guaranteed capabilities and costs and for a defined period.

Challenge: For the AEC Industry to cooperate with / link up with / integrate with the Real Estate sector and with the FM community

- this combination of ‘industries’, together with the construction materials and equipment manufacturers, constitute approximately 20% of a (developed) countries GNP

Challenge: development of new business models

Challenge: development of new skill sets > re-definition of educational programs, but also: development of a new language to define new types of companies and new types of professions

- what will the “old” professional institutions do?

Challenge: make the new ethics part of main stream construction

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Challenge: make the new ethics part of main stream construction

13 – 16 constitute (a possible direction for) a profound transformation of our industry. Such industry transformation requires strong visionary and committed industry leadership.

How can the research community contribute? Can international cooperative research be of special importance? Can CIB be a platform for this?

CAN RESEARCH CONTRIBUTE: STRATEGIC CHALLENGES

NEW TOPICS FOR RESEARCH

So far various possible challenges for the building and construction research community have been suggested:

- development of new and replacement construction materials
- exchange of lessons learned about construction in periods of quick economic development (Europe in 50-60's > China now)
- development of new design concepts taking more elderly people into account
- development of products and services that focus on quality as opposed to lowest costs
- future thinking of impacts from >10M mega cities and >100M urban regions
- zero energy settlements
- redefinition of Sustainable Construction
- support cities in resilience programs
- (new concepts for) resilience against terrorist threats
- making validated information on new technologies and best practices accessible to all professionals, all over the world and including small firms
- new challenges for construction management from internationalisation
- international research and international research programming and funding, possibly with international Research Roadmaps as component
- new R&D challenges related to urban upgrading
- IT based maintenance monitoring
- R&D in support of developing integral AEC, RE and FM products and services
- BIM as new information platform
- R&D in support of Offsite Construction and related new business concepts
- Research in support of developing new city concepts based on new mobility concepts
- R&D in support of an Industry that develops and own buildings and built environments
- R&D in support of finding New Ethics
- R&D in support of Re-defining the Industry in general and specially redefining types of companies and professions and developing new educational programs

INNOVATION AND INFORMATION

Collection, validating and disseminating information on new technologies and best practices should be a major priority for the research community in support of an industry that wants to become more innovative, quality oriented and international

To make such knowledge available to all types of built environment professionals (and clients), all over the world explicitly including the many small firms in our sector, is a major challenge.

Challenge: international validation

RESEARCH AND INDUSTRY

Construction research and construction practices are in general considered different worlds that employ different types of professionals who speak "different languages". It is sometimes difficult to envisage for decision makers in

construction practice that Research could be important to Industry transformation. As it is sometimes difficult for researchers to envisage that practitioners could have a say over and be engaged in research priorities and projects.

In general Building and Construction Research is being considered as being outside of the Industry, while in some other sectors Research is very much an integral part of the Industry and often decisive for the innovative and competitive capabilities of the Industry. Could this be possible for Building and Construction also? A small example:

In certain complex construction projects in Japan that require new technologies to be applied or even developed, the Japanese government as the responsible client made the research and innovation capabilities of a company a criteria for tendering. Having certain research labs made such company obviously more competitive in the respective segment of the market. Knowing this it was not a surprise to see that in some of the big 6 Japanese Construction companies the research director is part of companies team of 3 or 4 CEO's. That reflects how much research was being considered as part of companies core business.

Could such approach be possible for more big Construction companies and for the Construction sector as a whole?

Challenge: (Education >) Culture change for Building professional and clients

STATE OF THE CONSTRUCTION PROFESSIONS; UNDERLYING FACTORS AND THE IMPLICATIONS

HEALTHCARE FACILITIES IN NIGERIA: REDEFINING STANDARDS AND DEVELOPING PERFORMANCE BENCHMARKS FOR THE PROFESSIONALISATION OF FM PRACTICES

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Healthcare in Nigeria is delivered by three tiers of government: the federal, state, and local governments. Public hospital buildings suffer as facilities management (FM) functions are often neglected, with significant adverse effects on the operation of public hospitals. Most government hospitals have no tools for measuring FM performance. The aim of the study is to propose a performance measurement framework by redefining standards and developing performance benchmarks to improve current practices and to professionalise FM. The research adopted mixed qualitative and quantitative approaches to explore key issues and barriers to FM practices with stakeholders responsible for the management of hospital assets. The findings provided pointers on how to develop performance measurement in FM. Adoption of the FM performance measurement framework will assist policy makers in public hospitals in Nigeria to drive key organisational changes in the way assets are managed to support healthcare delivery and the professionalisation of FM.

Keywords – healthcare facilities, facilities management, performance measurement

INTRODUCTION

In Nigeria today, the provision of health care facilities seems to be at a low ebb as many Nigerians are exposed to the danger of death (Abel 2014). Indeed, poor healthcare services in the country have contributed to an increase in mortality rates in the country. Statistics of health indices from international agencies point to the fact that 58 years after independence, Nigeria is still far from achieving the minimum required health standard. A recent World Health Organisation (WHO) report shows that 466,000 Nigerian children die at birth out of the 4.1 million infant deaths recorded globally (WHO 2017).

The provision of health care in Nigeria remains the functions of the three tiers of government: the federal, state, and local governments. The primary health care system is managed by the 774 local government areas (LGAs), with support from their respective state ministries of health as well as private medical practitioners. The primary health care has its sublevel at the village, district, and LGA levels (Adeyeye *et al* 2010). The ministry of health at the state level manages the secondary health care system. Patients at this level are often referred from the primary health care. This is the first level of specialty services and is available in

different divisions of the state. The state key health care provision comprises laboratory, diagnostic services and rehabilitation. Teaching hospitals and specialist hospitals provide the tertiary primary health care. At this level, the federal government also engages the voluntary and nongovernmental organizations, as well as private practitioners (Ahmed and Gidado 2010).

The World Health Organization (2010) reported that the growth of performance measurement uses in FM amongst public hospitals in Nigeria is very slow compared to other developing countries. It ranked Nigeria 187 out of 191 in health system performance. Nigerian government is seeking ways to improve the position. Most public hospital buildings in Nigeria suffer from inadequate physical conditions (Pati *et al* 2010).

Public hospital buildings in Nigeria are generally old and in a poor state of repair. The hospitals are faced with many challenges including poor maintenance culture and there is a need for the professionalization of FM. It is therefore essential for every hospital district to have an effective FM performance measurement plan of its facilities. The lack of proper performance FM systems in public hospitals resulted in problems of various nature (Orubuloye 2008, Abukhder and Munns 2013). FM is viewed as a secondary function in public hospitals; professional FM expertise barely exists in most of them. Thus, few hospitals determine the maintenance needs for their facilities (Ilozor 2013, Kirkham *et al* 2012).

The aim of the study is to propose a framework for performance measurement by redefining standards and developing performance benchmarks to improve current practices and to professionalise FM. Following the introduction, the literature review is presented, followed by the outline of the research methodology underpinned by qualitative and quantitative approaches. The findings based on case studies of major public hospitals are then discussed to provide the basis for developing a performance measurement framework for FM.

CONCEPT OF FACILITIES MANAGEMENT

Traditionally, FM has been seen as the management of buildings and related building services. The growing trend is to view FM as the management of non-core organisational assets and activities to support and increase the efficiency of the core businesses of an organisation (BIFM 2013). The goal of FM has now evolved into improving organisational effectiveness by helping the organisation to allocate its resources in a way that allows it to flourish in competitive and dynamic markets. Measurement of FM performance is one of the three essential issues for effective implementation of a facilities strategy (Akhlaghi 1997). FM is a term that encompasses a wide range of activities involved in the effective management of built assets. It involves the total management of all services that support the core business of the organisation (Bootle and Kalyan 2002). The existence of active FM may help identify potential problems with maintenance and running costs before they result in component breakdown and even temporary shutdown of buildings (Reeve 2000). It can provide a disciplined framework for the examination of many of the relationships between decisions and the satisfaction of the end user of the property, whether in economic or environmental terms (Figure 1).

Measuring the performance of an FM system also provides a framework for redefining standards, developing performance benchmarks and reviewing user satisfaction as business and other circumstances change. It is clear that FM is an

umbrella term under which a wide range of property and user related functions may be brought together for the benefit of the organisation and its employees as a whole. Therefore, the aim of FM should be not just to optimise running costs of buildings, but to raise the efficiency and suitability of the management of space and other related assets for people and processes, in order that the mission and goals of the organisation may be achieved at the best combination of efficiency, cost and quality. The scope of FM includes: Hard (FM) services (such as building maintenance, groundwork, landscaping) and Soft FM services (such as cleaning, catering, security) (Robinson and Scott 2009). FM has the potential to contribute significantly and it is important to identify and measure the extent that it supports, or can be adapted to, the changing needs of organisations, and contribute to productivity, profitability, service and quality (Mole and Taylor 1992).

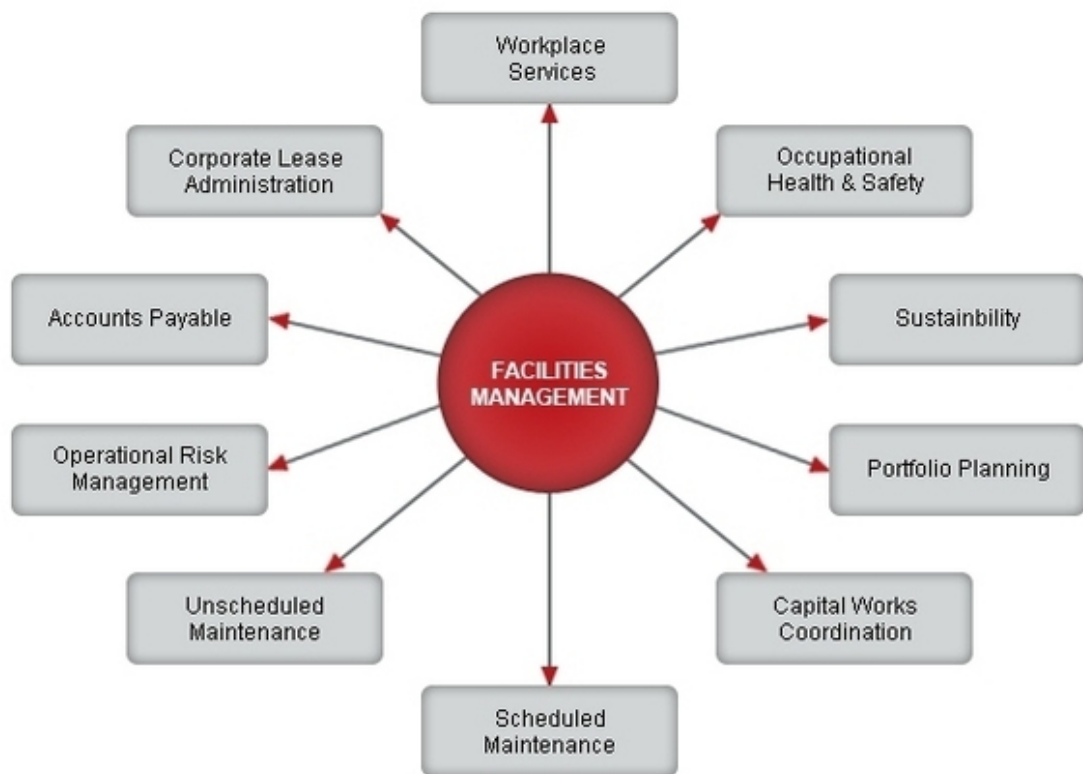


Figure 1: Scope of facilities management (adapted from Hronec, 1993)

THE NEED FOR PERFORMANCE MEASUREMENT

FM has the potential to contribute significantly to organisational efficiency and it is important to identify and measure the extent that it supports, or can be adapted to, the changing needs of organisations, and contribute to productivity, profitability, service and quality (Mole and Taylor 1992). Measurement of FM performance is one of the three essential issues for effective implementation of a facilities strategy (Akhlaghi 1997). Performance measurement systems historically developed as a means of monitoring and maintaining organisational control, which is the process of ensuring an organisation, pursues its strategies that lead to the achievement of its overall goals and objectives (Djerdjouri 2015). In attempting to change the focus of an organisation, Goyal (2007) suggests that performance measurement is a key agent of change. The four potential benefits that can arise as a result of having an appropriate performance measurement system are: satisfying customers;

monitoring progress; benchmarking processes and driving change (Chotpanich 2014).

Performance measures are used to ensure that an organization is achieving its aims and objectives (Jensen 2008). The measures are used to evaluate, control and improve production processes (Mathew and Michael 2010). Mudrak *et al* (2014) discussed how performance measurement can be built and used as a motivational tool. Inappropriate performance measurement is a barrier to organizational development since measurement provides the link between strategies and actions according to Santos (2009). Inappropriate measures lead to actions incongruent with strategies not well formulated and communicated. For these benefits to be realized, it is necessary for organizations to implement an effective performance measurement system that, "enables informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through acquisition, collation, sorting, analysis, interpretation, and dissemination of appropriate data" (Santos 2009). Appropriate performance measures for soft and hard FM should provide and strengthen this link, and both lead to attainment of strategic goals and impact on the goals and strategies needed to achieve them. It has long been recognized that performance measures can be used to influence behaviour and thus, affect implementation of strategy (Loosemore 2004). Strategies are realized through consistent decision-making and action (Bell 1992). Indeed, performance measurement is seen as an integral part of the strategic control cycle.

CHALLENGES FACING HEALTHCARE FACILITIES IN NIGERIA

Many hospital organisations are transforming their culture as a means by which they may improve performance. FM has a positive role to play in enabling the transformation either by supporting the hospital organisation as part of the holistic drive for change or by acting as a catalyst, leading the way for others to emulate (Becker 1990). For these benefits to be realised it is necessary for hospital organisations to implement an effective performance measurement system (Neely 2008). Public hospital buildings in Nigeria are often in a poor state so it is essential for every hospital district to have an effective FM performance measurement plan of its facilities. The hospitals in Nigeria have poor maintenance culture and are faced with many other challenges. Research conducted by the Amaratunga and Baldry (2002) concluded that hospital organisations use performance measurement systems as the basis for management to perform better. However, the lack of proper performance FM system in public hospitals in Nigeria is caused by problems of various nature (Orubuloye 2008, Abukhder and Munns, 2013).

There is a major challenge that arises from government subvention due to the irregular flow of funds. This implies that the hospitals must rely on the other sources of finance for running the healthcare facilities (Nutt 2010). There are delays in the payment of the subvention confronting the hospital and at times, the subvention for some periods is not received (Anderson and McAdam 2004). There is also a gradual reduction in the amount of subventions received exacerbated by the fact that the monies received from government are often 'ring fenced' for only health workers' salaries and administrative expenses (Bell 1992). There is no component of the subvention directed specifically for investments and the delivery of FM services (Kirkham *et al* 2012). The inability of patients to pay fees and

charges is another problem and some patients often default in settling their hospital bills (Ilozor 2013). There are additional problems including government's influence in determining the fees to be charged (Pitts and Goyal 2004).

Other challenges include exploitation largely around control of resources and lack of accountability for resources in the hospital creating crisis. Poor accountability and the control of financial resources flowing around various units of the hospital is always a cause of friction (Okoroh 2012). There is also the problem of incompetence due to poor recruitment practices. When appointment to management/administrative positions are made based on entry level qualifications and specialty, regardless of experience and further training, the best candidate may not be favoured (Ahmed and Gidado 2010). While entry qualification and specialty are basic, it must be appreciated that further training and experience are required in order to function effectively in a top management position (Adeyeye *et al* 2010). There is a widespread culture of government sponsoring public officials abroad for treatment at the expense of investing and modernising the healthcare infrastructure delivery system (Okoroh 2012). Even the leaders who ought to show their commitment by example are guilty of this practice demonstrating a lack of faith in the Nigerian healthcare system, which is why they support health tourism by flying themselves and their cronies to other countries with highly developed healthcare systems (Orubuloye 2008).

Finally, there are inadequate tools for measuring output. Most government hospitals have no tools for measuring the work output of their staff (Ilozor 2013). Significant latitude is therefore given to individual staff to work as expected, but this is largely abused, creating divided loyalty and double-dealing. Measuring outputs should be linked to the inputs that are required to deliver the standard of healthcare facilities, hence the need for an FM system redefining the standards for both soft and hard FM and developing performance benchmarks that would support the delivery of key outputs expected of public hospitals. However, the poor understanding of FM performance measurement in public hospitals in Nigeria is a major barrier to healthcare service delivery (Ilozor 2013). Redefining standards and developing performance benchmarks is crucial in developing and transforming FM as a profession in Nigeria. Although the area of performance measurement is not new, this concept is neither well established or standardised across and even within FM organisations.

RESEARCH METHOD

The aim of the research is to develop a framework for performance measurement in facilities management (FM) for the public hospitals in Nigeria. Review of the literature was the initial step and this included an in-depth examination of literature relating to performance measurement in organisations in general and performance measurement in FM organisations in particular. A pilot study was conducted as a crucial step to improve the quality of the research by focusing on the data collection phase (Miles and Huberman 2014, Easterby-Smith *et al* 2018, Yin 2014). From the conclusions of the pilot study, the research focused on the following key questions:

- What are the economic, technological and managerial factors or drivers that influence the development of performance measurement?

- How can the needs of public hospitals be captured in the development of an FM performance measurement system?
- How can performance measurement change public hospitals?

The preference for the case study strategy derives from the fact that the main research questions are in the form of “how”, and case studies provide the ability to examine contemporary events – the development of performance measurement framework in FM for the public hospitals in Nigeria by dealing with a wide range of evidence (Creswell 2013). For the purpose of this research, an important criterion was the selection of case studies based on areas with significant population (i.e., more than 70% of the Nigerian populations use the case study hospitals selected). The existence of FM practice was another criterion to compare the current and “best practices” (Yin 2014). A multiple case study design was adopted to achieve more robust conclusions by considering a range of similar and contrasting cases to strengthen the reliability of the findings of the research (Miles and Huberman 2014).

KEY FINDINGS AND DISCUSSIONS

A summary of case study organisations and findings from interviews with the senior and middle management and operational staff are presented below. Most of the organisations provided feedback on the practical validity of case study findings. The feedback was incorporated into the final research which was the basis for development of a performance measurement framework for the public hospitals in Nigeria.

Summary of case study organisations:

Lagos University Teaching Hospital: Lagos State University Teaching Hospital popularly known as LASUTH is a state-owned teaching hospital in Lagos, Nigeria. It is strategically located in Ikeja, the state’s capital. LASUTH also shares structures with the College of Medicine, Lagos State University. The hospital was established in 1955 from a small cottage health centre by the Old western region. It was converted into a teaching hospital in July 2001.
National Hospital Abuja: National Hospital Abuja is a hospital in Abuja, Federal Capital Territory, Nigeria. The institution was formally established under Decree 36 of 1999 (Act 36 of 1999). Originally the National Hospital for Women and Children, the hospital opened on 1 September 1999. The hospital received its current name on 10 May 2000.
University Teaching Hospital Enugu: The University of Nigeria Teaching Hospital (UNTH) Ituku/Ozalla Enugu, has come a long way. It began early in the 20th century as a standard general hospital for Africans built by the colonial administrators. It later metamorphosed into a general hospital on the attainment of Nigeria’s independence in the 1960s. However, at the end of the Nigerian civil war in 1970, the then government of East Central State transformed it into a Specialist Hospital with effect from July 1, 1970.
University College Hospital Ibadan: The University College Hospital, (UCH) Ibadan was established by an August 1952 Act of Parliament in response to the need for the training of medical personnel and other healthcare professionals for the country and the West African Sub-Region. The establishment of the Hospital followed a Visitation Panel in 1951 to assess the clinical facilities for the clinical postings of medical students registered for M.B.B.S. degree of the University of London. The visitation panel, led by Dr. T.F. Hunt of the University of London rejected the enhanced facilities provided by the Government/Native Authority Hospital at Adeoyo, Ibadan following the establishment of a Faculty of Medicine in the University College, Ibadan (now University of Ibadan) in 1948.
University Teaching Hospital: The hospital was established in 1955 from a small cottage health centre by the Old Northern region. It was converted into a teaching hospital in July 2016.

Main findings from analysing the responses

Insufficient Resources and Lack of Performance Measurement Tools

A key challenge noted was a shortage of budget allocated to FM maintenance. Relating to other resources available in maintenance, it was agreed that there was a shortage of resources in the form of methods and analytical tools. Respondents also agreed there were no FM performance measurement tools and the FM departments are poorly equipped with no advanced instruments and machines to carry out inspection, maintenance work and other aspects relating to the management of the assets effectively.

Problems with Leadership, Co-ordination and Understanding of the Scope of FM

Respondents disagreed that there was effective leadership in their organisations as there was no clear vision advocated and the mission was not clearly addressed to deal with employee loyalty and employee confidence which were both low. The respondents disagreed that there was co-ordination and co-operation between the different departments within the hospitals and maintenance managers were empowered to do their jobs. The respondents also asserted that top management had no clear understanding of the scope of FM and maintenance requirements and disagreed that there was a good housekeeping system. The lack of training programs, critical in FM particularly in areas of maintenance was raised by respondents. The responses showed that public sector hospitals have not clear rules for updating of FM checklists. Furthermore, the effect of culture on the delivery of quality programs was also noted so was the lack of a customer feedback system, essential for driving any improvement in services.

PROFESSIONALISATION OF FM: THE NEED FOR A PERFORMANCE MEASUREMENT FRAMEWORK

Given the catalogue of problems identified in the case studies, there is need for the professionalization of FM for continuous improvement. A performance measurement framework would provide the basis for the public hospitals in Nigeria to understand their own processes. A further benefit is that it can lead to a set of “best practices” and “lessons learned” that can be used internally to improve the Nigerian public hospital’s management practices activities. These lessons learned, and best practices can also be shared with other public agencies, thereby facilitating the development of tools and ideas that can benefit the broader government public agency in Nigeria (Then 2016). First, the case studies clearly demonstrated that the scope of FM is not well understood. The definition of FM is poorly understood, and it is not being practiced in an appropriate way. The traditional narrow approach of maintenance is applied compared to integrated FM systems to drive strategic operations. The lack of understanding in FM definitions and functions is possibly the root problem of the passive development of FM as a professional cadre in public hospitals in Nigeria. FM practice is not guided and most often its importance is neglected in business strategies (Pitt 2014), hence there is a need for the professionalization of FM.

Second, performance measurement ensures that decisions are based on facts. Hence, there is a need for redefining standards and performance benchmarks for FM in public hospitals in Nigeria. It means that decisions by the public hospitals to take any action in improving business or healthcare delivery are based on defined

standards to be measured using measurement of tools or models for measuring performance supported by a professional cadre of FM specialists.

The key FM standards should be redefined in terms of ‘soft FM’ and ‘hard FM’ based on best practices. In the context of public hospitals in Nigeria it is important to redefine ‘what’ is required in terms of standards for hard facilities management (FM) services (such as building maintenance, groundwork, landscaping, etc.) and soft FM services (such as cleaning, catering, security, etc.) and how it supports core services (non-FM) such as teaching, nursing, surgical and medical services in public hospitals. The level of requirement (performance benchmarks) for each soft and hard FM service category should be stated with a ‘pass’ or ‘fail’ criteria for assessing performance and setting rectification periods if a service fails. The soft and hard FM service performance standards as part of an integrated FM system should both be linked to the performance measurement framework for monitoring and feedback and taking appropriate actions (see Figure 2).

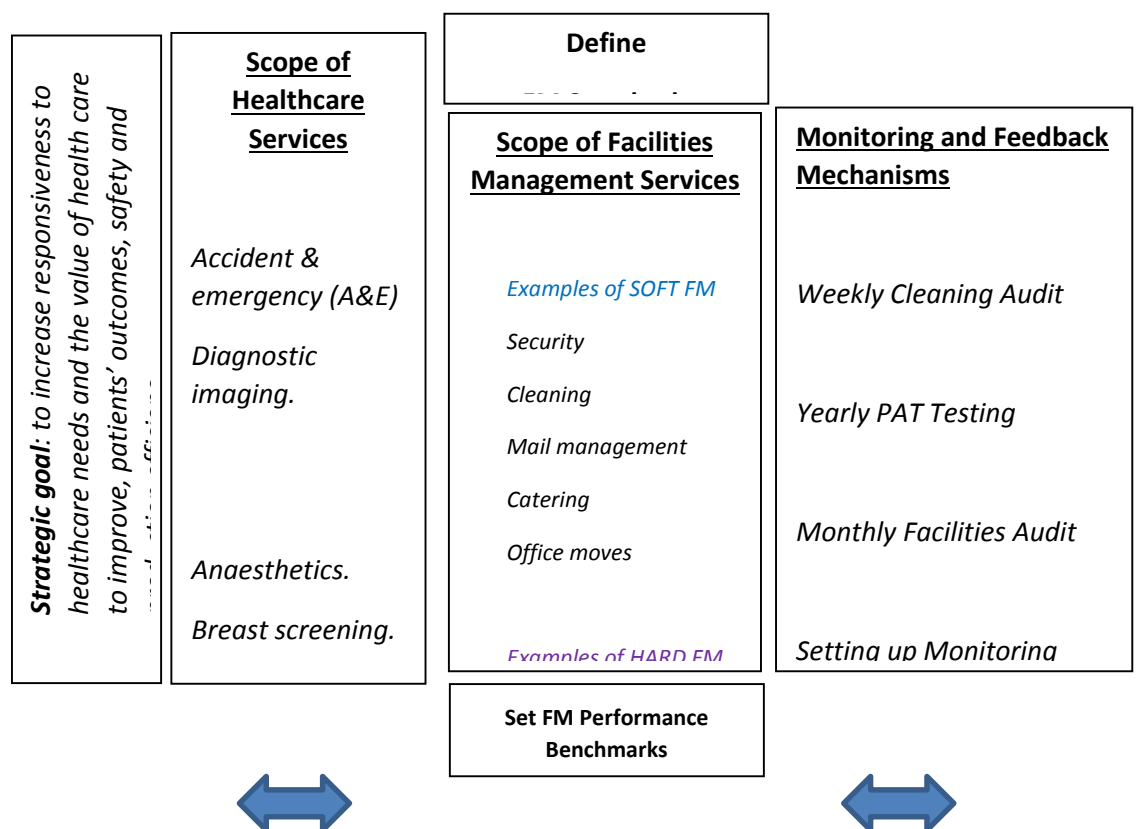


Figure 2: Conceptual FM Performance Measurement Framework

Hinks (2009) argues that the success criteria for FM are more likely to be associated with innovation. He further suggests that predominant features of good FM in the future may major on value, adaptability, novelty, support for new processes, and timelines, and herein lies the performance assessment challenge for FM. In terms of value for money, the FM performance plan should describe how to meet business needs and how optimising cost may be measured.

The proposed framework will serve as a management tool that will enhance the management and reporting of the FM activities by measuring the level of achievement and results in public hospitals with respect to both soft and hard FM

to support core healthcare service delivery. It will enable top management and the government to make more informed and effective choices and decisions about FM practices. By developing such a framework, the Nigerian public hospitals will be in a position to utilise concrete, objective information and data on which to make sound management decisions and report to clients, stakeholders and government. Another important aspect will be the professionalization of FM as a distinct discipline in Nigeria with the knowledge and skill sets required. Development of standards and benchmarks for good FM practices will encourage specialised training in FM and codification of best practices.

CONCLUSION

The existing research has highlighted the increasing importance of performance measurement. However, the literature in the FM area is still evolving given the lack of clarity over many concepts. There are existing performance measurement frameworks but they do not capture the context and specific challenges of public hospitals in Nigeria. There is therefore a need for the development of performance measurement framework in FM for the public hospitals in Nigeria. This research can therefore contribute to addressing the knowledge gap through the development of a systematic evidence-based framework with identification of the elements to be taken into consideration in redefining standards and developing performance benchmarks for continuous improvement of public hospitals in Nigeria. Adoption of the performance measurement framework in FM will assist policy makers in public hospitals in Nigeria to drive key organisational changes in the way assets are managed and to move away from a culture of narrow 'maintenance approach' to a holistic approach integrating all aspects of FM for the optimal delivery of healthcare services. The outcome will also provide policy makers in public hospitals in Nigeria with tools for accountability.

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REGULATION AND CONTROL, AND CONTINUOUS DEVELOPMENT OF CONSTRUCTION PROFESSIONS

RESEARCH ON REGULATIONS AND POLICIES ON PROFESSIONALISM MANAGEMENT OF OFF-SITE CONSTRUCTION IN CHINA

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Many studies have shown that regulations and policies are the most important factors to promote the sustainable development of off-site construction (OSC). However, the role of regulations and policies in enhancing the level of professionalism of the construction industry has always been neglected. This research introduced the status quo of regulations and policies on OSC in China and identified the existing problems in current regulations and policies for the management of professionalism through personal interviews in Beijing, Tianjin, Shanghai, and Chongqing in China. The problems include low attention, low binding force, immature regulatory tools and insufficient financial support. Aimed at these problems, this research put forward some improvement approaches, such as filling policy gaps, ensuring clear responsibilities, improving the supervision mechanism and establishing an incentive system.

Keywords: improvement, off-site construction, professionalism, status quo, regulations and policies.

INTRODUCTION

Off-site construction (OSC) has been regarded as a radical innovation to replace conventional in-situ construction methods. OSC has a positive impact on saving time, improving quality, reducing waste and reducing energy consumption (Chao Mao 2015). Currently, the adoption of OSC has made considerable progress around the world. For example, the United States has formed a complete standardization system, and the application rate of precast concrete structures has reached 35%; in the UK, over 30% of the new homes built today are prefabricated; in Ireland and Scotland, the prefabrication rate is projected to reach 70% in a few years (Clyde 2016). However, the application of OSC is not as widespread and mature in China.

Although China's construction industry has developed into one of the world's largest markets, the domestic demand for OSC is still low, and its market value is estimated to be less than 2% of that of the total construction sector. In addition to market demand and technology, a large number of unethical practices such as corruption, negligence, bribery, conflict of interest, mismanagement and collusion in bidding in the construction industry have become obstacles to the promotion of OSC (Hamzah 2014). In recent years, the Chinese government has attached importance to the development of OSC and has formulated corresponding regulations and policies to

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enhance the levels of professionalism. However, due to inadequate regulations and policies, professionalism management has only made limited progress. Therefore, the objective of this research is to identify the existing problems of regulations and policies that affect professionalism and ethics of OSC in China, from the perspective of professionals. The results will provide useful information to practitioners, researchers and, in particular, policy makers who have an important impact on promoting the social image of OSC and improving the understanding of the Chinese construction industry among foreign professionals.

STATUS QUO

In China, the development of professionalism in the construction industry is largely driven by the state. Since 1998, a series of administrative regulations have been promulgated to promote the professionalization of OSC in China. There have been many other efforts in the construction industry across the country to improve ethical standards and integrity. Cities such as Beijing, Shanghai, Tianjin, and Chongqing have successively issued regulations and policies of OSC and set industry development goals. Some of these are now outlined.

A. Administrative Regulations of off-site Construction

Administrative regulations are the normative documents promulgated by the State Council. They have the nature of legal documents and have a guiding role in formulating local regulations and policies. Administrative regulations on sustainable construction are described in Table 1.

Table 1: Administrative regulations of off-site construction

Administrative regulations	Date	Remarks
Building energy conservation and green building development "13th five-year plan"	2017	Accelerate the improvement of building energy efficiency standards and implementation quality
The 13th five-year assembly building action plan	2017	By 2020, the proportion of built-up buildings in the country will account for more than 15% of new buildings
Guidance on vigorous development of prefabricated buildings	2016	Promote industrial restructuring and upgrading
Outline for the modernization development of the construction industry	2015	By 2020, the proportion of fabricated buildings to new buildings be over 20%.
2014-2015 action plan for energy conservation, emission reduction and low-carbon development	2014	Increase support for the production of fabricated parts
Green building action plan	2013	Accelerate the establishment of a standard system
Some opinions on promoting the modernization of housing industry and improving housing quality	1999	Emphasize the requirements for residential R&D and promotion

B. Beijing's local regulations and policies

Beijing is the first city to introduce the incentive policy of fabricated buildings in China; it has proposed that the proportion of fabricated buildings in newly built buildings by area will reach 30% or more by 2020. Table 2 illustrates the relevant local regulations and policies of Beijing.

Table 2: Beijing's local regulations and policies

Local regulations and policies	Date	Remarks
Opinions on speeding up the development of prefabricated buildings	2017	By 2018, the proportion of prefabricated buildings to new construction should be more than 20%.
Opinions on the implementation of complete decoration finished goods delivery in municipal affordable housing	2015	Improve the quality of affordable housing.
Measures for energy conservation management of civil buildings in Beijing	2014	Strengthen the energy conservation management of the citizens' buildings and reduce energy consumption
Notice on the task of advancing housing industrialization in affordable housing construction	2014	Comprehensively promote the industrialization of housing. By 2015, the industrialization of housing construction reach more than 30% of the construction area
Guiding opinions on promoting the industrialization of housing in this city	2010	In 2012 and 2013, the proportion of residential industrial projects reached 7% and 10% respectively

C. Shanghai's local regulations and policies

As can be seen in Table 3, with the goal of building a modern and comprehensive demonstration city for the national housing industry, Shanghai has issued a series of policies on the aspects of quality management and financial support to promote the professionalization of the industry.

Table 3: Shanghai's local regulations and policies

Local regulations and policies	Date	Remarks
Construction safety management regulations for prefabricated building concrete structures	2017	Construction safety supervision station
2016-2020 development plan for fabricated buildings in Shanghai	2016	By 2020, fabricated buildings become one of the main construction modes in Shanghai..
Opinions on promoting the development of fabricated buildings in the city	2015	Since 2016, all new civil buildings within the outer ring line should adopt prefabricated buildings and more than 50% outside the outer ring line
Shanghai green building development three-year action plan (2014-2016)	2014	Proposed significant progress in the level of industrialization of construction.
Some opinions on further promoting the development of prefabricated buildings in this city	2013	Provide policy support for building industrialization from land supply, floor area rate awards, industrial support funds, etc.
Some opinions on accelerating the industrialization of housing in this city	2011	The precast assembly rate of the single housing structure is more than 15%.
Pilot project for the modernization of housing industry in Shanghai	2010	Initially form a framework for housing industrialization

D. Tianjin's local regulations and policies

Tianjin has been committed to promoting the transformation and development of the construction industry. Since 2014, the municipal government has issued several

policies on the development of green buildings and prefabricated buildings. Some relevant local regulations and policies of Tianjin are described in Table 4.

Table 4: Tianjin's local regulations and policies

Local regulations and policies	Date	Remarks
"13th Five-Year" development plan for fabricated buildings in Tianjin	2018	By 2020, the proportion of prefabricated buildings in the city to new construction area reach 30% or more.
Vigorously develop the implementation of prefabricated buildings	2017	Proposed assembly development goals and key tasks.
Implementation opinions on accelerating the development and reform of the construction industry	2015	Promote the upgrading and development of the construction industry and vigorously promote the modernization of the construction industry
Tianjin green building action plan	2014	Clearly propose to vigorously promote the industrialization of construction

E. Chongqing's local regulations and policies

Chongqing has a huge OSC market and shoulders the responsibility of promoting the construction of the western OSC base. It has also puts forward the goal that the city's new construction prefabricated assembly rate should reach more than 20% by 2020. Table 5 illustrates some local regulations and policies of Chongqing.

Table 5: Chongqing's local regulations and policies

Local regulations and policies	Date	Remarks
Management method of Chongqing assembly construction industrial base	2018	Promoting the development of fabricated buildings
Suggestions on further promoting the reform of the construction industry and sustainable and healthy development	2018	Promoting reform, innovation and sustained and healthy development of Chongqing's construction industry
Opinions on accelerating the modernization of construction industry	2014	By 2020, the prefabricated assembly rate of the newly built buildings in the city be over 20%.
Guiding Opinions on Accelerating the Industrialization of Buildings	2011	Formulating and improving the standard system for design, production, construction and acceptance of residential industrialization in Chongqing.
Notice on Printing and Distributing the Guiding Opinions on Accelerating the Development of Finished Housing	2010	Strict engineering construction management

METHODOLOGY

To identify the problems of regulations and policies for regulating the OSC industry and improving the level of professionalism, interviews formed the main form of data collection in this research. In the first step, a review of the literature on OSC in China was conducted; the results are presented in Table 6. Based on questions outlined from the literature review results, in-depth interviews were conducted with professionals to examine the rationality and comprehensiveness of the said provisional problems. The respondents were invited to address questions on three main problems: (1) Indicate whether the results of the literature review are representative and supplement the

literature results; (2) Rank the problems of regulations and policies according to their importance; and (3) Give advice on how to improve regulations and policies.

Table 6: Results of literature review

No	Problems	Source
1	Lack of rules for incentive policies	Yang Zhang(2015)
2	Incomplete project quality supervision system and mechanism	Su (2017)
3	difficult to exercise the powers of the supervisory agencies	Su (2017)
4	Incentives are inadequate	Chao Mao (2014)
5	Unsatisfactory policy implementation	Zhaohong Lan(2017)
6	Local government has not established a special regulatory department	Zhaohong Lan(2017)
7	Lack of industry policy	Xiang Hang (2018)
8	Limited policy binding and difficult implementation	Xiang Hang (2018)
9	Lack of economic support, weak incentives	Xiang Hang (2018)
10	Lack of regulatory policy	Xiang Hang (2018)
11	Lack of supervision system suitable for fabricated buildings	Quanliang Wang (2016)
12	Regulatory tools are not mature.	Xiaolong Gan (2018)

The interviewees were professionals and officials in the construction industry drawn from the four cities in China previously mentioned: Beijing, Shanghai, Tianjin and Chongqing. A total of 60 interviewees (15 interviewees from each of the four cities) were selected from stakeholders of the OSC sub-sector, including the government, customers, contractors, design units, and construction units. Stakeholder theory shows that different stakeholders have different characteristics and attitudes towards prefabricated buildings. So, together, these interviewees will provide a comprehensive and profound view. To ensure the authority of the survey results, the professions of the respondents include university professors (12 interviewees), government staff (12 interviewees), senior project managers (12 interviewees) and intermediate project managers (24 interviewees). Universities, governments, and enterprises have an irreplaceable role in promoting the development of the industry in China. Table 7 indicates the demographic information of response.

Table7: Demographic information of response

	Beijing	Shanghai	Tianjin	Chongqing
Government	3	3	3	3
Customers	3	3	3	3
Contractors	3	3	3	3
Contractors	3	3	3	3
Design Units	3	3	3	3
Construction Units	3	3	3	3
Total	15	15	15	15

PROBLEMS OF CURRENT LAWS AND REGULATIONS

The existing problems of regulations and policies in relation to professionalism management of OSC in China drawn from the interviews are now presented.

A. Low attention

Almost all interviewees regarded low attention as the most important and influential issue.

On the one hand, Chinese construction industry regulations attach little importance to OSC (Luo, 2015). As can be seen from Table 1, the regulations and policies related to the OSC sub-sector were first issued in 1999, which is much later than the rise of China's construction industry. On the other hand, although numerous OSC-related policies and regulations have been introduced, the majority of them are more focused on expanding the market, with few policies aimed at improving the professional level.

B. Low binding force

In the interviews, low binding force also ranked at the top of the importance list.

The specific provisions and measures used in implementing of OSC are quite short. Although some rules or measures formulated by construction departments are operational, they could not constrain construction companies and practitioners effectively by reason of lower legal status and therefore less legal effectiveness. Moreover, the majority of policy documents currently issued, such as "green building action", "several opinions on further strengthening urban planning and construction management" and "guidance on vigorously developing prefabricated buildings", are seen as general implementation frameworks and incentive mechanisms, rather than specific decision-making guidance, effective working procedures, or detailed goals, steps and measures. These documents do not include sufficient workable standards (Wang 2014).

C. Immature regulatory tools

Some 60% of the interviewees put immature regulatory tools in third place on the list.

According to the relevant laws and regulations, the government's supervision of construction projects in China is the responsibility of the construction administrative departments of governments at all levels and other relevant departments; the construction administrative department of the State Council carries out unified supervision and management of construction activities throughout the country. Compared with traditional building methods which have been developed for many years, OSC has only had a short period of development. Various supervision systems and mechanisms of the traditional buildings are perfect, while the supervision of OSC is far from meeting the requirements. The policy guidance at the national level is not strong enough, and the implementation of the policies does not meet the expectations. The local government does not attach enough importance to improving the level of professionalism of the OSC sub-sector. For example, there is no special department to supervise the employees.

D. Insufficient financial support

Some 55% of the interviewees indicated that insufficient financial support deserves to be placed at the end of the importance list.

Many research works focus on the mechanism of education to improve the quality of employees and the moral image of the construction industry, hoping to change the status quo of the industry from the perspective of individuals. But researchers such as Ilari and Aho (2013) have highlighted the importance of rewarding worthy conduct. Industry structures currently do not reward those responsible for a building's added-

value or performance. A reasonable incentive mechanism should be able to measure the value of individual conducts and improve the professional ethics of practitioners through long-term incentives.

Most of the current incentive policies in China aim to promote the market share of assembled buildings, and there is a gap in the policy of rewarding innovation and high-quality behaviour of employees in the construction industry.

IMPROVEMENT OF REGULATIONS AND POLICIES

Based on the interviewers' point of view and combined with the actual situation of the industry, this research proposes the solutions to the problems which are now outlined.

A. Filling policy gaps

The current OSC project system covers the management of planning, design, procurement, construction, operation and disposal, but lacks attention to professionalism and ethics. To solve the problem of absence of regulations and policies on professionalism management, government departments at all levels need to fill the policies gap in this area. Many efforts have been made to improve professionalism around the world. For example, the regulatory system relating to built environment professionals in South Africa was overhauled in the late 1990s and a new suite of Acts were promulgated in 2000 to enhance professionalism in the sector. A Standard of Professional Conduct to govern the ethical practices in the American civil engineering profession was published by the American Society of Civil Engineers (ASCE, 2000).

B. Clear responsibilities

Clear responsibility refers to the implementation of relevant regulations and policies to clarify the responsibilities of OSC stakeholders. For government departments, the scope of responsibility includes the introduction of relevant policies to regulate the construction market, as well as the supervision of government departments, such as those for penalizing unethical conduct and rewarding valuable conduct. Enterprises have the responsibility to standardize their own construction process and conduct self-supervision of the construction process in accordance with ethical standards. Practitioners should strictly abide by the government and enterprise regulations, and enhance their self-discipline.

C. Improving the supervision mechanism

The governments of the United States, Australia and other developed countries have established relatively good regulatory mechanisms to enhance the social image of the construction industry. The Chinese government can learn from the experience of developed countries such as these and combine the actual situation of the domestic construction market to provide professional ethics and relevant standards for enterprises and employees.

D. Establishing incentive system

Valuing individual professionalism will be a prerequisite for the industry being able to attract and retain talent in future. The incentive mechanism based on cost savings is prevalent in enterprises, which encourages the reduction of early-stage costs at all levels of the construction value chain, regardless of the negative impact on performance on construction projects. This is an unsustainable mode of development for both enterprises and individuals. Establishing an incentive model that reflects the

value provided to customers and society through the successful achievement of specific performance goals is the key to establishing a successful incentive mechanism for OSC in China.

CONCLUSIONS

Regulations and policies play an important role in promoting the professional development of fabricated buildings in China. Aiming at solving the problems existing in the current assembly building regulations and policies, this study puts forward some improvement measures, which can be used for reference by policy makers. In addition, the relevant government departments should ensure effective implementation of policies through effective supervision and incentives.

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STAKEHOLDERS' RESPONSE TO THE MENACE OF BUILDING COLLAPSE IN LAGOS STATE, NIGERIA

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The phenomenon of building collapse in Nigeria and the accompanying fatality and magnitude of economic loss have been issues of concern to stakeholders, particularly the professionals in the built environment and the government. This paper outlines historical records of building collapse incidences in Lagos State, Nigeria in the last 10 years and examines stakeholders' response to the menace with a view to providing intervention policies for resolving ethical issues in the building industry in developing countries. Content analysis was used for data obtained primarily from secondary sources. Findings reveal that the menace of building collapse is pronounced in the Ikeja and Lagos administrative divisions, and common among the two- and three-storey residential building categories. Timely interventions of Building Collapse Prevention Guild and Building Control Agency led to significant reduction in the incidences and fatalities. It is hoped that other developing countries facing similar ethical issues in their building industry will learn from the interventions in Lagos State, Nigeria.

Keywords: Building collapse, construction project, Lagos State, stakeholders' response.

INTRODUCTION

The phenomenon of building collapse in Nigeria has been a source of concern to stakeholders, particularly the professionals in the built environment, in view of the acute shortage of housing in Nigeria's urban cities and the poor image of the built environment professions. Out of the six geopolitical zones in Nigeria, the South West zone has the highest record of building collapse, and Lagos State tops the list of six states that make up this zone in terms of number of incidences, death toll from the collapse and injuries recorded (The Guardian, 2018).

Lagos State is adjudged the commercial hub of Nigeria with an estimated population of over 21 million (NPC 2016). Lagos state is a coastal city with a topography that harbours 78% water bodies ranging from the Atlantic Ocean, lagoon, streams and wetland. For most sands filled land and wetland, foundation types are restricted to pile or raft foundations depending on the number of storeys in the proposed building and the economic status of the developer. These foundation types are quite expensive and beyond the economic means of most private developers in the state. As the population of the urban centre grows, the need to address the housing deficit and increasing need for residential and commercial accommodation among others in the city centre prompted unauthorised alteration and conversion of existing structures to other uses different from the original design, by real estate property owners. Some single-storey residential buildings were suddenly converted to multi-storey residential or commercial buildings without approval from regulatory agencies and often without

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the input of relevant professionals. Some of these buildings collapsed either at construction stage or after habitation (during the buildings' lifespan).

A building is said to collapse when part or whole members of the structure suddenly gives way or completely fail; when most members have caved in, crumbled or buckled. As a result of this failure, the building will no longer be able to fulfil its intended purpose. Building collapse is an extreme case of structural failure. Structural failure is a defect in one or more critical elements of the building due to its inability to perform the original load-bearing function effectively. In many developed countries, building collapse is traceable to natural disasters such as earthquake, hurricane or tsunami. In developing countries like Nigeria, however, human factors are the major causes of building collapse. Studies have shown that 50% of building failure cases are traceable to design faults, 40% to faults during construction and 10% to product failure (Oyewande 1992). Windapo (2006) attributes 37% of building collapse to professional negligence and greed and 22% to design faults. A study by Oke (2011) revealed that poor maintenance culture, design error, poor quality of materials and workmanship, natural phenomenon and excessive loading contributed about 7%, 15%, 52%, 7%, and 20% respectively to building collapse. Folagbade (2001) cited in Ajufoh (2014) reported that of the 25 reported incidences of building collapse in Lagos State between 1980 and 1999, 76% are private-owned property, 12% are corporate-owned property and 12% are public (government) owned property. The fatality and magnitude of economic loss resulting from building collapse require that stakeholders' understanding and cooperation efforts should be directed at minimising the menace. This paper outlines historical records of building collapse incidences in Lagos State in the last 10 years and examines stakeholders' responses to the menace with a view to providing an intervention policy for resolving ethical issues in the building industry in developing countries.

RESEARCH METHOD

This study uses secondary data comprising reports from national newspapers, *ad hoc* committees, panel of enquiry, and other bodies established by the government. Reports of building collapse incidences in Lagos State between 2008 and 2018 were examined employing content analysis. Strategies put in place by the major stakeholders in the building industry were also examined.

RESULTS AND DISCUSSION

Historical record of building collapse between 2008 and 2018

Table 1 presents the historical record of buildings that collapsed between 2008 and 2018 in Lagos. This list is by no means exhaustive as it covers only the cases reported in the sources cited. The location of the building collapse incidences is grouped according to the administrative division of Lagos state. There are 20 Local Government Areas (LGA) in Lagos State, grouped into five administrative divisions. Ikeja division comprising Agege; Alimosho; Ifako-Ijaye; Ikeja; Kosofe; Mushin; Oshodi and Shomolu local government areas. Lagos division is made up of Apapa; Eti-Osa; Lagos Island; Lagos Mainland; and Surulere LGAs. Ajeromi-Ifelodun; Amuwo-Odofin; Badagry and Ojo make up Badagry division. Ibeju-Lekki and Epe, and Ikorodu are under Epe and Ikorodu divisions respectively. The result indicates that 44% of the building collapses occur in the Ikeja and Lagos administrative divisions apiece, eight per cent in Epe division, four per cent in the Badagry division and none in the Ikorodu division. Ikeja and Lagos divisions are densely populated parts of Lagos and a home for most of the business organisations, commercial hub

and administrative seat of government. In addition, the topography of the Lagos division is predominantly wetland. Table 1 also shows that 84% of the collapsed buildings in the period under review are residential while 12% are commercial buildings and only four per cent are religious buildings. This affirms Fagbenle and Adewunmi's (2010) study which reported that up to 70% of the reported building collapse between 1980 and 2010 occurred in the private setting, dominated by the informal sector.

Most of the perceived causes of the reported collapses in Table 1 were a structural failure, mostly from unauthorised alteration or conversion of existing structures. Many of the residents of Lagos prefer to live close to their places of livelihood, particularly Lagos Island, Apapa and Ikeja because of the poor transport infrastructure in the state. Property owners in these locations take advantage of the high demand for residential and commercial buildings for financial gain by making alterations and or conversion to existing structures without considering the additional loads which would be imposed on the foundations and other structural components. As a result, the building elements would be unable to withstand additional loads, leading to a sudden collapse. Some of the property owners have a penchant for cutting corners by not employing qualified professionals to produce the production documents and supervise the building work during construction. Interpretation of the underlying causes of a building collapse in Lagos State suggests that several factors could be responsible for this: the use of substandard or inadequate materials for construction, poor workmanship, lack of supervision by professionals, non-compliance with standards among others. These findings exonerate built environment professionals from unethical practices leading to building collapse as claimed by Oyewande (1992) and Windapo (2006).

The results (Table 1) indicate that the categories of reported collapsed buildings are three storeys (36%), two storeys (24%), four storeys (16%) while five and six storeys account for 20% of the collapsed building. Many of these buildings were originally designed as bungalows for residential purposes. Collapse is not common in bungalows and buildings more than five storeys. This is because bungalows have non-load bearing structures requiring simple strip or raft foundations (in the case of locations in wetland or made-up ground). Multi-storey buildings (above five storeys) are complex structures that require pile foundation or a combination of short bored piles and raft foundation, and the services of professionals. Such buildings also require local authority permit or stage certification. Owners of such buildings can afford to engage the services of professionals who would ensure that regulations and standards are upheld.

Table 1: Historical record of building collapse between 2008 and 2018

Year of occurrence	Type of building	Number of storey	Lagos Administrative Division	Perceived cause(s) of collapse	Number of deaths	Source
28th September, 2010	Residential/Commercial	Four	Lagos	Structural defect	Three	www.thenigerianvoice.com/news/35414/25-rescued-scores...
28th September 2010	Residential	Two	Ikeja	Unprofessional alteration	Two	Nigeria Tribune, 2010 Sept. 28
13th March 2011	Commercial	Five	Ikeja	Poor workmanship, substandard materials	Two	NBRRI Report No. 23, 2011
10th July 2011	Residential/Commercial	Four	Lagos	Non-compliance to regulatory warning, substandard materials	18	The Nations 2011 March 13
25th October 2011	Commercial	Six	Ikeja	Structural defect	2	Omenihu et al (2016)
20th November 2012	Residential	Two	Lagos	Structural defect	Two	Omenihu et al (2016)
20th November 2012	Residential	Bungalow	Lagos	Gas explosion	Nil	Omenihu et al (2016)
7th May 2013	Residential	Three	Ikeja	Unauthorised conversion, structural failure	Two	Omenihu et al (2016)
8th May 2013	Religious	Three	Ikeja	Unauthorised conversion, structural failure, use of quacks	One	Omenihu et al (2016)
11th June 2013	Residential	Three	Ikeja	Unauthorised conversion, structural failure, use of quacks	One	Punch 2013 June 11
11th July 2013	Residential	Three	Lagos	Structural defect	Seven	Ejembi, S. (2016 March 11) 10 tragic building collapse in Nigeria
21st July 2013	Residential	Two	Lagos	Non-compliance to regulatory warning, substandard materials	Four	Premium Times 2013 July 21
5th November 2013	Commercial	Five	Lagos	Excessive loading, structural failure	Three	Vanguard 2013 Nov.5
30th June 2014	Residential	Two	Ikeja	Structural defect	Two	Omenihu et al (2016)
30th July 2014	Residential	Three	Ikeja	Structural defect	Nil	Omenihu et al (2016)

12th September 2014	Residential	Six	Ikeja	Unauthorised conversion, structural failure, non-compliance to standard	116	Ejembi, S. (2016 March 11) 10 tragic building collapse in Nigeria
23rd September, 2015	Residential	Two	Epe	Substandard materials, poor workmanship	Nil	Vanguard 2015 Sept. 23
25th September 2013	Residential	Three	Lagos	Structural defect	Two	Omenihu et al (2016)
21st October 2015	Residential	Three	Lagos	Structural defect	Nil	Premium Times 2015 Oct. 21
9th March 2016	Residential	Five	Epe	Rainstorm	18	Building collapse achieve www.vanguardngr.com/tag/building-collapse
8 th March 2016	Residential	Six	Epe	Structural defect from unauthorized addition of extra floor	34	Ejembi, S. (2016 March 11) 10 tragic building collapse in Nigeria
19th March 2016	Residential	Two	Ikeja	Poor maintenance	One	Nigerian Bulletin 2016 March 8
19th May 2017	Residential	Three	Ikeja	Substandard materials, unauthorised addition of extra floor	One	Vanguard 2017 May 19
						www.premiumtimesng.com/238218-death-toll-rises-eight-lagos-building-collapse
25th July, 2017	Residential	Four	Lagos	Unauthorised addition of extra floor	8	PM News 2017 July 19
1 November 2017	Residential	Four	Lagos	Structural defect	Not reported	
29th August 2017	Residential	Three	Badagry	Structural defect	Nil	Sahara Reporter 2017 August 29
					Two	Building collapse achieve www.vanguardngr.com/tag/building-collapse
31 st March 2018	Residential	One	Ikeja	Structural defect		

Report of Tribunal/Panel of enquiry on building collapse

In response to the spate of building collapse, the state government set up Tribunal of Enquiry to investigate the causes of the reported collapse, recommend appropriate sanctions for the individuals and groups who are responsible, and suggest how to avoid future occurrence. The Tribunal, in its findings, according to Alo (2015), linked the spate of building collapse in the state to: cumbersome planning permit process and the requirement for a land title document as a pre-requisite for granting planning permit leading to preponderance of illegal developments in the state; crass indiscipline and gross corruption by all and sundry (professionals, law enforcing agents and the judiciary) among others. It also made appropriate recommendations

Many years after the tribunal submitted its report, nothing has been heard from the government and no action has been taken. Underground financial inducement to officials of planning permit authority which makes them turn blind eyes to developers' non-compliance with the approved plan is common. The fact that no one was arrested or prosecuted for any of the over 135 reported cases of building collapse between 2007 and 2013 might suggest complicity by law enforcing agents and the judiciary.

STAKEHOLDERS' RESPONSE TO MENACE OF BUILDING COLLAPSE IN LAGOS STATE

To curtail the trend in building collapse in Lagos State, concerned built environment professionals formed an advocacy group by the name of "Building Collapse Prevention Guild" and pressed the National Assembly through their various professional bodies for the enactment of the National Building Code. The government of Lagos State, under the administration of Mr. Babatunde Fashola, responded by creating the Lagos State Building Control Agency. From the results in Table 1, it can be inferred that these interventions by stakeholders have contributed to reducing the spate of building collapse in Lagos State by about 75% in the last two years. The death toll from the recorded collapsed structures has also reduced by about 97% within the last three years. In 2017, the Lagos State Building Control Agency commenced the demolition of 114 distressed buildings across Lagos State (Olowoapejo 2017) which could have led to a catastrophic collapse. The strategies adopted by these interventions in achieving the remarkable results are presented below:

1. Building Collapse Prevention Guild

Building collapse prevention guild (BCPG) is a non-governmental advocacy group comprising representatives of all the built environment professional bodies fighting for the prevention of building collapse, especially in Lagos state. The body has a cell group in all the 20 LGA and 57 Council Development Areas (CDA) of Lagos State. The body advocates for sanity in the built environment by:

- i. Promoting acceptable building standards through public awareness in prints and news media
- ii. paying regular visits to building construction sites to check soundness of building materials, and to deter involvement of quacks handling building construction.
- iii. enforce compliance with building regulation and best practices
- iv. identify buildings that have serious structural defects and alert the relevant agencies of government.

The challenges this body is facing include low response of the relevant agencies of government because of gross under staffing and lack of political will to enforce “stop work” orders or carry out outright demolition of defective buildings. There is the need to give legal backing to this body and to recruit more professionals into the relevant government agencies for prompt response.

2. Lagos State Building Control Agency

Lagos State Building Control Agency (LASBCA) was created for the enforcement of building regulations and implementations of the 2010 Physical Planning, Urban Development and Building laws in Lagos State. Strategies adopted by LASBCA to stem the spate of building collapse in the state include:

- I. Inspection of building works, certification and approval of various stages of building construction and keeping the records
- II. Demolition of illegal structures and structurally defective buildings to prevent collapse
- III. Issuance of certificate of completion and fitness for habitation
- IV. building material evaluation and testing on construction site and conducting integrity test on residential and commercial buildings.

Another strategy adopted by LASBCA to ensure city-wide coverage of their operation in view of the gross inadequacy of personnel was “Whistle Blowing”. Lagos residents are encouraged to assist the agency (pro bono) in reporting on-going development as well as distressed buildings in their neighbourhood through a dedicated toll-free telephone line. Physical signs of distressed building to watch out for include: where cracks (5-10mm wide) or bulges on walls or structural members (beams and columns) of the building are observed; exposed or rusty reinforcement in reinforced concrete members; visible settlement of a part or all of a building; perpetual dampness in walls; among others. The whistle-blowing policy is not yielding the desired results now because of the lack of enabling laws to protect whistleblowers. There is also possibility of abuse of whistleblowing by tenants who want to deal with landlords not following the regulations.

One of the challenges faced by LASBCA is that most of the property owners in Lagos State have no permit and have not built in compliance with the regulations. Some property owners do not comply with set-backs and other standards in the approved drawings during the construction. Building without permit comes with severe sanctions; hence enforcing compliance will then mean that over 40% of buildings in Lagos State will have to be demolished. Government does not have the political will to do that. Recently, the present administration of Mr. Akinwunmi Ambode waived the penalty for building without permit to encourage property owners to build and keep their completed illegal buildings. The requirements for obtaining a permit for existing buildings are quite expensive in view of current economic realities. The requirements include: submitting “as-built drawings” of the property (which must be prepared by a registered Architect); pay a specified amount to the government for non-destructive test on the building to test the structural integrity of all its components; pay permit processing fee, stage certification fee, along with three years tax clearance certificate of the property owner among others.

3. Training of artisans

In view of the findings that most building projects were handled by unqualified persons, and to enhance craftsmen's skills in relevant building trades, the Department of Building, University of Lagos, in collaboration with the Lagos State chapter of the Nigerian Institute of Building (NIOB) set up strategies to conduct regular training for artisans in the building industry. This initiative would not only enhance artisan productivity but their performance on site if backed by appropriate legislation which ensuring annual certification and issuance of practice licence for artisans in the building industry.

CONCLUSIONS

The study examined historical records of building collapse in the last 10 years in Lagos State, Nigeria and responses of the built environment professionals, the Lagos State government and academics in proffering solution to the occurrence. From the discussion, Ikeja and Lagos administrative divisions of the state comprising: Agege; Alimosho; Ifako-Ijaye; Ikeja; Kosofe; Mushin; Oshodi; Shomolu; Apapa; Eti-Osa; Lagos Island; Lagos Mainland; and Surulere LGAs are the hot spots for building collapse. Building types involved in the reported incidents of collapse were mainly two- and three-storey residential buildings. The causes include structural failure resulting from unauthorised alteration or conversion of existing buildings to the other uses, use of substandard or inadequate materials, and poor workmanship. The interventions of the built environment professionals and the government of Lagos State has yielded remarkable results by cutting down the spate of collapse by about 75% in the last two years and fatality by about 97% in the last three years. These findings have put to rest the notion that building collapse in Nigeria is linked to professionals' unethical practices. Instead, the searchlight should be beamed on the private or informal sector compliance with appropriate regulations, and effectiveness of the monitoring mechanism put in place by the relevant government agencies. Furthermore, there is a need for appropriate legislation to empower professional organisations to take action against quacks in the industry

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KEY INDICATORS AND RECOMMENDATIONS TO MITIGATE COUNTERFEITING IN CONSTRUCTION SUPPLY CHAINS

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A research project funded by the Construction Industry Institute confirmed that there is a problem in the construction industry with counterfeit goods finding their way into construction supply chains and construction projects. Almost 200 construction industry and government leaders from around the world were interviewed for from one to four hours in the data gathering phase of this study. The research resulted in a list of over 40 Key Indicators and Recommendations for use by the construction industry. Additional findings include that the problem is substantial, the most common source country of the counterfeit goods is China, and the most common destinations of the goods are the US, China and the Middle East. Detailed results of the research can be found in published literature, but this is the first time that the researchers have published the entire list of key indicators and recommendations that resulted from the research.

Key Words: Counterfeit; Construction Materials; Counterfeit Products; Counterfeit Equipment; Mitigation; Approved Vendors; Recommendations; Tip-offs; Indicators; Organized Crime

INTRODUCTION

The infiltration of construction supply chains by counterfeit materials and equipment is a growing problem for those in the construction industry. A research project funded by the Construction Industry Institute (CII) involved a massive effort in which almost 200 construction professionals, mostly procurement officers and those at the vice-president level from major contractors, manufacturers, suppliers, owners, government agencies and insurance companies, were interviewed for from one to four hours. Over 8000 data points were gathered from these interviews, which involved each person answering up to 45 questions. The interviewees came from seven countries on three continents, with six team members conducting the interviews.

In modern times, counterfeiting has been widespread and posed serious threats to the economies and general market stability in the countries that it affected. Following World War II, globalization made counterfeiting an international problem, much of it emanating from Japan's post-war, manufacturing-based economy. As Japan's economy matured in the 1960s, the epicenter of the counterfeiting industry moved to

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South Korea. As South Korea's economy improved, the greater portion of the problem moved to China, where it resides today.

Within the construction industry, the use of counterfeit products can have dangerous, even deadly, consequences. For instance, in 2007, a counterfeit cement kiln ruptured while operating and killed two workers in Canada (Carlton, 2013). In 2014, the Australian Competition and Consumer Commission issued a voluntary recall for electrical cable. An investigation had concluded that 3,900 km of this cable was sold under fraudulent certificate and its substandard insulation caused fires (ACCC, 2015).

Earlier in 2015 at the Technical University of Denmark, James Robinson, chief engineer at Borealis shared the results of tests he had performed on PVC conduit. When exposed to fire, most of the tubes he tested performed as expected, but one tube quickly became engulfed in flames and completely melted. After analysis, he found that it was a fake tube, made without any non-flammable additives, but labeled as having the additives (Adams, 2015).

So why is counterfeiting becoming so prevalent in construction? Steel, the most counterfeited construction product, provides a good answer. For a contractor, using a low-grade steel can cost as little as half as much as using a structural steel (Carlton, 2013). This makes counterfeiting a very lucrative option for some. The other reason for the increase in counterfeiting is lack of enforcement. In certain countries, such as China, intellectual property violations are not prosecuted as in the US, so there is much less risk in producing and selling fake products. Even if the receiving country has strong laws, it can be very difficult to determine what is counterfeit and what isn't without extensive testing that costs time and money.

Catastrophes resulting from counterfeit parts in the construction industry are not isolated events. In 2007, the Shershah Bridge in Pakistan collapsed only 25 days after opening, killing five individuals and injuring dozens more. It is suspected that counterfeit steel bars were used in the construction of the bridge. In 1985, counterfeit bolts were used in the construction of a self-propelled howitzer. The howitzer collapsed, killing a soldier. The use of counterfeit bolts in the construction of cranes also killed two US citizens on American soil in 1987 and 1998. More recently, a garment factory in Dhaka, Bangladesh collapsed killing over 1,100 workers. The collapse was blamed partly on the use of extremely poor quality construction materials, possibly counterfeit (Carlton, 2013).

Obtaining an item from the original component or equipment manufacturer (OCM/OEM) is the easiest way to ensure a genuine part. An OCM-authorized distributor provides the next-highest level of security. When obtaining an item from an independent distributor, broker distributor or an unknown source, one is greatly increasing the chance of receiving a counterfeit item. It is wise to require the use of OCMs and OEMs in the contract. Also, if the industry as a whole adopts a zero tolerance policy, and adequate training and education is provided for management and field personnel, the likelihood of anyone within the industry procuring a counterfeit item is greatly decreased (Lockheed Martin, 2015). It is this sort of intra-industry cooperation that is lacking in the fight against counterfeiting. Individual companies greatly fear that their competition will discover that they have been victimized by counterfeiting, so instead of reporting it, they hide the fact.

RESEARCH METHODS

The objective of this research was to determine whether counterfeiting is a problem in today's construction industry, and if so, how big a problem. Other sore questions included "what is the source of the problem?", "what construction items are being counterfeited?" and "what is the destination of the counterfeit items?"

To accomplish the research objectives, several interview instruments were developed and used to interview a variety of people. The instruments were comprised of approximately 40 questions about various interrelated aspects of counterfeiting, each dealing with a particular position along the construction supply chain. The interviewees included government personnel, insurance agents, owners, contractors, manufacturers and suppliers. Depending on who was being interviewed, different sets of questions were asked specific to a person's area of experience. Each interview took from one to four hours to conduct, depending on the interviewee's level of knowledge on the subject. These people were chosen based on the size and importance of their organizations in the global construction industry and their particular positions and functions within the organizations. Most interviewees were procurement directors or vice-president-level officers of major companies or agencies.

In total, 192 mostly face-to-face interviews were conducted with industrial and governmental leaders in China, Taiwan, Hong Kong, the UK, Canada, and the US. The breakdown was 78 interviews in the US, 70 in China, 10 in Canada, 16 in Taiwan, eight in the UK, eight in Pakistan and two in Hong Kong. The questions that were asked included but were not limited to:

1. What is the difference between counterfeits and low-quality products?
2. What do you do to prevent counterfeit items from entering your supply chain?
3. Have you ever experienced cases of counterfeiting? What was the problem item? Where did it come from?
4. What do you do to qualify vendors?
5. What are some key indicators of counterfeiting?
6. Who reports to whom in the case of counterfeiting?
7. What trends do you see in counterfeiting?
8. How aware is the industry of counterfeiting?

The data were stored in an Excel® spreadsheet in such a way that key words could be used to group interview answers by topic.

RESEARCH RESULTS

In China, more than half of the interviewees have been, or know some people who have been, victims of counterfeiting in the construction industry, a fact that indicates that the overall environment is not good. Some fear that the increased counterfeiting activities ultimately could lead to increased tolerance of counterfeiting.

The research found that steel items, mostly piping and valves, were most identified as counterfeit by the industry. Meanwhile, there is an increase in counterfeit nonstructural materials in construction supply chains. One reason for this is the lower cost of "decoration" material, another may be the fact that a non-structural item probably has a longer "incubation period" during which no problems are discovered.

Most counterfeit items are purchased from smaller manufacturers or suppliers in China. These kinds of suppliers are more concentrated in smaller cities or towns in China, where few or no regulations exist. Counterfeit items have been discovered in several ways, the most common being by testing. But many counterfeit products are put into use without being identified. This indicates that the current detection methods are, to some extent, ineffective or that some problems exist in certification standards.

The research discovered that the reaction of Chinese vendors when confronted about providing counterfeit products is likely to be negative. They do not readily accept responsibility. This is the most common problem in the Chinese construction industry.

The research also found that local Chinese governments understand the problem of counterfeiting and have decided that counterfeiting needs to be dealt with. But too often the local economy depends on counterfeiting operations, so the economic needs of the region override any motivation to eliminate counterfeiting. Therefore, the government tends to turn a blind eye to the situation. The national government also wants counterfeiting stopped, but they do not have the resources to control it. This is partially a result of a Chinese culture that believes that “close is good enough.” Many of the Chinese populace see nothing wrong with the practice, and view counterfeiting activities as merely one step in business development.

It was found that when any counterfeit item is found in a Chinese construction project, more than one counterfeit product is almost always discovered. In addition, counterfeit items are generally discovered after the purchase, during an inspection of the product. Therefore, it is necessary to strengthen prevention techniques to reduce the number of counterfeit products reaching construction supply chains. It is also essential to increase inspection within the supply chain to promote early detection. The research discovered that the most commonly counterfeited construction items are raw steel, steel fasteners, circuit breakers, transformers, fuses, resistors, switch gears, metal struts, pipe components, fittings, flanges, valves, raw materials, and testing certification stamps.

A majority within every segment of the supply chain believes that the Chinese government knows of the existence of the counterfeiting problem and has full or partial capability to mitigate it. This majority demands government action that could lead to the prevention and reduction of counterfeiting activity within the industry. The response of the government to counterfeiting, however, is unclear, and there is much to be done for the government to improve its identification processes and enhance its preventive and corrective procedures to the point of acceptable effectiveness.

Of the counterfeit items discovered that originated from an unapproved vendor, most were reported by suppliers. This is a strong indication that suppliers deal with more unapproved vendors than other members of the Chinese construction industry and could indicate that suppliers are the weak link in terms of Chinese construction supply chain integrity. Almost all respondents that have experienced counterfeit items in their construction supply chains believe that they have identified tip-offs or warning signs that an item is counterfeit. These are all listed at the end of this paper.

While the production of counterfeit items may be concentrated in certain areas of the world, their distribution covers the entire globe. Of those interviewed almost half feel that their clients have little to no awareness of the counterfeiting problem. However, the majority of those people feel that counterfeiting is a high risk to the construction

industry. Inspection efforts alone will be ineffective if the people performing these tasks do not know what they are looking for.

Inspection by experienced third-party personnel who have no connection to the manufacturer, supplier, or purchaser is recommended. It is also recommended that, especially in Asia, inspectors not be of the same nationality as those being inspected. Vendors and suppliers should be continually monitored and checked to ensure that proper procedures are being implemented and followed throughout the entire process. Random checks of the manufacturing plants and the supply chain should be conducted anytime something suspicious occurs.

If problems are discovered, the purchaser should immediately cut off business with the supplier to let it know that this is not an acceptable business practice.

Implementing penalties, the practice of accepting an unacceptable product at a reduced price, is strongly discouraged. The purchaser should make all parties associated with the company aware of the issue to help encourage others to not make the same mistake.

The research found that 26% of those interviewed check back as far as the supplier in their supply chain. In total, the research found six different levels to where different organizations check their supply chain. While most do not check all the way back to the source, many say this would be the best way to prevent counterfeit materials entering their supply chain.

KEY INDICATORS AND RECOMMENDATIONS

There are many warning signs that indicate a product or piece of equipment may be counterfeit. The list of Key Indicators is meant to enable procurement and project personnel to keep counterfeit goods out of the supply chain through identifying individual counterfeit items as someone attempts to infiltrate the supply chain or project site with the items. The Recommendations are more about policy decisions that organizations – contractors, manufacturers, suppliers, government agencies and owners – can make that will help mitigate this problem.

Key Indicators of Potential Counterfeit and/or Suspect Goods and Materials

Assuring product integrity is different than ensuring product quality. Product integrity means that the buyer is receiving what the buyer is paying for – not something else of equal quality, but exactly what is paid for. In some situations a counterfeit item may be of equal (or greater) quality to the real thing. However, a supply chain that can be infiltrated by high-quality counterfeit goods is more likely to be infiltrated by low-quality counterfeit goods than a supply chain that is diligent about product integrity. This list of Key Indicators is a list of circumstances. The presence of the listed circumstance means that an item or a shipment has a higher probability of containing (a) counterfeit item(s) than if the circumstance did not exist.

Supplier Behaviors

- Item is notably less expensive than the majority of competitors for the same item (price is too good to be true).
- Supplier too eager to make sale.
- Salesman / Representative doesn't ask questions when informed of a complicated requirement, but repeatedly says "no problem," or words to that affect, when he is told what is needed. A salesman that asks a lot of knowledgeable questions, while not appearing overconfident, is preferred.

- Goods arrive from an unknown supplier.

Documentation / Supporting Information

- Manufacturer and/or country of origin not readily detectable on the packaging, accompanying document, or website.
- Lack of material traceability or certificates of conformance.
- Generic invoices and documentation received with goods (not normal specific documentation).
- Shipment contains no, or insufficient, paperwork.
- Certificates of conformance are either missing altogether, missing expected information, or otherwise don't look right.
- Serial numbers are missing, or all serial numbers in the shipment are the same.

Appearance

- Markings or logos are inconsistent in placement or appearance.
- Items from a known supplier not packaged as usual.
- Components do not appear new.
- Obliteration of, or alterations to, markings or logos.
- Inconsistent appearance of items within the same lot.
- Inconsistent dimensions against a known standard.
- Item or logo is the wrong color.
- Words misspelled on the packaging or the item itself.
- Product markings are altered.
- Product appearance looks "off", different in appearance (sometimes the counterfeited item or its packaging looks "better" than the real thing).
- A shipment arrives with obvious differences in quality between similar products.
- Products show evidence of repairs or refinishing.

General

- Sudden, or instant, availability of difficult-to-obtain-or long-lead-time materials (without a premium price).
- Goods are offered from a resource outside of the normal supply chain or typical procurement methods, or from a source not known to you or an experienced procurement staff.
- Web-sites for supplier may contain photographs from someone else's facility.
- Normal receiving and/or NDE (non-destructive evaluation) methods reveal deficiencies or other non-conformance in goods or materials.
- A shipment exceeds the known production capacity of the plant of origin.
- A shipment arrives containing a non-homogeneous lot of products.

Recommendations for Companies and Agencies to Mitigate Counterfeiting in Construction Supply Chains

The following list of recommendations was developed as a means of providing owners, contractors, manufacturers and suppliers with techniques to minimize the Opportunity for counterfeit and suspect goods to enter their supply chains. None of the Recommendations are appropriate for all entities within the construction industry. All are appropriate for some. It is left to the reader to decide whether a recommendation is appropriate for their particular place in the industry.

Training / Education

- Train procurement personnel about the hazards of counterfeit goods and the most common ways these goods enter the supply chain. These are discussed briefly in this paper, but are described extensively in the literature.
- Train personnel performing quality evaluations on materials and equipment as to the hazards of counterfeit goods and the most common ways these goods enter the supply chain.
- Educate and train US Customs officials and those from other law enforcement agencies regarding construction goods and materials – not just the higher-profile retail products. These agencies are open to helping the industry, but they don't know what to look for.

Supply Chain Issues

- It is no longer enough to have and maintain an Approved Vendors List (AVL). Procedures and practices should be developed for qualification of suppliers and sub-suppliers. A key point to include in the practices and procedures is a visit to supplier or sub-supplier facilities. The visit should be made by personnel within the organization qualified to evaluate compliance of goods and materials to company and/or project quality standards. Only those vendors that pass this process should make up the AVL.
- NEVER buy anything from those not on the AVL, unless the subject of any such deviation has been afforded similar evaluation as the products of those companies on the AVL.
- Procedures and practices should include requirements that inquiry documents and purchase orders include language that will limit suppliers to known, proven and vetted manufacturers and sub-suppliers. These procedures and practices then need to be enforced by project management. Generate a strong list of approved manufacturers (AML) and make it readily available to users. NEVER buy from any supplier or distributor that does not guarantee that all products delivered to your company come from manufacturers on this list without having put forth the additional due diligence to assure that any such deviation from the AML is an acceptable manufacturer.
- Specify all base metal requirements in Purchase Order Requisition per project / industry code requirements.
- Require documentation of traceability / authenticity of supplied / purchased items and notification of process or sub-supplier / manufacturer changes prior to use or implementation of change.
- If possible, use distributors and/or suppliers who have documentation systems and receiving inspection systems that ensure the traceability of their parts / materials to an approved source.
- If goods or materials are ordered from a foreign country, it is important to have source surveillance inspection performed on a routine basis, or have resident inspectors in place, depending on the criticality of the order.
- In foreign countries, it is recommended that the qualified source inspector should be from another country. This is especially important where there may be *state-owned* suppliers, to lessen the chances of intimidation of the source inspector when making sensitive calls regarding quality.
- Consider reducing the company sourcing base to enhance the ability to perform effective auditing. Fewer suppliers mean less auditing. Develop

procedures and practices for purchasing personnel to follow when inquiring for purchase and placing orders for goods and materials.

Testing and Inspection

- Consider connections (fasteners) such as bolts as “pressure equipment” and not just as “commodities.”
- For alloy materials, a Positive Materials Identification (PMI) program should be developed and implemented. The materials to be examined would be any materials above a P-1 grade (carbon steel) material. There are several methods that can be used to provide *independent verification* of the material composition with respect to essential alloying elements. This should include base materials as well as welding consumables and finished welds.
- The PMI program should include witness and/or monitoring from a quality stand-point.
- No matter where an order is placed there should be a source inspection program for critical materials. The higher the criticality of the goods or materials, the more robust the inspection program should be. Likewise the less knowledge and experience the organization has with the supplier the more robust the inspection program should be.
- In foreign countries it is preferable to have a qualified ex-patriot perform the source inspection when possible. Minimally, supervisory visits from a qualified ex-patriot should be made.
- If problems arise during any phase of inspection that leads to a conclusion that the goods or materials are possibly counterfeit, a deeper investigation is warranted. Good documentation is a must, as is ongoing visibility and accessibility of documentation.
- Consult specialists whenever in doubt about product integrity.
- All inspection (from base materials to final products) should be performed per applicable codes, specifications & standards.
- Material Test Reports (MTRs) should be requested for raw materials and steel. The MTRs should be matched to the heat numbers or heat codes on applicable materials.
- Unannounced audit visits (when possible) should be conducted at suppliers’ facilities in order to evaluate the suppliers’ activities in the process of providing goods and materials.
- If the investigation leads you to believe the goods or materials are counterfeit, or alternatively, if the integrity of the goods or materials cannot be verified, all members of the project (purchasing, inspection, engineering, etc.) should be made aware of the issue and a conscious decision must be made as to the potential risks and the disposition of the goods and/or materials. This evaluation and final determination should be documented and communicated for lessons learned.

General

- Adopt a “zero tolerance” policy regarding counterfeiting. Report all incidences of counterfeiting and NEVER fail to support any law enforcement agency’s effort to prosecute.
- Each company that purchases or produces goods and materials should have a strong and enforced ethics policy. Good ethics can be a strong inducement to avoid counterfeit and/or suspect goods and materials.

- Document findings from evaluations performed on potential suppliers so that evidence can be provided and discussed with clients and/or purchasing personnel. By this, wise decisions can be made regarding risks associated with placing orders with new or unproven suppliers. The documentation should be updated as more information and experience is gained.
- Caution is urged when determining that usually unacceptable goods and/or materials will be accepted if a large enough discount in the pricing is granted. In some low-cost sourcing countries, accepting a discount is tantamount to a tacit agreement that whatever goods are delivered will be deemed suitable for service. Thus, the supplier or manufacturer will feel sufficient justification for stating that the goods provided are not counterfeit – or substandard.
- Notify the entire supply chain of any suspected findings of counterfeit goods.
- Encourage *victims* of confirmed counterfeiting to share the information with others within the industry to raise awareness and to help reduce the chances of that particular counterfeiting effort to continue.
- The intrinsic difference between “VENDORS” (contractual relationship only) and “MANUFACTURERS” (technical relationship) must be realized by all departments involved in the purchasing of goods.
- Recommend establishment of a repository for documented cases of counterfeit goods and materials in construction supply chains. If photographs and other comparisons between real and counterfeit items are available, they should be posted. These could be useful tools for comparison of suspect goods received on projects. The entries should be kept current and only posted after validation. If a particular incident cannot be validated or if it is found to be a hoax, that finding can also be posted.

CONCLUSIONS

Counterfeiting, as defined in this research, is a large and growing problem in the construction industry, and its ramifications are almost unlimited. Besides the US and Canada, five other nations were scrutinized in a research project sponsored by CII. The services of experts within each of the five countries were retained to carry out research on counterfeiting in the construction industry within the confines of their assigned nation. Each National Coordinator was also assigned the task of determining the perceived impact that the export of counterfeit goods manufactured within their country might have on the international construction industry. Besides the US and Canada, the countries chosen were the five countries that had been the import nation for the most counterfeit goods confiscated by the ICE. The nations were China, Hong Kong, Taiwan, Pakistan, and the UK.

China is the epicenter of today’s worldwide counterfeiting industry. This is true of non-construction and construction items. Indications from the research are that Hong Kong, Taiwan, and Pakistan are all places that have an illicit counterfeit manufacturing industry, though most of those interviewed in those countries fear imports from China. The UK seems to be a place that counterfeiters from around the world send their products to “launder” them before they are transshipped to the US.

The authors recommend that the industry make a priority of training its procurement, quality, and field personnel in how to prevent and mitigate the damage from counterfeit items in the supply chain. The industry must also systematically train the people hired to protect the public. The Port Master of the largest port in the US urged the research team to impress upon the industry their (port customs personnel) need for

training. He explained that construction items were off the radar of his customs inspectors because [they] don't know what to look for. He emphatically requested assistance in training them to inspect for counterfeit construction materials. The Tip-offs and Recommendations presented are intended as guidelines; following these guidelines cannot guarantee the elimination of all counterfeit goods targeted for a supply chain, nor can it prevent all purchases of counterfeit goods.

Finally, more research is needed. Although comprehensive and international in scope, this research project has just scratched the surface of the problem. Indeed, many interviewees expressed their concern that this research has only been able to look at the tip of the iceberg and that the world will eventually see a series of disasters attributable to counterfeit construction goods. Future research should focus on helping China and third world countries to stop the production of counterfeit goods and on helping supply chain operators identify and eliminate counterfeit items before they enter their supply chain.

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CURBING UNETHICAL PRACTICES ASSOCIATED WITH PREFERENTIAL ALLOCATION OF CONSTRUCTION CONTRACTS IN GHANA: SURVEY PROFESSIONALS' PERCEPTION OF WHO SHOULD LEAD THE WAY

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The construction industry in Ghana is bursting with speculation and pieces of information that suggest that certain contracts are awarded on bases other than merits of a proposed bid and the competitiveness of cost. This unethical practice is amongst the most prominent challenges facing the construction industry in Ghana and many other developing countries. Literature is not lacking on measures to tackle this practice, but what remains unclear is which professional stakeholder group is best positioned to lead efforts to change the situation. This paper reports a survey conducted into the extent to which key stakeholder groups of the Ghanaian built environment surveying profession (i.e. professionals; their organisations; and professional body) can influence improvement in unethical practices associated with preferential allocation of construction contracts in Ghana. On the four unethical practices considered, the results showed surveying professionals perceived themselves to have greater influence in helping to curb the practice of collusion. On bribery, they perceived similar levels of influence as their organisations. The professional, his or her organisation and professional body were perceived to have similar influence in helping to curb discrimination and nepotism whilst political influence was perceived to be best tackled by the professional's organisation and the professional body. Results from this study provide information to begin a bigger conversation on how to curb unethical practices associated with the problem of preferential allocation of construction contracts in Ghana's construction industry. Obviously, this conversation cannot be had without taking into consideration the roles various stakeholder groups can and should be playing in efforts to deal with the problem.

Keywords: preferential allocation, construction contracts, survey professionals, ethics, Ghana.

INTRODUCTION

Governments the world over are the major construction client. They often use the construction sector which creates and manages the bulk of a nation's built-assets to drive socio-economic development. Construction, therefore, underpins the economy

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of many nations (see HM Government 2018:7). In providing transportation, communication and energy infrastructure; housing; healthcare and education facilities, governments have tended to procure the services of contractors through various public procurement contractual arrangements. The World Bank (2013) defines public procurement as the process by which governments and other publicly-funded entities acquire goods, works, and services needed to implement public projects.

Many governments have enacted laws to harmonize public procurement processes in the public service to ensure judicious, economic and efficient use of state resources. These laws are meant to ensure that public procurement is fair, transparent and non-discriminatory. They aim at promoting competition and hampering corruption (Steven and Patrick 2006), reducing cost (Simon et al. 2005) and providing the enabling environment for effective utilization of scarce resources in the economy (Dikko 2000). Reducing bottlenecks, combating corruption, and building capacity in procurement helps governments to maximize the buying power of their budgets and improve the quality of service delivery to their citizens. Competitive and transparent public procurement systems are therefore a key element in achieving sustainable development and more prosperous societies in Africa (World Bank 2013). In Africa, examples can be seen in countries like Kenya, Uganda and Tanzania where they have sought to streamline public procurement in terms of efficiency and transparency through the enactment of laws (Odhiambo and Kamau, 2003). In Ghana, the Public Procurement (Amendment) Act 2016, Act 914 was introduced to streamline the anomalies in public procurement.

Public procurement laws notwithstanding, there is a growing consensus within and outside the construction industry that corruption and other unethical practices are endemic in the construction industry (Ameh and Odusami 2010). The presence of unethical practices within the construction industry is widespread (see Zou, 2006; Plimmer et al. 2009; Bowen et al. 2012; CIOB 2013; Brown and Loosemore 2015). Among the most critical ethical issues faced by the construction industry is bias in tendering or unethical tendering practices (preferential allocation of contracts) (Doran 2004; Vee and Skitmore 2003; Jackson 2001; Ray et al. 1999). In Ghana's construction industry, there is speculation and pieces of information that point to the fact that most contracts are awarded on a basis other than merits of a proposed bid and the competitiveness of cost. This misconduct in the tendering processes or award of construction contracts is unethical.

Whilst several measures have been suggested to tackle this unethical practice, it remains unclear which professional stakeholder group can best lead efforts to realise a positive change. This paper, therefore, reports a survey conducted into the extent to which key stakeholder groups of the Ghanaian built environment surveying profession (i.e. professionals; their organisations; and professional body) can influence improvement in unethical practices that border on preferential allocation of construction projects and attempts to identify the professional stakeholder group which is perceived to be the best to drive change.

UNETHICAL PRACTICES IN THE CONSTRUCTION INDUSTRY

Many features of construction contracts provide enormous opportunities for unethical practices to flourish. The size in terms of monetary value, the competitive nature of such contracts (Shakantu 2003), the uniqueness of such contracts (Robb 1996; Zhuwakinyu 2003) and government being the major client for such contracts provide

good grounds for unethical practices to flourish. There is extant literature on unethical practices in the construction industry. A study of the literature on unethical practices in the construction industry points one to examples of the practices to include failure to protect worker and public health, safety and welfare; collusion; mishandling of sensitive data (such as leakages); production of fraudulent documents (such as invoices and claims; failure to protect environment; bribery; improper relations with other parties (such as excessive gifts); abuse of company resources; abuse of client resources; discrimination and nepotism; misrepresentation of competence; and political interference. A segment of these practices noticeably touches on issues of corruption in the award of contracts (preferential allocation of contracts).

Corruption is defined by the World Bank as the abuse of public (entrusted) power for private benefit (Tanzi 1998). It is mostly seen in the form of a bribery i.e. illiciting money or payment-in-kind. A bribe involves anything of value solicited, bestowed, or offered to induce or influence the receiver's conduct in the discharge of public or legal duty (in this case the award of contracts). Bribery certainly is a form of corruption, and corruption most often involves bribery. Though not the only form of corrupt or unethical practice in construction contracts, bribery in relation to the award of contract seems the most visible form (Ameh and Odusami 2010). Among the most significant ethical issues, the construction industry is confronted with biases in tendering or corrupt tendering practices (Doran 2004; Vee and Skitmore 2003). Corruption in the procurement system is when public officers use their public powers for personal merit by taking bribes in exchange for an award of contracts to a contractor. In Ghana, this is referred to as 'kick-backs'. Percentages of the contract sum are given to officials of the tender board for their role in bid rigging in favour of a said contractor.

There is evidence in the literature to point to the role of individual professionals, their organisations and professional bodies in the fight against preferential allocation of construction contracts (Ameh and Odusami 2010). However, what remains to be known is the extent to which specific professional stakeholder group can lead and influence a change. Ameh and Odusami (2010) reported that in a construction contract, the quantity surveyor is the most susceptible to bribery. The builder/construction manager faces the greatest pressure to engage in unethical practices. The majority of respondents in their study in Nigeria indicated their involvement in unethical practices. They identified their professional body to have a crucial role to play a role in minimizing ethical lapses in the industry. They reckon that professional bodies should give more priority consideration to ethical discourse such as professional negligence, liabilities, responsibility to the profession and the society, whistleblowing and other contemporary ethical issues at technical sessions, public lectures, and seminars.

Ameyaw et al. (2011) asked their respondents to indicate whether corruption is prevalent in the construction industry in Ghana. The result showed that incidence of corruption is still endemic in the construction industry despite the efforts by successive governments to curb corruption. They identified the bidding/award stage as highly susceptible to corrupt practices. The tender evaluation stage of the procurement process was found to be the most susceptible to corrupt practices. They recommended that the evaluation panel, as provided by the law, should, therefore, be given a close monitoring to foil any attempt by unscrupulous bidders to bribe officials at this stage. It is worth noting that a lot of things happen during this stage and evaluation panels are sometimes pressurized to disqualify the most competitive tender

and rather recommend favourites of politicians or those in authority. Other times, corrupt bidders pay their way through the evaluation team to use all foul means to disqualify other bidders to their advantage.

Collusion in tendering takes the form of bid-rigging where members of the tender board come into agreement with external parties (such as politicians) to rig the tender process. This cartel is gradually developing deep roots in Ghana's procurement system. It is in most cases referred to as 'Whom You Know' (cronyism and nepotism). Politicians, especially, are seen to use their office to aid and abet in the allocation of a construction contract to an unmerited contractor with an agreement with members of the procurement board. Political interference, cronyism, and nepotism all have the tendency to weaken commitment and capacity of regulators to enforce regulations. The effects of such unethical practices can be seen in shoddy works, uncompleted projects, and outrageous final contract figures. The menace of preferential allocation of construction contracts has adverse consequences for the construction industry (see Runde et al. 2014; Schwab 2013).

RESEARCH METHOD

The target population for this study comprised built environment surveying profession stakeholders in Ghana (i.e. the professionals, their organisations, and the professional body). Data was collected from this target population through a questionnaire survey conducted during the 2015 Ghana Institution of Surveyors (GhIS) annual conference which was jointly organised with the Commonwealth Association of Surveying and Land Economy (CASLE). In Ghana, GhIS is the professional body that oversees the built environment surveying professions. The body has members in three divisions which represent the surveying professions: quantity surveying; valuation and property surveying; and land surveying. The conference was attended by about 450 delegates who were predominantly members of GhIS. A total of 105 useable questionnaires were retrieved from 250 questionnaires that were distributed at the conference i.e. a response rate of 42%.

The extent to which surveying professionals, their organisations, and professional body can influence improvement in four unethical practices associated with preferential allocation of construction contracts (i.e. collusion, bribery, discrimination and nepotism, and political influence) was assessed through a questionnaire survey. A five-point Likert scales (i.e. 1 = not at all; 2 = low; 3 = moderate; 4 = high; 5 = very high) was adopted in the questionnaire for the assessment. Demographic information such as professional role, education, and length of professional experience was also collected during the study. All data collected were analysed using descriptive statistics and presented using a table and multiple bar charts. This approach of data analysis and presentation was adopted for this study because of the ease with which it helps to construct a mental picture of the data and the people from which it was collected.

RESULTS AND DISCUSSION

Demographics

All the respondents were professional surveyors. The respondents' demographic information is shown in Table 1. The results show that the majority of the respondents are quantity surveyors (43%) with a postgraduate degree as their highest level of education (51%). The majority of the respondents are male (84%) aged from 31-40 years (35%) with up to 10 years of professional experience (49%). Survey professionals in senior management/executive positions constituted the majority of the respondents

for the study (56%). This is particularly important given that Ameh and Odusami (2010) reported that construction professionals in the junior to middle-level managerial positions are often the target recipients of financial bribes.

Table 1: Respondents' demographic information

Variable	Option	Frequency	Percentage (%)
Role	Estate Surveyor/Valuer	41	40.00
	Quantity Surveyor	45	43.00
	Land Surveyor/Geomatic Engineer	18	17.00
Highest educational qualification	Pre-degree (HNC/Diploma/HND)	10	10.00
	Bachelor's degree	41	39.00
	Postgraduate degree (Masters/Doctorate)	54	51.00
Years of professional experience	0-10 Years	51	49.00
	11-20 Years	42	40.00
	Over 20 Years	12	11.00

CURBING PREFERENTIAL ALLOCATION OF CONSTRUCTION CONTRACTS

Figure 1 shows that 47.6%, 52.4%, and 50.5% of the respondents perceive that they can influence improvement to have high to or a very high extent in collusion, bribery, and discrimination and nepotism, respectively. However, on political influence, only approximately 30% of the respondents perceive that they can, to a high or very high extent influence improvement.

Regarding the extent to which professionals' organisation can influence improvement in unethical practices, 42.0%, 54.3%, 60.0% and 55.2% of respondents were of the view that their organisations can influence improvement to a high or a very high extent in collusion, bribery, discrimination and nepotism and political interference, respectively. Figure 1 shows that 37.1%, 39.1%, 42.9% and 49.5% of the respondents perceived the professional body can influence improvement to have high or a very high extent in collusion, bribery, discrimination and nepotism and political interference, respectively.

On the four unethical practices considered, the results suggest that survey professionals perceived themselves to be best placed to lead efforts to curb the practice of collusion. On bribery, the results suggest that professionals and their organisations have a similar ability (i.e. high to very high) to influence improvement. Incidence of bribery is usually among project team members in the construction industry. Not only are professionals approached with monetary bribes but also nonfinancial bribes in the form of a promised future contract, gifts, birthday party and/or entertainments, or even an all-expenses-paid holiday abroad (Ameh and Odusami 2010).

According to Ameh and Odusami (2010), when professionals are short-changed, they tend to collude with contractors to defraud the client. Professional bodies and organisations can play a role in making taking bribes an unattractive venture through their actions against those found to be culprits but a personal decision not to take

bribes remains the surest way to curb the problem. In a desperate bid to win a contract for the survival of a firm, contractors may be unable to resist the temptation to bribe or indulge in other unethical tendering practices and thus find professionals that are willing to go along with them. It could be practically difficult to proceed with the unethical conduct if they do not find a willing professional in the process.

Chan and Armstrong (1999) and Bailey et al. (1991) opined that individual behaviour within an organisation is most likely to be according to group norm or corporate culture. This points to the need to focus on all three stakeholder groups if significant impact is to be made in efforts to limit unethical practices in the award of construction contracts. From the results of this study, the professional, his or her organisation and professional body are all perceived to be equally equipped to play a lead role in efforts to curb discrimination and nepotism.

However, on the problem of political interference, survey professionals feel that very little success will be achieved if they are placed at the forefront to curb this problem. The findings rather suggest that their organisations and the professional body should lead efforts to address political interference. This underscores the role of professional institutions in minimising unethical practices in the construction industry (Ameh and Odusami 2010).

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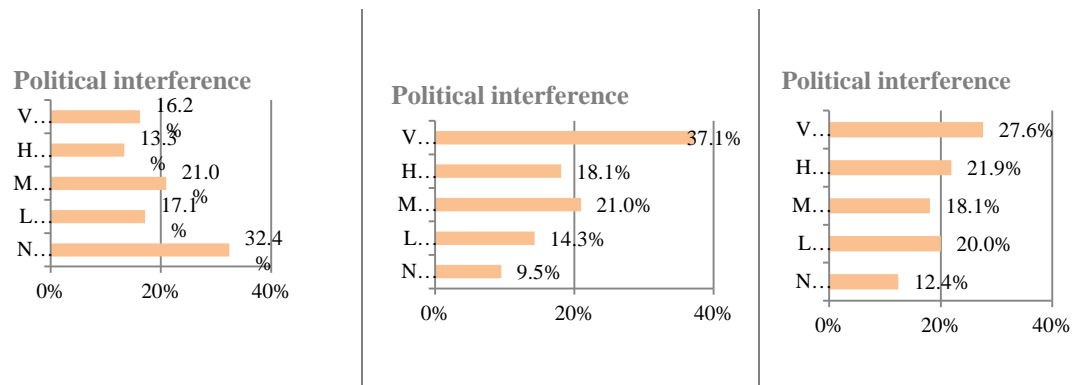


Figure 1: Extent to which practitioners, practitioners' organisations and professional body can lead efforts to curb preferential allocation of construction contracts

CONCLUSIONS

There is a myriad of unethical practices in construction contracting. However, on the problem of preferential allocation of contracts, it is mostly seen to manifest itself in practices such as collusion, bribery, discrimination and nepotism, and political influence. This potential denial of genuine and competent contractors from winning contracts affects all. There are trails of the adverse effects of such misconduct in tendering processes.

In answer to the question of which survey professional stakeholder group can best lead efforts to curb unethical practices associated with preferential allocation of construction contracts, this study concludes that individual professionals, their organisations and the professional body all have important roles to play. The professionals, and to some extent their organisations, could lead the fight against collusion. Regarding bribery, the professionals and their organisations could also lead efforts to bring about improvement. The professionals, their organisations and the professional body could all be at the forefront in the fight against discrimination and nepotism. The professional body and professionals' organisations could lead the charge against political influence.

Surveying professionals should be serious with ethical issues and their organisations and professional body must provide them with the training and support systems required to help them to operate ethically in the discharge of their professional duties. Adequate and prompt payment of monies due to professionals should be a matter of great importance in the fight against bribery and collusion. The professional body remains a key stakeholder in tackling political interference. Through dialogue with government and lawmakers, the professional body should develop enough clout to protect their members who resist this kind of interference and to be bold to name and shame politicians who engage in this act. Overall, the results from this study provide information to begin a bigger conversation on how to curb the problem of unethical practices associated with preferential allocation of contracts in construction.

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**PROFESSIONALISM AND
CURRENT ISSUES SUCH AS
LEADERSHIP; SUSTAINABLE
DEVELOPMENT;
TECHNOLOGY
DEVELOPMENT; AND
INNOVATION**

PERCEPTION ON SUSTAINABLE CONSTRUCTION PRACTICES: THE CASE OF SRI LANKA

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While being a significant player in the economic and employment sectors in most countries, negative impacts of the construction industry such as carbon emissions, environmental pollution and waste generation have become a great global concern. It is recognized that the built environment has a high potential to address sustainability issues such as energy consumption, thermal comfort and waste implications through sustainable construction. Sustainability has been misunderstood largely in the developing countries as an expensive means to reduce the environmental impacts of construction. Moreover, developing countries have shown less concern for sustainability due to a lack of knowledge and competency among the construction practitioners. Hence, it is necessary to investigate the understanding, awareness and attitude of construction practitioners about sustainable construction. The Sri Lankan construction industry has recently recorded a significant boom with several large construction projects taking place around the country. Government initiatives on sustainability to improve the quality of construction projects have failed due to lack of awareness and knowledge of construction professionals about sustainability. The study was conducted among 112 professionals using snowball-sampling method, to gain insight into the knowledge and awareness levels of Sri Lankan construction professionals about sustainability in general and sustainable construction practices in particular. The study revealed that the Sri Lankan construction professionals lacked sufficient awareness and knowledge of sustainable construction practices. Moreover, the interest of Sri Lankan construction professionals in sustainability remains low despite the global trend.

Key words: Construction, Sustainability, Sri Lanka

INTRODUCTION

The construction industry is a significant player in the economic and employment sectors in most countries (Afzal, Lim, & Prasad, 2017). Simultaneously, construction activity has resulted in several negative impacts such as carbon emissions, environmental pollution and waste generation, and this has become a global concern (Zuo & Zhao, 2014). Accordingly, the environmental performance of the construction industry has become an area of concern, making sustainability an important agenda in the strategic decision making process (Afzal et al., 2017; Sev, 2009). The concept of sustainability has evolved over time to incorporate economic, social and environmental dimensions (Kuchinka, Balazs, Gavriltea, & Djokic, 2018). It is recognized that the built environment has a high potential to address sustainability issues such as energy consumption (Santamouris et al., 2001), thermal comfort (Chee, Chang, & Wong, 2011) and waste implications (Hammond & Jones, 2008) through sustainable construction. Hence, the necessity to investigate the understanding, awareness and attitude of construction practitioners of sustainable construction has increased significantly.

Early perceptions of sustainability emphasized the environmental perspective resulting in several misconceptions. This misconception is severe in the developing countries and remains a current issue. There is a difference in the perception of sustainability in the developing countries in comparison with developed countries due to several

reasons. (i) Sustainability is considered as a concept to address environmental issues which involves significant overheads; (ii) Precedence of economy over sustainability in the developing countries has given less importance to sustainability; (iii) Knowledge and awareness of sustainability is at an early stage in the developing countries. Accordingly, conducting a study on perceptions of sustainability perceptions has become a necessity, in order to encourage the construction practitioners to identify the true potential of sustainable construction.

Despite the large number of studies available on sustainable construction worldwide, very few have taken a holistic approach to address the economic, social and environmental sustainability aspects (R.-D. Chang et al., 2018). Serpell, Kort, and Vera (2013) conducted a study on the awareness and actions on sustainable construction in Chile, and Yin, Laing, Leon, and Mabon (2018) did a similar study in Singapore to assess the awareness and understanding of sustainable construction. A study by Matinaro and Liu (2017) suggested that the lack of innovative practices in the Finnish construction sector has a negative impact on the societal adoptability towards sustainable construction. Yusof, Abidin, Zailani, Govindan, and Iranmanesh (2016) did a similar study in Malaysia and Son, Kim, Chong, and Chou (2011) surveyed the sustainable construction practices of US and Korean constructors. The predominant focus of many studies on the environmental aspect of sustainability has resulted in failure to capture the complete picture of sustainability. This has been severe in developing countries such as Sri Lanka.

The Sri Lankan construction industry provides an ideal case to study the awareness of, and attitudes to, sustainable construction as there has been heavy focus on sustainability, especially with the government's initiatives on sustainable development. As in many other countries, the Sri Lankan construction industry is mainly concerned with cost and time of construction projects. Sustainability is wrongly perceived as an expensive choice to reduce the environmental impacts of the construction project. Thus, sustainability has been of less concern among the Sri Lankan construction stakeholders. A boom in the Sri Lankan construction industry has made this the right time to emphasize the importance of taking sustainable construction practices into consideration in new developments. Over the past decade, Sri Lanka has recorded a rapid development in construction with an increasing volume of construction taking place, especially in the Colombo suburbs. Thus the efforts made by the government to establish sustainable development initiatives have failed to attain the desired results. The initial step of establishing sustainable practices is to increase the awareness and knowledge. In this endeavor, an awareness assessment of Sri Lankan construction practitioners about sustainable construction practices is timely. The purpose of this paper is to contribute to this knowledge field through consideration of the Sri Lankan construction industry's perception of, and its effort in practicing, sustainable construction.

LITERATURE REVIEW

The construction industry has a significant impact on the Sri Lankan economy. It has recorded an upward trend, especially after the end of the ethnic war in 2009. Revival of economic activities has resulted in a boom in the construction industry. ICRA Lanka (ICRALanka & IMaCS, 2011) reported that the development activities which started from the rebuilding of the North and the East have spread all over the country. The construction industry accounted for 7.6% of the Sri Lankan GDP and recorded a

substantial growth of 14.9% in 2016 in terms of value addition of construction industry. Department of Census and Statistics Sri Lanka reported that 684,970 people were employed in the Sri Lankan construction sector (Jayalath & Gunawardhana, 2017).

The development of the Sri Lankan construction industry has been affected by the new trends. These include high volumes of activity in building offices, luxury residential developments, hospitality facilities, affordable housing, and the government's mega infrastructure development projects. On the other hand, the urban population is growing, with an uptick in demand for the apartments. Major development projects such as the Western Region Megapolis Project and Mega Port City have resulted in an increase of land prices. This has led to a further increase in the demand for apartments; major projects such as Crescat residencies, The Emperor, Monarch, Trillium Residencies and Havelock City have been established while another 3000 units are still under development (Jayalath & Gunawardhana, 2017).

Moreover, a sharp increase has been recorded in the number of hotels due to the rise of tourist arrivals. Major hotel and shopping malls such as Shangri-La, Grand Hyatt, Cinnamon Life and ICT Hotels, are under construction in the Colombo suburbs. There are many other large projects under development all over the country. The requirement for Grade A office spaces has increased over the past few years, resulting in more office space constructions. Access Towers Phase II, Orion Towers, Cinnamon Life, Water Front, and Shangri-La are some of the ongoing office space construction projects. The government infrastructure development has also increased significantly over the past few years, resulting in more construction being taken place in the country (Jayalath & Gunawardhana, 2017).

The increasing number of construction projects has had a significant impact on the environment (Serpell et al., 2013). Construction is responsible for 40% of total energy production, 35-40% of CO₂ emissions, 16% of the global water use, 40% of raw material use, 25% of timber use and 30-40% of solid waste generation globally (Akbiyikli, Eaton, & Dikmen, 2012; Berardi, 2013; Son et al., 2011; Van Bueren & De Jong, 2007). It is clear that high importance should be given to reduce the impact of construction on the environment.

Sustainable construction was defined as "a holistic process aiming to restore and maintain harmony between the natural and built environments, and create settlements that affirm human dignity and encourage economic equity" in Agenda 21 for Sustainable Construction in Developing Countries (SCDC) (Du Plessis, 2002). The environmental aspect of sustainability has been recognized as a key element in sustainable construction. Thus, many researchers focused on that dimension (R.-D. Chang et al., 2018). However, Serpell et al. (2013) suggested that most of developing countries have not achieved the environmental goals of sustainable construction yet.

The main stakeholders of the construction industry are responsible for adopting sustainable measures during the whole construction process (Dahl, Horman, Pohlman, & Pulaski, 2005). A systematic approach was proposed by (Abidin, 2010) to achieve sustainable construction which involves all construction stakeholders. Awareness of sustainability concepts is a critical element in implementing sustainability strategies successfully. Serpell et al. (2013) indicated that lack of awareness on sustainable construction is a common issue among the construction stakeholders of developing countries. This has resulted in less motivation to implement sustainable construction

practices. Identifying the need, Shafii, Arman Ali, and Othman (2006) discussed the barriers in implementing sustainable construction in South-east Asia. Lack of education on sustainable design and construction and lack of awareness were recognized as the main barriers in implementing sustainable construction practices in the region. Other barriers were: perception of higher cost of sustainable buildings, lack of regulatory frameworks to encourage sustainable construction, low-prices due to hard-bid processes, and lack of professional capabilities.

Myers (2005) reviewed the practices of sustainability in UK based construction companies and found that very few companies have embraced sustainability. Manoliadis, Tsolas, and Nakou (2006) found that fundamental drivers of sustainable construction in Greece were resource conservation and energy, urban planning policies and land use regulations. Majdalani, Ajam, and Mezher (2006) examined the role played by various actors in sustainable construction in Lebanon and found that the use of sustainable practices was at a significantly low level in Lebanese construction. Son et al. (Son et al., 2011) found that in Korea and US, the constructors had a higher awareness of sustainable construction practices with a lack of sustainable construction practices adaptation during the design stage. Abidin (2010) found that only the large developers were using sustainable construction practices in Malaysia. Thus, it is evident that despite the efforts, sustainable construction still remains a prospect which is not fully embraced by the construction practitioners worldwide.

The Sri Lankan government has taken several initiatives on sustainability. The Ministry of Environment and Natural Resources (MENR) has released the National Sustainable Development Strategies, a country-based and country-owned system (Athapaththu & Karunasena, 2018). The aim of this guideline was to aid sustainable development in the country. However, it is argued that despite the demand for sustainability, Sri Lanka's construction industry is not sufficiently equipped with sustainable construction practices. A recent study by (Athapaththu & Karunasena, 2018) identified that the contractors have a significant role to play in the sustainable construction process in Sri Lanka, but the lack of resources, lack of technical skills and other barriers have restricted the successful implementation of sustainable construction in Sri Lanka. It is evident from the above discussion that the Sri Lankan construction industry lacks the proper awareness of sustainable construction.

RESEARCH METHODOLOGY

The study adopted a structured questionnaire survey. The research was initiated with a literature review on sustainable construction practices. This formed the basis of a questionnaire survey to assess the awareness of Sri Lankan construction professionals about sustainable construction practices. The questionnaire was administered to 120 construction practitioners in Sri Lanka. The targeted respondents included Architects, Civil Engineers, Electrical Engineers, Quantity surveyors, Facilities Managers and Compliance Managers from both public and private sector. The questionnaire was also sent to some organizations including the Construction Industry Development Authority (CIDA), Institute of Quantity Surveyors of Sri Lanka, Institute of Engineers Sri Lanka and developers on the member list of CIDA. Snowball sampling method was used to increase the sample size of the survey (Atkinson & Flint, 2001). Respondents were requested to distribute the questionnaire among other construction professionals.

Data collected through the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS). Cronbach's alpha, Relative Importance Index [RII] and descriptive statistics were the tests applied in the analysis. (Siegel & Castellan, 1988) stated that the above-mentioned non-parametric statistical tests are useful when the population of the distribution is not exactly known and the sample size is small. Cronbach's alpha test was used to measure the reliability of data. Leontitsis and Pagge (2007) have indicated that Cronbach's alpha reliability coefficient measures the reliability by examining the internal consistency of the adopted measurement scale. Some 112 of the 120, professionals responded to the questionnaire. Time length a respondent has been involved in the construction industry ranged from below 1 year to above 5 years. Majority of the respondents had an experience between 2 to 5 years (60.36%) in the construction industry. More than 75% of the respondents had more than two years of experience in the construction industry, which increases the reliability of the study.

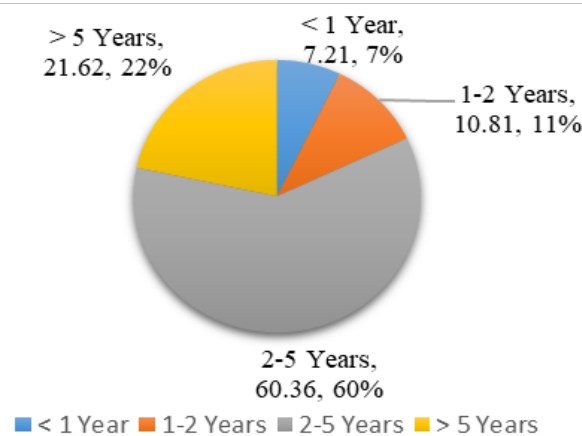


Figure 1: Experience of the respondents

FINDINGS AND RESULTS

Results of the study are reported under three categories. Table 1 shows the interest of Sri Lankan construction professionals in eight selected factors of sustainable construction including sustainability, cost of construction and water use, using a five-point Likert scale.

Table 1: Interest of respondents on construction related factors

	Mean	Std. Deviation	Rank
Cost of construction	3.96	0.827	1
Sustainability	3.63	0.630	5
Health and Safety of construction workers	3.54	1.146	7
Local Business/ Local Economy	3.39	0.809	8
Duration of construction	3.78	0.707	3
Resource consumption	3.95	0.613	2
Environmental Impact	3.72	0.796	4
Water Use	3.60	0.915	6

The professionals were concerned with the cost of construction, closely followed by resource consumption. Sustainability was ranked fifth among the eight factors. This relatively low level of interest of respondents in sustainability is a concern. The definition of sustainability which interconnects the goals on environment, economy and society, implies an ethical concern in the the practices of construction professionals

(Ball, 2002; L.-F. Chang, Seto, & Huang, 2013). This ethical concern is even more significant as sustainability addresses social factors such as respect for staff and team work (Akadiri, Chinyio, & Olomolaiye, 2012).

The next part of the study was focused on assessing the awareness relating to the concepts of sustainability. This was also done using a 5-point Likert scale (see Table 2).

Table 2: Understanding of respondents on sustainability

	Mean	Std. Deviation	Rank
Sustainability is all about environment only	3.13	1.163	2
Sustainability is a synonym for 'Green'	3.11	0.971	3
Practicing sustainability can be expensive	2.87	1.061	4
Sustainability is about Reduce, Reuse and Recycle only	2.87	0.963	5
Sustainability means lowering our standard of living	2.75	1.248	7
New technology is the only solution to sustainability	3.26	1.191	1
Sustainability creates pollution problem (e.g. more people, more wastes are generated)	2.79	0.950	6

The majority of the respondents believed that technology has a significant impact on sustainability. This was closely followed by the misconception that sustainability is about the environment only. Many professionals across the globe have this misconception due to the initial definitions of sustainability which significantly focused on the environmental aspects. These results indicate that respondents are in line with the findings of R.-D. Chang et al. (2018) who suggested that sustainability has not been holistically approached by many professionals world-wide. These results are also in line with the reasons for lack of interest in sustainability in Table 1.

Simultaneously, respondents were asked to indicate their awareness of, and attitudes to, concepts related to sustainable construction. Results suggest that the majority of the respondents believe sustainable construction can improve energy efficiency. Respondents also believed that sustainability needs to be introduced into construction during the design stage, and it can help reduce the use of resources. This indicates that respondents had a significant awareness about sustainable construction. These results further affirm the fact that respondents believe sustainability to be a concept which addresses environment-related factors.

Table 3: Awareness and attitude towards sustainable construction practices

	Mean	Std. Deviation	Rank
Sustainable construction can improve energy efficiency	3.60	1.009	1
Sustainable construction should begin from design stage rather than construction stage	3.38	1.032	2
Sustainable construction can reduce use of resources	3.36	0.985	3
Utilization of high performance insulation protection, water and energy saving equipment etc. are less damaging to the environment, but often increase the capital cost	3.30	1.114	4
Implementation of ISO 14001 EMS for sustainable construction is to achieve better environmental performance	3.29	0.934	5
There are various types of construction waste materials available for recycling	3.22	1.221	6
Success of sustainable construction will not be possible without the commitments from stakeholders and consultants	3.15	1.006	7
There are limited selections of environmental friendly materials	3.11	0.831	8
Sustainable construction requires setting minimum standards through legislative requirements	3.06	1.133	9
There will be time impact in practicing sustainable/green construction	3.00	0.959	10
Recycled or environmental friendly materials are 'Green' labelled	2.84	0.886	11

CONCLUSIONS

The study sought to assess the awareness of, and attitudes to, sustainability, of Sri Lankan construction professionals. Sustainability is a concept that combines three main aspects: economic, social and environment. However, very few studies have approached it holistically. It was evident through the literature review that the majority researchers believed sustainability to be a concept that addresses environmental aspects. It was also evident that this situation was severe in developing countries.

The Sri Lankan construction industry has recorded a significant development in the past decade with large construction projects taking place throughout the country. This study is more significant as the Sri Lankan government has put forward several sustainability initiatives to address the developments in the country. The questionnaire-based survey revealed that among the factors related to construction, professionals showed a high level of interest in cost and resource consumption. More significantly sustainability was ranked low on the list of interests. From the literature, holistically approached sustainability has a significant impact on the ethical concern of the professionals. Therefore, lack of interest on sustainability will have an impact on the ethical behaviour of construction professionals. The findings of this study further suggests that Sri Lankan construction professionals are aware of the environmental aspects of sustainability. Thus, more effort should be made to promote factors relating to social and economic sustainability the professionals. The research reported in this paper suggests that whilst certain preconceptions about the realities of sustainable construction might well persist, the enshrining of practical routes to the adoption of sustainable practices is likely to have the greatest and most significant effect on construction practices.

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PROJECT MANAGEMENT AND PROFESSIONALISM

EXPLORING THE DISCREPANCY BETWEEN ARCHITECTURAL MANAGEMENT THEORETICAL MODEL AND REAL-LIFE APPLICATION IN EGYPTIAN SMALL AND MEDIUM-SIZE DESIGN FIRMS

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One major challenge that faces architectural practice nowadays is managing the design process effectively. With the present growth in scale and complexity of projects in Egypt, local design firms need to develop innovative means to manage the business, hence become more efficient and profitable. Architectural Management (AM) helps design firms become more responsive to changes, more efficient and competitive. Several theoretical models attempted to incorporate AM into practice; this paper adopts 'Architectural Management Competitive Framework' (AMCF), for that it can be very useful in transferring the theory to practice. The research claims that there is a certain level of discrepancy expected in theoretical models when it comes to application, it examines the aforementioned claim by surveying a sample of 15 Egyptian small and medium-size architecture firms. A purpose designed semi-structured interview was employed to investigate where the AMCF applies, and where it comes short in the Egyptian context. The findings conclude the need for AMCF model in architectural firms with some adjustments, it also highlights the difficulty of applying this model to smaller firms and the need for adjustment when applied to larger firms.

Keywords: Architectural Management; Architectural Practice; Egypt; Practical Application; Theoretical Model.

INTRODUCTION

The increase in complexity and scale of projects in Egypt requires that architecture firms adopt innovative means to manage the business to become more efficient and profitable. Architects need to acquire adequate design, technological and managerial skills to better manage their firms (Stephan Emmitt, 1999b). Architectural Management (AM) offers the design firms the necessary activities and tools for an enhanced management system, leading to a more competitive practice that is responsive to the challenges faced.

The term AM has been in use since 1964 (Brunton, Baden Hellard, & Boobyer, 1964), and despite the significant role of Conseil International du Bâtiment⁴ workgroup 096⁵ (CIBW096) in the development of AM – being the main advocates

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for the research and development in this field, research on AM is generally considered scarce at present (Alharbi, 2013).

Applicability of AM in Egyptian firms is examined by this research. It discusses the main AM models, definitions, developments and current standing point – to conclude to the adopted framework. The main elements of Architectural Management Competitive Framework (AMCF) are then used to develop a semi-structured interview, towards identifying the gaps between theory and practice, as applied to implementing AM in small and medium Egyptian architecture firms. The research validates the tools and activities proposed in the AMCF model, which will be explained later in the paper. The authors conclude with some recommendations and insights regarding the application of AMCF model in the Egyptian context.

RESEARCH DESIGN

This research adopts a qualitative approach that is built on two main pillars; namely literature review and in-depth interviews. The literature is analysed by discussing different models of applying AM in practice. The objective of the analysis is to choose a model that best addresses the wide spectrum of variables facing architectural firms when applying AM. Moreover, the model should explain how AM is being deployed inside firms and its benefit with respect to the efficiency of architectural firms.

To test the selected model in the Egyptian context, the authors conducted in-depth interviews as they allow interviewees to share their personal experiences, and discuss further issues around the topic, which consequently enriches the value of the information collected (Kvale, 1996; McNamara, 1999).

SCOPE OF THE STUDY

There is no single official classification of firm sizes being adopted in Egypt (Ayadi et al., 2017). Thus, the present study builds on the classification by the European Commission (EC) “[EU recommendation 2003/361](#)”, due to the presence of some similarities between European and Egyptian domains. This EC classifies the firms either by staff head count or turnover. This research chose classification by staff headcount with the following parameters: small-sized firms 50 employees or less; and middle-sized firms 250 employees or less.

Small and medium-sized firms were researched. These are believed to be the most appropriate for testing the model: micro-design firms were excluded from this research as they lack the sufficient structure for testing the AMCF model. Large design firms were also excluded due to the complexity of managing such firms, and the difficulty of interviewing senior managers, hence making it difficult for the AMCF model to be tested and to be applied – particularly with the extension of their projects in different regions around the world.

INTERVIEWED SAMPLE

Due to the qualitative nature of the study, a purposive sampling strategy was adopted. This sampling technique – also referred to as judgment sampling – is useful as it is a non-random technique that does not require a certain number of participants (Teddlie & Yu, 2007). Purposive sampling allows the researcher the freedom and flexibility to find most relevant participants to the research relying on their experience and knowledge (Etikan, Musa, & Alkassim, 2016).

Interviews were conducted with 15 architects in positions ranging from project managers up to senior partners and/or owners. The selection criteria relied on choosing those who are more involved with the management process, who are exposed to different departments and/or activities, and who are in direct contact with the design teams.

UNDERSTANDING ARCHITECTURAL MANAGEMENT

What is Architectural Management?

Although the term AM was mentioned as early as the 1960's, it is still considered a new field and literature on it is still scarce. It is suggested that AM was first defined by chartered architects Brunton, Baden Hellard & Boobyer in 1964 as a process that entails two distinct parts: office or practice management and project management. Practice management provides an overall framework where many projects will be initiated, managed and completed. (Brunton et al., 1964).

Previously, in the 1940s, architectural practice was not considered a business. Since then, it was common to separate the management of the firm from the management of the projects. There were several other attempts to define AM in the 1990s that are either too vague or too specific. In the mid-1990s, a more elaborate definition was attempted by Akin and Eberhard who defined AM as the entire set of management functions that involves the building, designing and operating of buildings (Akin & Eberhard, 1996).

Alharbi et al. more recently defined AM as "...[t]he strategic management of the architectural firm that assures the effective integration between managing the business aspects of the office with its individual projects in order to design and deliver the best value to all stakeholders." (Alharbi, Emmitt, & Demian, 2015).

Putting AM into Practice

Since there was a need to put AM into practice and to administer a research work that expands the scope of AM, AMCF (Alharbi, 2013), the Design Management Framework (DMF) (Sun, Williams, & Evans, 2011), and Lean Design Management (LDM) (Reifi & Emmitt, 2011) were developed to focus on transforming the design industry from the theoretical approach to a rather practical one.

AMCF directed its framework specifically to the architecture and building industry, while DMF and LDM referred to the industry as a design industry. Additionally, the AMCF framework is a more comprehensive one: it covers all stakeholders involved in the industry. Both business and management aspects of the industry were included in the definition of the model. AMCF seeks to basically supply all the information that professional practitioners, researchers and students will need to transform their theoretical knowledge to a practical one. The AMCF framework was put through a rigorous process of evaluation, employing the scrutiny of professionals, researchers and academics.

On the other hand, both DMF and LDM focus on design rather than the holistic overview of AM. Moreover, DMF did not have a complete evaluation or adaptability of effectiveness. Fundamentally, no credible evaluation was done (Sun et al., 2011), while LDM requires customization to be adopted in the management of architecture firms (Reifi & Emmitt, 2011).

Thus, the effectiveness and usability of both DMF and LDM were not confirmed. Consequently, the researchers chose the AMCF framework to further analyse firms in the Egyptian context as it has been shown to be adequate and applicable.

Architectural Management Competitive Work (AMCF)

A preliminary study by AlHarbi (Alharbi, 2013) revealed that AM can be practically applied by understanding its scope and recognizing its benefits. Moreover, Emmitt (Stephan Emmitt, 1999a), added that effective communication, better education, human resource strategies and planning are fundamental to the practical application of AM.

As the need of a change in management arose, AlHarbi developed AMCF to support and enhance the transferring of AM from theory to practice. This theory aims at equipping architects to understand and avail resources to manage the business side of architectural practice. AMCF made provision a set of structured tasks that are active and flexible to allow room for improvement by users to fit into their specific processes and/or regions.

Theory Development and Testing

The AMCF theory conceptualises a generic and specific structure solely for the application of architectural management to enable practitioners and students to understand the scope of AM as well as the connection between its components.

The AMCF theory was developed by using several methodologies including a systematic review of literature, survey questionnaires, and historical frameworks which had previously been tried. Furthermore, discourse analysis of the literature obtained was undertaken, and workshops were held to discuss and make analogical comparisons of the literature and information gathered. Quantitative measures were employed at this phase; however, functioning architecture firms were not willing to adopt a new untested theory.

Testing the theory was achieved through workshops, interviews and questionnaires with the intention to critically evaluate, and provide recommendations to improve the practicality of the theory and definition of AM.

The AMCF theory was put through a revision process and informal piloting sessions to authenticate its dependability. Later, the theory and the definition of AM were found sufficiently suitable to be adopted to champion the transferring of AM from a theoretical approach to a practical approach with room for further testing.

AM Building Blocks

AM is a comprehensive framework, developed in a bottom-up approach starting with tasks and activities that lead to the main building blocks: managing the business, managing the projects, managing stakeholders and managing education (Alharbi, 2013).

a. Managing the Business

Alharbi explains that managing the internal environment of an organization is paramount to its success in the external business environment. He believes that when dealing with internal components, managers will have to examine strengths, weakness, market opportunities and threats. He reiterated that to manage a business successfully, managers need to acquire certain interpersonal and managerial skills. Many believed that it is not possible to find one solution to fit all firms (Piven & Perkins, 2003) yet following a successful model is a prerequisite; as Littlefield

(Littlefield, 2012) explained, the firm's success relies on a 'complex matrix' of variables.

b. Managing the Projects

Efficient management is critical for a firm to become successful and more competitive. Alharbi discussed several significant sub-categories when analysing managing projects under the AM framework that include the management of the design, project, construction, facilities, quality as well as value management.

c. Managing Stakeholders

There are several stakeholders involved with architecture firms; each has different interests. They include: clients, architects, engineers, contractors and governmental organisations.

The 'client' is considered the most important stakeholder, as he is the main reason for the existence of the firm. Moreover, the "client" is a rather complex term (Stephen Emmitt & Prins, 2005). Different stakeholders fall under the term (Rutter & Wyatt, 1995); they differ in each project and fall under three main categories: Strategic, Tactical and Operational stakeholders. Different tools and tactics are required to deal with each stakeholder. Managing stakeholders allows the firm to identify, analyse, value and measure the stakeholders and their involvement.

d. Managing Education

Many of the current education programs fail to cover the Royal Institute of British Architects (RIBA) definition of Architecture Education; RIBA explains it as "the education of architects [that] prepares them to assist their clients at all stages of the building project and to coordinate all the elements of the design and construction process" (Cairns, 1992; Nicholson, 1995). Nicholson and Naamani (Nicholson, 1995; Nicholson & Naamani, 1992) continue their criticism of the current educational programs by explaining that the current programs do not consider the different aspects of the projects; rather, they focus on the design stage.

Moreover, Banks (Banks, 1993) explains that AM has not made progress in architecture education due to the low availability of professionals designated to teach AM. The main sections of AM are not part of the programs offered.

ANALYSIS AND FINDINGS OF INTERVIEW RESPONSES

The authors relied on the practical experience of 15 key persons in a sample of Egyptian firms to test where the building blocks of the AMCF model applied, and where they came short in the Egyptian context.

Managing the business

Many of the firms interviewed stated that they already implement an organizational structure; some explained it by sketching out their organizational chart, others printed out the structure from the firm's database and the rest just explained it verbally. The majority have a dedicated managing director for each department; the remaining few either merged several departments under one manager or delegated most of the supporting functions to the partners or managing director.

A chief operations officer of one medium-size firms stated that "companies that grew from a small design office into a design firm, gave weight to the design director at the expense of other functional directors". Moreover, respondents from other medium-size firms argued that entities that are established as design firms or relied on a

managerial model to grow through research and consultancies, acknowledged that function directors – other than design and engineering – are as important as design directors.

When asked about business planning, very few respondents seemed to have a proper planning function; instead they rely on the volatile market demand and respond accordingly. Only three of the respondents set annual targets and objectives and the head of each department works with his/her teams to set realistic goals that are quarterly evaluated.

With regards to bringing in new businesses and planning their growth, all respondents agreed that a business development unit tracks new leads. A few firms rely on client relationship management systems and follow-up. This mechanism is a substitute for marketing and sales services.

All firms realize the need to have a designated person responsible for financial issues. The responsibility is either that of the managing director, or an assigned director who handles the financial issues, or a chief financial officer. The main responsibility of the financial officer is estimation of design billable hours, rather than financial planning and scheduling. Almost half of the interviewees said that they have proper financial plans and adequate audit systems in place.

Interviewees suggested that human resource management is shared with other administrative functions in small firms. In larger firms, it is under a stand-alone department. Five of the interviewed firms confirmed that the human resource role is to implement a continuous professional development program based on the projects' requirements and team needs.

All 15 respondents' legal matters are handled as part of the administrative function. Legal subjects typically include issuing permits, clients' and sub-contractors' contracts, governmental and formal institutional requirements.

When the issue of professional ethics was discussed, all respondents instantly stated that they respect ethics. However, no personnel in charge or a procedure are set up to govern ethical matters when needed.

Respondents seemed to manage the working environment by instinct. Only two of the 15 respondents are trying to engage with employees through a better work environment. One executive manager of a small firm said, "we try to enhance our work environment by celebrating our employees' special occasions and achievements".

Technology is a significant pillar in architecture firms; accordingly; all respondents have a very strong information technology department. Technologies, tools, software and hardware are regularly updated to keep up with the fast pace of market developments and clients' needs.

A large segment of the respondents had a system that shares and manages knowledge. Some rely on experiences from previous projects; others share knowledge through planned seminars and workshops.

Managing the projects

Design management is the most significant function in any architecture firm as clarified by the interviewees. There is either one person who manages all design activities, or a number of players who are assigned different design departments.

All departments in all the interviewed firms function in the same manner, with a head of department supervising team leaders assigned to specific projects, starting with the concept stage until the delivery of drawings to the project manager.

The role of project managers is integral to the process, as explained by all respondents. A design director in a medium-size firm explained that “project managers are the focal point of communication with internal and external stakeholders; because internally, they are in charge of communication between the different team-leaders”. He added that “externally, project managers are the face of the firm. They communicate and deliver clients’ needs to internal departments and make sure they are fulfilled”. Four of the interviewed firms explained that project managers assess clients’ satisfaction after the project is completed.

Not all respondents have construction management activities; however, those firms which do, merge it with construction supervision. Moreover, facility management and property development are two activities proposed by the AMCF model, yet none of the interviewed firms offered such services. Linked tasks were carried out under construction management and supervision.

The interviewees explained that depending on the size of the firm, some engineering services are offered in-house and some are outsourced. In medium-sized firms, in-house engineering consultancy services are offered. In small firms, some services are offered in-house while some or all are outsourced.

Finally, the AMCF model studied the firms’ other ventures that increase revenues. One of the interviewed firms offer architecture training services. Another capitalizes on offering advisory services and feasibility studies to less experienced real-estate developers.

Managing the stakeholders

A great deal of interviewed firms was not familiar with the topic at hand. However, managing stakeholders is an activity conducted implicitly within the business. After defining stakeholders to interviewees in detail, they claimed that stakeholders are clearly identified as an industry standard and that they need no further identification and analysis.

Discussing the involvement of stakeholders and the management of their requirements and tasks, respondents stated that most of them are already covered under the project management function. The same issue had arisen when conflict management was discussed and was identified to be the responsibility of projects managers, directors or managing directors.

Respondents understood value management activities as the monetary value of the firm itself. None of the interviewees had a system to identify and manage value management of the firm.

When sustainability management was discussed, most related it to the environmental standards of the projects; none identified the matter as one requiring an internal organizational strategy. The issue was mostly brought-up when the managing of the design activity was discussed.

Four of the interviewed firms had social responsibility teams with an allocated budget. Five others encourage employees to volunteer with no organizational mandate.

Three respondents believed that extending clients' awareness was the responsibility of the project manager; this helped to achieve enhanced client benefit.

Managing Education

Respondents were not aware of the concept of managing education. However, when the authors presented the issue, they agreed that it is important to prepare architects to manage. Likewise, developing skills for management should be part of students' core undergraduate studies and professional practice education. Respondents believed that academics should also focus on AM-related topics to push its development further. Only one respondent managing a small- size firm stated that "the firm is eager to offer undergraduate and postgraduate students internship opportunities to research and learn from real life practices".

From the interviews, it was apparent that firms were not aware of the role of education in improving AM while they believed education should be one of the main focus of both the undergraduate and post-graduate curriculum of architecture schools in collaboration with architecture firms.

CONCLUSION

The findings of the empirical study suggest that AM is applied in Egyptian firms to various levels. The AM vocabulary appeared to be more present in medium-scale firms than in their smaller counterparts. It is clear that small firms find it difficult to put the AMCF model into practice. Nevertheless, it was also clear from the analysis that bigger firms have more pressing needs for a new or an adjusted AMCF model to reflect their requirements.

Moreover, the analysis of the interviews suggested that the AMCF model is useful and is already applied in the businesses studied. However, the authors realize that managing the stakeholders was not recognized as a stand-alone task in the context of Egyptian firms, it already exists under activities of managing the projects and managing the business. Additionally, an applied model such as AMCF can help build a better managing structure. Consequently, it is expected that the model will increase the efficiency of the medium firms and assist smaller entities to grow.

Egyptian firms have two options: they can either assign the management to engineers – civil, mechanical and others who are already involved in construction management hence are exposed to managerial skills. The enhanced option is for architects to manage project because they have a more holistic vision. In that case, the authors believe there is a need to train and educate architects to acquire the necessary skills to efficiently manage projects.

AMCF is a system and a model that sets guidelines for a better business management process. Ethical and governance architecture ensure clients satisfaction, responsible sourcing of materials, the existence of a solid and trustworthy leadership, contracting responsible suppliers, and fighting corruption and malpractice. These issues are all reflected in the AMCF model.

Today, all sectors – including architecture – are not only encouraged, but in many countries, they are required, to embed and adopt a responsible professional approach, one that considers all business stakeholders. In short, a responsible professional management system, one that considers both office and project management should be a main driving engine in the field of architecture. The building up of a 'responsible

construction sector', one that respects ethics and assures the well-being of communities and the satisfaction of clients is a challenging – yet rewarding exercise.

Finally, the application of AM has potential for the growth of architecture firms in Egypt and can gear their development towards a more effective and healthier professional environment.

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QUALITATIVE EVIDENCE ON THE SIGNIFICANT FACTORS IMPEDING BUILDING DESIGN TEAMS PERFORMANCE IN NIGERIA

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This study aims to gain an understanding of factors impeding building design team performance. Qualitative research method was employed to glean information from a diverse range of building professionals in Nigeria. Thematic analysis, of interviews involving 21 key professionals resulted in identification of a number of themes. The first theme focused on the operational challenges including the integration delays, soft conflict and communication. The second theme pertained to professionals' competency from resourcefulness and skilled recourse perspective. The third theme concerned client quality, within the financial and organizational context. The fourth theme dealt with the difficulties associated with professional institutes' processes. The last emphasized the impact of societal challenges on professionals' practices. All the themes were found to be interconnected, indicating the complexity associated with team performance at various scales in developing economies. The results indicate that the current approach to project delivery is unlikely to ensure that team effectiveness and sufficient quality of building projects. Therefore, the study concludes with recommendations on possible ways forward.

Keywords: building, design team, professionals, projects.

INTRODUCTION

Building design represents a small part of the total costs in a project, yet it has predominant influence both on construction costs as well as on operation costs (Bibby, 2003). The design process contributes significantly in defining the project outcomes especially as regards functionality, quality, services, life-cycle operation cost as well as bringing inclusive social and environmental benefits (Cockshaw, 2001; Ali and Au-Yong, 2013; Karna and Junnonen, 2017).

In the literature, the implications of the design process for project success has been well acknowledged. According to Josephson & Hammerlund (1996); Bibby (2003), the cause of the majority of construction delays and defects can be traced back to poor design process performance. Cockshaw (2001), Emmitt & Gorse (2009) assert the importance of the design process to project success, while (Josephson & Hammerlund, 1996, Bibby, 2003; Quanjel, 2013) suggest that poor performance in the design phase can have serious consequences for subsequent activities and the finished product. Love *et al.*, 2000 found that poor design coordination often results in design changes which directly has a significant effect on progress and budget.

Over the past decades, the construction sector has been consistently criticized for underperforming largely due to a preponderance of project failures experienced over the years. Yet, little focus has been directed towards identifying the significant issues and challenges affecting the performance of design professionals especially in developing countries. It is therefore crucial to investigate the critical barriers to design professionals' performance and find a solution to help design experts to work together

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effectively to achieve the desired project goals. Moreover, the design process requires significant co-ordination, negotiation, agreement, and compromise often under uncertainty and time-pressure to achieve success.

Several studies have reported various factors affecting the success of a project. For instance, Arditi and Gunaydin (1999) examined the construction professionals' perspective on factors affecting the process quality. The study revealed that collaboration within the team, communication with the client, leadership and teamwork are critical success factors for the design firm. Koutsikouri *et al.* (2008) investigated critical success factors from the design team perspective. Four mutually supporting factors were identified including: management, design team, competency and resource. Specifically, the project team characteristics were adjudged critical.

Yin *et al.* (2011) deployed design performance measurement (DPM) matrix to gauge the level of collaboration among design team members. The study showed that the decision-making process is central to DPM for collaborative design efficiency and towards achieving competitive advantage for innovation. Siva and London (2012) examined the implication of architect-client relationships to the success of a building project. They brought to fore the importance of client learning as a tool for successful relationships within project teams.

Several other studies (e.g. Chan and Kumaraswamy, 1997; Love *et al.*, 2000; Ling, 2002; Bibby, 2003; Emmitt and Gorse, 2009; Toor and Ogunlana, 2009; Ahadzie, Proverbs and Sarkodie-Poku, 2014; Ali and Au-Yong, 2013; Amos-Abanyie, *et al.*, 2014; Soetanto *et al.*, 2015; Karna and Junnonen, 2017) have also examined success factors for building projects. While significant contributions to knowledge have been made about critical success factors, few studies have examined the critical hindrance to success. Different from prior studies, this study focuses on exploring the critical barriers to design team performance in Nigeria. The next section presents the method and procedure used in the study, followed by the results and discussion of findings. Finally, some conclusions are made, based on the findings.

METHOD AND PROCEDURE

This study examines the issues and challenges affecting the performance of the building design team using a qualitative approach. Semi-structured interview was selected as the main data collection technique because of the level of probing it allows without losing control on issues that have to be discussed. This is in line with the conclusions by Slack and Rowley (2000) that cognitive information, such as beliefs, motivation and perception can be obtained by interviewing the observed. The interviewees were purposively selected based on their level of professional experience across diverse construction professions. Therefore, the interviewees were adjudged to have in-depth or expert knowledge of the research problem. The profile of selected interviewees is presented in Table 1.

The selection process was exploratory since it followed the steps expected within an exploratory case study research (Yin, 2003). This approach was aimed at achieving the core goal of the research which is understanding the experience of the construction experts. Thus the sample was stratified across the construction disciplines such as architects, quantity surveyors, structural engineers, mechanical engineers, and project managers. The sample also represents two job types: clients and consultants; and the participation was voluntary.

Table 1: Profile of the Interviewees

Respondents	Professions	Years of Experience	Approx. No of previous projects	Role on Projects
Respondent 1	Structural Engineer	17	150	Consultant
Respondent 2	Architect	25	100	Consultant
Respondent 3	Service Engineer	30	120	Consultant
Respondent 4	Quantity Surveyor	25	100	Consultant
Respondent 5	Architect	18	40	Consultant
Respondent 6	Project Manager	20	60	Consultant
Respondent 7	Service Engineer	10	30	Client representative
Respondent 8	Structural Engineer	12	50	Client representative
Respondent 9	Structural Engineer	20	70	Consultant
Respondent 10	Project Manager	15	30	Consultant
Respondent 11	Quantity Surveyor	12	80	Client representative
Respondent 12	Architect	10	25	Consultant
Respondent 13	Architect	25	80	Consultant
Respondent 14	Service Engineer	30	90	Consultant
Respondent 15	Quantity Surveyor	30	120	Consultant
Respondent 16	Architect	15	40	Client representative
Respondent 17	Quantity Surveyors	25	75	Consultant
Respondent 18	Service Engineer	15	25	Client representative
Respondent 19	Architect	20	50	consultant
Respondent 20	Structural Engineer	25	70	Consultant
Respondent 21	Service Engineer	18	30	Client representative

The interview sessions were 30 to 45 minutes long. The questions asked were:

1. What is your opinion of performance of design consultants' teams in Nigeria?
2. What are the barriers that have limited your performance on past projects?
3. How do you think design team performance can be improved in Nigeria?

The interviews were non-formal; this was aimed at encouraging free interactive section. As a result, the interviewees provided robust and detailed information of practical experiences within prior organized teams involved in project execution. The information obtained was subjected to qualitative content analysis. The content analysis entails recording and analysis of the meanings, means of communication, messages and symbols during the interview (Krippendorff, 2013).

Data analysis comprises examining, categorizing, tabulating and testing evidence to address the initial study proposition. This research followed the logic model technique (Yin, 2003) and the data and the pattern observed were presented using a thematic framework. Specifically, the process followed in analyzing the interview information had two stages. In the first stage, the interviews were transcribed verbatim, because the data collected were in the form of words and had to be translated into text for ease of interpretation and analysis. The second involves making meaning out the information; it was sorted into emerging themes using cross-case across the number of interviewees (see Table 2).

RESULTS AND DISCUSSION

The participants expressed diverse opinions on factors affecting their performance during the design phase. For clarity and easy interpretation findings, the key issues mentioned by the participants were grouped into five themes. The analysis entails a summary of issues pertaining to building design team performance and project success. In all, twenty-one key issues were identified which were grouped into themes as shown in Table 2.

OPERATIONAL FACTORS

The first set of issues identified from the interviews were classified as team operational challenges which entails delay in integration of design team members, soft conflicts, ineffective composition, poor communication and inappropriate sequence of operation. Over half of the respondents mentioned the issue of delayed integration of team members. Most participants lamented that some professionals are not integrated during the first stage of the design phase. A participant noted:

“As of today, only two consultants carry out stage one (that is Architects & Quantity Surveyors) ...yet all consultants are paid for stage one,hence government need to ensure that other professionals carry out the preliminary design accordingly to ensure better project delivery”

Early integration of all design professionals into the team was highly stressed by the participants. The interviewees argued that the coordination of a building project needs serious attention right from the beginning of the project through early involvement of the team members. Also, the issues of inadequate preliminary works and investigative survey especially regarding the site topography is posing challenges to construction experts' performance. Someone suggested;

“Ideally, a reconnaissance visit to the site at the commencement of the project should be a joint visit involving all consultants' right before any drawing is made”

Moreover, the interviewees cited experiences of conflicting requirement due to poor coordination and proper synergy among the professions. Most believed that the requirement of various professional disciplines usually generates conflict during design and construction process. For instance, a Structural Engineer noted:

“there has been reoccurring issues of soft conflict between Service Engineers and Structural Engineers especially in placement of service pipes in beams/ columns; cover for reinforcement amongst others. Ideally, the right process should be that the Service Engineers prepare a preliminary design before the Structural Engineers input”

Some observed that most consultants are not flexible to accommodate the request of other professionals. Most of the interviewees lamented that the number one hindrance to project performance is the sequence of operations of the design team.

Table 2: Thematic Analysis

S/N Themes		Respondents																					Points
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
A	OPERATIONAL FACTORS																						
1	Delayed Integration of all team members	+	.	.	+	+	+	+	.	.	.	+	.	+	+	+	.	.	+	+	+	+	13
2	Soft conflict within professionals	.	+	.	.	.	.	+	.	+	.	.	.	.	+	.	+	.	.	.	.	.	6
3	Ineffective team composition	+	.	+	+	+	.	.	+	.	+	+	+	.	.	+	.	+	+	+	.	.	12
4	Poor communication / decision making process	+	.	.	+	+	+	.	+	.	.	+	+	+	.	+	.	.	+	+	+	+	12
5	Inappropriate sequence of method of operations	.	+	+	.	.	.	+	.	+	.	.	.	.	+	.	+	+	.	.	.	.	9
6	Inadequate preliminary work/ reconnaissance survey	+	.	.	+	+	+	+	+	.	.	+	+	+	+	+	.	.	+	+	+	+	15
		4	2	2	4	4	3	4	3	2	2	4	3	3	4	4	2	2	4	4	3	3	
B	PROFESSIONAL COMPETENCY ISSUES																						
7	Lack creativity by professionals	+	.	.	+	+	.	.	+	.	.	+	+	.	.	+	.	.	+	+	.	.	9
8	Lack of flexibility	+	.	.	+	+	.	.	+	.	.	+	+	.	.	+	.	.	+	+	.	.	9
9	Inexperience and inadequate exposure	+	+	.	.	+	+	+	+	+	.	+	+	+	+	+	+	.	.	+	+	+	16
10	Lack of thoroughness	.	+	+	.	.	+	+	.	+	+	+	.	+	+	.	+	+	+	.	+	+	14
11	Incompetent Leadership	.	+	+	.	.	+	+	.	+	+	.	.	+	+	.	+	+	.	.	+	+	12
12	Inadequate Drawings Details	+	+	+	.	.	+	+	+	+	+	.	.	+	+	+	+	+	.	.	+	+	15
13	Lack of Commitment	+	.	.	+	.	+	.	+	.	.	+	.	+	.	+	.	.	+	.	+	+	9
14	Frequent Design revision	.	+	+	.	.	.	+	.	+	+	.	.	.	+	.	+	+	.	.	.	.	9
		5	5	4	3	3	5	5	5	5	4	5	3	5	5	5	5	4	4	3	5	5	
C	CLIENTS' FACTORS																						
15	Low client's understanding of design process	.	+	+	+	+	.	+	.	+	+	+	+	.	+	.	+	+	+	+	.	.	15
16	Poor Remuneration	+	+	+	+	+	.	+	+	+	+	+	+	.	+	+	+	+	+	+	.	.	18
17	Poor Working Environment	+	.	.	+	.	.	+	+	.	.	+	.	.	+	+	.	.	+	.	.	.	12
		2	2	2	3	2	0	3	2	2	2	3	2	0	3	2	2	2	3	2	0	0	
D	PROFESSIONAL INSITUATES FACTORS																						
18	Differing organizational standard across institutes	+	+	.	.	+	.	.	+	+	.	.	+	.	.	+	+	.	.	+	.	.	9
19	Insufficient effective regulation	+	+	.	+	+	.	.	.	+	.	+	+	.	+	+	+	.	+	+	.	.	13
		2	2	0	1	2	0	0	1	2	0	1	2	0	1	2	2	0	1	2	0	0	
E	SOCIETAL FACTORS																						
20	Corruption	+	+	+	+	+	.	.	+	+	+	+	+	.	.	+	+	+	+	+	.	.	15
21	Low Economic situations	.	+	+	.	+	+	.	.	+	+	.	+	+	.	.	+	+	.	+	+	+	12
		1	2	2	1	2	1	0	1	2	2	1	2	1	0	1	2	2	1	2	1	1	
	Gross total	14	13	10	12	13	9	13	12	13	10	14	12	9	13	14	13	10	13	13	9	9	

Key: + Indicates that the issue was mentioned by the respondent; . Indicates that the issue was not mentioned by the responden

There are similarities between these findings and those of other studies which identified challenges of team integration (Sebastian, 2007, Ibrahim *et al.*, 2011; Quanjel, 2013). Specifically, Agung Yana *et al.*, (2015) found that operational factors which affect design consultants' performance include; unrealistic period to design; failure of a consultant to provide adequate and clear information in the contract documents; errors and omission of consultants; changes made as a request of a consultant; consultants who are not familiar with the regulations and construction permits and poor coordination between the design team members and the client. A similar interview-based research conducted in UK by Koutsikouri *et al.* (2008) shows that participants agreed that team building has to happen as early as possible in the project life cycle to create mutual trust and respect as well as positive emotion.

PROFESSIONAL COMPETENCY FACTORS

The second theme identified from the interview focuses on professional competency. Over half of the participants stressed the challenges of inadequate exposure and experience by some professionals. Although a participant argued that performance cannot be generalized for the entire country since performance is centered on the individual's level of exposure which in a way depends on the location (city) where the professional practices. The participant commented,

“An architect practicing in Lagos will be required to do more to satisfy his/her client since an average client in Lagos is capable and willing to pay for the services. On the contrary, an architect practicing in less developed cities usually works with clients who expect them to do less because of cost. Over time, the culture of doing less makes such professionals less experienced, less exposed and limits their creativity in term of architectural designs and expressions”

However, most of the participants agreed that lack of thoroughness and inadequate details has been a major hindrance to design team performance. The majority observed a decline in commitment on the part of the design consultants and this was attributed to societal issues such as poor remuneration, a discouraging working environment, a poor economic situation, and corruption amongst others. One interviewee's stressed that:

“design is much more than drawings, most professionals in Nigeria have limited design to conception of shapes and sizes, whereas building design entails specification writing, detailed production drawings as well as construction management”

Some respondents also lamented that the working environment is not conducive for professionals, and as a result, they are not interested in producing sufficient design details. This extract makes that argument:

“Ideally, a consultant should work on four or five project per year for him/her to provide all the details required for construction. However, poor remuneration, delayed payment among other challenges made most professionals carries out sordid construction drawings”

It was also observed that available technology, building materials as well as expertise often limits the design innovation and creativity. In this regard, an interviewee advised thus,

“An architect need to go extra mile above the Engineers as well as other team members by suggesting alternative technology and building materials, consequently, providing team necessary lead to achieve an innovative design, an architect cannot afford not to be uninformed”

This result resonates with findings in other previous studies conducted in other developing countries. For instance, Ahadzie, Proverbs and Sarkodie-Poku (2014), and Amos-Abanyie, *et al.*, (2014) observe that one of the biggest challenges in the Ghanaian construction industry (GCI) and other developing countries is the high level of unprofessionalism and managerial inefficiencies. As a possible solution, Bennett *et al.* (2005) and Haverila *et al.* (2011) suggest that tacit and explicit knowledge that is exhibited in the competencies of the professionals in performing the tasks that meet client needs and satisfaction is a prerequisite and thus must be rigorously pursued. Professional competency issues required critical attention within the training and ethical regulatory context to achieve team effectiveness and project success.

CLIENTS’ UNDERSTANDING AND ATTITUDE

The third theme addresses the clients’ understanding and attitude during the design process. The majority of the respondents agreed that performance on a project is often hindered by clients’ low level of understanding of the design process especially in terms of the duties of clients and responsibilities of design professionals. Consequently, the interviewees emphasized the importance of client’s education. An interviewee suggested that clients should be well-educated on the design processes and procedures for the inspection of project. The respondent remarked:

“Consultants especially the architect should create an understanding with the client on the importance of thoroughness during design phase”

Another interviewee outlined a personal approach to client education thus:

“As a strategy of educating our client, we develop a culture of suggesting various classes of residential buildings to our client; the classes are based on affordability”.

Noteworthy are the issues of poor remuneration system and poor working conditions which were mentioned by nearly all the respondents. These findings are in line with those of previous authors on the importance of client’s education. For instance, RIBA (2007) noted that the most common complaints from clients who have used architectural services relates to misunderstandings and dissatisfaction. Similarly, Siva & London (2011) argue that although the client is pivotal to the design process, they often do not understand design processes and are unaware of what information they need to pass on to the design team. According to Norouzia (2015), clients who find themselves involved with “strange architectural design processes” often suffer feeling of stress and confusion caused by these unfamiliar processes (p. 638). Agung Yana *et al.* (2015) found that owner actions and inactions such as instruction to modify a design; the owner’s failure to make decisions or to review documents at the right time; changes of funding scheme from the owner; and incomplete or incorrect instructions from the owner; and unclear project scope affect design team performance and project success.

Similarly, in the literature, delays in progress payments by clients has been identified as a critical factor which causes construction cost overruns not only in Nigeria but

also in most countries including in Gaza (Enshassi, Sherif and Saleh, 2009), India (Iyer and Jha, 2005), the UK (Olawale and Sun, 2010), and Ghana (Frimpong *et al.*, 2003). A recent study in Afghanistan (Niazi & Painting, 2017) also revealed problems of delayed payments by clients.

PROFESSIONAL INSTITUTE FACTORS

Another set of factors observed relates with the laxity on the part of the professional institutes in coordinating the activities of practices. Most of the interviewees mentioned that practices in the building industry are not properly regulated in Nigeria, thus giving rise to quackery with the resultant effect being evident in poor projects outputs. Nearly half of the respondents criticized the differing organizational standards across professional institutes in Nigeria especially in terms of the scale of fees and consultancy obligations which often hinders teams' effectiveness. This is similar to prior findings by Koutsikouri *et al.*, (2008) who found that structural engineers, building services engineers, technologists and architects usually speak different 'languages', and each of them fails to readily understand the problems of the others.

SOCIETAL FACTORS

The last set of issues were grouped as societal factors. These issues include; poor economic conditions, bad governance and populace behavioural challenges. Particularly corruption was often mentioned, while poor economic situation was also stressed by respondents. As noted by the interviewees, other factors such as market forces, economic situation, irregular cash flow, shortage of skilled manpower, insufficient design planning and management, among others also contribute to the ineffectiveness of the project team.

In previous studies, societal challenges were widely discussed as critical to construction industry. For instance, Sonuga *et al.*, (2002) found that corruption is a major factor that leads projects to failure in Nigeria. In a study by Locatelli, *et al.* (2017) in Afghanistan, Corruption was ranked as the first major contributor of cost overrun and constitutes a serious threat to the countries construction industry. They observed that corruption is particularly relevant for large projects where the public sector acts as client/owner. Tabish and Jha (2012) also found a positive correlation between "corruption free indicators" and professional standards, transparency, fairness of punishment, procedural compliance and contractual compliance.

DISCUSSION AND RECOMMENDATIONS

This study elicits the perspective of building design professionals on the significant factors hindering their performance at team levels using semi-structured interviews. Many perceived challenges relate to frustration experienced within the operational process, team member competency, clients' characteristics, professional institutes and society. Since projects are principally delivered through teams, the level of relationships among the members may propel the actual pathway for mutual success. Thus, an important prerequisite for managing operational difficulties is the development of techniques and frameworks which will allow adequate participation of team members in all steps of the design process. The design team is an essential component in any project, and if the relationship within the team is well managed, it

could aid the project's success. Based on the findings in this study, some key lessons could be noted.

First, it is important for developing countries to embrace integrated project process. Most developing countries commonly practice the traditional procurement approach which affects early team integration. Moreover, it is important for design professionals to prepare to accommodate soft conflict and manage the operational process more effectively. As stated by scholars (such as Sebastian, 2007; Ibrahim *et al.*, 2011 and Quanjel, 2013), in managing collaborative design, team members need to realize that what counts most is not how compatible its members are, but how its members manage to deal with incompatibility. Arain (2013) noted that a vibrant team may sometimes experience conflict, which is, in fact, required to generate innovation. Thus, an effective group should look for points on which they disagree, and consequently, encourage conflicts among participants in the early points of the discussion (Sebastian, 2007). In contrast, less-motivated groups feel the need to establish a common view quickly, use simple decision-making methods and focus on completing the task rather than on finding innovative solution. Therefore, conflict should be sought for high-level performance and creativity; all team members also need to be committed to the project benchmarks through proper interaction, negotiations and agreement. Hence, design dialogues throughout the planning process is a good way to achieve good results within an inter-disciplinary team without losing sight of the schedule, standards and limits.

Second, success on the construction project depends on the quality of individuals and firms engaged to provide the requisite services. Developing efficient design competencies is important for ingenuity and skilled recourse. This study also affirms the important role an architect must play to bring out the best out of the team. Some studies hold similar perspective. For instance, Soetanto *et al.* (2015) suggest that architects have to combine creative design, building techniques, and social aspects in professional practice; thus, successful architects need skill to integrate knowledge from various fields into the design process. Palea, Ciobanu, & Kilyeni, (2012) suggest that certain traits should be possessed by an architect. These include the ability to communicate effectively, coordinate and manage complex projects, and negotiate with clients to resolve issues.

The client quality within the financial and organizational context also appears to be a significant factor. Thus, client education is an important prerequisite for project success. Through proper orientation, the client learns more about these processes, and the client-consultant relationship improves. The need for client education has also been stressed by scholars (Siva and London, 2011; Norouzi, et al., 2015). It is hence imperative for design professionals to ensure that their clients are well educated right at the commencement of project.

Clients' attitude, especially in providing motivation for the team through timely and appropriate remuneration, is essential to design team performance. Also crucial are the psychological rewards such as the Opportunity to use one's ability, a sense of challenge and achievement, appreciation, recognition, and being treated in a considerate manner with trust and openness. These are motivator or growth factors which, if present, serve to motivate the individual to superior effort and performance (Sebastian, 2007. Thus, the socio-psychological approach for managing collaborative design in the conceptual design phase can bring significant benefits. A well-motivated

design team could prompt performance improvement in terms of thoroughness besides ensuring professionalism. Studies affirm that group performance is affected by what motivates members. Cantu (2007) notes that extrinsic motivation is the result of tangible rewards such as fair payments and bonuses as defined in the contracts. Sebastian (2007) noted that such factors are those which, if absent, can cause dissatisfaction; that is, they are hygiene or maintenance factors. Appropriate rewards and recognition help reinforce areas of excellent performance (Duel, 2010; Forsyth, 2010). Robbins (2005) argues that the presence of adequate resources, effective leadership, a climate of trust and a performance evaluation and reward system that contributes to team performance. Generally, the respondents opined that when a client gets adequate advice from the professionals, the team is more likely to be effective.

The professional institutes' regulations should aim at creating and maintaining effective relationships in a project team. The need for synergy among professionals through concerted effort of the professional bodies cannot be overemphasized. This requires taking a broader view of the industry with a view of developing strategies and ethical measure required for high performance. In another perceptive, due to the pressure experience in the society, the integrity and professionalism are often jeopardized. Thus, the impact of societal challenge on professionals' practices must be addressed through ethical and regulatory frameworks. In particular, recognizing the importance of factors such as emotional feelings, nepotism and prejudice which are most often ignored by practitioners. These issues are fundamentally important although difficult to measure.

CONCLUSION

The interactions with the professionals shows that there is a need for improvement of the design process in Nigeria. The findings showed the need for developing countries to embrace the integrated project process rather than the traditional procurement approach. Most challenges which are associated with delayed integration, soft conflicts, and communication gaps can be minimized with an integrated design process. These findings stress the importance of creating an environment in which projects can succeed by addressing the identified baseline issues. It also draws attention to the strategic importance of improving design management effort towards enhancing team effectiveness for long-term project success.

The study contributes to knowledge on major challenges hindering design team performance. The results are useful for the construction industries in developing countries in terms of policy reviews, training, professional development and regulatory measures. However, some limitations should be noted. First, this research used semi- structured interviews. Thus, it is difficult to generalize the findings. Future research might consider statistical analysis to rank the degree of importance of the barriers. It is also necessary to explore the level of influence of these barriers to project success using inferential statistics. Studies can also compare the perception of construction experts on the barriers across specific project cases.

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FACTORS AFFECTING COST OF CONSTRUCTION IN LAGOS STATE, NIGERIA

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Project cost is one of the most important criteria of success of projects and is of high concern to those who are involved in the construction industry. However, studies show that projects are rarely completed within the stipulated budget. This study is focusing on the identification of significant causes affecting construction cost on large projects in Lagos State. This paper presents the results of a questionnaire survey conducted among the personnel of a Project Management Consultant (PMC). Data was analyzed with statistical tools to determine the rank of factors affecting construction cost. It is concluded that cash flow and financial difficulties faced by contractors, contractor's poor site management and supervision, inadequate contractor experience, shortage of site workers, incorrect planning and scheduling by contractors are the most severe factors influencing costs, while changes in scope of project and frequent design changes are least important factors. Spearman correlation analysis showed that incorrect planning and scheduling by the contractor has a strong positive relationship with the contractor's poor site management and supervision, inadequate experience of contractors has a strong positive relationship with incorrect planning and scheduling; and contractor's poor site management and supervision, changes in scope of project has strong positive relationship with frequent design changes; and vice versa.

Keywords: Construction cost, Construction Industry, Project cost and Management Consultant.

INTRODUCTION

The growing need for construction of all types coupled with a tight availability of funds has provided the construction industry with a big challenge to cut cost. According to Mendclson and Greenfield (1996), the last decade of the twentieth century would involve corporations, institutions and government in a race to survive. The attendant dwindling economic fortune of national economies around the world have required participants in these sectors (the client in particular) to take up the challenge of ensuring efficient use of their resources to obtain value for money in terms of performance.

The total cost of construction in normal circumstances is expected to be the sum of the following costs: Materials, Labour, Site Overheads, Equipment/Plant, Head Office Cost and Profit but in many parts of the world, particularly in Nigeria, there are other costs to be allowed for. These costs, according to Mbachu and Nkado (2004), have negative implications for the key stakeholders in particular, and the industry in general. To the client, these are added costs over and above those initially agreed upon at the onset, resulting in less returns on investment. To the end user, the added costs are passed on as higher rental / lease costs or prices.

To the consultants, it means inability to deliver value for money and could tarnish their reputation and result in loss of confidence in them by clients. To

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the contractor, it implies loss of profit through penalties for non-completion, and negative feedback on their performance that could jeopardise its chances of winning further jobs, if at fault.

The proposed work investigates report the other costs to be allowed for which are the basic factors affecting construction cost in Nigeria and also proffer solutions to how

construction cost can be minimized. The problem of high contract costs of all aspects of construction is becoming obvious. Consequently, substantial increases are being observed in projects. These increases have brought about loss of client confidence in consultants, added investment risks, inability to deliver value to clients, and disinvestment in the construction industry. This paper reveals the factors affecting construction cost in Lagos State construction project and proffers measures to address how construction cost can be minimized.

LITERATURE REVIEW

The Nigerian Construction Industry

In Nigeria, like most developing countries, the construction industry plays a dominant role in the economic activities of the country. According to Olowookere (1988) the construction industry accounts for about 60 percent of the Nation's capital investment and 30 percent of the Gross Domestic Product (GDP). Moreover, the construction industry is said to have contributed about half of the total stock of fixed capital investment in the Nigeria economy (Olaloku, 1987). The industry also generates employment opportunities which place it second to the Government in the employment of labour (Husseini, 1991).

When the construction industry was booming in the 1970's, the country's economy experienced similar effects during that period. However, from the early to mid-1980s, the industry experienced a jolt and its effect was felt in all spheres of national life (Isiadinso, 1988). Buhari (1991) reported that the lull in construction industry of early 1980s was not limited to Nigeria. It also occurred in Western Europe and America. But the parent companies of these big timers in our midst were not only able to stay afloat the stormy ocean but were able to expand their sales. They were able to do this by initiative, creativity and research.

Consequently, the Federal and State governments resorted to taking foreign loans as a quick solution to the problem. However, some of the measures taken by Government in order to revitalize the economy have further aggravated the situation. One obvious implication of this development is that the cost of imported raw materials and subsequently of the finished products has substantially increased (Husseini, 1991).

These substantial increases as reported by Mbachu and Nkado (2004) have obvious negative implications for the major players and the industry; undermining the viability and sustainability of the industry.

The Roles of Construction Actors in Construction cost

There are diverse interests in the construction industry. The principal interest or actors in the construction industry are:

The Client

The Client is the most important member of the construction team as the initiator and financier of the project. Omole (1986) noted that the major contribution the client can make to the successful operations of the construction industry lies in his skill in

specifying his needs prior to the preparation of the design. It is also important for the client to set cost limits of the project at the briefing. the client should also ensure that adequate financial provisions are made prior to the commencement of any project.

The Consultant

Cost considerations are among the most important and basic considerations that Consultants must deal with. It is essential to see that projects are contained within the client's budget and cost forecasts. Cost has the final control over virtually every project. Accurate cost analysis and control is one of the necessary services the client requires from the consultants (Omole, 1986).

The Contractor

Omole (1986) further reveals that the major task of Contractors is to assemble and allocate the resources of labour, equipment and materials to the project in order to achieve completion at maximum efficiency in terms of time, quality and cost.

Construction Cost Factors

Many studies have found that there are several factors affecting construction costs of large buildings. In a study of the Nigerian construction industry, Omoregie and Radfort (2005) sampled the opinions of contractors, consultants and clients, they discovered 15 factors responsible for project delays, and construction cost escalation in Nigeria. The study revealed that price fluctuation is the most severe cause of project cost escalation, which is, attributed to the limitation in exchange rate which in turn affects construction material prices and general price level.

Elinwa and Silas (1992) identified 31 essential factors causing the high cost of buildings with fraudulent practices and kickbacks being the second most important factor in Nigeria. Hussain (1999) noted that fraudulent practices and kickbacks occasioned by greed are perpetuated by some major players in the construction industry. Frimpong. Oluwoye and Crawford (2003), in a review of the situation in developing countries such as Ghana, identified some factors as underlying causes of delay and cost over runs in ground water construction projects. The five most important factors agreed by clients, consultants and contractors were monthly payment difficulties from agencies, poor contract management, material procurement, poor technical performances and escalation of material prices.

A study of the relative weight often major causes of business failure in the United States of America revealed construction cost related factors as mostly contributing to business failure. (Kangari, 1989). They include: bad profit margins, management incompetence, lack of experience, inadequate sales, loss of market and economic decline.

WAYS OF MINIMIZING COST

Authors propose several ways in which cost of construction can be minimized. Fisk (1997) reveals two cost reduction measures. The first is the application of a value engineering concept, which aims at a careful analysis of each function and the elimination or modification of anything that adds to the project cost without adding to its functional capabilities. He argues that by carefully investigating costs, availability of materials, construction methods, procurement costs, planning and organizing, cost/benefit values and similar cost influencing items, an improvement in the overall cost of project can be realized. Cooke and Williams (2003)

recommended as cost reduction measures, the elimination or minimization of design/specification, delivery and site wastes through the formulation and implementation of effective material policy and material management.

In addition, Ashworth (2000) observed that profitable firms may be generating their revenues from the elimination of waste at both professional and trade practice levels. Cost reduction measures also include: establishing firmly the requirements and features of the project before getting started, preparing the project team to do its best by getting members to sign off on capabilities and responsibilities, and staying diligent about keeping the project on the right path through contract clauses that disallow significant changes once the project is underway, effective human resource management through motivation, and project tracking involving discerning early what area or paths are leading to dead ends and applying early corrective actions.

In summary, high construction costs have negative implications for the major actors in particular, and the industry in general. Project abandonment drop in building activities, bad reputation and inability to secure project finance are all implications of high construction cost. An application of the proffered solutions would restore clients' confidence in consultants, reduce investment risks and generally boost the viability and sustainability of the industry.

The Study Area: Lagos, Lagos state, Nigeria.

The study area for this research is Lagos state, a metropolitan city in western Nigeria. The choice of Lagos as the study area is because since the creation of the state in 1967 and in spite of the movement of the nation's capital to Abuja, it has been the centre of the country's economy, commerce and 'power'; coupled with its high population, it enjoys the benefits of being the fulcrum of the nation. Lagos is a relatively 'built up' environment with modern infrastructure, tall buildings, government buildings, private developments, schools, hospitals, and so on. Thus, there cannot be a better place to obtain data for this study.

METHOD

Characteristics of the study population

The population of the study consisted of clients, consultants and contractors in Lagos, western Nigeria.

Sampling design and procedures

Having identified clients, consultants and contractors as the target groups for the effective conduct of this research, 70 respondents comprising 16 clients, 22 consultants and 32 contractors were randomly selected using stratified random sampling technique in order to give everyone that falls into any of these identified target groups equal and independent chance of being included in the sample.

Data collection instrument

The primary data were obtained through the use of a structured questionnaire developed from the initial identification of likely factors affecting construction cost in Nigeria and solutions to minimize cost.

The questionnaire was designed to elicit information on the following:

- (a) The respondent's role in construction

- (b) The respondent's professional background (for consultants and engineers only). How long the respondent has been in construction industry. An assessment of the severity of likely factors affecting construction cost from not severe to extremely severe.
- (c) An evaluation of the effectiveness of proffered solutions to minimizing construction cost from not effective to very effective.

Statistical tools for data analysis

The descriptive survey method was used, where 70 questionnaires were distributed among principal actors in the construction industry, namely: the client, the consultant and the contractor. Frequency and percentages were used for the descriptive data. Coded broad sheets were thereafter used for extracting data from the returned questionnaires. These were analyzed using the Statistical Package for Social Science (SPSS) having completed the variables and imputed the extracted data appropriately on the data view. Mean score, standard deviation and Spearman rank order correlation were used to achieve the stated objectives.

Analysis and presentation of descriptive data

Survey responses

A total of 52 usable responses were received, representing 74.29% effective response rate. The maximum responses from each sampling frame are shown in table 1.

Table 1: Response Rate

	Clients	Consultants	Contractors	Total
No. Distributed	16	22	32	70
No. Received	9	15	28	52
Percentage	56.25%	68.18%	87.5%	74.29%
N	70			

Respondents' role in construction

Table 2: Respondents' role in construction

	Frequency	Percent	Cumulative	Percent
Client	9	17.3	17.3	
Consultant	15	28.8	46.2	
Contractor	28	53.8	100.0	
N	52			

The demographic profiles of the respondents in table 2 above show that 17.3% were in the Client category, 28.8% in the Consultant category and 58.8% in the Contractor category.

Respondents' professional background

Quantity Surveyors form the largest chunk of consultants for this research with 46%. Architects are next with 27%, followed by Electrical Engineers accounting for 13%, and Mechanical and Structural engineers both represent 7 %.

Data presentation, analysis and discussion of findings

Table 2. Identification of the main factors affecting construction cost in Nigeria.

	N	Mean	Rank
Cost of materials	52	3.90	1
Incorrect planning	52	3.73	2
Wrong method of estimation	52	3.23	3
Contract management	52	3.00	4
Fluctuation of prices of materials	52	2.75	5
Previous experience of contractor	52	2.75	6
Absence of construction cost data	52	2.73	7
Additional cost	52	2.60	8
Project financing	52	2.56	9
High cost of transportation	52	2.54	10
Poor financial control on site	52	2.52	11
Economic stability	52	2.50	12
Fraudulent practices and kickbacks	52	2.44	13
Inadequate labour availability	52	2.44	13
High cost of machinery	52	2.42	15
Inadequate production of raw materials	52	2.40	16
Contractual procedures	52	2.40	16
High cost of machinery maintenance	52	2.40	18
Bureaucracy in tendering method	52	2.38	19
Duration of contract period	52	2.37	20
Supplier manipulation	52	2.37	20
Disputes on site	52	2.35	22
High cost of labor	52	2.33	23
Government policies	52	2.27	24
Relationship between management and labour	52	2.19	25

Table 3. Mean score and rank for the 15 most important factors affecting construction cost as reported by the different groups.

Average Factors Affecting Construction cost	Client Mean	Client Rank	Consultant Mean	Consultant Rank	Contractor Mean	Contractor Rank
Cost of materials	3.90	1	3.67		4.00	1
Incorrect planning	3.73	2	3.44		3.89	2
Wrong method (^estimation	3.23	3	2.56		3.25	4
Contract management	3.00	4	2.56		3.54	3
Fluctuation of prices of materials	2.75	5	2.78		2.93	6
Previous experience of contractor	2.75	5	3.22		3.07	5
Absence of construction cost data	2.73	7	2.33		2.61	
Additional cost	2.60	8	2.33		2.86	8
Frequent design change	2.56	9	2.11		2.86	8
Inadequate raw materials	2.54	10	2.33		2.68	12
Poor financial control on site	2.52	11	3.33		2.79	11
Economic stability	2.50	12	2.33		2.82	
Fraudulent practices and kickbacks	2.44	13	2.11		2.89	7
Supplier manipulation	2.44	13	2.11		2.64	11
Currency exchange	2.42	15	2.22		2.68	12

. Minimizing construction cost in Nigeria

N	Mean	Rank
Unsure efficient time management through proper resource planning	4.03	1
duration estimation and schedule development and control.		
Ensure adequate site supervisions to minimize poor quality workmanships and idle times	3.92	2
Hire and motivate experienced and qualified workforce to improve productivity and quality of workmanship	3.71	3
elect suitable contractors not only on the basis of price and lime but also in experience, financial standing, capacity and expertise	3.69	4
Ensure realistic estimates through proper resource cost studies	3.67	5
Allow sufficient time for feasibility studies, design, planning and submission.	3.67	5
Minimize propensity for late changes by ensuring a holistic client real and staled needs.	3.65	7
Aim at the economy in design by exploring alternatives and doing detailed investigations and analyses.	3.34	8
Ensure comprehensive articulation and communication of own and user needs and requirements during briefing sessions	3.63	9
Minimize conflicts with subcontractors, which could undermine productivity and progress of work	3.61	10
Provide comprehensive information required for easier	3.57	11

FINDINGS AND DISCUSSIONS

All three parties are of the opinion that cost of materials is the most important factor affecting cost of construction in Nigeria. This is in consonance with

the findings of Abdulazi/ and Al Juwairah (2002) about the factors contributing to construction cost in Saudi Arabia. Consultants rank wrong method of estimation second. This is anticipated since they are more aware of different methods, accuracy and precision of estimating. The same factor was ranked fourth by contractors. However, it was not in the top five factors in the client rankings. Consultants rank Incorrect planning as the third most important factor affecting construction cost in Nigeria. It was however ranked second by both Contractors and Clients. These findings are also similar to those of Abdulaziz and Al-Juwairah (2002) about the factors contributing to construction cost in Saudi Arabia.

Clients believe that fluctuation of prices of materials also have a very significant effect on the cost of construction. They rank it fifth most important factor.

Omoriegbe and Radforl (2005) came to the same conclusion after they studied the factors responsible for project delays and construction cost escalation in Nigeria. Although their survey revealed price fluctuation as the most severe cause of project cost escalation which they attributed to the limitation in exchange rate which in turn affects construction material prices and general price level.

Contractors are of the opinion that poor contract management will affect cost of construction. Kangari (1989) calls it management incompetence. Contractors rank it third most important factor.

Since contractors depend on their Quantity Surveyors for reliable estimates, they can be severely affected by any wrong method of estimation. They rank it fourth most important factor. The three parties do not generally agree in the ranking order of factors affecting construction costs. There is a higher agreement between contractors and consultants than between the others. This supports the findings of Abdulaziz and Al-Juwairah (2002).

The most effective method of minimizing the cost of construction in Nigeria as perceived by the three parties is ensuring efficient time management through proper resource planning, duration estimation and schedule development and control. This is similar to the recommendations of Ashworth (2000) where he observed that profitable firms may be generating their revenues from the elimination of waste at both professional and trade practice levels. The recommendations he made are outlined above.

RECOMMENDATIONS AND CONCLUSION

The main factor affecting cost of construction as opined by the three key players in the construction industry is cost of materials. Since Quantity Surveyors are cost experts they are in the unique position to examine these factors and take care to estimate, include contingencies in the budget, plan for, and mitigate the adverse effects of these factors on the project cost. Clients, Contractors and Consultants should give an economic approach to construction work such that they would be able to identify the dominant factors leading to high cost of construction in Nigeria and apply the proffered solutions to minimize the cost increases so as to restore clients' confidence in consultants, reduce investment risks, and generally boost the viability and sustainability of the industry.

Focus should be placed on the major factors affecting construction cost in order to reduce the cost, enhance construction performance and generate confidence within the construction industry. Quantity Surveyors should become more alive to their responsibilities as cost experts ensuring that they make use of correct estimation

methods. There should be thorough crosschecking of estimates based on updated price information in order to avoid any wrong estimation. Clients should clearly identify their requirements and needs, to determine whether they are able to achieve them with their financial capability in order to reduce payment problems.

There should be proper coordination and communication among various parties working on the project in order to improve management, control problems and reduce any avoidable delay. Contractors should come up with a clear plan and strategy before starting a project. Early project planning and scheduling of labour, equipment and cash, combined with a good bidding strategy, will help to obtain efficient work at a proper price. Since Contractors and Consultants generally agree on the severity rank of the factors affecting construction cost, they should work together to ensure that they give the Client quality for his money without exceeding the contract sum. All parties should take the responsibility to make use of the proffered solutions to minimizing cost of construction.

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A STUDY OF PROJECT MANAGEMENT APPLICATIONS AND INFLUENCE ON SUCCESSFULLY COMPLETING CONSTRUCTION PROJECTS

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Project management methodologies have failed to deliver consistent project success. There is, however, a need to understand the real relationship between the application of project management techniques and their impact on projects finishing according to pre-set criteria. Project success depends on project management success and the success of the end-product. Project success can be influenced by many different factors, outside the control of the project management team. This paper reports on the research analyses of project data gathered from practitioners from over ten nations. The paper examines the current status of project management tools and techniques and their impact on the level of project success. The findings suggest that most successful projects implement, but do not fully utilize, contemporary project management tools and techniques to their capabilities. The impact of such project management tools and techniques on projects depends on several factors including the development of practitioners' skills, and the rigour, timing and level of implementation achieved. It is important to stress that the human factor plays an essential part in securing project success. This research concludes that there is a direct connection between achieving project success and successful implementation of project management tools and techniques.

Keywords: project management principles, tools and techniques, project success factors and criteria, construction, UAE

INTRODUCTION

Project management as a technique has increasingly become recognized as a factor of competitive advantage for companies managing projects (Mathur et al. 2014). This position is a clear improvement on the perception that project management lacks a theoretical foundation and is based on a narrow and implicit theory that requires further development and enrichment as traditional project management causes self-inflicted problems which impact project performance negatively or cause projects to fail and that there is no measurable value added by implementing best practices of project management (Koskela and Howell 2002).

Despite the vast array of project management literature available, the complex question about the contribution of project management toward project success remains unanswered. To some extent, there is general agreement on the cornerstones of project success, whereas on others there is massive disagreement (Cooke-Davies 2004). Apparently, scholars, researchers and practitioners have different views on the influence of the application of project management methodologies on project success and that a lot of ground has yet to be explored (Joslin and Müller, 2016; Mathur *et al.*, 2014; Rolstadas *et al.*, 2014; Nguyen *et al.*, 2004).

DEFINITION OF PROJECT

A project is temporary and unique with a defined beginning and end and a specific set of objectives to be achieved (PMI 2013). Projects have specific characteristics and rules in comparison to operational work (Turner 2004). A project achieves specific objectives through a series of activities and tasks; it consumes resources and complies with a certain set of defined specifications (Munns and Bjeirmi 1996). Contemporary literature offers many definitions, highlighting the uniqueness of every project. Projects are temporary organisations, established to achieve desired goals and objectives (Turner 2004), resulting in project teams were also temporary, redundant or reassigned after the completion of the project (PMI 2004). A major drawback in temporary organisations is that project teams know that their contribution is only required for a limited period. Shenhar (2001) places emphasis on the common misconception that projects are alike and argues that one of the reasons why projects fail is that project managers are using the same tools and techniques for all projects similarly. Projects are unique and demand distinctive judgment. Therefore, it appears difficult to implement a static management methodology capable of successfully managing projects on a consistent level. The “unique”, “particular aim” and the individual project “objectives” point towards aiming at a moving target.

PROJECT MANAGEMENT

Project management methodologies date back as far as 2550 BCE (Kozak-Holland, 2010). It is reported that the Pyramids were delivered by following a systematic approach featuring a project charter and a business justification, incorporated into a life-cycle approach (Kozak-Holland 2010).

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements (PMI, 2013). Project management practices attempt completion of the project as intended, and in the most efficient way by minimizing cost and achieving external goals related to customer needs (Koskela and Howell 2002). Although project goals may appear straightforward and achievable, projects continue to run late, exceed their budgets and/or fail to meet their objectives (Hyväri 2006). It is suggested that modern project management was introduced during the Manhattan Project in the early 1950s (Kerzner 2006), but certainly, projects had been realised before that time. Project management tools developed and being applied nowadays started with the Swiss engineer Hermann Schuerch in 1912 when he developed and successfully utilized the bar chart as a scheduling tool on a bridge project few years before Henry Gantt developed the now commonly used bar chart in 1916 (Weaver 2006).

Projects are better designed to respond to expected uncertainties (Turner and Müller 2003), whereas project tasks demand proper planning and may be more challenging to project teams when compared to routine work. In addition, the PMBOK® Guide (2000) points out that its project management methodology is only “...applicable to most projects most of the time” (PMI 2000:13).

Project management methodologies are not designed to be generic but applicable to all projects at any given time (PMI 2008). Project management methodologies need to be adapted to individual project objectives, in order to achieve consistent project management success. Therefore, it appears that either methodology is wrongly applied or, project management does not directly influence the success of projects. Several project management organisations relate project failures to improperly trained practitioners and project managers. PMI (2004) states that a reason causing projects to fail is that project practitioners pay inadequate attention to activities in the conceptual stage. Joslin and Müller (2016) concluded that there is a positive

relationship between the elements of the project methodology and the characteristics of project success.

PROJECT SUCCESS FACTORS

Table 1 provides a summary of the literature on criteria for project success as reported by Westhuizen and Fitzgerald (2005). There is clearly no agreed definition and consistency of the criteria for project success. Researchers are still searching for project management practices being implemented to achieve a common understanding of project success.

Table 1: Literature summary of project success criteria (Westhuizen and Fitzgerald E. (2005).

PROJECT SUCCESS CRITERIA	Booch 1996	Wateridge 1998	Baccarini 1999	Kerzner 2002	Thomsett 2002	Marchewka 2003
Quality of Project management process			X	X		X
Within time	X	X	X	X	X	X
Within budget	X	X	X	X	X	X
Specified quality	X	X	X	X	X	X
Specified service quality		X	X	X		
Project stakeholder satisfaction		X	X	X	X	X
User satisfaction	X	X	X	X	X	X
Net benefits		X	X		X	X

The traditional criteria, known as the iron triangle, including cost, time and quality, remain the commonly accepted measures of project success (Atkinson 1999). Rubin and Seeling (1967) studied the impact of the project manager's experience on the success of projects. Munns and Bjeirmi (1996) highlight the role of project management processes in achieving project success, noting that there are factors affecting project success that are beyond the control of project management. Some projects miss all three parameters and are still hugely successful (Peters and Horner, 1997). Dvir *et al.* (2006) are of the opinion that the traditional project success measures are incomplete and may be misleading.

Baccarini (1999) concludes that project success is the combination of project management success with product success, whereas Lim and Mohamed (1999) suggest that a project is only successful when achieving its objectives. Lim and Mohamed (1999) also introduced the micro and macro perspective that looks at project success from a different perspective. The micro view focuses and assesses project management success at project completion, whereas the macro perspective incorporates the operational aspect of projects and concentrates on long-range customer satisfaction. De Wit (1988) made the distinction between project success and project management success and highlighted that project success is measured against the overall project objectives following project completion. De Wit (1988) further concluded that project management success is measured during the project life cycle by focusing on classic performance measures.

Milosevic and Srivannaboon (2006) focus on the link between project management and the project's final product as the new dimension for achieving project success, whereas project success is not achieved by completing the project within its constraints, but only after achieving end-user satisfaction. Even so, this approach may

be intended to deliver individual business outcomes, rather than managing project activities successfully to achieving successful project completion (Shenhar *et al.* 2007).

Other researchers note that measuring success should be done from the perspectives of the individual owner, developer, contractor, end-user as well as the general public (Lim and Mohamed 1999; Freeman and Beale 1992). Thus, it is broadly accepted that different projects may have individual success factors (Dvir *et al.* 1998). Liu (1999) highlights that every project may even have its unique set of success measures. Apparently, this complicates the effort to derive an agreed definition of project success. Stakeholder satisfaction is commonly agreed to be a valuable addition to the iron triangle whereas a successful project shall also satisfy its stakeholders (Baccarini 1999). Kam and Müller (2005) argue that if the end product of the project does not perform to customer satisfaction, although the project is delivered within the time, cost and quality constraints, the project appears successful from the project management perspective, but the product could be a failure. Therefore, in simple terms, project success comprises two main ingredients, project management success as well as product success (Baccarini 1999; Kam and Müller 2005; Baker *et al.* 1988; Lim and Mohamed 1999).

I. Project Management Tools and Techniques

Different projects have different project success factors. As a result, contemporary research lacks sufficient hard evidence for justifying the positive influence of project management on project success (Patanakul *et al.* 2010). Nevertheless, the definition of PMI (2008) for project management puts emphasis on the successful application of tools and techniques against project activities to achieve project success. Due to the rich variety of different tools and techniques, which are applicable to different project life cycle phases, it seems of utmost importance to apply the right tool and technique at the right time. Zeitoun (1998) suggests that the influence of the tools and techniques depends on the practitioners training as well as the implementation process. Hence, several success factors relate to human-influenced factors, the so-called soft project management (Kloppenborg and Opfer 2002) and do not relate directly to the tools and technique of the hard project management. Other researchers such as Nguyen *et al.* (2004), Scott-Young and Samson (2004), and Kloppenborg and Opfer (2002) partially confirm these findings.

The findings from a study by Thamhain (1999) showed that only 50% of project managers are familiar with project management tools and techniques, whereas only 28% implement them effectively. Al-Hajj and Sayers (2014) found that around 42% of practitioners in the United Arab Emirates do not utilize the Work Breakdown Structure (WBS) in their projects and around 48% do not feature an Organisation Breakdown Structure (OBS). Nevertheless, the investigated projects achieve a success rate (time, cost and quality) of around 66% (Al-Hajj and Sayers 2014). Such findings are surprising, and one may conclude that not all project management tools and techniques are directly influencing project success.

Studies by Pinto and Slevin (1988), Cash *et al.* (1992), Hatfield (1995), Thamhain (1999), Coombs and McMeekin (1998) and Milosevic *et al.* (2001) concluded that properly and timely applied project management tools and techniques may lead to project success. However, wrongly used project management tools and techniques may trigger the opposite result, leading to project failure (Cash *et al.* 1992; Hatfield 1995; Kerzner 2006).

The project manager is fully accountable for the success of the project and he or she is ultimately responsible for developing the project execution strategy and aligning it with the parent organisation's primary strategy (Globerson and Zwikaël 2002). This

highlights the importance of having properly trained project managers. Turner and Müller (2003) conclude that the title “Project Manager” shall be restricted to individuals who possess professional certificates in order to create more confidence and trust among principals or sponsors, during the process of selecting competent project managers. Other studies suggest that competence is essential to achieve project success but does not guarantee it (Hobbs *et al.* 2001; Turner and Müller 2003). Such studies partially align with the micro and macro perspective for project success of Lim and Mohamed (1999) in that project management success does not necessarily translate into project success. Nevertheless, the competence of the project manager plays a vital role in choosing the right tools and techniques to deliver the necessary project life cycle deliverables.

According to Dvir *et al.* (2004), “Plans are nothing, changing plans is everything”. It is unlikely that every activity can be planned in the exact way it shall be accomplished. Project management practices need to cope with the ever-changing internal and external factors influencing project success. Thus, it is important to appreciate the competence of the project manager. Turner and Müller (2003) confirm this point, which leads to the conclusion that proper project management training is a predecessor to the top-ranked project success factors. Nguyen *et al.* (2004) identified five Critical Success Factors (CSFs) in their study of major construction projects in Vietnam; the first factor for the success of projects is the ‘competent project manager’

Project Management and Project Success

Table 2: Summary of ranking of project success factors in construction projects

Ran	Ashley <i>et al.</i>	Nguyen <i>et al.</i>	Toor <i>et al.</i> (2008)	Rohaniyati (2009)
1	Organisational planning effort	Competent project manager	Effective project planning and control	Project manager's capabilities and experience
2	Project manager goal commitment	Having adequate funding until project completion	Sufficient resources	Clarity of project scope and work definition
3	Project team motivation and goal orientation	Multidisciplinary/competent project team	Clear and detailed written contract	Organisational Planning
4	Scope and work definition	The commitment to project	Clearly defined goals and priorities of all stakeholders	The use of control systems
5	Project manager capability and experience	Availability of resources	Competent project manager	Project manager's goal commitment
6	Control system	Top management support	Adequate communication among related parties	Project team motivation and goal orientation
7	Safety	Awarding bids to the right designer / contractor	Competent team members	Safety precaution and applied procedures

Project management practices, in combination with several other factors, influence project success (Munns and Bjeirmi 1996). The studies of Thamhain (1999) and Al-Hajj and Sayers (2014) suggest that not all project management tools and techniques are directly associated with project success. Nevertheless, even a thorough literature review could not identify any project which had been successfully completed without the utilization of basic project management practices.

Thus, many researchers (Pinto and Slevin 1988; Cash *et al.* 1992; Hatfield 1995; Coombs *et al.* 1998; Milosevic and Inman 2001) highlight that correctly applied tools and techniques may positively contribute to project success. The contemporary literature refers to project management practices, as the combination of concepts, processes, tools and techniques (PMI 2013). Besner and Hobbs (2004) highlight the difference of applying tools and techniques and using generic concepts and procedures to illustrate the importance of correct implementation of generally available tools and techniques, rather than the generic concept and procedures, which are partially also applicable in operational management.

Table 2 shows the ranking of project success factors compiled from Ashley *et al.* 1987; Nguyen *et al.* 2004; Toor *et al.* 2008; and Rohaniyati 2009. The literature review revealed interesting facts, supporting the conclusion that project management positively influences project success. Leading researchers in the field referred to in this paper argue that a project may have individual sets of success criteria and factors. Thus, it is also recommended that studies be initiated on a global scale, for identifying a possible generic set of project success parameters.

RESEARCH METHODOLOGY

Data were collected using a web-based questionnaire featuring 20 questions sent to 142 selected project managers in ten different countries. The participants were selected based on their background, geographical location and the current employment position they held. More than 75% of the respondents occupy managerial positions. The questionnaire features closed and five-point Likert scale questions in combination with matrix ratings.

ANALYSIS OF RESULTS

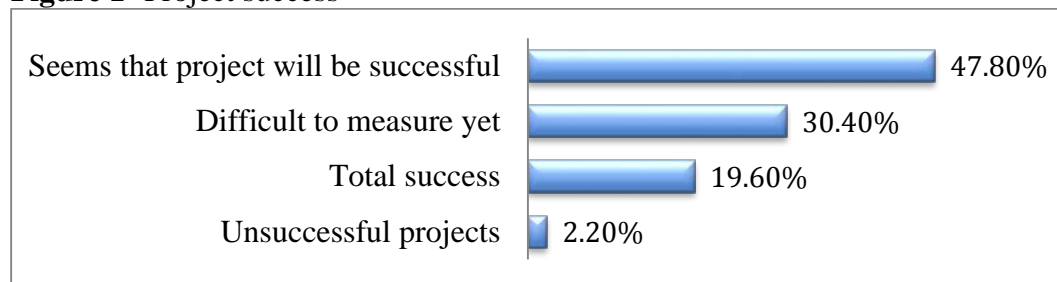
The data collected shows that one-third of the surveyed projects failed to achieve their objectives of being within the iron triangle, but despite this finding, 86.3% of the clients and 90% of the contractors were satisfied, as stakeholders, with their achievements in the projects they were involved in, showing that stakeholders' satisfaction should be perceived independently. This finding may indicate that project management success influences project success. Some 78% of the respondents were working on unfinished projects at the monitoring and control phases. Therefore, the level of satisfaction reflects satisfaction at that particular construction phase and not related to success of the product. This finding contradicts the observations of researchers such as Baccarini (1999), Kam and Müller (2005), Baker *et al.* (1988) and Lim and Mohamed (1999), who widely agree that project success is a combination of project management success and product success. The findings show that the traditional success criteria are not the only and main measure of success and achievements on projects.

About 43% of unsatisfied stakeholders reported that the projects they were working on were on time, 71.4% were within the budget and 28.6% deliver the project as per contract terms and conditions. Demonstrating the iron triangle of Atkinson does not necessarily fully serve as an appropriate success measurement. None of the unsatisfied stakeholders works for a client organisation, whereas 50% of the respondents work for a contractor. Although the overall result illustrates projects with satisfied stakeholders, the above finding aligns with the reviewed project management literature. Nowadays, considering time, cost and quality, as primary success measures appears insufficient. Therefore, as suggested in the literature, additional parameters shall also be considered for evaluating project success. The majority of the surveyed projects are within the given time (66.7%), within the agreed budget (72.5%) and comply or exceed quality requirements (66.7%). The analysis

unambiguously demonstrates that around two-thirds of the surveyed projects operate within the iron triangle and achieved stakeholder satisfaction.

Figure 1 shows that these projects achieve the broadly agreed definition of project management success. Only 47.8% of the respondents predict their project successful and only 19.6% of practitioners are confident in achieving project success. Based on the respondents' opinions, the adequate funding until project completion strongly influences the success of a project. However, market or industry fluctuations, on a global scale, may have influenced such a rating. Nevertheless, it is apparent that global changes may influence the success of an individual project, a finding that consolidates the micro and macro perspective of project success. Nonetheless, a project does not operate in a vacuum.

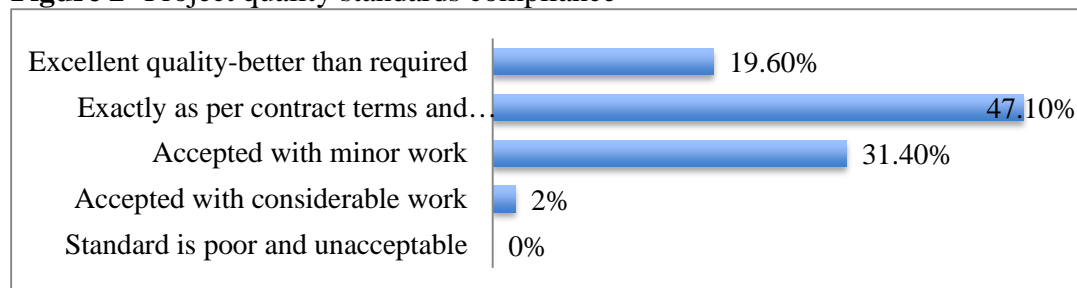
Figure 1- Project success



Beyond stakeholder Satisfaction

Figure 2 shows that about 20% of respondents reported over satisfaction in the quality of work that was seen as better than required. Some 70% of these answers originated mainly from Singapore. These findings are in line with Ashley *et al.* (1987) who emphasised on success being achieved only when delivering a product that supersedes the contracted specifications. It is worth noting that this does neither align with advanced quality management thinking, nor with good project management practices. The practice of exceeding specifications in Asia is seen as a way of building confidence and good relationships with the client. Chinese stakeholders rate the importance of relationships over the iron triangle as a measurement for project success. Also, Shenhar *et al.* (1997) rank stakeholder satisfaction before time, cost and quality. Nevertheless, this practice is not recommended by the Project Management Institute (PMI) and is seen as “*gold plating*” as a project manager shall not deliver extras to customers and shall only deliver what is necessary to meet the project objectives. The response to this question partially indicates that Asian stakeholders attempt to foster relationships by going beyond the contractually agreed obligations whereas 47.1% of the participants deliver their projects as per contract terms and conditions.

Figure 2- Project quality standards compliance

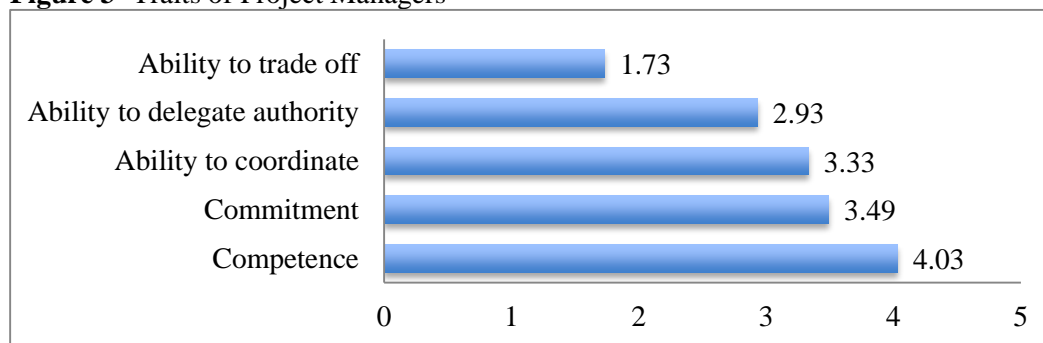


Project management traits

Turner and Müller (2003) concluded that a competent project manager should have proper training as well as a professional certificate. Later on, in 2005, the same authors argued that project managers style of leadership and their level of competence

did not impact project success. This research study addressed the traits of project managers as well as the impact of professional affiliations. Figure 3 presents the findings of data gathered on project managers traits. It clearly shows that the most important trait of all for project managers is ‘competence’ and followed by ‘commitment’ then ‘ability to coordinate’, then ‘delegation, and finally the ‘ability to trade off’.

Figure 3- Traits of Project Managers



Project managers were asked about their affiliations with world-famous professional institutions that look after construction project management as follows: CIOB (Chartered Institute of Building), RICS (Royal Institute of Chartered Surveyors), PMI (Project Management Institute), IPMA (International Project Management Association), ICPMA (International Construction Project Management Association), AIPM (Australian Institute for Project Management) and PPMA (Professional Project Management Association) and others. Only 20% of all the respondents have affiliations with only three internationally known professional institutions. These are 15.2% with PMI, 2.2% with RICS, and 2.2% with ICPMA.

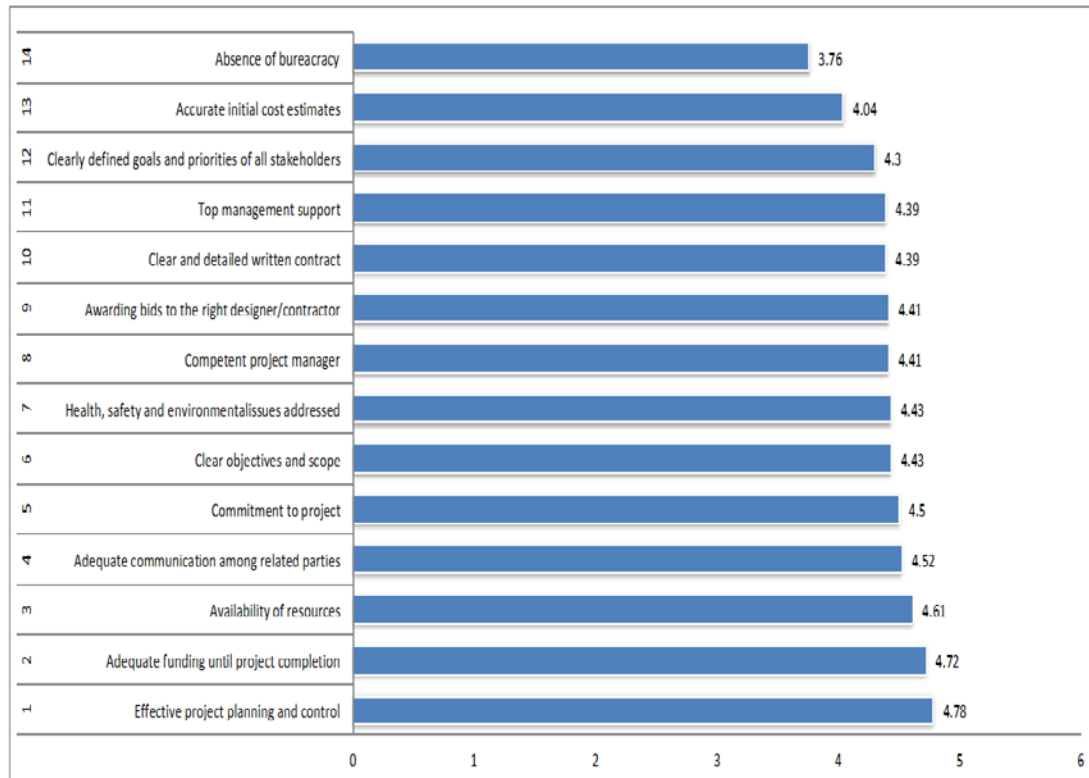
About 13% of respondents got training internally inside the company. Furthermore, 6.5% of respondents had affiliations different from the selected list provided in the survey. Perhaps the most surprising finding of all is the fact that about 61% of respondents did not have any kind of professional affiliation or any proper project management training, at all. Such results indicate that practitioners perceive that competence can be gained without obtaining professional training or professional certification process, which puts it in contradiction with the literature. More than three-quarters of participants occupy a manager’s position; about 22% of them are senior project managers or project directors. The age range of the participants is between 25 and 65 years. About 56% of participants have a bachelor’s degree or higher. One-third of practitioners have less than five years of project management experience. Nevertheless, as stated earlier, the extent of affiliation with internationally recognised project management organizations reveals that most of the respondents do not have professional training directly organized or recognized by the project management renowned institutions. Based on this, one may conclude that specific project management training may not necessarily be related to project success.

The analysis of the information collected shows that the majority of construction project managers enter the project management profession through experience rather than through an academic and/or professional certification process, a finding contrary to the suggestion by Turner and Müller (2003) in that the title “Project Manager” shall be restricted to individuals having obtained professional certificates.

Project Success Factors

In Figure 4, ‘Effective Project Planning and Control’ is ranked by respondents as the most important factor for the success of construction projects. It received the highest score of 4.78 out of 5. ‘Competent Project Manager’, however, was ranked in eighth place of the success factors.

Figure 4- Project Success Factors from Data



A. PM Tools and Techniques Utilisation

Figure 5- Project Management Tools and Techniques

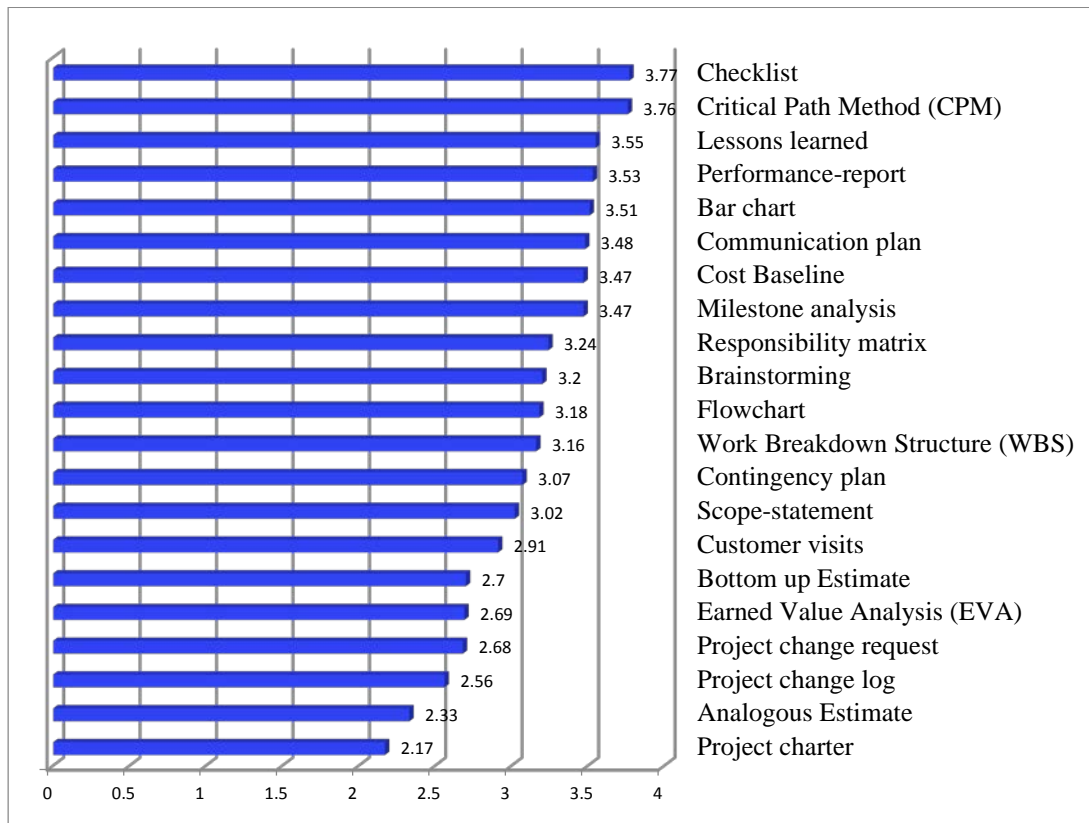


Figure 5 provides the ranking tools and techniques used in projects respondents are involved with. 21 techniques are ranked. Earned Value Analysis (EVA) is considered very important, whereas 19.5% report that they rarely use EVA, representing a

conflict. EVA is an essential tool for performance measurement and control of projects (Nagrega 2002). It is also pertinent to note that 16.7% of respondents do not use and 16.7% only rarely use a work breakdown structure (WBS). These, in sum 33.4% of participants, rate effective project planning and control as the most important factor leading to project success, representing another contradiction in that the WBS is of utmost importance for performing project planning and control. Moreover, the respondents rank clear objectives and scope only on the sixth rank of the project success factors. A finding which partially aligns with the responses of EVA and WBS in that it appears that contemporary project practitioners perceive project planning and control as independent tools and techniques, rather than an integrated concept, leading to the assumption that practitioners do not fully appreciate project management tools and techniques, indicating a lack of professional training of the surveyed practitioners.

CONCLUSIONS

A clear and strong correlation exists between project management success and successful projects. Although, the traditional cost, time and quality criteria remain as the preferred method to measure projects' success it does not guarantee stakeholders' satisfaction. It can be said that project success is a perceived measure, irrespective of the individual success criteria and factors. There is no indication that project success was achieved in isolation from the optimization of project management tools and techniques. There is a universal set of project success measures, applicable to all projects in the construction industry. The data features significant similarities representing a new insight. The research findings show that project practitioners do not fully utilize available project management tools and techniques, the vast majority of project managers implement project management methodologies though. It is recognized that project management practices and techniques are widely used in successful projects and therefore, project management positively influences project success. It can be concluded from this research that successfully delivered projects utilize tools and techniques of project management practices. Finally, competent and properly trained project managers who demonstrate a strong command of project management tools and techniques, relevant to produce the project life cycle phase deliverables directly influence project success.

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THE APPLICATION OF ALTERNATIVE TECHNICAL CONCEPTS IN TRADITIONAL AND INNOVATIVE PROJECT DELIVERY METHODS AND IMPEDIMENTS ASSOCIATED

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Project owners are always seeking a technique to allow contractors to provide innovative solutions to meet or even exceed the requirements of the request for proposal (RFP). Alternative Technical Concepts (ATCs) have been proved to have the potential and to allow for innovation, environmental impacts reduction, cost and schedule saving, improvement of project quality and aid constructability. This research analyzes how ATCs have been applied in different project delivery methods such as Design-Bid-Build (DBB), Design-Bid (DB), Construction Manager-General Contractor (CM/GC), Public-Private Partnership (PPP), and Integrated Project Delivery (IPD). Impediments associated with each project delivery methods are identified. Industrial practitioners and other researchers can rely on this research to obtain a primary understanding towards the current state of practice of ATCs, to develop more applicable ATCs adoption plan to ameliorate the performance of ATCs and eventually to improve the overall project quality for the purpose of meeting and surpassing owners' requirements.

Keywords: alternative technical concepts, departments of transportation, highway sector, innovation, project delivery methods.

INTRODUCTION

To address the widening gap between investment needs and available resources, Departments of Transportation (DOTs) have adopted strategies that promote innovation and motivate industry to propose cost or time-saving ideas. These strategies have included the use of alternative project delivery methods, value engineering and constructability reviews, alternate bidding strategies, performance specifications, and more recently Alternative Technical Concepts (ATCs).

Federal Highway Administration (FHWA) (2014 a) defines ATCs as “A suggested change submitted by proposing teams to the contracting agency’s supplied basic configurations, project scope, design or construction criteria”. Moreover, according to the definition of Missouri Department of Transportation (MoDOT) (2017), “ATC is a proposed change to agency-supplied base design configurations, project scope, design criteria or construction criteria. This change provides a solution that is equal or better to the requirement in the contract”.

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Section 1304 of Moving Ahead for Progress in the 21st Century Act (MAP-21) provides an incentive to increase the Federal-aid share to promote innovation (FHWA 2014). The Map-21 S. 1304 builds off Every Day Counts (EDC) program by the FHWA. It aims at fostering innovation, enhancing safety, reducing cost, protecting the environment and encouraging overall improvements in traditional highway projects (FHWA 2016 b). National visibility to implementing ATCs into transportation projects was brought by EDC-2 (2013-2014). The need for ATCs has been pressed by the deteriorating infrastructure of the United States where innovative measures must be updated. DOTs have adopted it to promote innovation and motivate industry many years prior to the official introduction of ATC by FHWA.

The Transportation Expansion (T-REX) project deployed by Colorado DOT was the first application ATCs in 2001. Minnesota DOT started using ATCs in its design-build (D-B) program, which could be considered the first programmatic use of ATCs in 2002. Building on existing success use of ATC in D-B projects, Missouri DOT experimented with ATCs on design bid build (DBB) projects in early 2011 and Michigan DOT followed suit in 2013, piloting the use of ATCs for innovative traffic staging and management strategies for DBB projects. The first implementation of ATCs in construction manager-general contractor (CM-GC) was considered the Utah DOT on "I-80 Pipe Repair" Project in 2012 (Alleman et al. 2016).

ATCs allow for innovation, reduction to environmental impacts, cost and schedule saving, improvement of project quality and aid constructability by providing a mechanism to consider design input of contractors and bring multiple experience and creativity of all project stakeholders. Concepts that merely delete scope, lower performance requirements, lower standards, or reduce contract requirements are not acceptable as ATCs. Innovative aspects of ATCs should not include revisions to established department standards, specifications and policies. The past experiences of agencies have proved ATCs can be applied in nearly all kinds of forms of project delivery methods, DBB, CM/GC and many others. ATCs have the potential to provide greater value to state DOTs and the public.

Research literature on the subject of ATCs focused on the implementation in DBB, D-B and CM/GC. There has no research comprehensively examining and comparing the ATCs appliance in both traditional project delivery method and all innovative project delivery methods, including D-B, CM/GC, Public-private partnerships (P3s) and Integrated Project Delivery (IPD). If Impediments associated with the appliance of ATCs could be identified, Industrial practitioners and other researchers would be able to develop a more applicable ATCs adoption plan. Therefore, the objective of this research is to present the ATCs process in individual project delivery methods and summarize associated impediments.

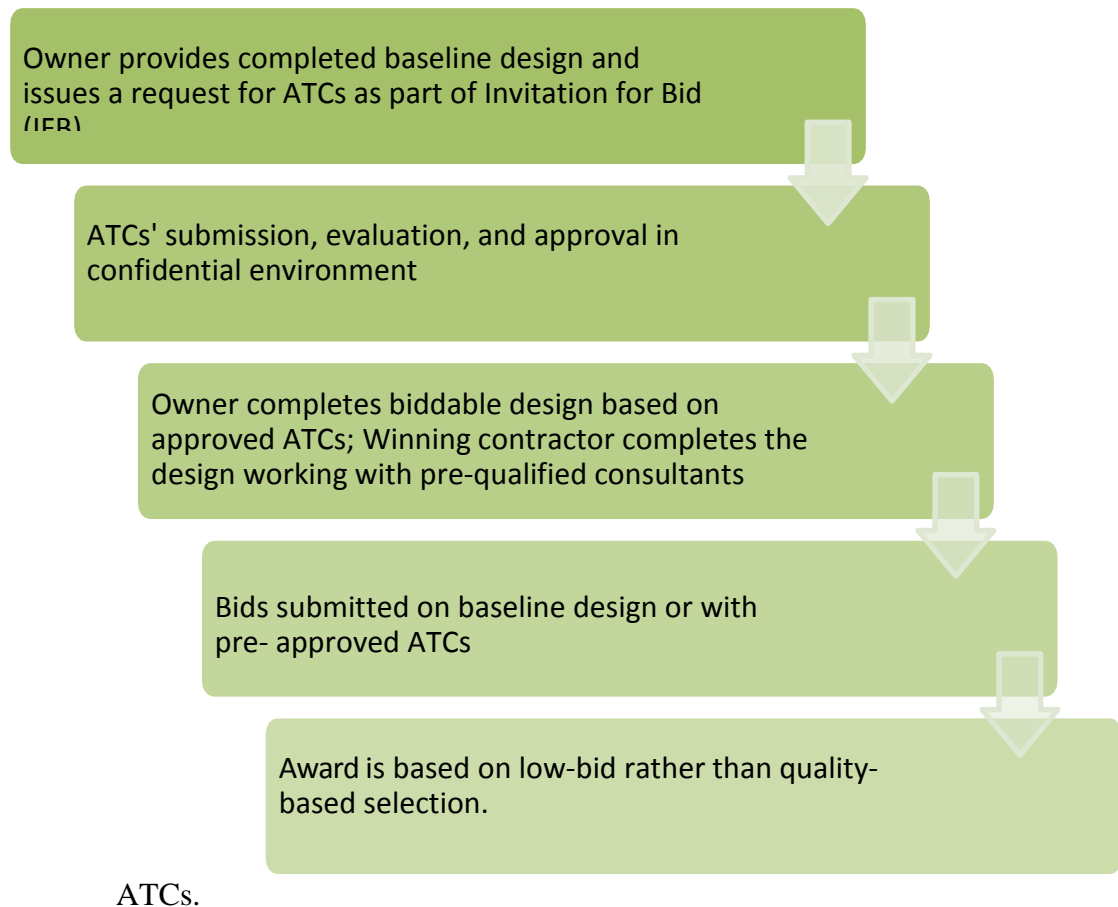
ATCS IN TRADITIONAL PROJECT DELIVERY METHOD

ATCs in DBB

State DOTs have a long history of implementing D-B as the primary contract delivery methods, while the utilization of ATCs in DBB is about a decade later. The application of ATCs in DBB projects provides the Opportunity that construction personnel could involve in the early process to enhance constructability, increase the quality of temporary construction and Maintenance of Traffic (MOT) on projects.

Figure 1 illustrates the ATCs process in DBB projects. Contractors get involved after the establishment of baseline design. If proposed ATCs are approved, they have the

option to submit a proposal based on pre-approved ATCs or baseline design. The award is based on low-bid. DBB ATCs do not have as significant impact as DB ATCs since the scale is much less. Completed design with established accurate biddable quantities is required for DBB



ATCs.

Figure 1: ATCs process in DBB projects

Some of the state DOTs have been experimenting on ATCs in DBB successfully in the last few years since 2011. The Minnesota Department of Transportation (MnDOT) is one of the few state DOTs that experimented on DBB ATCs to increase the quality of Maintenance of Traffic (MOT) and reduce cost under the provisions of Special Experimental Project No. 14 (SEP-14) 5 (MnDOT 2015). The pilot projects include I- 35W/I-35E/I-35 Junction Project and I-35W/Lake St. Reconstruction Project. DBB ATCs are only allowed on temporary items with lump sum bid items. New Mississippi River Bridge and Hurricane Deck Bridge were the two projects in which MoDOT has experimented with ATC. Michigan DOT (MDOT) utilized DBB ATCs for the project on rehabilitation project on I-75 in the Bay Region in 2014. DBB ATCs are limited to maintain traffic and staging in MDOT (FHWA 2014 a). Both MoDOT and MDOT have applied ATCs in DBB projects successfully. However, they employ different approaches. The main difference is which party, owner or contractor, is responsible for completing the biddable design. DBB ATCs have more potentials with large projects over \$10 million, projects with complicated MOT management and projects having necessary additional time to run the process properly.

The full scope and limited scope are two forms of ATCs, which can be implemented in DBB projects. MnDOT has experimented ATCs which can be performed in any level of involvement in DBB projects. Limited involvement of ATCs enables its implementation in DBB projects without rising of the level of risk for both the owners and contractors (Gad et al. 2015). While the full scope application of ATCs provides

the most flexibility for contractors to bring innovation to projects, they could result in contractors' better understanding of the project. MoDOT's Hurricane Deck Bridge Project is considered to be a full-scope ATCs projects, whereas MDOT's I-75 rehabilitation project is deemed to be a limited scope ATCs on DBB project.

There are some impediments associated with the implementation of ATCs in DBB projects. The bidding process of traditional DBB projects requires that all contractors bid on the same baseline design. However, under the ATCs case, contractors propose different content and include their own ATCs to the project owner. Further escalation is that neither contractors nor the State DOTs are familiar with this process.

Contractors have to submit different bid forms owing to ATCs. It may cause some degree of logistical challenges and conflicts to the traditional documenting system (FHWA 2014).

Potential contractors submit alternative designs in connexion with DBB ATCs after the owner has provided the finished baseline design and issued a request for ATCs as part of IFB. Additional bidding time for redesigns is required before contract awarding. To sum up this point, DBB ATCs are not suitable for projects with a limited schedule.

As of DBB projects, the approval of ATCs is prior to the submission of bids. In light of this, site condition evaluations pertaining to ATCs may result in delays, which reduces the contractor's likelihood of winning the contract. If site condition evaluations are conducted after contract award, the approved ATCs may not be feasible in the construction phase. Risks arisen from ATCs may eliminate all time and cost savings (Gransberg 2014).

ATCS IN INNOVATIVE PROJECT DELIVERY METHODS

ATCs in D-B

ATC is most commonly applied in D-B projects, especially in large projects where innovative solutions can improve the performance of projects the most efficiently. Most state DOTs pilot ATC in D-B projects. Projects with complicated or costly arrangements are more common with the appliance of ATCs. Contractors are more interested in undertaking additional effort associated with ATCs to obtain more profit from larger projects. In D-B projects, contractors submit ATCs based on baseline design and project configurations. If ATCs are approved by the owner, contractors may submit price or technical proposal incorporating those concepts. Proposers have the option either to include or to exclude pre-approved ATCs in the final proposal. It is important to note that "pre-approved" does not mean proposers are obligated to submit a final proposal including ATCs. The confidential one-on-one meeting is required in the process. Figure 2 illustrates the ATC process in D-B projects.

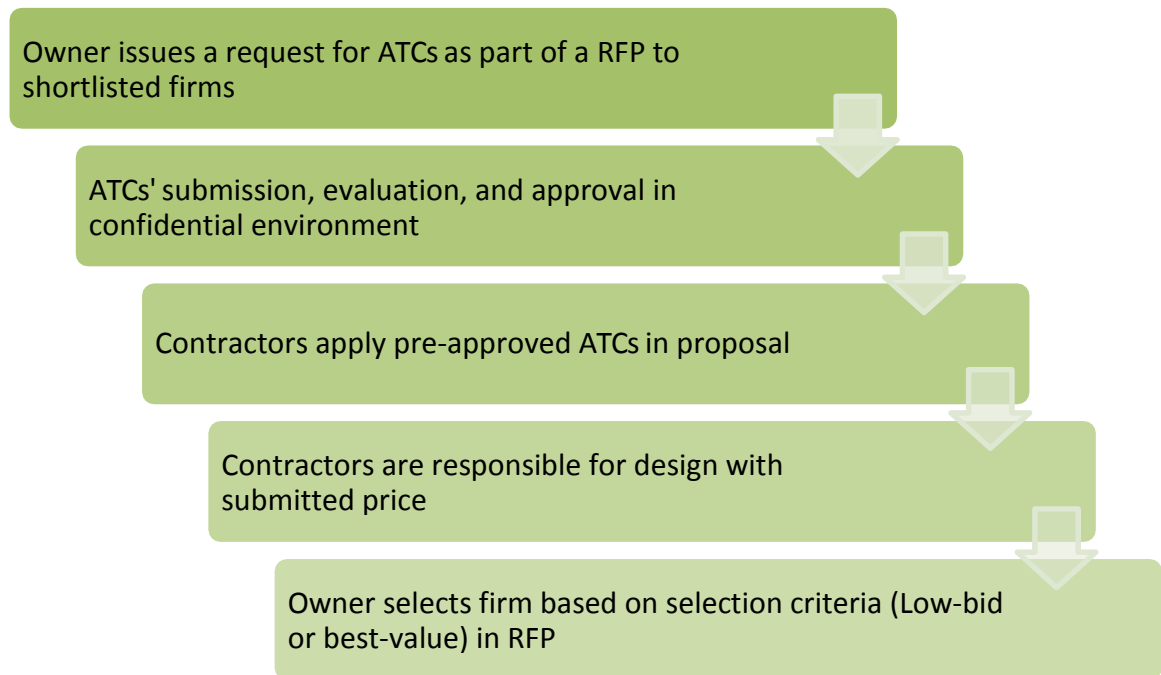


Figure 2: ATC process in D-B projects

The Final Rule for D-B of FHWA allowed ATCs but necessitates that contractors also submitted a proposal based on baseline design. The revised Final Rule for D-B was published in 2014, the requirement for baseline design proposal is eliminated when ATCs are applied under SEP-14.

Lacking standardized guidance is one of the correlated issues. There is no federal-level formalized introduction to ensure the “equal or better” criteria in D-B ATCs. Approval of ATCs hinges on the sole discretion of each DOTs, varying state by state. It may cause conflicts between state DOTs and contractors, which may even include disputes inside different parties of DOTs since there is no formalized introduction to follow. Productivities and efficiency are affected during the process. Without formalized introduction, project owners are bound to struggle to maintain consistency in different projects (FHWA 2014 b).

ATCs in CM/GC

ATCs and CM/GC project delivery method are all considered FHWA EDC initiatives. Utah Department of Transportation (UDOT) is one of the leaders to have incorporated ATCs into CM/GC projects. The implementation of ATCs on CM/GC projects are not as common as D-B projects. Taking into account CM/GC projects, the ATC is approved after contractor awarding. The selection of contractors is the best value based, or qualification based. The innovation ability of potential contractors is evaluated before contract granting. Project owners request a list of innovations from contractors and circumspectly assess their CM/GC approach. It leads to the fact that contractors who have the most innovation ability to bring more benefits to the project have the most possibilities to win the contract. Contracts of CM/GC project can be divided into two parts, preconstruction contract and construction contract. Whereas baseline design is established after preconstruction contract awarding and prior construction contract awarding. There is no baseline design when the successful contractor generates potential ATCs. The successful contractor's individual ATCs do

not need to be reviewed, evaluated and approved before construction contract awarding since there is no baseline design at this time. ATCs can be integrated directly and promptly to the final design without wasting time and resources in baseline design. Figure 3 illustrates the ATC process in CMGC projects. The design process of CM/GC ATCs is part of the baseline design process. It offers more flexibility for ATCs development after procurement. CM/GC ATCs allow project owners to obtain all savings that stem from ATCs. Successful contractors are compensated by contract awarding. Besides, ATCs are made possible in CM/GC projects without prolongation of schedules (Gransberg 2014).

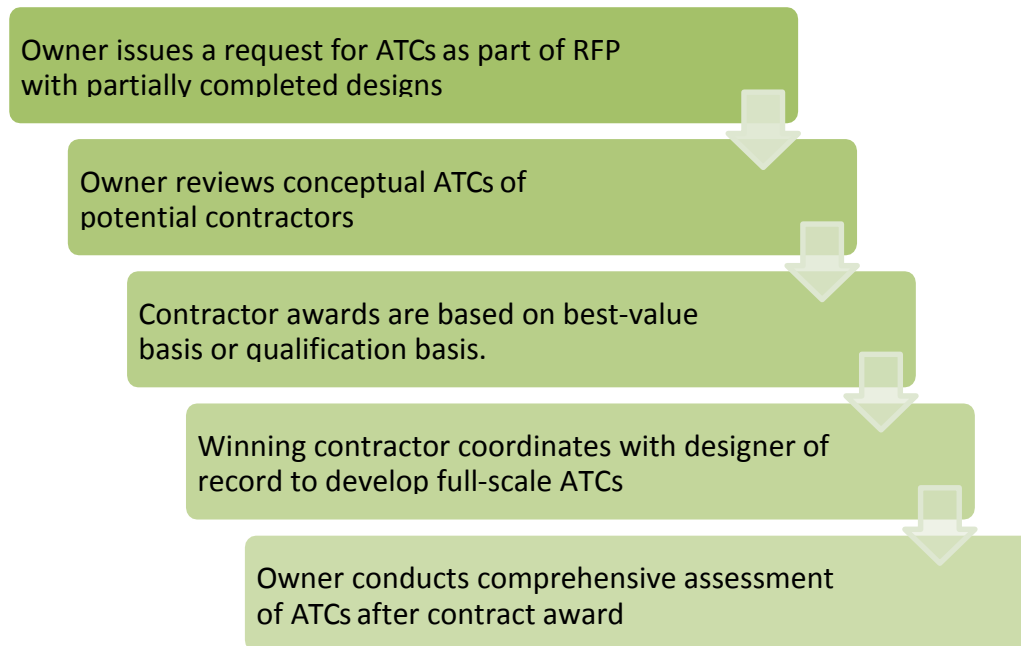


Figure 3: ATCs Process in CM/GC projects

There was a misunderstanding that ATCs could not be incorporated into CM/GC projects. ATCs are naturally not apparent in CM/GC projects (FHWA 2014 c).

However, many previous successful projects applied, and researches have proved that the instinct CMGC process provides a big advantage for the implementation of ATCs. In CM/GC, project owners only get ATCs from the successful contractor. This is different from DBB and D-B ATCs, which are submitted by several contractors.

Designer-of-record assumes responsibility for design and redesign. Design liability of CM/GC ATCs is the clearest among all project delivery methods (FHWA 2014 d). The application of ATCs on CM/GC projects is the most efficient compared to the use in DBB and D-B projects (Gransberg 2014). There is no federal regulations and guidance in regard to CMGC ATCs. “Innovative approaches to project execution” (FHWA 2014 c), “Proposed Technical Concept” and suchlike names are used instead of ATCs when the concept is applied in CM/GC projects. Furthermore, ATCs in CM/GC projects is informalized, and the implementation varies state by state. CM/GC delivery method was initially considered not appropriate for ATCs. Thus, very few CM/GC projects have implemented the concept of ATCs. Limited experience and meager familiarity obtained from the previous projects, further use of ATCs in CM/GC projects has been causing a degree of hesitation for many project owners and contractors.

ATCs in P3s

There has been a clear trend that P3s to be accepted by global governments, its popularity having become significantly potent since the late 20th century. According to the United States Department of Transportation (USDOT), the definition of P3s is “contractual agreement between a public agency and a private entity that allow for greater private participation in the delivery of projects. Participation typically involves the private sector taking on additional project risks such as design, construction, finance, long-term operation, and traffic revenue” (USDOT 2018). P3s as an innovative project delivery method connects both private and public sectors. Reducing risks, encouraging innovation, promoting the long-term relationship between the public and private sectors are all fine examples that illustrate the benefits that P3s has to offer. P3s are deemed design-build-finance (DBF) or design-build-finance-operate-maintain (DBFOM) delivery method, which is one kind of the D-B method.

Compared to traditional D-B projects, long-term operating and maintenance cost savings and life-cycle assessment are given more emphasis in the application of ATCs in P3s projects. The implementation of ATCs in P3s plays a significant role in construction projects. ATCs have been deployed in numerous P3s projects, such as Texas’s North Tarrant Express Highway Construction Project, Virginia’s Martin Luther King Jr. Expressway, and Florida’s Ultimate I-4.

The ATCs process in P3s is quite similar to that of D-B projects. Figure 4 illustrates the ATCs process in P3s projects. One of the significant differences, nevertheless, lies in the involvement of the private developer. Although the evaluation and selection of ATCs may still be at the sole discretion of the public owner, in some particular projects, private developers have the right to evaluate ATCs together with public owners. Another form of distinctness is that ATCs are to be ‘equal or better’ in the evaluation process in contrast with the preliminary design in RFP. Life-cycle cost analysis plays an essential role in P3s projects forasmuch as it determines whether the private be able to bring the project to fruition. Long-term operating and maintenance cost savings must be considered along with the short-term design and construction cost savings in P3s projects. When it comes to the application of ATCs in P3s projects, the life-cycle cost analysis in the ATCs evaluation process is more important than general D-B projects.

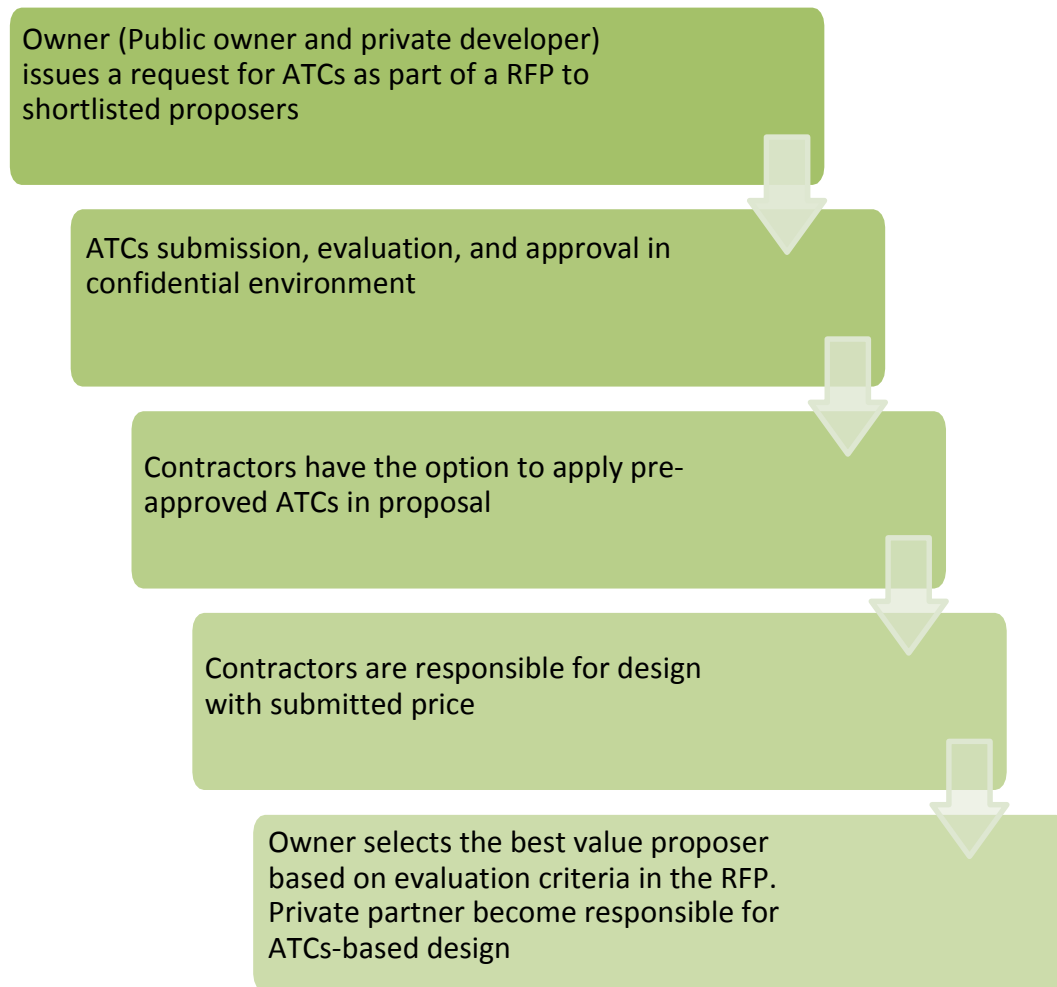


Figure 4: ATC process in D-B projects

There are impediments in connexion with the application of ATCs on P3s. In particular, the number of P3s projects applied with ATCs is scarce. Given the inadequate performance history and insufficient previous experience, it is difficult to identify the appropriate path to implement ATCs on P3s with moderate risks. ATCs handled on P3s projects are typically in a short period of time, which result in limited thorough conversation opportunities for involved parties to clarify alternative design, new methods, risks and benefits. Furthermore, it is difficult to identify cost benefits resulted from ATCs within P3s projects since lifecycle cost is not easy to be calculated within a restricted time span.

ATCs in IPD

Since the 1990s, IPD has emerged as an innovative alternative project delivery method and designed to solve key construction issues and change the current construction project delivery methods fundamentally. According to the definition of the American Institute of Architects (AIA), IPD is “a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction.” (AIA 2007). Through the multiparty contractual agreement, the IPD method brings all participants collaboratively at the very early stage and allows rewards and risks to be shared by all parties of the project. This cooperative approach encourages early decision-making early when most value could be accomplished. IPD maximizes value to the owner.

Even though there is no actual ATCs appearing in proposals of IPD projects, the benefits of ATCs could be achieved in the process. In IPD projects, main project participants, such as architects, civil engineers, owners, general contractors, and

subcontractors began to work jointly when 0% of the baseline design is completed. ATCs proposed by contractors to realize the cost, schedule or other benefits are through modifications of the baseline design. However, there is no baseline design in IPD projects. Conceptual design, criteria design, and detailed design are created by all main project participants cooperatively. In IPD projects, general contractors and subcontractors collaborate with designers and make the design fit into their specialties at a very early stage with no restriction of owner's baseline design, whereupon it is needless for contractors to file ATCs to modify designs. The concept of ATCs and potential benefits are built in IPD, which could save more resources of all involved parties of the project.

CONCLUSIONS

ATCs have been proved to bring benefits and deliver cost and time saving, improved quality and lower risks to traditional DBB projects and innovative project delivery methods, such as D-B, CM/GC, P3s and IPD projects. This research examined and summarized the ATCs process in each of the five project delivery methods, providing a better understanding of DOTs and the public. Specific impediments associated with the application of ATCs in different project delivery methods were identified. To gain a better insight into the impediments will result in eliminating barriers and improving the performance of ATCs. This research provided a briefly comprehensive analysis of the appliance of ATCs. Reviewers are able to obtain a primary understanding of the current state of practice of ATCs through this research.

Extended bidding time, deficient relevant experience, geotechnical risks, lack of formalized introduction, and difficulty in evaluating long-term cost were main impediments recognized and analyzed in this research. In order to eliminate these impediments, contractors and especially project owners should establish a well-functioning lesson-learned mechanism. Besides, federal and state agencies should develop formalized regulation and guidance to lead industry practitioners to apply ATCs.

For future research, there is a need to analyze ATCs and the current status through its key elements, such as confidentiality, environmental permitting, ownership rights, intellectual property, design liability, risk allocation, and programmatic implementation. Investigation of these key elements would contribute to a further better understanding of ATCs.

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THE COST OF FIRE IN HIGH-RISE BUILDINGS: POST GRENFELL AND IMPLICATIONS FOR THE PROFESSIONAL DEVELOPMENT OF THE QS

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The recent Grenfell Tower fire disaster in 2017 and Hackitt Review heightened the need to address the issues of fire safety in high-rise buildings. However, increasing pressure to reduce building costs and to complete construction projects on time remains a major challenge. This study examines the cost of fire in high-rise building projects and the implications for the professional development of quantity surveyors (QS). The method adopted is a case study approach drawing on the recent experience of the Grenfell Tower fire disaster, an analysis of data collected on fire provision in high-rise buildings using the BCIS database and a review of the RICS New Rules of Measurement. Given the significant cost of fire in high-rise buildings, there is a need for adequate provision in fire protection by investing in costs in anticipation of fire during cost planning stages to significantly reduce the costs associated with the consequence and responses after a fire incident estimated to be high in the case of Grenfell. The QS needs to adopt a proactive approach in pricing items specific to fire protection as part of a team of professionals and developing the required competencies will ensure that there is adequate costing for fire provision in the cost plan.

Keywords: Grenfell fire, Hackitt review, cost of fire, high-rise buildings.

INTRODUCTION

The annual cost of fire to the UK economy was estimated to be £8.3 billion in 2008 and the financial implications have been increasing over time (The Chartered Institute of Public Finance and Accountancy, 2008 and Department for Communities and Local Government 2011). The number of high-rise buildings in the UK has continued to grow significantly. For example, London has over 435 high-rise buildings in its development pipeline for 2016 to 2020, with over 30% in construction (AMA Research, 2017). According to Hall (2011), an average of 15,700 fires per year were reported in high-rise buildings in the USA, causing a total of 53 deaths, 546 injured, and \$235 million in direct property damage. The building codes create the requirements which every design of a high-rise building must meet and added safety measures are necessary to mitigate against risk inherent in a project and the difficulties in fire-fighting operations (Hall, 2012). International technical guidance from National Fire Protection Association 101 in the U.S. (NFPA 2012), or the Approved Document B (The Building Regulation 2006) in the UK provides information on the design of

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major buildings and components including high-rise buildings. Other countries also have similar standards such as the Code for Fire Protection Design of Tall Buildings in China (GB50045-95 [2005](#)), the Fire Safety Requirements for super high-rise residential buildings in Singapore (Singapore Civil Defence Force [2006](#)) or Chapter 7 of the Fire and Life Safety of National Building Code of India (Bureau of Indian Standards, [2005](#)). In Shanghai, any building over 100 m is referred to as a super-high tower, which requires a different set of fire prevention measures for design, including a refuge storey for fire escape purposes (Picken and Ilozor, 2015). The UK government has the right to fine companies if they do not adhere to the correct regulation on fire safety standards. The top four fire fines handed out in the UK according to City Fire Protection (2018) are: The Radnor Hotel (£200,000) The Chum Leigh Lodge Hotel (£210,000), The Co-operative (£210,000) and New Look (£400,000).

Many questions have been asked and some remained unanswered following the recent fire incident on Grenfell tower building regarding the adequacy of current safety regulations and emergency procedures for high-rise buildings and it raises serious issues relating to ethics and professionalism. In a report reviewing of building regulations and fire safety, Dame Judith Hackitt (2018) described how the regulatory system covering high-rise and complex buildings was not fit for purpose. The interim report also established that “a lack of skills, knowledge and experience and a lack of any formal process for assuring the skills of those engaged at every stage of the life cycle of higher risk residential buildings (HRRBs) as a major flaw in the current regulatory system”. But issues of costs have also been part of the on-going debate on fire safety of high-rise buildings, particularly relating to retrofitting existing stock of buildings to make them more fire and safety compliant. During the planning of a high-rise development many factors must be taken into consideration including the roles of the professional and accreditation bodies. The Hackitt Review noted that the professions in the construction and fire safety sectors “have a key role to play in agreeing and monitoring accreditation and reaccreditation, and the period within which the competence of individuals should be reassessed and reaccredited” (Hackitt, 2018). This study examines the cost of fire in high-rise building projects and the implications for the professional development of the quantity surveyor (QS).

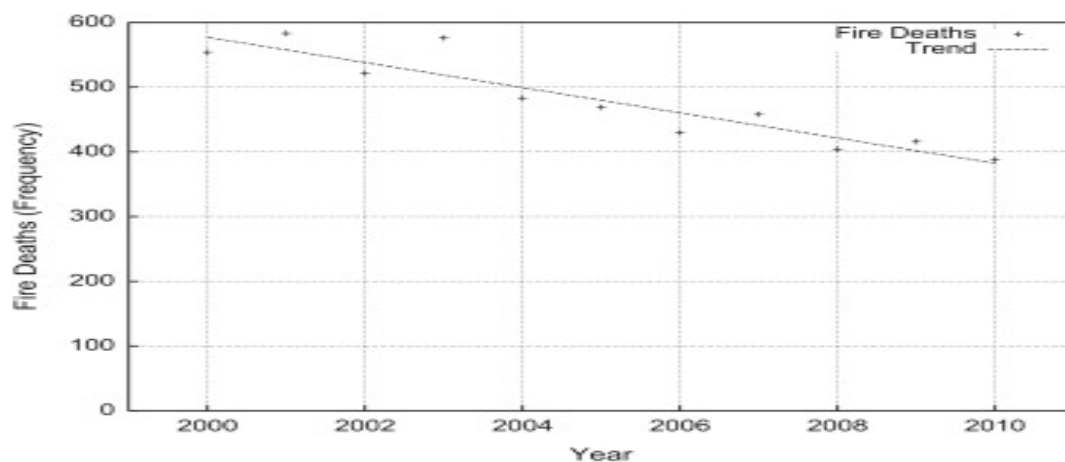
LITERATURE REVIEW

High-rise Buildings and the Cost of Fire

A high-rise building can be defined in many ways with most agreeing that it is a tall encased structure (Quiter, 2008). A high-rise building can also mean “*buildings greater than 75 feet (approximately 23 m) in height where the building height is measured from the lowest level of fire department vehicle access to the floor of the highest occupiable storey*” (NEPA 2012). Some also define it by height with over thirty-five metres often cited in the literature whilst others use the number of storeys. For example, seven storeys plus was indicated in Hall (2005). Knoke (2006) defines high-rise buildings as “one that extends higher than the maximum reach of available fire-fighting equipment”. However, it is generally down to the fire codes in a particular city, country, region or county. Hall ([2011](#)) identified the main building uses that can be categorised such as office buildings, residential buildings (such as hotels, apartment buildings) and health care facilities. Each of the categories presents different characteristics from the point of view of the infrastructure and the population. The analysis of building use is therefore crucial to predict the possible cost

of fire. For example, high-rise office buildings typically for commercial and business activities are considered less hazardous than medical or residential. Office buildings are also split into multiple business uses belonging to various companies. Medical high-rise buildings have living spaces such as hospital beds. The risk of fire is higher than other buildings because of the hazardous nature of the activities including the high cost of medical equipment. Residential high-rise buildings are associated with significant risks because of the nature of activities, kitchens and appliances (Beaudry, 1996). Hazards in hotel buildings are generally less than in other type of buildings. Whilst fire deaths have decreased, the costs of fire have been increasing; this is a concern for the insurance companies working with the construction industry. The fire deaths from 2001 to 2011 are shown in Fig.1.

Fig.1. UK fire deaths from 2001 to 2011



Source: (DCLG, 2011)

The costs of fire can be categorised into three areas, (1) *costs in anticipation*, (2) *costs as a consequence* and (3) *costs in response* using an approach adopted by Brand and Price (2000) and González Cabán (2010). *Costs in anticipation* relate to measures put in place *prior to a fire occurring* to prevent and protect possible victims of fire and to reduce the effect of fire damage such as the use of a fire alarm system, sprinklers and insurances. *Costs as a consequence* arise from the impact of fire on property, persons, the environment, private businesses and the public. Wider economic distortions include effects on local communities, markets, discouraging new residents to move in or even new businesses to open in the affected area, time off work and loss to local businesses because of the shutdown following a fire. Other costs according to Brand and Price's (2000) and González Cabán (2010) include environmental costs as a result of the impact a fire can have on landscape and surrounding areas, local wildlife and plants, especially if it is nearer a natural environment, the health implications for surrounding residents such as asbestos burning, carbon dioxide released into the atmosphere which contributes to global warming. Heritage and cultural costs relate to people's belongings, community infrastructure and cultural networks. *Costs in response* are costs that are related to the putting out of fires, clearing up operation and rebuilding which occurs afterwards such as removal, replacement or upgrading of existing building components. Some of these costs are absorbed by the public such as the fire and rescue, and emergency services. For example, the residents of a building will need to move out for the authorities to undertake the cleaning and repair damages.

In 2008, the UK's GDP was £1466 billion, and the cost of fire was £8.3 billion broken down as shown in Table 1.

Table 1: Cost of Fire

Area	Anticipation (£m)	Consequence (£m)	Response (£m)	Total (£m)
ENGLAND	£3,185	£3,285	£1,807	£8,277

Source: (DCLG, 2011)

There was a 43% decrease in fires in purpose-built high-rise flats from 1,261 (in 2009/10) to 714 (in 2016/17). This could be due to many factors, one being the increased technology in fire safety and additional procedures and regulations in place. About 2% of fires in 2016/17 was in high-rise flats (Department for Communities and Local Government, 2017). To minimise the effects of fires in buildings, the UK Government implemented the building regulations i.e. Approved Document B (ADB) with pro-active fire safety initiatives. However, it was highlighted in the Hackitt report that there were serious shortcomings in the planning, design, and construction of buildings. The Hackitt Review (2018) described how the regulatory system covering high-rise and complex buildings was not fit for purpose and noted that the lack of a coherent and comprehensive approach to competence can seriously compromise the fire safety of HRRBs. The review further noted that “in other parts of the world, those engaged to work on more complex buildings require a higher degree of competence and expertise – for example through certification and accreditation – than that required for work on small-scale or simple buildings”. The Hackitt Review also identified key professions whose work is essential to the fire safety of high-rise buildings and recommended that increased levels of competence should be an integral part of the proposed new regulatory framework.

QS Competencies and the Provision for Fire Safety in Cost Planning

Issues of costs have been part of the on-going discussion of fire safety and the competence of the QS is crucial in ensuring that there is adequate provision for fire safety during the cost planning process of high-rise buildings. The New Rules of Measurement (NRM) developed by the Royal Institution of Chartered Surveyors (RICS) is designed to bring consistency to cost management of new construction and maintenance work (Earl, 2012). The NRM is designed to provide a robust framework for cost management using a structured approach from inception through to post occupation using NRM 1 (Order for cost estimating and elemental cost planning), NRM 2 (rules for measurement of new building works) and NRM 3 (cost estimating and planning for building maintenance works). There are provisions for fire safety associated with many elements in the NRM. For example, the provision of mechanical and electrical (M&E) services is a significant component of a building's overall cost (Cunningham, 2017). M&E services are broadly classed into sub-elements with 5F designated for Space Heating and Air Conditioning in the cost plan, 5H (Electrical Installations), 5K (Fire and Lightning Protection) and 5L (Communications and Security Installations). The more complex the building, the greater the M&E input that will be required and often the value of M&E can easily exceed other elements of a building project. For example, M&E costs for traditional buildings has risen from 15 to 30% to between 15 to 70% of the total building costs depending on the sophistication of the services (Rawlinson and Dedman, 2010). It is therefore important at all stages for the quantity surveyor to have a good understanding of the provision for fire so that appropriate costs can be allocated to improve fire safety.

Hence, there is a need for robust cost planning procedures at both pre- and post-contract stages of a project to ensure the cost of fire provision is adequately factored in the cost planning process. According to Symonds and Robinson (2015), NRM was introduced to provide a consistent elemental breakdown structure, to enhance the measurement rules and to strengthen the link with the nature of contractor organisational structures and construction procurement methods. The new rules use the word 'mandatory' when describing the information that must be put into a BoQ description. Unlike the SMM7, the new rules allow the measurer to create composite descriptions provided the descriptions make clear what is to be included in the rate (Symonds and Robinson, 2015).

METHODOLOGY

This is part of an on-going study on the provision for fire protection system in the cost planning process. A three-pronged approach was adopted in the study. First, a case-study approach was developed based on secondary data to help understand how the three key categories of costs can be applied using the Grenfell tower fire disaster to provide context and to analyse the cost associated with fire in terms of *costs in anticipation*, *costs in response* and *costs as a consequence*. Second, data was collected on completed high-rise building projects using the Building Cost Information System (BCIS) database to assess the provision for fire safety in elemental cost plans as part of the costs in anticipation. Third, the provision for fire safety in the New Rules of Measurement was assessed to identify the sections where there is an explicit mention of fire protection as part of the costs in anticipation.

FINDINGS AND DISCUSSIONS

Emerging Issues from Grenfell Tower

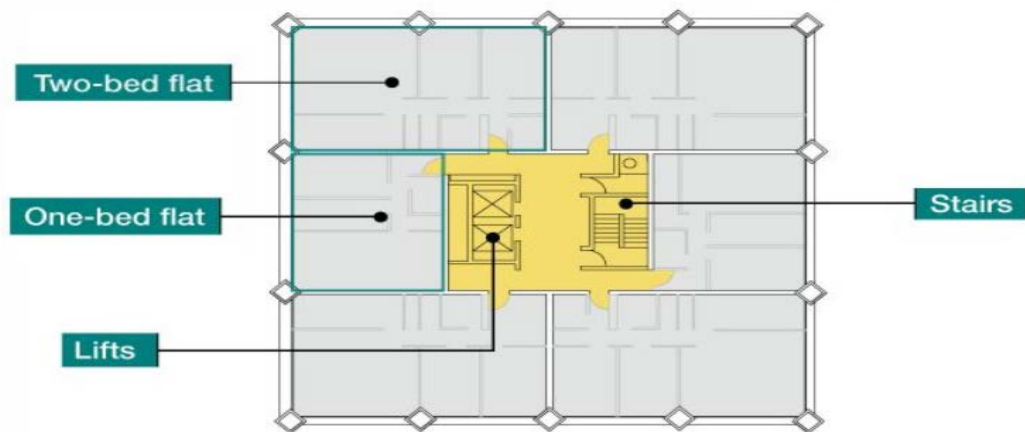
Original Design

Grenfell Tower was constructed in the 1970s and consists of four storeys of community and office facilities at the base of the building with 20 storeys of flats above. The building features included an in-situ concrete core and concrete escape stair and lifts in the centre with the flats arranged around the core which is a straightforward and standard form of construction that is widely used today.

Upgrading of Building

The building was refurbished recently including a new heating and cladding system at a cost of £8.6 million Clark (2017). One of the key drivers for the refurbishment was to improve the thermal performance and appearance of the building through the new cladding. The cladding features spandrel panels at cill height with alternating windows and panels above. The windows are a polyester-powder coated aluminium tilt/turn design. The spandrel panels are a rain screen cassette system fixed to the building. Drawings suggest the cassettes feature a timber coloured backing board with insulation - possibly a foam type material - fixed to the panel.

Typical residential floor in Grenfell Tower



Source: Studio E Architects

BBC

There is a ventilated cavity in front of the insulation which drawings suggest is approximately 50mm deep Lane (2017). The cavity features horizontal cavity barriers to prevent the spread of fire. The building is faced with aluminium rain screen panels. A Reynobond aluminium composite panel was specified with two aluminium sheets sandwiching a core material to give the panel its rigidity. According to Reynobond's website (2017), the panels are available in two variants, one with a polyethylene core, which is a type of plastic and a version with a fire-retardant mineral core said to provide higher resistance to fire.

Cause of the Fire

The main areas of concern were: the cause of the fire (later confirmed to be a faulty fridge), claims from residents about long-term fire safety concerns and the speed at which the fire engulfed the building. Tenant Management Organisation (TMO) Health and Safety Officer conducted a fire risk assessment in 2012, which Grenfell Action Group (GAG) published the following year, describing a variety of safety concerns, including fire-fighting equipment not been serviced for up to four years, on-site fire extinguishers that had expired with the word 'condemned' marked on some of them due to their age. GAG WordPress (2016), rt.com (2017). In January 2016, GAG raised concerns that people might be trapped in the tower block by fire because there was only one entrance and exit GAG WordPress (2016). Also, rubbish such as old mattresses was accumulating in the corridors. Later that year, GAG published an online article criticising Kensington and Chelsea Tenant Management Organisation (KCTMO) for their attitude and accusing the council of ignoring health and safety laws. Some of the key issues are outlined below.

Highly flammable construction materials was used

The unusual speed at which the fire travelled from the foot of the building to the top floor shocked many onlookers. Attention soon turned to the cladding on the exterior of the tower block which experts suggested may have acted as an accelerant used (Bulman, 2017) Subsequent testing of the cladding material suggests that it is combustible. Fire safety experts are already calling for a ban on the use of combustible materials in the construction of high-rise buildings. The cladding was a huge issue for the fire spreading; it was reported that the cladding was banned in other countries and should have been thoroughly considered before it was used (Bulman, 2017). It was

also claimed that only a small expense was required to upgrade the cladding to a fire-resistant version of the material used (Bulman, 2017)

Fire evacuation and the integrity of the building structure was compromised

A 2014 newsletter from KCTMO advised residents that there was an official ‘stay put’ policy in place in the event of fire (Grenfell Tower Regeneration Newsletter, 2014). It also claimed that the doors to the flats were 30-minute fire rated. A subsequent newsletter in 2016 repeated this information, adding that it was based on the advice of the London Fire Brigade (Grenfell Tower Regeneration Newsletter, 2016).

There was no sprinkler system in the building

Regulations stipulate that all new tall buildings must have sprinkler systems, but this does not apply retrospectively to older buildings. Grenfell Tower did not have a sprinkler system from its original build and it did not have one installed during refurbishment. The building was built in 1974 where the building regulations did not require the installation of sprinkler systems (Clark, 2017).

THE COSTS OF THE GRENFELL FIRE

Anticipation Cost

The cost of anticipation was considered for the Grenfell Tower. One of the failings that have been commented on is not having a suitable sprinkler system. A sprinkler system is ideal to have in high-rises as it can either extinguish a fire or allow more time for evacuation (National Fire Protection Association, 2018). Fitting sprinkler systems are cost effective over other methods of anticipation as it has a higher probability in its performance. (RAD, 2018). It was estimated that it would have cost £200,000 to install a suitable system (Hughes, 2017). Compliance with the current building regulations may have averted the disaster and all its consequences.

Cost as a Consequence

Costs as a consequence of the Grenfell Tower fire is significant due to the number of fatal (80 deaths in total) and non-fatal casualties, property damage and the loss incurred to businesses (Bergin, 2017). Grenfell Tower did not have an ordinary fire alarm system, which alerts everyone in the building to evacuate as needed. Instead it had a ‘stay-put’ policy that meant residents were not notified of the fire, so that they did not leave their dwelling and flood communal stairways that emergency services would need for access (O'Neill, 2017). The amount of fatalities and injuries could have been reduced significantly by the building’s fire strategy (Hsiung, Chien, & Wu, 2006) and the associated costs would have been lower if prevention methods had been in place. The alarm system that was installed was deemed suitable (O'Neill, 2017). A generic alarm system may have worked better and allowed more personnel to evacuate, keeping the consequence costs down. The chosen method seemed to be cost effective and no need to lay out extra for this as individual flat were equipped with a cheaper alternative smoke alarms (Mark & Cynthia, 2017). Families were left with facing their loss in a state of bereavement with close family members dying through no fault of their own (Quality Solicitors, 2018). Families have the right to be compensated which will mean a large sum of money to be paid out. Many lawyers and Reuters News are part of the investigation so the total cost for this type of event which has not happened before will lead to significant expenses (Bergin, 2017).

Cost in Response

There are significant costs associated with the response from the fire and emergency services, rehousing the victims of the Grenfell tragedy, fire risks assessment on similar buildings and the public inquiry to find out what happened and to identify agencies

accountable for the deaths and damage. After the loss of approximately 80 lives further investigations and actions are being taking to avoid such disasters such as the reviews and fire risks assessment carried out by local authorities. However, post-Grenfell, the London fire chief has called for sprinklers to be installed in all social housing blocks (BBC News, 2017). An immediate reaction to Grenfell Tower was to investigate any other similar contracting works involving the same cladding, which was applied to many other high-rise developments in the surrounding area and nationally. The clean-up and repair operation involved for Grenfell Tower is expected to have extraordinary costs with the remains of the building planned to be demolished and a memorial put in place. The Grenfell Tower is insured for a sum of £20 million, although the cost of the response is rumoured to be near £1 billion (Gangcuangco, 2017). This insurance will provide a guarantee of paying out a specified amount as compensation for each death with the first phase of funding of an initial £20,000 for families of each person who has died or declared missing (Press Association, 2017). Other phases are to follow, as the initial amount is to allow families to start recovering.

Analysis of BCIS Projects for Provision on Fire Protection in Cost Plans

Investing in costs in anticipation of fire can significantly reduce the other category of costs in terms of consequence and responses. Prevention is better than cure as money spent putting measures in place before fire incidents take place will save lives, property and significantly reduce other costs associated with consequences and responses. For example, the sprinkler system in the Grenfell Tower, could have been installed for the cost of £200,000 which would work out to around £2,000 per flat. This is around £72,000 per flat or an additional 8% of the cost of the refurbishment (£8.6 million) which could have drastically changed the outcome of the tragedy (Davey, 2017). Based on 22 projects analysed (See Tables 2, 3, 4 and 5) from the BCIS database, the cost for fire provision was explicitly identified and included within element 5K (Fire and Lightning Protection) for only 4 buildings.

Table 2: Analysis of Fire Provision in Selected Projects

	Location and type	Date	Store y	Floor area (m ²)	Cost/m ²	Fire Provision (£) / Sub-element	Total Cost
1	London N7 / New build	Jul 2016	6	3,863m ²	£1,971	£8,790 / 5K	£7,613,973
3	London E3 / New build	Sep 2014	7	14,799m ²	£1,367	£1,060,876 / 5K	£20,230,233
7	Hampshire / New build	May 2013	6	1,461m ²	£1,064	£9,143 / 5K	£1,554,504

5F (Space Heating and Air Conditioning)
 5H (Electrical Installations),
 5K (Fire and Lightning Protection)
 5L (Communications and Security Installations).

Table 3: No of Storeys in the Buildings.

Height	6- Storey	7-Storey	8-Storey	9-Storey	10- Storey
Nos. of buildings	10	6	1	0	2

Table 4: Gross Floor Area (GFA) of the Buildings.

GFA of buildings	Less than 5000m2	5000 - 10000 m2	10000 - 15000 m2	15000 - 20000 m2	20000 – 25000 m2
Nos. of buildings	9	6	1	0	1

Table 5: Cost of the Buildings (£/m2)

Cost range	(£)500 – 1000	(£)1000 – 1500	(£)1500 – 2000	(£)2000 – 2500	(£)2500 – 3000	(£)3000 – 3500
No of buildings	1	9	6	0	1	2

In the remaining buildings, the cost for fire protection was not explicitly stated. In 5 other buildings, it was noted in the cost plans that the cost for sub-element 5K was included ‘elsewhere’ which could be under sub-element 5F (Space Heating and Air Conditioning), 5H (Electrical Installations), or 5L (Communications and Security Installations). However, the amount was not explicitly stated in any part of the cost plan. In another 5 buildings, the cost was included for fire alarm and smoke detector within other sections but again the amount and the specific sections where the cost was allocated was not explicitly stated. In the remaining 6 buildings, the costs for fire protection were not included anywhere. However, a common barrier to the costing is the lack of an explicit approach to costing specific items for fire safety provision in the cost plan. There is an over reliance on ad hoc approaches that affects the accuracy of costing for fire provision leading to costs that are often unrealistic during cost planning and therefore investing less in costs in anticipation of fire. Recent research also suggests that there are significant gaps in technical knowledge of quantity surveyors and shortages of specialists M&E QS's in the industry to address costs relating M&E sub-elements. The findings suggest there is a need for adequate provision for fire protection in the cost plan and to strengthen the link between NRM 1 and NRM 2.

Fire Provision in the New Rules of Measurement 2 (NRM 2)

Analysis of NRM 2 (2013) shows that there is provision for fire protection which is reflected in numerous work sections, of NRM 2, particularly on M&E (see Table 6). See Appendix A for the provision of fire protection in other sections.

There is a need for further study to determine whether the existing provisions for fire safety in NRM is sufficient for an informed estimation and to explore how the practices of professional quantity surveyors and estimators affect the cost allocated for fire safety provision in high-rise buildings. This could increase the cost of professional services, the cost of development for clients and builders working on high-rise buildings. Following the Grenfell tragedy there has been a significant demand for contractors who provide fire protection services and products, and, in some cases, there has been a fivefold increase in business enquiries (Davey, 2017).

Table 6: Analysis of Fire Provision from NRM

	Work Section	NRM Reference	Main Item	Sub-element	Unit	Remarks
33	Drainage above ground	33.4.3.1.1-2 / P228	Pipe sleeves through walls, floors and ceilings	Fire rating	nr	All making good including fire stopping is deemed included Fire stopping to consider
38	Mechanical services	38.9.1.1.1 / P247	Insulation and fire protection		nr / m	pipework/ductwork and associated insulation and fire protection is to be measured inclusive of fittings Unless measured separately all fittings are deemed to be included
		38.10.1 / P248	Alternative 1 – Insulation and fire protection to pipe fittings		nr	
		38.11.1/ P248	Insulation and fire protection to pipe ancillaries		nr	
		38.12.1.1/ P248	Insulation and fire protection to ventilation ducts		m ²	
		38.13.1 / P248	Alternative 1 – Insulation and fire protection to duct fittings			

		38.14.1 / P248	Insulation and fire protection to equipment		m ²	
		38.15.1 / P249	Fire stopping		Nr	
39	Electrical Services	39.3.1.1 / P251	Cable containment	Inclusive of fire barriers and the like	M	
		39.9.1.1 / P252	Busbar	Inclusive of fire barriers and the like	M	
		39.10.1 / P252	Alternative 1 – busbar fittings	Inclusive of fire barriers and the like	nr	
		39.13.1 / P253	Fire stopping and other associated fire protect work		nr	
40	Transportation	40.1.5.1.1 / P254	System	System supplied will include fire alarm and the like	Item	
		40.2.1/ P255	Fire stopping and other associated fire protect work		nr	
41	Builder's work in connection with mechanical, electrical and	41.3.1.1.1- 3 / P256	Pipes and duct sleeves	Fire rating stated	nr	Fire compartmentation must be shown on the drawings

transportation
installation

CONCLUSION

Using the cost of fire framework, the Grenfell Tower fire disaster was analysed by breaking down the cost of the fire into anticipation, consequence and response costs. The Grenfell Tower episode also demonstrated that investing in costs in anticipation of fire can significantly reduce the costs in consequence and responses as prevention is better than cure. Money spent putting measures in place for fire protection such as sprinkler system, alarm systems, building components with adequate fire rating, testing and appropriate fire evaluation strategy before fire incidents will save lives, property, heritage and significantly reduce other costs associated with consequences and responses which in the case of Grenfell is estimated by any account to be extremely high. Analysis of completed projects also revealed that the provision for fire protection in cost plans is not often addressed explicitly and there is a need to move away from ad hoc approaches to ensure that measures put in place are priced appropriately. There are provisions for fire protection in sections of the NRM and quantity surveyors should ensure that they are adequately captured and reflected in cost planning process and the tender prices submitted by contractors. High-rise buildings require a high level of competence from QSs as such projects are subjected to more stringent regulation with regard to fire safety. Developing the required competencies of the QS will ensure that there is adequate technical knowledge for costing of fire provision in the cost plan in high-rise development projects and identifying the additional competences should also be an integral part of the proposed new regulatory framework recommended by the Hackitt Review.

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Appendix A: Analysis of Fire Provision in other sections of NRM

	Work Section	NRM Reference	Main Item	Sub element	Unit	Remarks
14	Masonry	14.25.1.1.1/P168	Proprietary and individual spot items	Will include fire backs and sides	nr	
15	Structural Metal Work	15. 15.1-4.1-2. 4 / P172	Surface treatment	Fire rating stated	m ²	All preparation deemed included
20	Proprietary linings and partitions	20.8.1.1/P189	Extra over for access panels		nr	Details include fire rating
		20.16./ P190	Extra over for nonstandard perimeter details		m	Components not used within the main body of work such as fire seals
		20.19.1.1/P191	Extra over for access panels		nr	Details include fire rating (?)
21	Cladding and Covering	21.12.1-2.1 / P194	Closers	Fire stops	m	
24		24.1.1-2.1.1-2 / P203	Door sets	Smoke stops Fire stops	nr	Door sets comprise the stops

	Door, Shutters and Hatches	24.2.1.1.1/P203	Doors	Fire resistance performance	Nr	Each leaf of a multi-leafed door is counted as one door
28	Floor, wall, ceiling and roof finishes	28.5.1-2.1/P214	Fire barriers with void below raised floor	Fire rating	m ² / m	Fire barriers are deemed to include all support work
29	Decoration	29.1-7.1-3.1-2.5/P219	Painting	Fire rating	m / m ² / nr	No further details on fire rating
30	Suspended Ceilings	30.10.1-2.1.1-2 / P221	Fire barriers	Fire rating where required	m / m ²	Fire barriers are deemed to include all support work
		30.11.1-2.1-2.2 / P222	Collars for services passing through fire barriers	Fire rating	nr	Collars are only measured where they are integral with fire barrier
31	Insulation, fire stopping and fire protection	31.7.2.1-5.1-2 / P224	Fire stops. Type stated	Fire rating	m	Fire rating where required is a mandatory information

ISSUES OF PROFESSIONALISM AND ETHICS IN DAM FAILURES: EFFECT OF CUTOFF WALL IN SEEPAGE ANALYSIS OF DADIN KOWA DAM IN NIGERIA

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Dams are essential elements in any modern society with great economic value. However, they present potential catastrophic risk of failure mostly attributed to seepage. This paper reviews the influence of seepage control using a cutoff wall and evaluates the professional and ethical malpractices that result in dam failure in Nigeria. To control seepage, the effect of a dam cutoff wall at mid sections of the dam having STA 455 was analysed using the Geo-slope SEEP/W 2D finite element software. Results showed that the annual seepage value at 37m maximum water level of STA 455 was 31.2585 m³/year with cutoff wall while 511.4825 m³/year was recorded without cutoff wall, the seepage value is higher than the value with the cutoff wall in place. To ensure dam safety, proper engineering design, use of qualified personnel and compliance with standard engineering principles and practices are vital professional practices that must be adhered to. Similarly, for the safety of villages in downstream areas, ethical issues such as corruption, disregard for due process and environmental degradation must be given attention in the construction of a cutoff wall. A cutoff wall helps to reduce seepage values. Routine inspections should be carried out to ensure standard specifications are adhered to and checked against dam collapse.

Keywords: *Professionalism, Ethics, Earth Dam, Seepage, Cutoff-wall, Geo-Slope (SEEP/W) and Analysis*

INTRODUCTION

Throughout history, there is evidence that mankind has feared and respected the destructive power of water, especially in the form of heavy rainfall, rivers overflowing their banks, melted snow, floods, tsunami waves and tides. Water is one of the most powerful forces of nature. Hidden in rock crevices and soil pores, it exerts force that can rip down a mountain side, causing mud slides and destroying engineering works. As a result, engineers have long taken importance steps to control water on the earth surface and beneath, in pores and cracks of rocks and formations for the benefit of humankind and an example of such an engineering project is the dam (Uloko 2016).

The building of dams started many centuries ago. The Sadd-el-kafara Dam, built in Egypt, is believed to be the oldest dam in the world. It was built in about 2700 B.C., on the River Nile, about 20 miles south of Cairo. The remains of earth embankments built for diverting water to large community reservoirs can still be found in Sri Lanka and Israel (Schnitter 1994, McCully 1996).

Seepage can be defined as the flow of water through homogeneous saturated soil under steady-state conditions. The soil particles, soil structure, and water are assumed incompressible and flow obeys Darcy's law. Seepage is also considered to be a movement of water from the reservoir through the embankment, abutments, and foundation. This includes porous media (inter-granular) flow, flow in fractures, and concentrated flow through "defects" such as cracks and loose lifts. Most dams have some seepage through or

around the embankment as a result of water moving through the soil structure. If the seepage forces are sufficiently large, soil can be eroded from the embankment or foundation. Seepage can also develop behind or beneath concrete spillways or headwalls. The signs of this type of problem could be cracking or heaving. Freezing and thawing will amplify the effects of seepage on concrete structures.

The enforcing of professionalism and ethical principles in dam construction and maintenance is a matter of great concern in Nigeria. Greenhalgh (1997) defined professionalism as taking possession and control of a certain specialized knowledge which confers upon its holders certain authority and power of service. Ethics is a system of norms which professionals are guided by in both morality and behavior (Brien 1998; Hamzah, Chan and Xian 2010). There are several cases where dam disasters occur, principally emanating from lapses in professionalism and ethical practices. Construction practitioners such as engineers, architects, project manager, contractor and operators must exercise their fundamental “professional conscience” (Martin and Schinzing 1996).

Dadin Kowa Dam in Nigeria is selected as the case study for this research. It is a multipurpose dam which impounds a large reservoir of water from Gongola River. It has a storage capacity of 1.77 billion cubic meters (Ibeje and Okoro 2014). The maximum flood level is 249 m above sea level (a.s.l), a maximum supply level of 247 m (a.s.l) and minimum supply of 239 m (a.s.l). The surface area of the reservoir is 300 km². The 1:10,000 year peak in-flow is 3,160 m³/sec and the peak outflow is 1,110 m³/sec. The total catchment area of the Gongola River, on which the dam is built, is approximately 56,000 km², 58.5% of which lies upstream of the dam. It also has a gated overflow crest open chute bucket spillway with a maximum design discharge of 1,110 m³/sec at reservoir maximum flood level and three (3) radial gates (Chido-Amajuoyi and Ofoegbu 1987).

The finite element is conceptually a physical rather than a mathematical approximation. The flow region is subdivided into a number of elements and permeability is specified for each element. Boundary conditions are specified in term of heads and flow rates and a system of equations is solved to compute gradients and velocities in each element (Desai 1972: 3-9, Desai 1977: 458–505). Two- and three-dimensional finite element seepage computer programs for both confined and unconfined flow problems have been developed. Steady-state and transient problems can be solved. Darcy's Law can be used to describe water flow through soils in both saturated and unsaturated conditions (Richard 1931: 8-9) which can be stated as follows:

$$q = -ki \text{-----(1)}$$

Where: q = discharge per unit area, i = total head gradient and k = co-efficient of permeability.

The governing partial differential equation for seepage through a heterogeneous, anisotropic, saturated, unsaturated soil can be derived by satisfying conservation of mass for a representative elemental volume. If the assumption is made that the total stress remains constant during a transient process, the differential equation can be written as follows for the three dimensional transient case:

$$\frac{\partial}{\partial x} \left(k_x \frac{\partial h}{\partial x} \right) + \frac{\partial}{\partial y} \left(k_y \frac{\partial h}{\partial y} \right) + \frac{\partial}{\partial z} \left(k_z \frac{\partial h}{\partial z} \right) = m\gamma \left(\frac{\partial h}{\partial t} \right) \text{-----(2)}$$

Where,

K_x , K_y and K_z are co-efficient of permeability of soil in x , y and z direction, respectively, and m = water storage (Zhao 2006: 831-835)

Darcy's Law shows the direct proportion relationship between the seepage velocity and the hydraulic gradient and the character of earth will influence it in a uniform porous medium. The normal form of Darcy's Law is as follows:

$$u = -K \frac{dH}{ds} \text{-----}(3)$$

Where: u is the seepage velocity, K is the permeability coefficient and H is the piezometric head on corresponding point.

This is the summation for pressure head and the location altitude. Because of the linear relation, Darcy's Law is adequate to the laminar flow with linear drag force. Except the turbulence seepage in big pore like rock filled dam, most seepage can be defined as laminar flow, that is why Darcy's Law is applied so widely.

Software use in handling seepage has gone a long way in simplifying the analysis of seepage in dams. Artificial Neural Networks (ANN) have recently been employed for the solution of many hydrologic, hydraulic and water resources problems ranging from rainfall and runoff (Rajurkar et al 2002: 865-878) to sediment transport (Tayfor 2002: 879-892) to dispersion. Depending on the modeling approach, different mathematical models are possible for tackling the same problem (Snehal, Shekhar and Bhole 2011). Out of various available numerical techniques, finite difference method (FDM), finite element method (FEM), finite volume method (FVM), boundary element method (BEM) and meshless method have become more popular among scientists and engineers. Several approaches can be used to transform the physical formulation of the problem to its finite element discrete analogue. If the physical formulation of the problem is known as a differential equation then the most popular method of its finite element formulation is the Galerkin method (Al-Gazali 2008).

GEOSTUDIO software is one of geotechnical programs that are based on the finite element and can do analysis such as, stress-strain, seepage, slope stability, dynamic analysis. SEEP/W is a finite element CAD software product for analyzing groundwater seepage and excess pore-water pressure dissipation problems within porous materials such as soil and rock (Geo-slope 2007).

The aim of this paper is to investigate and simulate flow, through Dadin Kowa dam using the Geo-slope 2D SEEP/W FEM Software and Dadin Kowa dam in Gombe state, Nigeria as a case study. The objectives are to get a better understanding of reasons behind dam failure due to seepage and evaluate the professionalism and ethical values that are lacking in construction of cut off wall in Nigerian dams.

Cases of Dam Disasters in Nigeria and its socio-economic elements

There have been several cases of dam-related disasters in Nigeria displacing thousands of people with the most affected being women and children, and destroying property. Dam failures affect the socio-economic lives of communities around as they provide water for irrigation to residents of the area who are predominantly farmers as well as serving recreational, tourism purposes and also creating employment to the youths through fishing.

Shiroro Dam failure: Over 26 villages in Kede, Lakpma and Shiroro Local Government in Niger State were flooded by waters from Rivers Niger and Kaduna in 2003. The flood displaced about 10,000 persons in Ketsho in Kede Local Government who were said to have moved to Kwara State, while another 13,500 persons in Lakpam and Shiroro were rendered homeless. The flood resulted from a downpour and the release of excess water from the Shiroro Hydro-Electric Dam by the National Electric Power Authority (NEPA). The affected villages included Galadima Kogo, Gofa, Kusasun, Pai, Lagado, Nakpinda and Karai. The people suffered despite the sacrifice they had made by releasing their land for the construction of the dam for the good of the nation. Similarly, in 1999 at least seven local

government districts in the state were flooded when water from the Shiroro Dam was released. Thousands of houses and buildings, including schools and hospitals were destroyed in the disaster.

Obudu Dam failure: The Obudu Dam spillway was damaged by a storm in July 2003 which resulted in a fatal disaster that claimed over 200 houses, several farmlands, settlements and business concerns. The disaster was allegedly caused by the release of excess water from the Lagdo Dam in Cameroun, which led to the Benue and Niger Rivers overflowing their banks. Besides the release of excess water from the dam, experts also attributed the disaster to intensive, continuous 16-hour rainfall in Obudu on the day. The rainfall recorded at the Obudu Dam meteorological station was 314.5 mm, more than 15 years average rainfall for the peak months of July and September, which was not anticipated when the dam was constructed. The estimated cost of rehabilitating the dam and completing the outstanding works on the irrigation area was valued at about ₦350 million (approximately \$2.8 million).

Igabi Dam: Property worth about ₦500 million (\$3.9 million) were destroyed while thousands of people were rendered homeless in Kaduna State when River Kaduna overflowed its banks and submerged several streets and housing estates. The flood was caused by the collapse of Igabi Dam. Areas affected by the flood were Mamman Kotangora Estate, Kirgo Road extension, Kabala area and parts of Malali Estate. At the Mamman Kotangora Estate, many expensive household items were damaged when water from the river submerged most of the houses. Several businesses such as mechanics workshops, grocery stores and pharmaceutical shops were also submerged. At Kirgo area, apart from household items, maize and sugar cane farms were also destroyed. It was learnt that a manual irrigation system constructed by some farmers in the area made it possible for the river water to submerge places like Mamman Kotangora Estate and Kabala area. The buildings which were destroyed included churches, mosques, and the Nsukka town hall.

Professionalism and Ethical Issues in Cutoff wall construction

Some of the unprofessional practices carried out in construction include:

- (i) Non-adherence to standard and specifications
- (ii) Improper design
- (iii) Lack of competence and technical capacity
- (iv) Use of unskilled labour for technical jobs
- (v) Non-sustainability
- (vi) Disregard for safety and environmental impact.

Some unethical behavior carried out in construction include:

- (i) Corruption and greed
- (ii) Contract cost inflation
- (iii) Concealing of construction errors
- (iv) Not following due process in award of contracts
- (v) Misleading clients in management of project
- (vi) Conflict of interest in contracts award
- (vii) Use of substandard materials and product
- (viii) Neglect of social responsibilities to the communities.

Materials and Methods

Location of Dam

The dam is located at 37 km from Gombe town and 5 km North of Dadin Kowa village in Yamatu-Deba L.G.A of Gombe state (between latitude 10° 19' 19''N and longitude 11° 28' 54''E). Dadin Kowa Dam is a source of water for the irrigation; it has the potential of irrigating 44,000 hectares of land, comprising Dadin Kowa and Guyuk lots and rural water supply for domestic use.

The dam is an Earth and Rock fill ($1 \times 10^6 \text{ m}^3$), whose height is 42 meters above deepest foundation. The length of the dam is 520 meters, the width of the crest is 8 meters, and the width of the base is approximately 230 meters.

Material data required:

Data used were collected from Upper Benue River Basin Development Authority (UBRBDA) office in Dadin Kowa town, Gombe State. The soil data are the logged ones during the construction of dam.

Area Considered for Analysis.

STA 455 was considered for the check on the cutoff wall so as to have a general view of the seepage at those sections, and check the trend of seepage flow. The general details of the dam foundation and sections are shown in Plate 1.

Software for the Analysis

The analysis was carried out using a computer programme SEEP/W (2007) software developed by GEO-SLOPE limited of Alberta, Canada. GEOSTUDIO software is one of geotechnical program that is based on the finite element and can do analysis such as, stress-strain, seepage, slope stability, dynamic analysis. SEEP/W is a finite element CAD software product for analyzing groundwater seepage and excess pore-water pressure dissipation problems within porous materials such as soil and rock.

Region Property hydraulic conductivity and Cross Section

Regional properties for the selected sections of the Dadin Kowa Dam, are presented in Table 1 while those of the cross section are on Table 2; they were obtained from Inspection, Monitoring and Evaluation Services of Dadin Kowa Dam (2011).

Mesh Size and Option

A global element size of 3.5 m was adopted and the triangular element mesh pattern used was the triangle because of the geometric nature of the dam.

Result

Results from Figures 1-6 showed that the annual seepage value at 37m maximum water level of STA 455 was $31.2585 \text{ m}^3/\text{year}$ with the cutoff wall while $511.4825 \text{ m}^3/\text{year}$ was recorded without the cutoff wall.

Discussion and Conclusion

The Dadin Kowa dam was selected as a case study to analyse the seepage using Geo-slope SEEP/W a 2D finite element method based software that can be used to model and determine seepage, provided the hydraulic conductivity and boundary conditions are adequately defined. Analysis was carried out at the maximum pool levels of 37m of the dam at STA 455 (Upper Niger River Basin Development Authority, 1988).

The results showed that the seepage value is far too high compared to the value with the cutoff wall in place. Particularly for the maximum section of the dam at 50mm pool level STA 455 values obtained are: $31.2585 \text{ m}^3/\text{year}$ with the cutoff wall while $511.4825 \text{ m}^3/\text{year}$ was recorded without the cutoff wall.

To ensure the safety of the dam and of villages in downstream areas, a cut-off wall should be used as it helps in reducing seepage values. Routine inspections must be carried out by assigned personnel and authorities to enforce compliance with professionalism and adherence to ethical values in construction. This will help to mitigate and check against dam break.

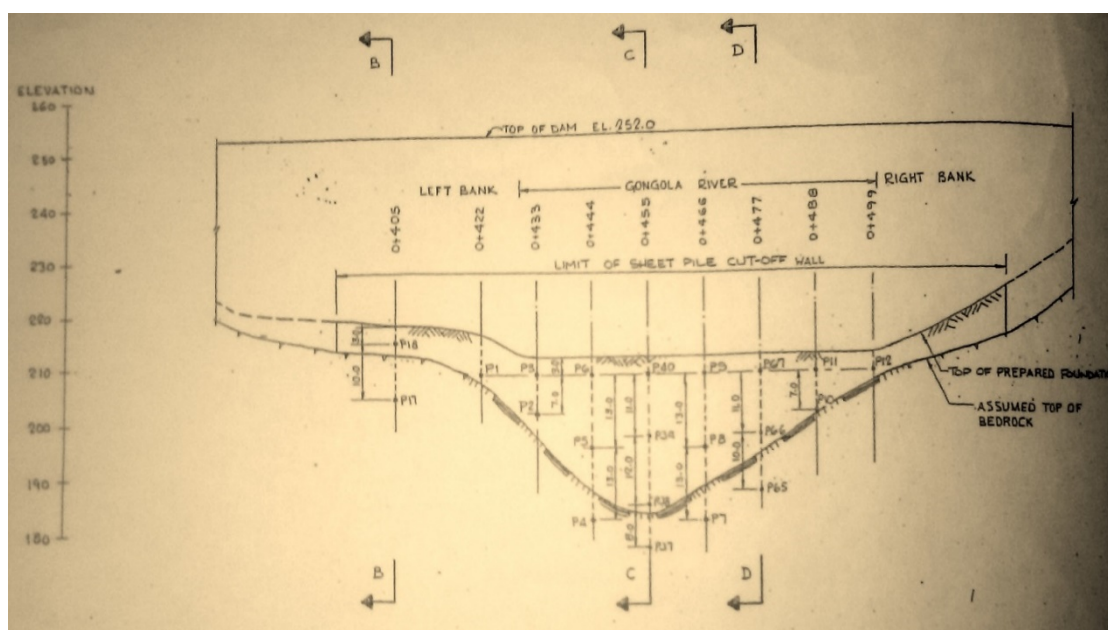


Plate 1. Dam Section Showing details of Dam Foundation. (Source UBRBDA)

Table 1: Region Property

S/N	Region Property	Hydraulic Conductivity
1	Foundation	1×10^{-5} m/s
2	Bedrock	1×10^{-8} m/s
3	Shell	1×10^{-5} m/s
4	Core	1×10^{-8} m/s
5	Filter blanket	1×10^{-4} m/s
6	Cutoff wall	1×10^{-8} m/s

Source: Tectonic Engineering & Consult Ltd, (2011).

Table 2: Typical Cross Section of Dadin Kowa Dam

Dam section	Dimensions (meters)
Dam crest elevation	252
Dam crest width	8
Maximum floor level	249
Maximum reservoir level	247
Minimum reservoir level	239
Upstream slope	2.5:1
Downstream slope	2.2:1
Reservoir volume	1,770 million cubic meters

Source: Tectonic Engineering & Consult Ltd, (2011)

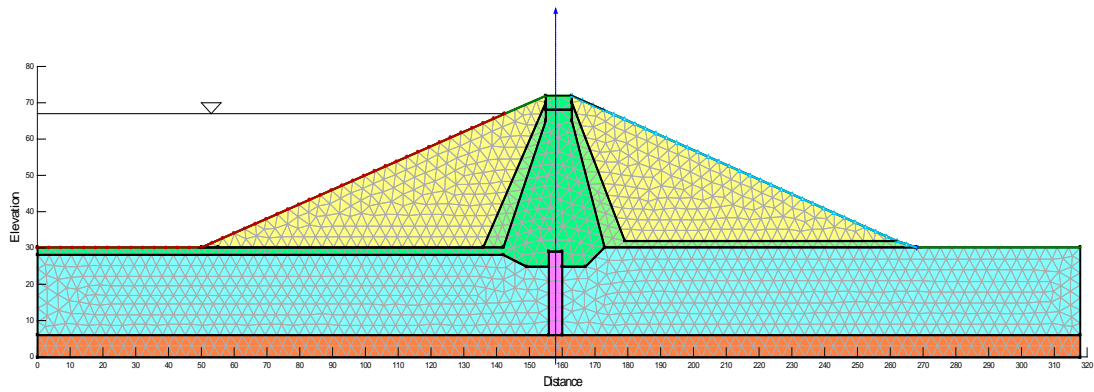


Figure 1: Section 455 Steady-state analysis definition (at maximum pool) 50m upstream and downstream

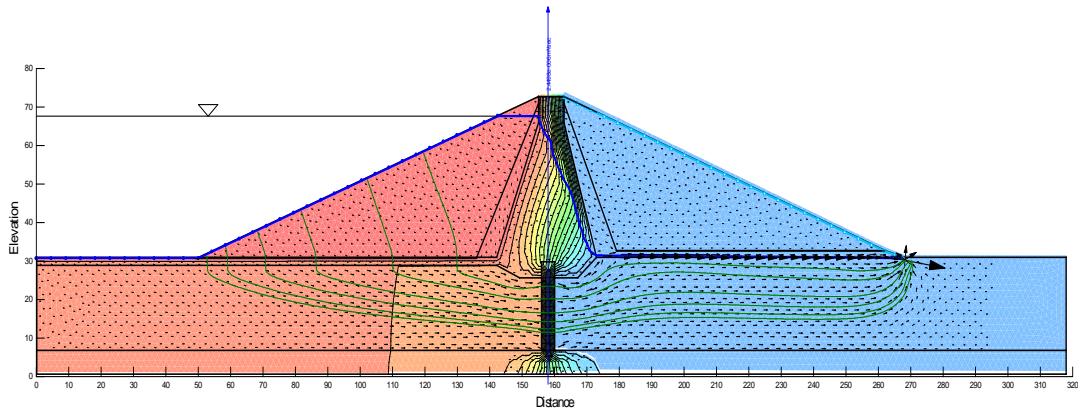


Figure 2: Section 455 Steady-state analysis solution contour (at maximum pool) 50m upstream and downstream.

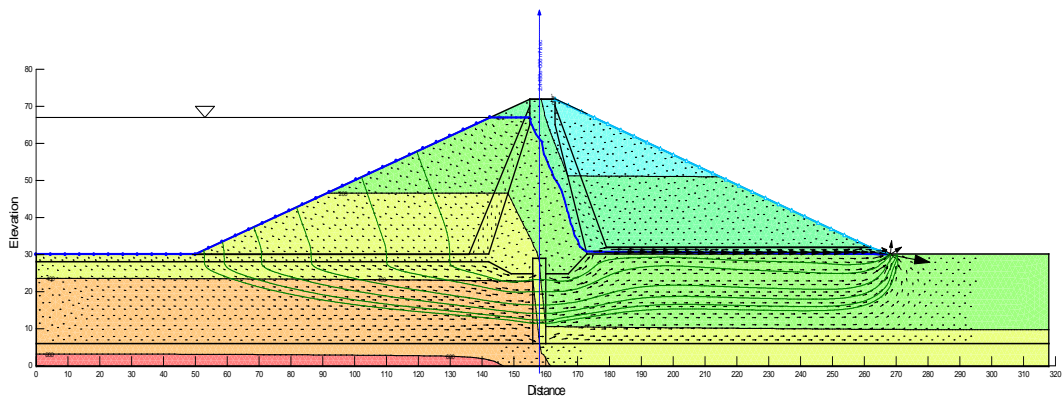


Figure 3: Section 455 Steady-state analysis pore- water pressure (at maximum pool) 50m upstream and downstream.

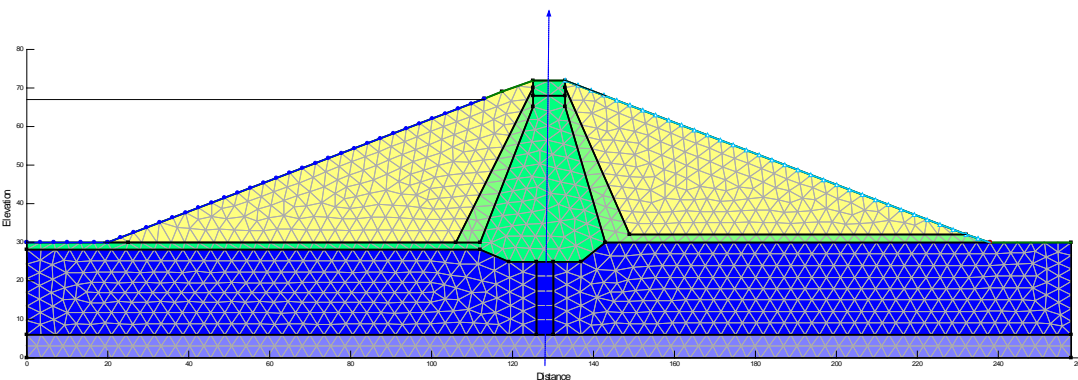


Figure 4: Section 455 Steady-state analysis definition (at maximum pool) 50m upstream and downstream.

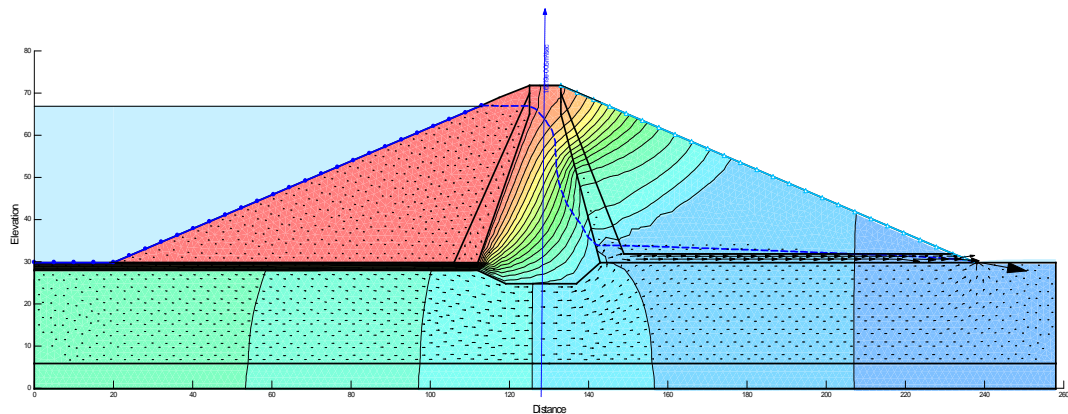


Figure 5: Section 455 Steady-state analysis solution contour (at maximum pool) 50m upstream and downstream.

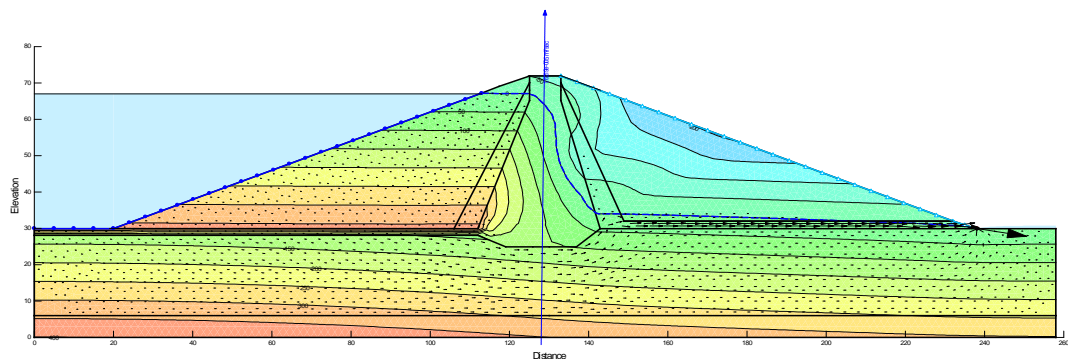


Figure 6: Section 455 Steady-state analysis pore-water pressure (at maximum pool) 50m upstream and downstream.

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ENGAGING BEST PRACTICES DURING WAXY CRUDE OIL PRODUCTION TO PREVENT WAX DEPOSITION IN SUBSEA ENVIRONMENT

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In the oil and gas industry, the deposition of wax is generally due to thermal differences between the flowing fluid, the pipeline material and the ambient conditions. This creates a plug of solid in the pipe leading to enormous reductions in field productivity, safety concerns and the high cost of wax remediation. Therefore, best engineering practices in terms of professionalism and ethics must be engaged during design, construction, and operations of the petroleum pipeline to manage this problem. This paper reviews the key stages of managing the effects of wax deposition. It also presents a laboratory experimental study of wax deposition under varied flow conditions using an in-house experimental flow rig to investigate parameters that control wax deposition and explore the ethical issues and professionalism involved. Results obtained reveals that a range of operational conditions must be adhered to avoid wax build-up, which could lead to blockage of pipe and its devastating effect. Maintaining the flowing fluid temperature above WAT and at a higher flow rate should be considered if the severity of wax deposition is to be managed by engineers.

Keywords: deposition, ethics, pipeline, professionalism, wax.

INTRODUCTION

Flow assurance is defined as a guaranteed flow of hydrocarbon from the reservoir to the processing facilities and point of sale (Hammami & Ratulowski 2007; Anand and Anirbid 2015). Therefore, flow assurance in oil and gas production is essential for the design, construction and optimization of pipeline operation. There are several flow assurance challenges encountered in the oil and gas industry, which includes wax precipitation and deposition, asphaltenes agglomeration and deposition, hydrates formation, corrosion, scales, and slugging (Figure 1) (Lee 2009; Bai and Bai 2005; Chala 2018). The above-mentioned problems are heightened as the oil and gas exploration and production moves increasingly towards greater depth and challenging environment (Lee 2009; Huang et al. 2015).

In the petroleum industry, the pipeline is the most commonly used method for the production and transportation of reservoir hydrocarbons because of the domestic economic impact, safety and effect on the environment (Furchtgott 2003). Several engineering, scientific and economic principles are key in the design, construction and operation of the pipeline. Impact resulting from non-compliance with these

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professional practices could have a devastating effect on the environment. For instance, accidental oil spills during pre-operational testing and operations could result in short and long term impacts to the aquatic environment (Malins 1977). Fishes, vegetation, and to some extent human lives are exposed to harmful substances used during pipeline construction or remediation (resulted from wax and hydrate pipeline blockage). Hydraulic fluid, wax and hydrate inhibitors, corrosion, and bacteriacides used during construction, cleaning and depressing wax crystals may be washed into the sea (Malins 1977; Bai and Bai 2005). However, these impacts can be substantially reduced with proper planning, education and regulation concerning ethics and professionalism. Some of the major factors that influences the design and construction of oil and gas pipelines (Nandagopal 2007) are as follows: (1) nature of fluid (gas or liquid) and fluid properties (2) volume flow rate (3) length of the pipeline (4) terrain and medium (soil/water) traversed by the pipeline (5) climatic conditions – extreme heat/cold (6) environmental constraints and impact on the environment (6) codes, standards and regulations governing the design, construction and operation of the pipeline (7) Seismic conditions (8) Economics (9) Materials (10) Construction, operation and maintenance of the pipeline.

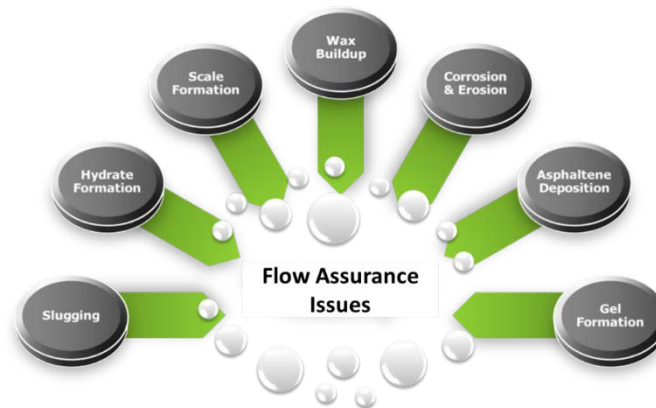


Figure 1: Oil and gas flow assurance issues (Gate 2018)

WAX DEPOSITION CONCERN IN PIPELINE

Wax (also known as paraffin wax) is a soluble component in the crude oil; it begins to precipitate when the crude oil temperature falls below the precipitation temperature popularly known as wax appearance temperature - WAT (Handal 2008). Wax precipitates as clusters of crystals molecules, which form an interlocking network with a “house-of-card” configuration (Paso, 2005). In a typical offshore environment to maintain waxy crude oil production at reservoir conditions of temperature (70-150 °C) and pressures (50-100MPa) is very difficult (Lee 2009). This is because of the thermal gradient between the flowing fluid and pipe wall, which are control by the ambient subsea condition (usually <4°C) (Lee 2009). This generally causes wax precipitation and subsequent deposition.

Several factors and physical mechanism control precipitation and deposition of crystals from higher temperature region of the pipe to the colder surface. Some of these factors include temperature, oil composition plus available solution gas, flow or shear rate, deposition time, pipe surface roughness and pressure of the oil (Hammami and Raines, 1999; Zhu et al., 2008; Chala 2018). Whereas, the mechanisms as highlighted by Hamouda and Davidsen (1995), Singh et al. (2000) includes: (1) molecular diffusion (2) brownian diffusion (3) shear dispersion and (4) gravitational settling.

Deposition of wax on pipelines could result in technical or economic consequences that could be mild or severe. Once wax deposition problem is been identified but not managed could lead to a reduction of the pipe flow area, increases the fluid viscosity and loss of production through unmanageable pipe blockage (Figure 2) (Calange et al. 1997). Therefore, this study investigates the effect of cooling temperature, and flow rate in wax deposition. In addition, the study evaluates and explore the most ethical and professional practices in the construction of the pipeline for waxy oil production.



Figure 2: Sample of wax deposit; (a) (Singh et al. 2000) and (b) (in-house) decreases in the actual pipe diameter (c) completely blocked pipeline system (Ricky 2016)

Wax Management Strategy

Wax management approach involves preventive and curative measures these include chemical, mechanical and thermal techniques (Paso, 2005; Becker 2000). Oil and gas field requires a high level of technicality, professionalism and ethical practices to achieve desire objectives.

Prevention and Remediation: Thermal and Chemical Techniques

Prevention method: includes the use of steam injection, electrical heating traces, and thermal insulation of the flow line to prevent heat loss and maintain flow line temperatures above the wax appearance temperature (WAT) (Bai and Bai 2005; Paso, 2005). The soluble wax molecules only precipitate out of crude oil when the WAT integrity is breached. Thermal and chemical methods have shown to be reliable. However, a thermal method is only applicable during steady state production and requires treatment of the injected water/steam to avoid corrosion issues and only applicable in a short distance pipeline up to 500m water depth. On the other hand, inhibitors (crystals modifiers) are the chemicals used to prevent wax precipitation and deposition (Denney 2004; Bai and Bai 2005; Chala 2018; Paso, 2005). The crystals modifiers have a similar molecular structure to wax and have the ability to prevent wax crystals from networking and forming a lattice structure by replacing some of the wax molecules on the crystal lattices (Kang et al. 2014; Gate 2016; Kelland 2009). During remediation of deposit wax, oil industries use a thermal injection of a heated fluid such as crude oil, or water into the production system to melt and remove deposits. Whereas, Xylene is one of the popular chemicals used for remediation and treatment of wax deposits (Becker 2000).

Prevention and Remediation: Mechanical Technique

Mechanical wax removal involves mainly physical removal of wax deposit by pigging process, through scrapping of pipe to remove accumulated deposits. This method requires shutdown of the production line and pig out the wax deposit, which consequently deferred production and affects revenue generation. In reality, these activities are complex and follow the standard procedure (Bai and Bai 2005).

Therefore, design and development of a viable, robust wax management strategy rely upon the economical evaluation of available management techniques. Pigging operation is commonly used as a singular approach in the oil field. However, a combination method is implemented - such as chemical and mechanical to provide the most cost effective approach. As of today, there is no universal method that can apply to all kinds of crude oil (Kang et al., 2014; Adeyanju and Oyekunle, 2014).

As highlighted in the literature, wax deposit build-up in the pipeline could be catastrophic if not prevented. Professionalism and ethics are key to ensure effective wax management. As wax deposit build-up and plug the pipeline, the integrity of the pipeline is been jeopardized. Depending on the mitigation strategy; for instance, to pig out a block of wax deposit a section of the pipeline needs to be cut-off and replace resulting in an oil spill that could contaminate the sea environment. The aquatic life, vegetation and humans are subjected to severe risk. Another example is the limited use of inhibitors such as chlorinated hydrocarbons for remediation of solid wax due to safety issues and processing difficulties (Fan and Llave 1996).

SOME KEY PROFESSIONALISM IN OIL PRODUCTION

The following key professional issues are important in wax remediation:

- (i) **Material selection to meet standard and specification:** As wax is majorly temperature dependent, thermal insulation, as well as the use of materials that are less conductive and meet acceptable standards and specifications is important. Steel material is most preferred for oil and gas pipeline construction because of its strength, toughness, ductility and weldability. Similarly, the use of plastic or coated pipe will help reduce deposition. Wall friction contributes to wax deposition, therefore surface with low-friction make it difficult for wax crystals to adhere and stick to the pipe walls (Trench and Kiefner 2001).
- (ii) **Pipeline Design and Geometry:** Design of size of equipment, the diameter of the pipe, volumetric flow rate and the geometry – curvature are important engineering considerations in oil and gas pipeline construction and operations. The effect of pipe curvature needs to be fully investigated to understand the severity on wax deposition.
- (iii) **Sound Engineering procedures:** accurate procedures and professional practices must be applied regarding health and safety, instrumentation, control, permit to work, firefighting, routing check and re-pair and maintenance, operations, constructions and upgrade. This can be achieved through proper planning, training and enforcement of regulation (Malins 1977).
- (iv) **Safety and Environmental Impact Assessment:** Oil spillage has very dare environmental degradation effect. The world greatest oil industry disaster “the Piper Alpha disaster” took place in the North Sea where 167 people lost their lives in July 1988 attributed to unaddressed failures in Safety and environmental considerations (MacAlister 2013; Scott 2011). The Piper Alpha disaster occurred due to gas leakage from one of the condensate pipes and communication errors.

ETHICAL ISSUES IN OIL PRODUCTION

- (i) The accuracy of experimental data: Wax deposition prevention measures sorely depend on experimental studies, either at the pilot plant or at the laboratory level. Some unethical practices in an experimental study are to record data that is different from what is generated. Therefore, repeatative run of the experiment is recommended
- (ii) Social responsibility towards host community: According to David (1999) “when investments deliver real value to society, companies are not only safe from criticism; they also have a powerful tool at their disposal for creating more meaningful and lasting relationships with their stakeholders”.
- (iii) Environmental degradation and oil spillage control: The environmental violation includes erosion, acid sulphate leaching, used of non-recommended inhibitors and other toxic gas during production activity. Unsolicited clearing of vegetation, dumping industrial waste and by-products and oil spillage could results in pollution of the environment (Furchtgott 2013).

DESIGN OF EXPERIMENTAL CASE STUDY

Materials and Methods:

To understand the severity of wax deposition in the pipeline at the sub-cool condition, a laboratory flow rig was designed and constructed in-house; in order to study the behaviour of waxy crude oil supplied by Roemex oil Service Company. Sensitivity and correlation analysis where run on certain varied and constant parameters to compare their responses to the thickness of wax deposited. The flow rig in this study consists is shown in Figure 3 below.

The facility comprises of a jacketed cooling test sections of 15 mm copper pipe, where crude oil flow and a 22 mm outer pipe (Jacket) connected to a chiller for cooling the crude oil test section. Water bath and screw pump for heating and pumping crude oil through the test section, while condenser and frequency inverter for condensing light fraction and regulating the flow rate.

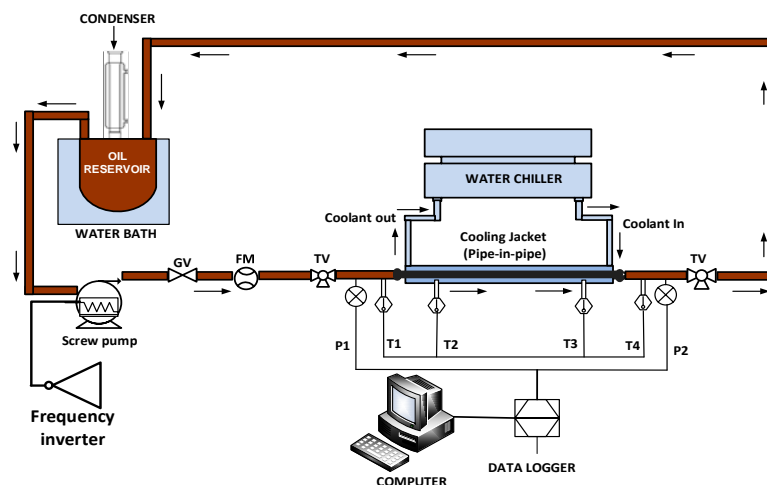


Figure 3: Experimental flow rig for the study of waxy oil behaviour at sub-cooled condition: P1 and P2 are inlet and outlet pressure, while T1 and T4 are the oil inlet and out temperature. T2 and T3 are the inlet and outlet coolant temperature.

Figure 4 illustrates a variation of the velocities profiles and pressure drop in the straight pipeline. A laminar and turlent flow regime are pictorially presented.

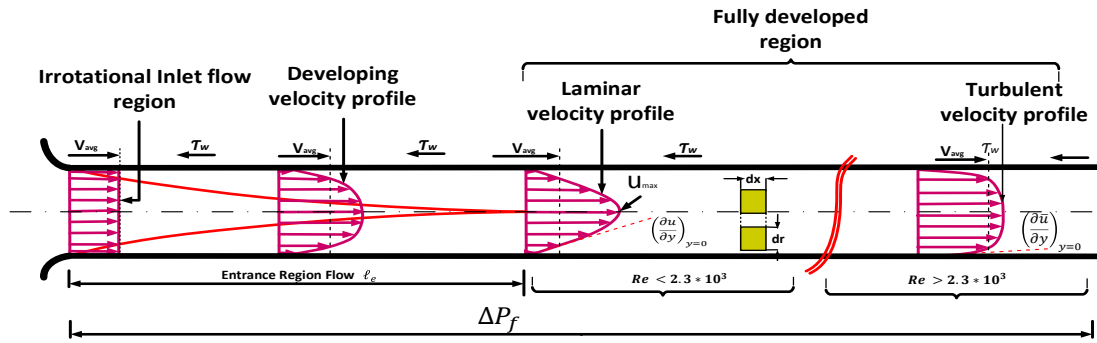


Figure 4: Straight pipe velocity distribution

RESULTS AND DISCUSSION

Wax deposition measurement using varied cooling temperature

The result of measurement from experiment to determine wax behaviour under varied cooling temperature and calculated thickness based on correlation with existing formulas is shown in Table 1. For this experiment, the constant variables are flow rate at 3l/min, oil inlet temperature at 45°C experiment duration of 2 hrs; while the varied parameter is cooling temperature (i.e. the pipe wall temperature). Five experiments were carried out by varying cooling temperature at 15, 20, 25, 30, 35 °C shown in Figure 5.

Table 1: Wax deposition under varied cooling temperature after 2hr at 3l/m

Varied Parameter	Measurement of Wax			Average thickness correlation (mm)			
Coolant Temp (°C)	The volume of Wax (ml)	Mass of Wax (g)	Pressure Drop (Pas)	Wet Gauge/Vernier Calliper	Volume	Weight	Pressure drop
15	136	73.94	3100	2.41	2.33	2.26	2.34
20	102	65.05	2720	1.98	2.01	1.94	2.08
25	81	54.55	2300	1.75	1.80	1.58	1.85
30	3.5	13.94	1900	0.35	0.37	0.37	0.39
35	0	0	1300	0	0	0	0

Wax deposition under a varied flow rate

Seven experiments were carried out to determine the effect of flow rate on wax depositional behaviour in the pipeline. The constant parameters include coolant temperature of 15°C, oil inlet temperature of 45°C, and experiment duration of 2 hrs. The varied parameter is flow rate with varied rates of 2, 3, 4, 5, 7, 9 and 11 l/min. Table 2 shows the measurement as well as results and calculated correlation based on the existing formula.

Table 2: Wax deposition under varied flow rate after 2 hrs at a 15°C cooling temperature

Varied Parameter	Direct Measurement			Average thickness correlation (mm)			
Flow Rate (l/min)	Volume of Wax (ml)	Mass of Wax (g)	Pressure Drop (Pas)	Wet Gauge/Vernier Calliper	Volume	Weight	Pressure drop
2	126	77.04	3420	2.37	2.24	2.38	2.36
3	115	74.21	3100	2.25	2.14	2.27	2.34
4	105	72.64	2500	2.22	2.04	2.21	2.14

5	76	63.16	2100	2.15	1.74	1.87	1.9
7	58	54.76	1050	1.91	1.52	1.585	1.62
9	53	50.01	950	1.60	1.45	1.43	1.47
11	49	46.98	740	1.44	1.4	1.33	1.42

Discussion

The depositional behaviour of wax under varied cooling temperature.

It is seen from Figure 5 and 6 that wax thickness is lower at a higher temperature. Notably, there was no wax deposition when the experiment was carried out at 35°C pipe wall (coolant) temperature; which is above the WAT (wax appearance temperature). At the WAT (30°C), however, there was a very little wax deposition. The highest thickness being 2.34 mm from the pressure differential correlation. The lowest thickness being 0.39 mm. This indicates that at WAT, the wax had begun to appear but no build up and serious deposition was observed as the temperature drops down. The increase in wax thickness as coolant temperature is reduced below WAT is significant, increasing along the line as cooling temperature reduces. The increase in WAX thickness as coolant temperature is reduced is indicative from the experiment that thicker wax layers are formed and deposit at pipe wall, and accumulating to form into thicker layers thereby reducing the effective flow diameter of the pipe.

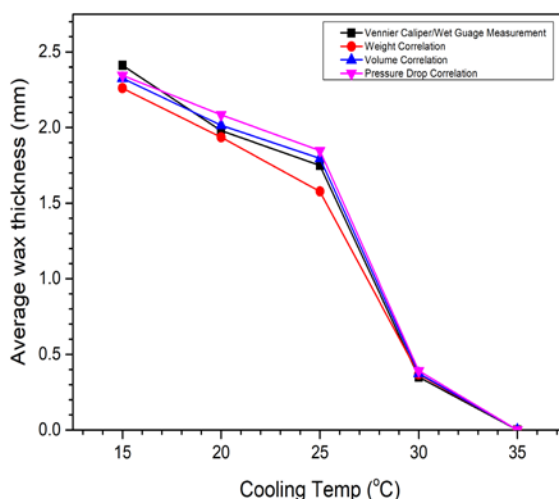


Figure 5: Effect of coolant Temperature on wax deposition at a constant flow rate of 3 l/m, and Oil inlet temperature of 45 °C.

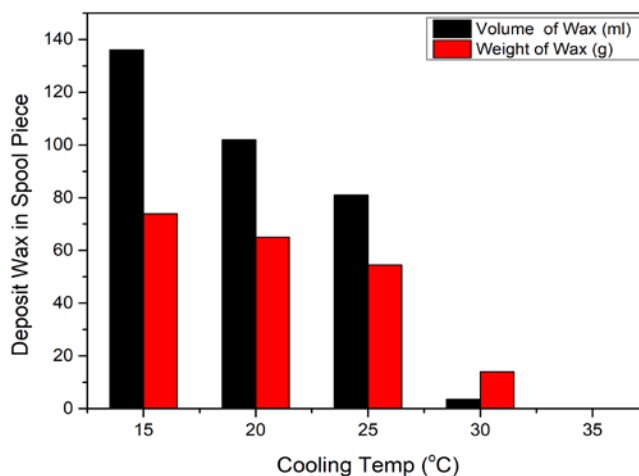


Figure 6: Effect of coolant Temperature on wax deposition at a constant flow rate of 3l/m, and Oil inlet temperature of 45 °C.

The depositional behaviour of wax under a varied flow rate

Seven experiments were performed to investigate the behaviour of wax deposition under varied flow rate. Figure 4.5 shows that at laminar flow with a varied flow rate of 2l/min, 3l/min, 4l/min and 5l/min the thickness of wax deposited is higher. At a turbulent flow of 9l/min and 11l/min, the wax thickness is lower. Wax deposition is inversely proportional to the increase in flow rate as indicated by Figure 7 and 8. That is, as flow rate increases, wax thickness reduces. It was discovered that deposition decreased under turbulent condition. This decrease was explained as sloughing effect, whereby a higher shear rate was created by higher flow rate that removed some of the deposits from the wall.

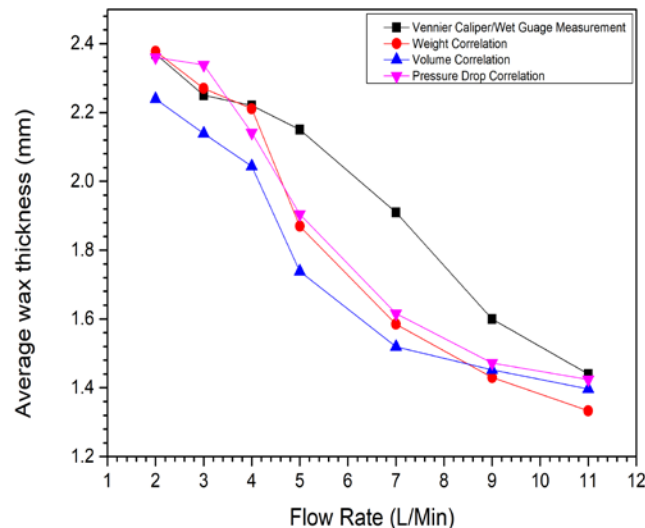


Figure 7: Effect of Flow rate on wax deposition at a constant cooling temperature of 15°C, Oil inlet temperature of 45°C and volumetric flow rate of 3l/min.

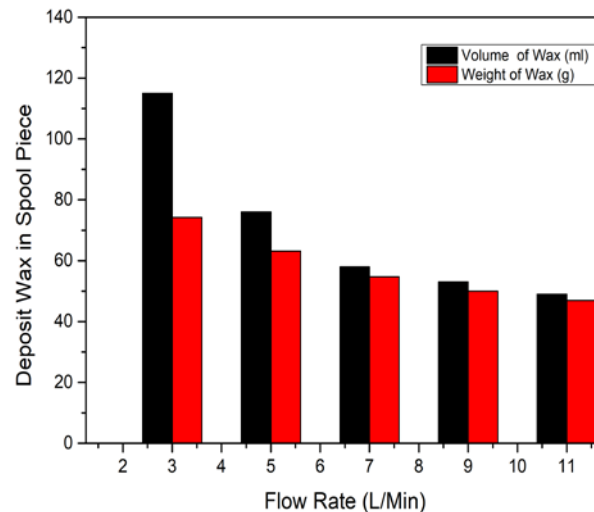


Figure 8: Effect of Flow rate on wax deposition at constant cooling temperature of 15°C, Oil inlet temperature of 45°C and volumetric flow rate of 3 l/min

CONCLUSION

Wax disposition requires costly remediation and prevention techniques, which also posed danger to the environment. This study concludes that the costly problem of wax deposition can be improved through:

1. Implementing of sound Engineering practices in the design, construction and operation of pipeline coupled with ethical value and core professional practices

that that would alleviate flow assurance risks and minimize associated remediation costs.

2. Comprehensive experimental studies to predict the severity of wax deposition behaviour in order to design a robust wax management strategy.

From the experiment investigation it is concluded that temperature and flowrate are the key parameters for wax deposition; hence, operating above WAT region and at a higher flow rate is recommended if the severity of wax deposition is to be managed by engineers.

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**ETHICS IN CONSTRUCTION
AND CURRENT ISSUES SUCH
AS BRIBERY AND
CORRUPTION, MODERN
SLAVERY, RESPONSIBLE
SOURCING, CONSIDERATE
CONTRACTING**

ASSESSMENT OF FACTORS INFLUENCING ETHICAL BEHAVIOUR OF QUANTITY SURVEYORS IN NIGERIA

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This study assessed the factors influencing the ethical behaviour of quantity surveyors in Ondo state, Nigeria with a view to enhancing service delivery to construction clients. Survey research design was adopted for the study. Sixty-seven (67) copies of well-structured questionnaire were administered to registered quantity surveyors in Ondo State, out of which 50 (74.6%) were retrieved and found suitable for analysis. Percentile and frequency measures were used to analyse the background information of the respondents. Mean Item Score (MIS) and standard deviation were used to analyse the factors influencing the ethical behaviour of quantity surveyors in Ondo state while Kendall's coefficient of concordance (W) test was conducted to determine the level of agreement of the respondents on the factors. Chi-square test (χ^2) was also carried out on the responses on these factors and compared with χ^2 critical value of 0.05 and 0.01 p-values. Severity index was calculated to determine the severity of the effects of quantity surveyors' compliance with the code of ethics of the profession. The findings of the study revealed that the love of money and unrealistic performance targets are the highest factors influencing the ethical behaviour of quantity surveyors. High productivity and efficiency in project teams and increase in public trust are the highest effects of quantity surveyors' compliance with the code of ethics in the course of discharging their services. The study recommends that to ensure the benefits of compliance with the code of ethics, levying of appropriate penalties on defaulters of ethics is important.

Key Words: Client, Code of Ethics, Construction Industry, Ethics, Quantity Surveyors

INTRODUCTION

The construction industry is multi-disciplinary and dynamic in nature (Chan and Chan, 2004) as it follows grouping and dispersal theory. Construction projects often start with two parties (mostly client and architect) and as processes of construction continue, more professionals, artisans and government parastatals come into play. This coalition of different professionals and stakeholders is important to the delivery of construction projects and therefore ethical considerations become a requirement for proper projects delivery. Aje and Awodele (2006) opined that the image of the construction industry lies on ethical conduct within the professionals in the industry. Hamzah, Wang and Yap (2010) stated that ethical issues cannot be undermined as the number of construction professionals often engaged on construction projects become increasing. Also, Mlinga (2006) reported that ethics is given one of the least considerations in the construction professional practices inspite of its extreme importance.

A professional code of ethics is a set of rules that reveals the statutory moral standards expected in the discharge of professional services within the ambit of the profession (Nawaz and Ikram, 2013). This code of ethics reveals the acceptable

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conduct expected from every category of member of the profession. Every professional code of ethics is subject to review depending on the dynamics of socio-political and technological advancements within the society (Omolewu, 2008). Mathew (2014) inferred that upholding professional ethics supports the primary objectives of codes of practice in any profession, as ethics is closely related to professionalism.

The importance of the service of quantity surveyors in the construction industry cannot be overestimated. Kadiri and Ayodele (2013) described a quantity surveyor as a professional trained to ensure judicious allocation of resources such as materials, manpower, machinery, money, methods and management for the purpose of achieving value for money. The quantity surveyor's services span from conception of construction projects to completion, and contribute to overall project performance by acquiring, developing and deploying appropriate competencies and skills (Nkado and Meyer, 2001). The practice of construction professionals in the Nigerian construction industry has been bedeviled by ethical related challenges. Oyewobi, Ganiyu, Oke, Ola-Awo and Shittu (2011) attributed the lack of meaningful development in the Nigerian construction industry to corruption and corrupt practices. Frisch (1996) submitted that corruption is one of the unethical occurrences in all facets of life and has probably been in existence since the creation of man. Nawaz and Ikram (2013) further asserted that corrupt and other unethical practices have been on the increase in the last two decades. Kadembo (2008) also submitted that the phenomenon of unethical practices is a cankerworm that has eaten deep into the fabric of the construction industry of developed and developing countries but is often handled with levity. Ameh and Odusami (2010) also averred that unethical practices are detrimental to the quantity surveying profession in Nigeria. This study therefore assessed the factors that influence ethical behaviour of quantity surveyors in Ondo state, Nigeria with a view to enhancing service delivery to construction clients.

LITERATURE REVIEW

Factors Influencing Ethical Behaviour of Construction Professionals

The construction industry is centred on the discharge of professional services to clients at maximum value. The discharge of these services is borne out of required ethical standards expected from construction professionals. The reputation of any profession is inferred from individual and corporate members of such an organisation (Dabson and Plimmer, 2007). There are many factors influencing the ethical behaviour of construction professionals. Transparency International (2005) highlighted the major factors that distort the ethical conduct of construction professionals and related this to global economic meltdown. Azhar, Selph and Maqsood (2011) found these factors influencing ethical performance of construction professionals: the type of political system in operation, love of money, professional indiscipline, favoritism, and profit maximization by contractors. Alutu and Udhwue (2009) have it that the factors that contribute to unethical behaviour of construction professionals include love of money, economic pressure and societal practices. In the South African construction industry, Aigbavboa, Oke and Tyali (2016) submitted that the major enablers of unethical behaviour of construction professionals are greed, political interference and favouritism in the process of construction contract administration and award. Other less pronounced factors that influence ethical behaviour of construction professionals include: lack of transparency, personal characteristics of the professional, poverty, and lack of executive control.

Olusegun, Benson, Esther and Michael (2011) attributed unethical behaviour and practice among construction professionals to societal corruption which is the result of greed and selfishness. Usman, Inuwa and Iro (2012) also submitted that the absence of penalties for professional misconduct is one of the greatest factors influencing ethical behaviour in the management of construction projects in Nigeria. Hassim, Kajewski and Trigunarsyah (2010) on contributory factors of unethical behaviour in construction project planning classified the factors into economic downturn, non-transparent selection process, leadership, national objectivity, ineffective evaluation of the process and ineffectiveness of professional ethics and policy in procurement.

In a study conducted by Olusegun et al. (2011), unethical behaviour of quantity surveyors brings about incompetence and quackery. It was submitted that quacks thrive in the Nigerian construction industry through paying of money to win construction contracts which are in turn constructed poorly. Other contributory factors to unethical behaviour in construction project delivery include; delayed payment of workers' salaries or inadequate remuneration, job insecurity, construction industry culture, personal characteristics and professionals' indiscipline. The expected conducts of construction professions are deterred by the fear of known and unknown. The Nigerian construction industry has some unique characteristics of unrealistic performance targets that are inherent in the private construction firms and other factors that have welled out of the unstable economic stand of the country.

Effects of Construction Professionals Compliance to Code of Ethics

Codes of ethics are becoming a necessity in the construction industry of developed and developing countries (Oladinrin and Ho, 2015). Iro (2008) asserted that the effect of construction professionals' compliance with ethics is significant to the development of the economy and human resources as it enhances free play of market forces and encourages the inflow of foreign direct investment. The relevance of code of ethics to execution of construction projects has not been undermined by most developed countries (Vee and Skitmore, 2003; Bowen et al. 2007; Oladinrin and Ho, 2015). According to Mohamed, Abdul Rahman, Usman and Tawil (2015), compliance with the codes of ethics is reflected in better project output, increase in public trust, and rapid growth of the construction industry. Ho (2011) pointed out that the effects of ethical adherences are proper project coordination, low maintenance cost and enhancement of client satisfaction on a particular project. Quality workmanship and speedy project completion were the results of ethical adherence as submitted by Svensson and Wood (2004) which is hindered by ethical misconduct such as bribery, ring collusion, insincerity to the client and other professionals, unfair treatment in giving to the contractor the tender/final account negotiation and illegal award of contract.

RESEARCH METHODOLOGY

The research design adopted for this study was the survey method. Structured questionnaire was used to garner the opinions of quantity surveyors on the factors influencing the ethical behaviour of quantity surveyors and the effects of quantity surveyors' compliance with the code of ethics in Ondo State, Nigeria. The target population was quantity surveyors who were registered with the Nigerian Institute of Quantity Surveyors (NIQS) and were practicing in Ondo state, Nigeria. The choice of Ondo state was based on familiarity, proximity of the study location to the researchers and the time available to conduct the study.

A total population of 67 quantity surveyors was identified from the state chapter of the institute. Because of the manageable size of the respondents, the census method research technique was adopted. The census method means that the entire population constitutes the sample size. Akinradewo, Ojo and Oyefusi (2017) submitted that the census method is superior to other sampling methods in that it helps eliminate sampling error. Sixty-seven (67) copies of structured questionnaires were administered to the respondents and 50 (74.6%) of the questionnaires were filled, returned and found suitable for analysis.

The reliability test of the research instrument was carried out. Cronbach's alpha value of 0.990 was gotten for the research instrument. This value is very close to 1.000 which implies that further analysis can be carried out on the study. Percentile was used to analyse background information of respondents. Mean Item Score and Standard Deviation (SD) were used to analyse the factors influencing ethical behaviour of quantity surveyors. Kendall's coefficient of concordance test was conducted to determine the level of agreement amongst the respondents while Chi-square (χ^2) value obtained was also compared to the chi-square (χ^2) critical value in the statistical table at the appropriate degree of freedom. Severity Index was used to analyse the effects of quantity surveyors compliance to code of ethics.

ANALYSIS AND RESULT

Background Information

The respondents in this survey comprised seven (14.0%) who work in quantity surveying firms established 1-5 years ago, 23 (46.0%) of the respondents' firms were formed 6-10 years ago, 10 (20.0%) of the respondents' firms were set up 11-15 years ago while 10 (20.0%) of the respondents' firms have been established for over 15 years. Eight (16.0%) of the respondents have 1-5 years of construction work experience and 42 (84%) have above 5 years of construction work experience. Twelve (24.0%) of the respondents have handled between 1-5 construction projects, 13 (26.0%) of the respondents have executed 6-10 construction projects while 25 (50.0%) of the respondents have handled over 10 construction projects. Twelve (24.0%) of the respondents have HND, 18 (36.0%) and 20 (40.0%) of the respondents have B.Sc. and M.Tech. degrees respectively. Twenty (40%) of the respondents are probationer members of the NIQS, 29 (58%) are corporate members of the institutes while 1 (2%) of the respondents is a fellow of the institute. The background information of the respondents reveals that the respondents are professionally and academically qualified to give valid information necessary to achieve the aim of this study.

Factors Influencing Ethical Behaviour of Quantity Surveyors

Table 1 shows the rating of the factors influencing the ethical behaviour of quantity surveyors by the respondents. 'Excessive love for money' was ranked as the highest factor influencing the ethical behaviour of quantity surveyors with a mean score of 4.34 followed by the 'Unrealistic performance target' with a mean score of 4.28. 'Global economic meltdown' and 'non-availability of job' ranked third and fourth with a mean score of 4.04 and 3.98 respectively. 'Inadequate remuneration of quantity surveyors' was ranked least with a mean score of 2.96. The mean scores of all the factors influencing ethical behaviour of quantity surveyors ranked above the average value of the 5-point Likert scale adopted for this study. This shows that these factors are significant in influencing the ethical behaviour of quantity surveyors.

The standard deviations (SD) of factors influencing ethical behaviour of quantity surveyors in table 1 range from 0.717 to 1.253. Nine (64.3%) of the SDs of the factors is less than 1.000 and 5 (35.7%) of the SDs of the factors is relatively above 1.000. This indicates that there is little variability in the dataset and a high level of consistency of agreement on the factors by the respondents.

Kendall's coefficient of concordance (W) of the dataset was also computed to determine the level of agreement on the factors influencing ethical behaviour of quantity surveyors. Kendall's coefficient (W) value of 0.633 was obtained from the computation. Kendall's coefficient (W) ranges from 0 to 1. The closer the coefficient is to 1, the better the interpretation of agreement of the respondents on given factors. Gisev, Bell and Chen (2013) also stated that there is possibility of low Kendall's coefficient value when respondents are more than seven. Despite the number of respondents in this study, the Kendall's coefficient (W) value is above average of 0.500 which is considered satisfactory. This reveals that there is a great consensus amongst the respondents of this study on the factors influencing ethical behaviour of quantity surveyors. The p-value of the dataset computed alongside the Kendall's coefficient of concordance test (W) was 0.000. This shows that there is no significant difference in the opinions of the respondents on the factors influencing ethical behaviour of quantity surveyors.

Chi-square value is also generated alongside with Kendall's coefficient (W) of concordance test in Statistical Package of Social Sciences (SPSS version 23). The chi-square value (χ^2) of the factors influencing ethical behaviour of quantity surveyors was 411.694. The χ^2 critical value from chi-square table reveals 22.362 (for $p = 0.05$) and 27.688 (for $p = 0.01$) at degree of freedom (df) of 13. The computed chi-square value (χ^2) was higher than the critical values obtained from statistical table at significant level of 0.000 which implied that a robust consensus among the respondents on the factors.

Table 1: Factors Influencing Ethical Behaviour of Quantity Surveyors

Factor	Mean	SD	Rank
Excessive love for money	4.34	0.717	1
Unrealistic performance target	4.28	0.904	2
Global economic meltdown	4.04	0.781	3
Non availability of job	3.98	0.892	4
Job insecurity	3.94	0.978	5
Influence of contractors	3.90	0.789	6
Government policy	3.86	1.05	7
Availability of loophole in project monitoring	3.82	0.825	8
Fear of status relegation after retirement	3.54	1.164	9
Time lag between commencement of contract and payment of fees	3.46	0.994	10
Pressure from project team member	3.28	1.051	11
Personal ethics and goals	3.08	0.966	12
Professional indiscipline	2.98	1.253	13
Inadequate remuneration for quantity surveyors	2.96	1.029	14
Number of Respondents		50	
Kendall's coefficient of concordance (W)		0.633	

Chi-square (χ^2) value	411.694
χ^2 – Critical value from statistical table [a:p =.05; b:p = .01]	22.362 ^a (27.688 ^b)
Degree of freedom (df)	13
Significance level (p)	0.000

Effects of Quantity Surveyors Compliance with Code of Ethics

Table 2 shows the respondents' responses to the effects of quantity surveyors' compliance with the code of ethics. The table shows that 'High productivity and efficiency of project team' ranked highest with severity index of 0.828. 'Increase in public trust' and 'Promote client's satisfaction' ranked second and third with severity index of 0.820 and 0.804 respectively. 'Better project output' ranked next with severity index of 0.788 while the least effect of quantity surveyors compliance with code of ethics are 'Encourage international investors' and 'Low maintenance cost' with the same severity index of 0.588. It is pertinent to note that all the effects of compliance with code of ethics have severity index of over 0.500 which indicates the significance of the compliance with code of ethics to quantity surveying practice.

Table 2: Effects of Quantity Surveyors Compliance to Code of Ethics

Effects of compliance to code of ethics	Severity index	Rank
High productivity and efficiency in project team	0.828	1
Increase in public trust	0.820	2
Promote client satisfaction	0.804	3
Better projects output	0.788	4
Rapid growth of the industry	0.740	5
Proper project coordination	0.704	6
Enhance professionalism	0.688	7
Speed project completion	0.672	8
Good quality infrastructural development	0.644	9
Free play of construction professionals	0.612	10
Low chance of upward review of contract sum	0.604	11
Encourage international investors	0.588	12
Low maintenance cost	0.588	13

DISCUSSION OF FINDINGS

This study revealed that excessive love for money is the most pronounced factor influencing ethical behaviour of quantity surveyors in Ondo state, Nigeria. These findings are in agreement with those in the study of Alutu and Udhwue (2009) that posited inherent love for money as a factor influencing unethical practice in the discharge of construction services. The study shows that excessive love for money anchors on the desire to meet basic necessities of life which the economic situation or low remuneration of construction workers makes unaffordable. Unrealistic performance target is one of the high ranked factors influencing the ethical behaviour of quantity surveyors. The tasks which are set cannot be achieved without unethical behaviour or actions. This is common to quantity surveyors working in construction firms in which they are charged to do all they can to raise enough claims in the course of executing a project. Global economic meltdown is also a significant factors identified in this study. This factor is a major contributory factor influencing the ethical behaviour of construction professionals identified by Hassim, Kajewski and

Trigunarsyah (2010). It can be inferred that economic stability of a country determines the response of labour to work and reaction to money.

Non-availability of job, job insecurity, influence of contractors and government policy were rated as contributory factors to unethical behaviour of quantity surveyors. This finding is in consonance with the outcome of similar study conducted in South Africa by Aigbavboa et al. (2016) where political interference and professional misconduct of construction contract administration were rated as most influencing factors to ethical practice of construction professionals. Azhar, Selph and Maqsood (2011) also attributed unethical behaviour amongst construction professionals to quest to secure maximum profit by contractors. The quest by the contractor to act opportunistically in the course of construction project execution cannot be successfully achieved without a quantity surveyor. The need to secure the job of the quantity surveyor in a contractor's firm can also influence undue behaviour in the discharge of professional services. The least ranked factor is inadequate remuneration of quantity surveyor. This is in line with the submission of Olusegun et al. (2011) that inadequate remuneration of construction professionals leads trust, enhancement of client's satisfaction, better project output and rapid growth of the construction industry were ranked as high effects of quantity surveyors' compliance with the code of ethics as revealed in this study. The results from this study is in line with the findings of the study of Mohamed et al (2015) study that, compliance with the code of ethics result in better output of construction works, increase in public trust and rapid growth of construction industry in general. Ho (2011) also attributed the effects of adherences to code of ethics of a given profession to proper project coordination and enhancement of client satisfaction. The outcome of the study of Svensson and Wood (2004) also revealed that quality workmanship and speedy project completion can be achieved through strict compliance of code of ethics.

CONCLUSIONS AND RECOMMENDATIONS

This study assessed the factors influencing the ethical behaviour of quantity surveyors and the effect of compliance with the code of ethics of the profession. The study revealed that the love of money; unrealistic performance targets and global economic meltdown are the most contributory factors that trigger unethical behaviour of quantity surveyors. The rating of the variables shows that all the factors are significant to propel quantity surveyors to put up unethical behaviour in the course of discharging their professional duty. The effects of compliance with the code of ethics on the other hand are also rated significant to delivery of quality service to construction clients. In order to ensure performance of service delivery by quantity surveyors, non-compliance with the code of ethics should be frowned at by the NIQS through the levying of appropriate penalties.

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CORE VALUES THAT SUPPORT CONSTRUCTION HEALTH, SAFETY, AND WELL-BEING (HSW)

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Values are an integral part of interventions relating to health, safety, and well-being (HSW). Values are important as they provide the foundation for the development of culture, which reflects the way in which contractors undertake the business of construction and projects. Literature indicates that seven core values and 22 value factors have been identified as supportive of HSW, the core values being: interconnectedness; participation; trust; justice; responsibility; development, and growth. A self-administered questionnaire survey was conducted among registered construction health and safety (H&S) practitioners in South Africa to determine the importance of, and perceived experience from, seven core values and 22 value factors in supporting HSW in construction. The findings include that 11 out of the 22 identified value factors are of near major to major, or major importance in terms of supporting HSW in construction. However, experience expressed as a percentage of importance ranges between 48.6% and 66.7%. Therefore, it can be concluded that the nature of the construction industry in the form of the manifestation of core values and value factors is not conducive to HSW.

Keywords: construction, core values, health and safety, value factors, well-being.

INTRODUCTION

The report, 'Construction Health & Safety Status & Recommendations' highlighted the considerable number of accidents, fatalities, and other injuries that occur in the South African construction industry (Construction Industry Development Board (cidb), 2009). The report cited the high-level of non-compliance with health and safety (H&S) legislative requirements, which is indicative of a deficiency of effective management and supervision of H&S on construction sites as well as planning from the inception or conception of projects within the context of project management. The cidb's report indicates the disabling injury incidence rate (DIIR) to be 0.98 i.e. 0.98 disabling injuries per 100 workers, the all industry average being 0.78, and a fatality rate of 25.5 per 100,000 workers, which does not compare favourably with international rates (cidb, 2009).

Zwetsloot, van Scheppingen, Bos, Dijkman, & Starren (2013) argued that individual values are recognised as health, safety and welfare (HSW) influencing factors. However, a good overview of HSW-related values is missing. Their study aimed to fill this gap by identifying relevant values and clustering them into a limited set of core values supportive of HSW, the central research question being: What organisational values are supportive of HSW at work? The central research question was operationalised into the following sub-research questions:

- What organisational values or value-laden concepts are mentioned in the literature as relevant for HSW?

- Can these values and value-laden concepts be logically clustered around a limited set of core values relevant for HSW?

The study resulted in the development of a framework, which includes seven core values, 22 value factors, and three value clusters, that are supportive of HSW.

Given the abovementioned, an exploratory study was conducted in South Africa to determine the perceived importance of the seven core values, and 22 value factors in terms of supporting HSW, and the perceived experience of the seven core values, and 22 value factors by workers.

REVIEW OF THE LITERATURE

Values

Values are defined as: a code of behaviour, ethics, standards (moral) and principles (Allen, 1990). The European Foundation for Quality Management (EFQM) (2013) defines values as “operating philosophies or principles that guide an organization’s internal conduct as well as its relationship with the external world. Values provide guidance for people on what is good or desirable and what is not. They exert major influence on the behavior of individuals and teams and serve as broad guidelines in all situations”.

The identification of core values and value factors

In terms of the process followed by Zwetsloot, van Scheppingen, Bos, Dijkman, & Starren (2013), 29 values or value-laden concepts were identified through a review of the literature. This resulted in the need to evolve clusters of closely related value factors. Content analysis was then conducted, which entailed the following:

- A value factor was only attributed to the cluster it was judged most relevant for;
- What values were more central than other values or value-laden factors?
- Some value factors are ‘essential values’ – potentially relevant for the identity of organisations, and selected as core values, and
- Other factors appeared to be ‘expressions of’ such deeper values. An example is the relationship between interconnectedness (core value), and ‘social support’ (an expression thereof).

The first workshop included 14 stakeholders, who:

- Were required to clarify the meaning of core values;
- Provide feedback and associations with respect to the cultural factors identified;
- Cluster the cultural factors and select a ‘core value’ for each cluster. The stakeholders evolved seven clusters versus the researchers’ six clusters.

The second workshop included eight stakeholders, who:

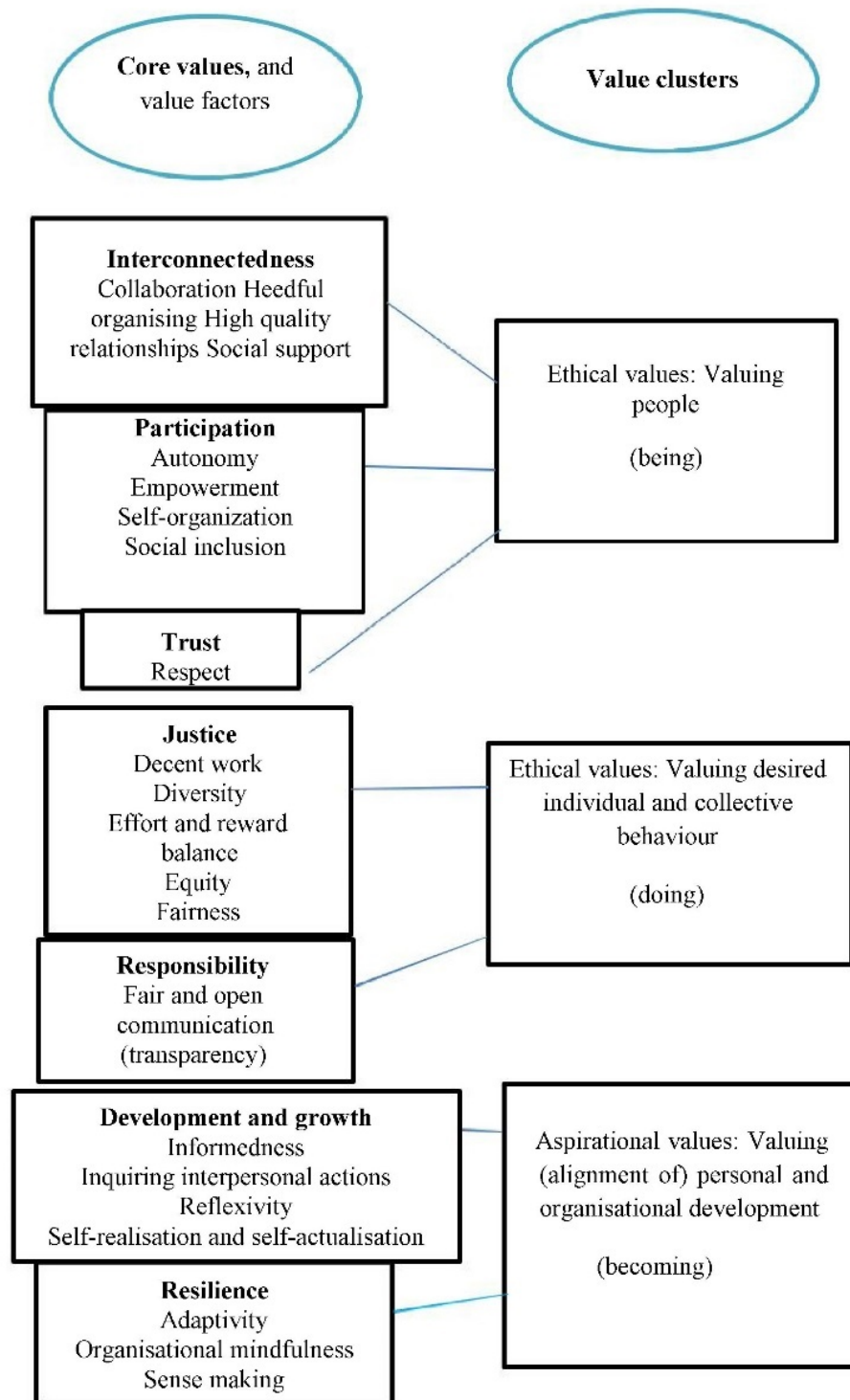
- Were required to clarify the meaning of core values;
- Provided feedback and associations with respect to the cultural factors identified;
- Clustered the cultural factors and select a ‘core value’ for each cluster. The stakeholders evolved seven clusters versus the researchers’ six clusters, and
- Finally, categorised the seven core values identified, which resulted in three main categories of core values that are supportive of HSW.

The process resulted in the development of a framework, which includes seven core values, 22 value factors, and three value clusters, that are supportive of HSW, as presented in Figure 1. The three value clusters are:

- Ethical values: valuing people (being)’;

- Ethical values: valuing desired individual and collective behavior (doing), and
- Aspirational values: Valuing (alignment of) personal and organisational development (becoming).

Figure 1: A framework of core values, value factors, and value clusters that support HSW (Zwetsloot, van Scheppingen, Bos, Dijkman, & Starren, 2013)



RESEARCH

Research method and sample stratum

The research method adopted the framework of core values, value factors, and value clusters that support HSW as evolved by Zwetsloot, van Scheppingen, Bos, Dijkman, & Starren (2013). The core values and value factors constituted the basis of the questionnaire in the form of two five-point Likert-scale type questions, followed by a qualitative question, and six close ended demographic questions.

The questionnaire was sent per e-mail to all members of the South African Council for the Project and Construction Management Professions (SACPCMP), registered Professional Construction Health and Safety Agents (CHSAs), Candidate Construction H&S Agents (Can CHSAs), and Construction H&S Managers (CHSMs) throughout South Africa. Table 1 presents the sample strata details and response rates.

Table 1: Sample strata details and response rates

Sample stratum	Size (No.)	Response (No.)	Response rate (%)
CHSAs	78	14	18.0
Can CHSAs	124	14	11.3
CHSMs	562	26	4.6
Mean	764	54	7.1

The survey commenced on 18 July 2018, and closed out on 25 July 2018, which means the duration was limited to one week. Owing to the low response rate, the findings can be deemed to be indicative, but likely to be from the more committed practitioners, and practitioners who are familiar with, and / or interested in, the subject area, which reinforces the validity of the findings.

Research findings

Table 2 indicates the importance of seven core values and 22 value factors with respect to supporting HSW in construction in terms of percentage responses to a scale of 1 (“not supportive”) to 5 (“very supportive”), and mean scores (MSs) between 1.00 and 5.00. It is notable that all the MSs are above the midpoint value of 3.00, which indicates that the respondents perceive the value factors to be more than important as opposed to less than important in terms of supporting HSW in construction.

Considering the collective importance of core values, responsibility (4.76) is ranked first followed by respect (4.70), resilience (4.30), justice (4.27), interconnectedness (4.08), participation (3.96), and development and growth (3.92).

A review of the MS ranges provides further insight into the results, with respect to the importance of the value factors. It is notable that 11 out of 22 (50.0%) of the factors have figures of MSs $> 4.20 \leq 5.00$, which indicates that the value factors are between more than important and very important. The top ten value factors are ‘fair and open communication (transparency)’ (core value: responsibility), followed by eight ‘respect’ value factors, namely ‘respect’, ‘fairness’, ‘decent work’, effort and reward balance’, ‘organisational mindfulness’, ‘collaboration’, ‘informedness’, ‘quality relationships’, and ‘justice’, and then ‘adaptivity’ (core value = resilience).

The remaining 11 out of 22 (50.0%) have figures of MSs $> 3.40 \leq 4.20$, which indicates that the value factors are between important to more than important and more than important.

Table 2: The importance of core values / value factors

Core value / Value factor	U	Response (%)					MS	R
		Not Very						
		1	2	3	4	5		
Interconnectedness:							4.08	5
• Collaboration	0.0	0.0	5.6	7.4	33.3	53.7	4.35	8
• Heedful organising	0.0	0.0	5.6	14.8	42.6	37.0	4.11	14
• Quality relationships	0.0	1.9	1.9	9.3	38.9	48.1	4.30	9
• Social support	1.9	3.7	7.4	22.2	27.8	37.0	3.81	18
Participation:							3.96	6
• Autonomy	0.0	5.6	5.6	27.8	37.0	24.1	3.69	21
• Empowerment	0.0	1.9	1.9	22.2	24.1	50.0	4.19	13
• Self-organisation	0.0	1.9	1.9	18.5	31.5	46.3	4.19	12
• Social inclusion	0.0	3.7	7.4	31.5	22.2	35.2	3.78	19
Respect:							4.70	2
• Respect	0.0	0.0	3.7	1.9	14.8	79.6	4.70	2
Justice:							4.27	4
• Decent work	1.9	0.0	3.7	3.7	29.6	61.1	4.43	4
• Diversity	0.0	1.9	5.6	11.1	44.4	37.0	4.09	15
• Effort and reward balance	0.0	1.9	3.7	1.9	35.2	57.4	4.43	5
• Equity	0.0	3.7	7.4	24.1	20.4	44.4	3.94	16
• Fairness	0.0	0.0	0.0	13.0	25.9	61.1	4.48	3
Responsibility:							4.76	1
• Fair and open communication (transparency)	0.0	0.0	1.9	3.7	11.1	83.3	4.76	1
Development and growth:							3.92	7
• Informedness	1.9	0.0	1.9	7.4	35.2	53.7	4.35	7
• Inquiring interpersonal actions	5.7	1.9	3.8	17.0	45.3	26.4	3.74	20
• Reflexivity	5.6	1.9	5.6	24.1	31.5	31.5	3.69	22
• Self-realisation and self-actualisation	1.9	0.0	7.5	24.5	30.2	35.8	3.89	17
Resilience:							4.30	3
• Adaptivity	0.0	0.0	1.9	17.0	34.0	47.2	4.26	10
• Organisational mindfulness	0.0	0.0	0.0	11.3	39.6	49.1	4.38	6
• Sense making	0.0	0.0	3.8	17.0	28.3	50.9	4.26	11

Table 3 indicates the experience of seven core values and 22 value factors in terms of supporting HSW in construction by workers with respect to percentage responses to a scale of 1 (minor) to 5 (major), and MSs between 1.00 and 5.00. It is notable that no MSs are above the midpoint value of 3.00, which indicates that the respondents perceive the value factors to be experienced by workers infrequently as opposed to frequently by workers.

In terms of the collective experience of core values, justice (2.97) is ranked first, followed by justice (2.97), respect (2.96), responsibility (2.87), interconnectedness (2.83), resilience (2.81), development and growth (2.72), and participation (2.56). The collective rankings have been emboldened in the rank (R) column.

A review of the MS ranges provides further insight with respect to the experience of the value factors. It is notable that no MSs $> 4.20 \leq 5.00$ – between a near major to major / major extent. Similarly, in the case of $> 3.40 \leq 4.20$ – between some extent to a near major / near major extent. Then, 19 / 23 (82.6%) MSs $> 2.60 < 3.40$ – between a near minor extent and some extent / some extent. The top ten value factors are: three ‘justice’ value factors, namely ‘decent work’, ‘diversity’, and ‘effort and reward

balance', followed by an 'interconnectedness' value factor 'collaboration', then 'respect' (core and value factor), then two 'justice' core values 'equity', and 'fairness', then two 'interconnectedness' value factors 'quality relationships', and 'heedful organising', and 'resilience' value factor 'organisational mindfulness'.

Table 3: The experience of core values / value factors by workers

Core value / Value factor	Response (%)						MS	R
	U	Minor Major						
		1	2	3	4	5		
Interconnectedness:							2.83	4
• Collaboration	0.0	5.8	30.8	36.5	13.5	13.5	2.98	3
• Heedful organising	1.9	5.8	34.6	34.6	11.5	11.5	2.88	10
• Quality relationships	1.9	1.9	36.5	38.5	11.5	9.6	2.90	7
• Social support	0.0	13.7	33.3	33.3	11.8	7.8	2.67	17
Participation:							2.56	7
• Autonomy	3.9	17.6	39.2	21.6	9.8	7.8	2.49	22
• Empowerment	1.9	9.6	42.3	30.8	3.8	11.5	2.65	18
• Self-organisation	0.0	11.8	49.0	17.6	15.7	5.9	2.55	20
• Social inclusion	0.0	21.6	33.3	23.5	11.8	9.8	2.55	21
Respect:							2.96	2
• Respect	1.9	13.5	25.0	25.0	21.2	13.5	2.96	6
Justice:							2.97	1
• Decent work	0.0	9.6	19.2	40.4	19.2	11.5	3.04	1
• Diversity	0.0	11.5	25.0	28.8	21.2	13.5	3.00	2
• Effort and reward balance	0.0	15.4	23.1	28.8	23.1	9.6	2.88	9
• Equity	0.0	11.5	25.0	30.8	21.2	11.5	2.96	4
• Fairness	0.0	13.5	25.0	30.8	13.5	17.3	2.96	5
Responsibility:							2.87	3
• Fair and open communication (transparency)	0.0	17.3	28.8	21.2	15.4	17.3	2.87	11
Development and growth:							2.72	6
• Informedness	3.8	9.6	32.7	26.9	15.4	11.5	2.86	12
• Inquiring interpersonal actions	5.8	9.6	36.5	26.9	13.5	7.7	2.71	15
• Reflexivity	9.6	7.7	44.2	19.2	11.5	7.7	2.64	19
• Self-realisation and self-actualisation	5.8	13.5	36.5	21.2	13.5	9.6	2.67	16
Resilience:							2.81	5
• Adaptivity	0.0	7.7	30.8	40.4	15.4	5.8	2.81	13
• Organisational mindfulness	0.0	11.5	28.8	30.8	17.3	11.5	2.88	8
• Sense making	0.0	13.5	34.6	28.8	11.5	11.5	2.73	14

Table 4 presents a comparison of the importance and experience of core values and value factors by workers in terms of MSs between 1.00 and 5.00, and the percentage experience constitutes of importance.

In terms of the percentage experience constitutes of the importance of value factors, the percentages range between 48.6% (self-organisation) and 66.7% (equity). The ten highest percentages are relative to equity (66.7%), diversity (64.7%), inquiring interpersonal actions (62.4%), reflexivity (61.0%), heedful organising (60.5%), decent work (59.5%), social support (59.4%), collaboration (59.1%), self-realisation and self-actualisation (57.8%), and quality relationships (57.6%).

In terms of the percentage experience constitutes of the importance of core values, the percentages range between 49.7% (responsibility) and 60.1% (justice).

Table 4: Comparison of the importance and experience of core values / value factors by workers

Core Value / Value Factor	MS		Exp. % of Imp.
	Imp	Exp	
Interconnectedness:	4.08	2.83	59.3
• Collaboration	4.35	2.98	59.1
• Heedful organising	4.11	2.88	60.5
• Quality relationships	4.30	2.90	57.6
• Social support	3.81	2.67	59.4
Participation:	3.96	2.56	52.7
• Autonomy	3.69	2.49	55.4
• Empowerment	4.19	2.65	51.7
• Self-organisation	4.19	2.55	48.6
• Social inclusion	3.78	2.55	55.8
Trust:	4.70	2.96	53.0
• Respect	4.70	2.96	53.0
Justice:	4.27	2.97	60.1
• Decent work	4.43	3.04	59.5
• Diversity	4.09	3.00	64.7
• Effort and reward balance	4.43	2.88	54.8
• Equity	3.94	2.96	66.7
• Fairness	4.48	2.96	56.3
Responsibility:	4.76	2.87	49.7
• Fair and open communication (transparency)	4.76	2.87	49.7
Development and growth:	3.92	2.72	59.0
• Informedness	4.35	2.86	55.5
• Inquiring interpersonal actions	3.74	2.71	62.4
• Reflexivity	3.69	2.64	61.0
• Self-realisation and self-actualisation	3.89	2.67	57.8
Resilience:	4.30	2.81	54.7
• Adaptivity	4.26	2.81	55.5
• Organisational mindfulness	4.38	2.88	55.6
• Sense making	4.26	2.73	53.1

Respondents were requested to provide comments in general regarding the recognised value factors in terms of their role in the HSW of construction workers. Selected comments include:

- “Workers are seen as a resource to complete a project, and when the project is running down they are de-mobbed as soon as possible, irrespective of the value they can add to the company they have been working for.”
- “Workers are bullied into a situation where it is clear that they must do as senior staff insist or face penalties, sometimes even loss of employment, this has the effect that workers do as they are told. I, for one had many discussions with the workers at grassroots level and I know that they DO have positive contributions to make, yet that are not given the chance.”
- “Further research is required re decent work environments. The South African government and private procurement systems should modernise their systems to allow for greater transparency throughout their supply chains. The UK’s recent launch of their Modern Slavery Act could be used as a starting point.”

CONCLUSIONS

As stated above, owing to the low response rate, the findings can be deemed to be indicative, but likely to be from the more committed practitioners, and practitioners who are familiar with, and / or interested in, the subject area of HSW in construction, which reinforces the validity of the findings.

Given the importance of the core values and value factors in terms of supporting HSW, it can be concluded that a holistic approach needs to be adopted relative to H&S, and that well-being needs to be included in the 'equation' and focused on. Furthermore, it is no longer a case of merely employing workers and addressing H&S, but rather addressing workers' wider needs as reflected in the core values: responsibility; respect; resilience; justice; interconnectedness; participation and development and growth.

Given that the perceived experience of the value factors by workers expressed as a percentage of importance ranges between 48.6% and 66.7%, it can be concluded that the nature of the construction industry in the form of the manifestation of value factors is not conducive to HSW.

This conclusion has implications for the construction industry in the short to medium term as workers may no longer be willing to entertain the status quo. Furthermore, the construction industry may be viewed as a 'last resort', and therefore not necessarily attract the preferred 'employee'.

The empirical findings reinforce the HSW framework as evolved by Zwetsloot, van Scheppingen, Bos, Dijkman, & Starren (2013) in terms of the importance of the core values, and value factors.

RECOMMENDATIONS

The construction industry needs to focus on the health component of H&S, and realise that well-being is an essential component of the 'duty of care' and respect for people.

H&S programmes in construction need to be expanded to increase focus on the health component, and to include well-being issues. Tertiary-level built environment education, particularly construction management, needs to address well-being issues. However, all stakeholders need to be conscious and mindful of the implications of project-wide decisions on the HSW of the construction team.

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CONSTRUCTION HEALTH AND SAFETY (H&S) AND RELIGION: IS THERE A LINK?

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Values are an integral part of health and safety (H&S) culture. Values reflect, among other things, ethics, moral standards, and principles. Religious beliefs in turn influence values through morality. A self-administered questionnaire survey was conducted among Professional Construction Health and Safety Agents (CHSAs) in South Africa, which entailed response in terms of the degree of concurrence relative to 21 statements. The empirical findings reinforce the findings of literature, and lead to the conclusion that there is an explicit and implicit link between H&S and religion. The inter-relationship between religion and morality and values, and the resultant influence on behaviour is a manifestation of the explicit link. The implicit link manifests itself in the underlying principle of all religions, namely the 'golden rule', 'do not unto others what you would not have them do unto you'. Recommendations include that H&S should be promoted based on the explicit and implied need for H&S by all religions, and the humanitarian, ethical, and moral motivation therefore.

Keywords: culture, health and safety, religion.

INTRODUCTION

Research conducted in South Africa investigated, *inter alia*, the extent to which general contractors (GCs) agreed or disagreed with the statement: 'Belief in and practice of a religion such as Buddhism, Christianity, Hinduism, Islam, and Judaism, positively affects a person's approach to each of occupational H&S, labour productivity, and quality in South African construction' (Smallwood, 2000). Given the possible range of responses and the need to determine the level of concurrence, a measure of central tendency in the form of a mean score (MS), with a minimum value of 0.00, and a maximum value of 5.00, was computed to enable assessment of the responses. Given that the resultant MS of 3.18 was above the midpoint value of 3.00, belief in and practice of a religion can be deemed to positively affect a person's approach to occupational H&S. It is notable that the MSs relative to labour productivity and quality were 3.24 and 3.31 respectively.

The findings emanating from the aforementioned study, an expanded survey of the literature, which at best can be described as perfunctory, provided the catalyst for an exploratory study to determine the link between H&S and religion (Smallwood, 2002). More recently, a follow up study was conducted to determine the status quo in terms of the link between H&S and religion.

REVIEW OF THE LITERATURE

Religion, thought, feeling and behaviour

Loewenthal (2000) contends that religion relates to behaviour via morality: religion → morality → behaviour. Morality involves ethical standards of behaviour, the evaluation of intentions and behaviour as right or wrong, good or bad. Moral standards can be rooted in religious tradition, and moral laws can be seen as having a divine origin.

Loewenthal (2000) also cites Eysenck's theory relative to personality and religion. Eysenck suggested that there are fundamental dimensions of personality:

- Extraversion – involving both sociability and impulsivity;
- Neuroticism – involving anxiety, depression, low self-esteem and tension, and
- Psychoticism – involving lack of impulse control, and
- Social desirability – assessed by the so-called 'lie scale'.

Recent work relative to personality does not include psychoticism.

Eysenck invoked the concept of conditionality, and found evidence that religious beliefs were 'tender-minded' rather than 'tough-minded'. His reasoning led to the suggestion that individuals low on extraversion, namely introverts, were more conditionable, and more likely to hold religious and moral attitudes. His theses also suggested that those low on psychoticism and those high on neuroticism would be more likely to hold religious beliefs. Although subsequent studies have generally not supported Eysenck's theses, a study by Lewis and Joseph did determine that low psychoticism is more strongly associated with religiosity. However, Loewenthal (2000) suggests Eysenck's theories relative to religion, personality and morality could remain on the agenda for investigation.

The Golden Rule

Eckhardt (2001) says the 'golden rule', which establishes a moral level of care for others that we are responsible to provide, is a common theme in most, if not all, of the world's major religions:

- Buddhist: hurt not others in ways that you would find hurtful;
- Christian: all things whatsoever ye would that men should do to you, do ye even so to them;
- Confucian: do not unto others what you would not have them do unto you;
- Hindu: this is the sum of the duty; do naught unto others which if done to thee would cause thee pain;
- Islamic: no one of you is a believer until he desires for his brother that which he desires for himself;
- Jain: in happiness and suffering, in joy and grief, we should regard all creatures as we regard our own self;
- Sikh: as thou deemest thyself, so deem others;
- Taoist: regard your neighbours gain as your own gain, and your neighbour's loss as your own loss, and
- Zoroastrian: that nature alone is good which refrains from doing unto another whatsoever is not good for itself.

Work is a deed of spiritual value

According to Sadeq and Ahmad (1999), work is a deed of spiritual value, which requires that Allah approve actions and behaviours. The Islamic 'Tawhidic' principles of justice and equity, dignity of labour, and removal of hardship, all amplify the need for H&S.

From a Christian perspective, Burkett (1990) in his title "Business by the Book", stresses the importance of treating employees fairly, and observes that although fairness is usually related to pay and benefits, fairness also involves attitudes and relationships. He states that the first principle in terms of fairness is recognising that all people are important.

Values

Values are defined as: a code of behaviour, ethics, standards (moral) and principles (Allen, 1990). The European Foundation for Quality Management (EFQM) (2013) defines values as "operating philosophies or principles that guide an organization's internal conduct as well as its relationship with the external world. Values provide guidance for people on what is good or desirable and what is not. They exert major influence on the behavior of individuals and teams and serve as broad guidelines in all situations".

Values are important as they influence the vision, goals, mission, assumptions, and to a degree, the perceived purpose of H&S (Krause, 1993). H&S should be a value, as opposed to a priority, as priorities change depending upon prevailing circumstances and priorities (Griffiths, 1995). An example thereof is schedule, which often becomes the priority on projects, to the detriment of H&S.

From a religious perspective, the Islamic 'Tawhidic' principles of justice and equity, dignity of labour, and removal of hardship, clearly influence the inclusion of H&S as a value. Inoue (1997), in his book "Putting Buddhism to Work", cites Schumacher's conclusion that the biggest problem facing humankind is the disappearance of a set of values and attitudes that will prevent economic activity from becoming all consuming. Inoue maintains that not only is it necessary to incorporate economics into a more holistic framework, but that it is necessary to live with more integrity.

Ethical business practice includes compliance with legislation. Given that values embrace ethics, the existence of Occupational Health and Safety legislation amplifies the need for the inclusion of H&S as a value. Hinze (2006) is emphatic and states that although even a cold, calculating economist can be convinced that there is a financial payback in being healthy and safe, a holistic H&S culture recognises the humanitarian aspects of H&S.

Waste

Accidents can result in fatalities, injuries, disease, damage to materials, plant and equipment, which results in waste. Waste in solid and other forms impacts on the sustainability of the earth.

Sadeq and Ahmad (2004) maintain that Islam seeks to unify the schism between ethics and economics, one of the six issues being the avoidance of undue waste.

Economic issues

The concept of the 'economic man', which entails the taking of decisions based on the calculation of the benefits relative to the costs of an intervention, may result in a

decision, which conflicts with values and the ‘Tawhidic’ principles (Sadeq and Ahmad, 2004).

Inoue (1997) in turn cites the Buddhist principle of ‘enlightenment’, the release from ‘picking and choosing’ i.e. the preference for one thing over another, often at the expense of other people. Payutto (1999) focuses on and defines consciousness as “The perception and awareness of sensations, which will be related to particular intentions”, which is fashioned into specific qualities by intention. Tanphaichitr (2001) relates the concept of mind-mindfulness, which includes awareness of mind movement, or thoughts. Mindfulness entails awareness of the constant changes of all mental phenomena resulting in intuitive wisdom, which in turn averts clinging to conditioned phenomena that would lead to suffering.

From a Christian perspective, Neff (1991) maintains that emphasis on the financial ‘bottom line’ to measure success can result in unreasonable practices, which can result in hardship and suffering, and consequently, lack of justice. In terms of Christianity, justice is important, as it reflects God’s character and His concern for his people.

Accountability

The Islamic ‘Tawhidic’ principles include public accountability. Public accountability implies and requires organisations to protect and ensure the H&S of workers derived from their respective communities. It also implies and requires public safety and the preservation of the environment.

Sustainability

Larkin (1999) describes a ‘right livelihood business’ as a business where the ‘bottom line’ is one of the principles. Such a business embraces balance and does not waste resources, acknowledging that energy and creativity flow naturally out of well-rounded lifestyles. Larkin maintains the characteristic that best differentiates between a ‘right livelihood business’ and other businesses, is that they are driven by spirituality-based principles. These principles can be communicated in the form of five precepts, inter alia, commitment to cultivating compassion and learning ways to protect the lives of people, animals, plants, and minerals, and commitment to cultivating loving kindness and learning ways to work for the well-being of people, animals, plants, and minerals.

RESEARCH

Research method and sample stratum

The study reported on entails the rerun of a study (Smallwood, 2002), and the self-administered questionnaire was replicated for the current study.

The questionnaire was sent per e-mail to all members of the South African Council for the Project and Construction Management Professions (SACPCMP) and registered Professional Construction Health and Safety Agents (CHSAs) throughout South Africa. Out of the 78 invited to participate, only 18 responses were returned, despite following up with the sample stratum, which equates to a response rate of 23.1%. Due to the low response rate, the findings are deemed to be indicative, but likely to be from the more committed practitioners.

Research findings

Table 1 indicates the extent to which respondents concurred relative to 21 statements, which were all positively stated i.e., true, based upon a review of the literature and previous research findings of the autor.

It is notable that all the mean scores are above the midpoint value of 3.00, which indicates that the respondents agree as opposed to disagree with the statements. However, it is significant that for 19 out of 21 (90.5%) factors, $MSs > 4.20 \leq 5.00$, which indicates that the consensus is between agree to strongly agree and agree.

The highest MS (4.94) is relative to 'A price cannot be put on a person's life', which has important implications in terms of risk management. Quantification of risk is determined by computing the product of probability and impact using either a three or a five-point scale. Although, a 'price' does exist in terms of a pension payable to the family of a deceased employee in terms of workers' compensation insurance protocols, philosophically a 'A price cannot be put on a person's life'. The second highest MS (4.89) is relative to 'Values influence a person's concern for another person's well-being', which highlights the relevance of values to H&S. Other 'value' related statements include 'Values are important for H&S' (MS = 4.82), and 'H&S should be a value and not a priority' (MS = 4.56). Furthermore, the statement 'We as people are 'our brother's (sister's) keeper' (MS = 4.67) is related to 'Values influence a person's concern for another person's well-being', and reflects the 'golden rule', which establishes a moral level of care that people are responsible to provide for others, which is a common theme in most, if not all, of the world's major religions. The statement 'People have a body, mind, and a soul' (MS = 4.83), and 'People are an organisation's most important resource' (MS = 4.82) amplify the humanitarian aspect of H&S.

The statement 'Non-compliance with legislation is unethical' (MS = 4.78) indicates that there are ethical issues relative to H&S, in terms of compliance per se, and that socially acceptable norms and practices relative to H&S are enshrined in legislation. 'Exclusive / Primary focus on cost compromises H&S' (MS = 4.72) reflects both religious and H&S related contentions in literature. 'Workers should be assigned work which suits their abilities' (MS = 4.67) is referred to in literature from both a religious and H&S perspective. Respect for and the role of H&S in the preservation of the environment are amplified by 'People and the environment (nature) are inter-connected' (MS = 4.65).

'A healthy and safe work place results in justice and equity (fairness)', 'A healthy and safe work place results in dignity of labour', and 'Accidents result in hardship to the injured' (MSs = 4.56), and 'A healthy and safe work place results in avoidance / removal of hardship' (MS = 4.35) reinforce the relevance of the Islamic principle recorded in literature. 'Optimum H&S engenders sustainability of the organisation' (MS = 4.56), and 'Optimum H&S engenders sustainability of the earth' (MS = 4.24) amplify the 'holistic' purpose of H&S. 'Management is responsible for workers' well-being' (MS = 4.44) reflects both legislation and holistic H&S literature. 'Belief in and practice of a religion influences a person's values' (MS = 4.35) reflects generic religious literature, and reinforces the indirect influence of religion on H&S through the medium of values.

Only two statements have MSs which are $3.40 \leq 4.20$, which indicates the consensus is between neutral and agree / agree. The first ‘Optimum H&S reduces waste’ (MS = 4.17) reinforces the role of H&S in the control and minimisation of injuries, damage and waste. It should be noted that the MS is marginally below the lower point of the upper range. The second ‘Work is a deed of spiritual value’ (MS = 3.44) reinforces the relevance of Islamic principles.

Table 2 presents a comparison of the degree of concurrence with ‘morality’ related statements in 2018 versus 2002. However, the 2002 sample stratum consisted of 26 general contractors (GCs), who had achieved a place in the Building Industries Federation South Africa (BIFSA) national H&S competition, and or BIFSA 4 or 5-Star H&S gradings on one or more of their projects, for the years 1995 to 2000. 17 GCs responded, which represents a response rate of 65.4%.

Table 1: Degree of concurrence with ‘morality’ related statements

Statement	Unsure	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	MS
A price cannot be put on a person’s life	5.6	0.0	0.0	0.0	5.6	88.9	4.94
Values influence a person’s concern for another person’s well-being	0.0	0.0	0.0	0.0	11.1	88.9	4.89
People have a body, mind, and a soul	0.0	0.0	0.0	0.0	16.7	83.3	4.83
People are an organisation’s most important resource	5.6	0.0	0.0	0.0	16.7	77.8	4.82
Values are important for H&S	0.0	0.0	0.0	0.0	17.6	82.4	4.82
Non-compliance with legislation is unethical	0.0	0.0	0.0	5.6	11.1	83.3	4.78
Exclusive / Primary focus on cost compromises H&S	0.0	0.0	0.0	5.6	16.7	77.8	4.72
We as people are ‘our brother’s (sister’s) keeper’	0.0	0.0	0.0	5.6	22.2	72.2	4.67
Workers should be assigned work which suits their abilities	0.0	0.0	0.0	5.6	22.2	72.2	4.67
People and the environment (nature) are inter-connected	0.0	0.0	0.0	5.9	23.5	70.6	4.65
H&S should be a value and not a priority	0.0	5.6	0.0	0.0	22.2	72.2	4.56
A healthy and safe work place results in justice and equity (fairness)	0.0	0.0	5.6	0.0	27.8	66.7	4.56
A healthy and safe work place results in dignity of labour	0.0	0.0	5.6	0.0	27.8	66.7	4.56
Accidents result in hardship to the injured	0.0	0.0	5.6	11.1	5.6	77.8	4.56
Optimum H&S engenders sustainability of the organisation	0.0	0.0	0.0	5.6	33.3	61.1	4.56
Management is responsible for workers’ well-being	0.0	0.0	5.6	5.6	27.8	61.1	4.44
Belief in and practice of a religion influences a person’s values	5.6	0.0	11.1	0.0	27.8	55.6	4.35
A healthy and safe work place results in avoidance / removal of hardship	5.6	0.0	11.1	0.0	27.8	55.6	4.35
Optimum H&S engenders sustainability of the earth	5.6	0.0	0.0	22.2	27.8	44.4	4.24
Optimum H&S reduces waste	0.0	5.6	0.0	16.7	27.8	50.0	4.17
Work is a deed of spiritual value	11.1	5.6	22.2	16.7	16.7	27.8	3.44

The variance (Var.) column indicates the difference between the 2018 and 2002 MSs. Only four statements have 2002 MSs greater than their 2018 MSs, the greatest difference being relative to ‘Optimum H&S reduces waste’ (-0.42). With respect to the eighteen 2018 statements whose MSs are greater than their 2002 MSs, the statements with difference is relative to ‘A healthy and safe work place results in dignity of labour’ (0.74), followed by ‘Exclusive / Primary focus on cost

compromises H&S' (0.72), 'A healthy and safe work place results in justice and equity (fairness)' (0.62), 'A healthy and safe work place results in avoidance / removal of hardship' (0.59), Management is responsible for workers' well-being' (0.56), 'We as people are 'our brother's (sister's) keeper' (0.55), and 'Workers should be assigned work which suits their abilities' (0.54).

Table 2: Comparison of the degree of concurrence with 'morality' related statements

Statement	MS		
	2002	2018	Var.
A price cannot be put on a person's life	4.94	4.94	0.00
Values influence a person's concern for another person's well-being	4.53	4.89	0.36
People have a body, mind, and a soul	4.82	4.83	0.01
People are an organisation's most important resource	4.88	4.82	(0.06)
Values are important for H&S	4.82	4.82	0.00
Non-compliance with legislation is unethical	4.35	4.78	0.43
Exclusive / Primary focus on cost compromises H&S	4.00	4.72	0.72
We as people are 'our brother's (sister's) keeper'	4.12	4.67	0.55
Workers should be assigned work which suits their abilities	4.13	4.67	0.54
People and the environment (nature) are inter-connected	4.41	4.65	0.24
H&S should be a value and not a priority	4.50	4.56	0.06
A healthy and safe work place results in justice and equity (fairness)	3.94	4.56	0.62
A healthy and safe work place results in dignity of labour	3.82	4.56	0.74
Accidents result in hardship to the injured	4.59	4.56	(0.03)
Optimum H&S engenders sustainability of the organisation	4.24	4.56	0.32
Management is responsible for workers' well-being	3.88	4.44	0.56
Belief in and practice of a religion influences a person's values	3.94	4.35	0.41
A healthy and safe work place results in avoidance / removal of hardship	3.76	4.35	0.59
Optimum H&S engenders sustainability of the earth	4.06	4.24	0.18
Optimum H&S reduces waste	4.59	4.17	(0.42)
Work is a deed of spiritual value	3.65	3.44	(0.21)

CONCLUSIONS

Literature indicates that there is both an explicit and implied link between H&S and religion. The explicit link manifests itself through the belief by some religions that work is a deed of spiritual value, which requires justice and equity, dignity of labour, and removal of hardship. Other religions stress the importance of sustainability of the environment. The inter-relationship between religion and morality and values, and the resultant influence on behaviour is a further manifestation of the explicit link.

The implied link manifests itself in the underlying principle of all religions, namely the 'golden rule', 'do not unto others what you would not have them do unto you' – would you like to have your life compromised because of inadequate H&S on the part of someone else?

Then, the impact of optimum H&S in terms of mitigating harm to people and the environment, promoting the health and well-being of people, and the sustainability of organisations and the planet because of mitigating incidents, accidents, damage to materials, plant and equipment, and property, indicates the circular and self-reinforcing role of optimum H&S as a result of the catalyst religion: belief in and practice of a religion → morality → behaviour → optimum H&S → manifestations of belief in and practice of a religion, inter alia, justice, fairness, and equity.

The empirical findings from the study reinforce the findings from the literature, namely that there is an explicit and implicit link between H&S and religion, and that human life and the environment should be respected and preserved.

RECOMMENDATIONS

The implications of these research findings are profound. Do they imply that an organisation should only employ 'religious people'? If so, then how does the organisation determine the degree of belief in and practice of a religion by a person? Such an approach is not feasible. *Quo vadis?* The most likely approach is the promotion of H&S based on the explicit and implicit need for H&S by all religions, and the humanitarian, ethical, and moral motivation therefore.

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HISTORICAL PERSPECTIVES ON ETHICAL OBLIGATIONS IN INTERNATIONAL CONSTRUCTION ARBITRATION

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International arbitration has been the most commonly used form of dispute resolution for international construction and engineering projects in recent years. The ancient Greeks and others may have arbitrated cross-border disputes, but the scope of the ethical dilemmas that arose seems unlikely to eclipse the complexities of transnational construction and engineering disputes today. For arbitrators and legal representatives to effectively manage multi-jurisdiction complexities, it is of fundamental importance to understand the ethical principles that apply. Ethical conduct is the responsibility of everyone in the process and it is central to managing effective proceedings and ensuring enforceable awards. Adherence to the relevant rules, codes and guidelines of ethical behaviour, during all stages of the arbitral process, limits the potential for protracted procedural machinations and challenges, while safeguarding those arbitral objectives of a fair, just, timely, confidential and cost-effective process. Arbitral organisations involved in both domestic and international matters have long been concerned with promoting the integrity of the arbitral process, and across the globe, participants have been provided with ethical guidelines and rules. The challenge for all those involved is to understand precisely which rules, codes and guidelines to use. This paper will trace and analyse the historical development of ethics rules in international arbitration and the role of professional arbitral organisations in the development and awareness among international arbitration practitioners.

Keywords: arbitrators, construction, ethics, international arbitration, arbitral organisations.

INTRODUCTION

International arbitration has been the most commonly used form of dispute resolution for international construction and engineering projects in recent years. According to a recent Queen Mary International arbitration survey, Respondents believe that the use of international arbitration is likely to increase in the construction and infrastructure sectors by 82%.² However, in the context of arbitral processes and procedures, conducting arbitrations ethically is the main reason for the confidence of the world in a fair and impartial dispute resolution process. From a historical perspective, it is this confidence that has remained central to the success of arbitration as a determinative process internationally. Given its historical success, there are some remaining concerns over the ethical obligations in arbitrations today. Moreover, the rise of transnational disputes and the consequential growth in international arbitrations make

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² QM and W&C, '2018 International Arbitration Survey : The Evolution of International Arbitration Executive Summary'.p29

it even more important for practitioners to understand the ethical issues that can arise.³

Universally, international arbitrators share a sense of duty about what it means to perform their function. Historically, this internal personal reflection among arbitrators was the only thing that guided arbitrators' conduct. However, today arbitrators' ethics have become an important topic of public debate, and the subject of new rules and standards. International arbitration and arbitrators have become more popular, and diversification of the cultural and legal traditions among them and among parties has become more complex and challenging. These various developments have led to a proliferation of specialized codes of ethics and rules intended to guide and govern arbitrators' conduct. Considering these developments, international arbitrators and parties must be aware of how arbitrator ethics affect arbitral proceedings and, consequently, their rights and obligations in those proceedings.⁴

On the other hand, the construction cases in international arbitration are expert-driven, often requiring arbitrators with an engineering background or expert testimony of various professionals, including engineers and accountants.⁵ In the absence of a mandatory international code governing the conduct of arbitrators in international arbitration, several international guidelines have been developed. Although such guidelines are not binding, they present useful guideposts in determining what conduct is ethical in international construction arbitration.⁶

The resolution of disputes in the construction industry is a complex and ever current topic. In transnational projects, arbitration is the method of choice for resolving disputes.⁷ Furthermore, the choice of arbitrators with expertise in the field is a further factor that makes arbitration attractive in transnational construction projects. Arbitrators can be chosen for their knowledge and experience in construction and in the specific type of dispute and sector at hand. They can also bring to the tribunal an understanding of different legal traditions and approaches, which may be crucial in resolving transnational construction disputes in a way that is not only actually fair by the applicable legal standards but is also clearly seen to be fair by parties from different jurisdictions.⁸

Considering these issues, international construction arbitrators and parties must be aware of how arbitrator ethics affect arbitral proceedings and, consequently, their rights and obligations in those proceedings. The purpose of this paper is to analyse the historical development of ethics rules in international arbitration and the role of professional arbitral organisations in the development and awareness among international arbitration practitioners. In doing so, this paper in the first part traces the historical development of international arbitration and international institutions. In the second part the paper analyses the ethical obligations in international construction

³ Deborah Lockhart, 'Ethical Obligations in Arbitration' <<https://disputescentre.com.au/wp-content/uploads/2015/02/Ethical-obligations-in-arbitration.pdf>> accessed 4 October 2018.p1

⁴ Catherine A Rogers, 'The Ethics of International Arbitrators' (2009) 9 Institute of Comparative Law 'Angelo Sraffa' (I.D.C.) Legal Studies Research Paper Series 1.p2-3

⁵ Troy L Harris, 'Ethics in International Arbitration: They're Not Just for Lawyers' (2013) 8 Const. L. Int'l 37.p38

⁶ Peter Halprin and Stephen Wah, 'Ethics in International Arbitration' (2005) 1 J. Disp. Resol.

⁷ Renato Nazzini, *Transnational Construction Arbitration Key Themes in the Resolution of Construction Disputes* (RENATO NAZZINI ed, informa law from Routledge 2018).p1

⁸ *ibid*.p1

arbitration. Finally, the paper reflects on the role of arbitrator and professional construction associations in the development of ethical awareness.

HISTORICAL DEVELOPMENT OF INTERNATIONAL ARBITRATION AND INTERNATIONAL ARBITRATION INSTITUTIONS:

- **International Arbitration:**

There are three distinct time frames in the development of international arbitration: the Middle Ages to about the eighteenth century; the eighteenth century too soon after the Second World War; and the 1950s to the present day. In each time frame, there was a different attitude towards international arbitration.⁹ This method of settling international disputes has grown rapidly since the end of World War II due largely to increased international trade and foreign investment. Parties from different countries agree to use arbitration in international commercial transactions because they wish to avoid having their cases determined in a foreign judicial forum, which could disadvantage a foreign party who lacks familiarity with the judicial system of that (other) country.¹⁰

In the first time period, the regulation of arbitration by national law was non-existent or minimal. The business community was left free to structure and use an arbitration system it considered suitable for its needs. The early forms of arbitration often existed without the blessings of the judicial mechanisms and national laws of the sovereign states in which they operated, and which may have been relevant. In fact, at that time arbitration was crafted specifically to facilitate the dispute resolution needs of a particular industry or a community. During the second time period, the eighteenth century to the 1950s, the sovereign state sought to control many aspects of arbitration through its national laws and judicial intervention. It was during this time that arbitration became more formalised with the development and adoption of specific arbitration legislation. Some examples are the English Arbitration Act 1698, the French arbitration law in the Code of Civil Procedure of 1806, and the German Code of Civil Procedure of 1879.¹¹

The start of the modern era can conveniently be taken as the end of the Second World War. At this stage, even before the end of the colonial system on which much of world trade was based, it was clear that the idea of promoting international trade as an incentive to peaceful coexistence had not worked, at least in the form attempted in the 1920s and 1930s. The United Nations was established within months of the end of the war and, by 1958, had published what was to become the most far-reaching and influential instrument in the promotion of international arbitration, the New York Convention. Building on the foundations of the Geneva Conventions, the 1958 Convention has substantially succeeded in achieving universal international recognition and enforcement, subject to limited exceptions, of both arbitration agreements and awards. Having achieved this goal, the United Nations logically turned its attention to the process of arbitration through the United Nations Commission on International Trade Law (UNCITRAL), established in 1966. In

⁹ Julian DM Lew, 'Achieving the Dream: Autonomous Arbitration' (2006) 22 *Arbitration International* 179.p182

¹⁰ Vincent S Dattilo, 'Ethics in International Arbitration: A Critical Examination of the LCIA General Guidelines for the Parties' Legal Representatives' (2016) 44 *Ga. J. Int'l & Comp. L.* 637.p 640

¹¹ Lew (n 8).p182-183

addition to promoting a series of measures for unifying international trade, UNCITRAL published its own Arbitration Rules in 1976 (UNCITRAL Rules), significantly at a time when the ICC Rules of Arbitration (ICC Rules) were universally known and in operation. The UNCITRAL Rules, conversely, are no more than rules with no accompanying institution. However, they necessarily acknowledge the need for some body empowered to carry out certain essential functions such as (where there is a vacancy) appointing tribunal members and (when invoked) deciding on challenges. Under the UNCITRAL Rules, this is ascribed to an ‘appointing authority’, which is to be either agreed or designated by the Permanent Court of Arbitration (PCA) at The Hague.¹² Thus, it can be concluded that, if the ‘private’ arbitral institutions had not existed previously, they would need to be invented or at least there would need to be created some body fulfilling such essential functions in international arbitration.¹³

- **International Arbitration Institutions:**

In a broad sense, international arbitration proceedings can be divided into two types: institutional and ad hoc. Institutional arbitration is conducted by a specialized institution that assists in administering the arbitration with its own set of rules that provide a framework for the proceedings. Many international institutions have been created for this purpose, including the International Chamber of Commerce (ICC) and the London Court of International Arbitration (LCIA). Institutional arbitration offers several advantages, including a set of pre-established rules and, experienced institutional arbitrators available to handle the case, and a forum provided by the institution in which to conduct the arbitration. Ad hoc arbitration is not administered by any institution, so all matters relating to the arbitration are determined by the participating parties. This form of arbitration offers more flexibility to the parties involved and is often faster and cheaper than institutional arbitration.¹⁴

There are currently dozens of arbitral institutions of differing sizes and importance throughout the world, located in virtually every significant commercial centre. Their constitutions vary greatly. Some, such as the International Chamber of Commerce (ICC) in Paris, is part of a much larger business and commercial organisation. Others, such as the LCIA, are substantially autonomous. Equally, all arbitration institutions operate or aim to operate on an international basis and thus provide what may be important contractual rules to supplement the local law applicable as the procedural law of arbitration.¹⁵

The ICC in Paris, which probably remains the largest and most representative business organisation in the world, was founded in 1919, with its own distinctive approach to arbitration containing provisions based on French law. Thus, the ICC was founded in the immediate aftermath of the First World War and in anticipation of a wider movement that embraced the League of Nations and, subsequently, the Geneva Conventions, sharing the common aim of providing an alternative to the armed conflict including, crucially, the promotion of international trade. Yet, the advent of arbitration institutions predates these developments by a considerable margin.¹⁶

¹² Nazzini (n 6).p34-35

¹³ *ibid.*p35

¹⁴ Dattilo (n 9).p641-642

¹⁵ Nazzini (n 6).p33

¹⁶ *ibid.*p33

In London, the Corn Trade Association started operations in 1878, bringing together existing trade groups whose interests included arbitration of disputes. It is clear that London, in particular, has a long history of trade associations promulgating their own rules and procedures for dispute resolution. It may be noted that, while such trade disputes were at the time thought of as domestic, being governed exclusively by English law as to both substance and procedure, a large proportion of the arbitrations coming through London were truly international in the modern sense, being disputes between parties from different states with London as the common hub. All of these London trade bodies became embraced within the City of London Chamber of Arbitration, set up in 1891 following the new Arbitration Act of 1889. This body migrated into the London Court of Arbitration in 1903, is the same body that, in 1981, expanded its title to become the London Court of International Arbitration, a change that simply reflected the fact that much of its commerce, as already noted, had been concerned with international disputes.¹⁷ Thus, it can be concluded that this served to provide both the basic requirements of tailored rules and a pool of experienced arbitrators, and also provided for special procedures suited to a particular dispute.¹⁸

THE ETHICAL OBLIGATIONS IN INTERNATIONAL CONSTRUCTION ARBITRATION:

- **The Dilemma of Regulating Ethical Obligations:**

Since international arbitration is not associated with a Sovereign State's law, an obvious source of law for regulating participating arbitrators is non-existent. The host state, where the arbitration takes place, is not responsible for regulating arbitrators and foreign attorney conduct and the ethical regulations from an attorney's home state will likely not apply in an international arbitration. If home state regulations were to apply, however, counsel for each party would be bound by different regulations that impose different ethical obligations. As a result, attorneys in an international arbitration are either each abiding by different and often conflicting national ethical rules or are engaging in a completely unregulated ethical free-for-all. To best respond to the different needs of different international arbitrations, multiple institutional codes of ethics may be preferable to a single, uniform code that governs all international arbitrations. Arbitral institutions are best suited to formulate ethical rules that are calibrated to the specific rules, traditions, and features of arbitration proceedings they oversee. These institutions have specialized knowledge of their own rules and functions and have direct experience in dealing with the ethical issues that arise in their arbitrations. Moreover, these institutions have a financial incentive to create rules that will ensure the integrity of the arbitrations they conduct because they often compete with one another to attract disputing parties.¹⁹

In the case of construction arbitration, individual lawyers and other professionals involved in such an arbitration, notable experts, would generally be subject to individual professional codes of conduct and rules. This is another dimension to the problem, in that numbers of individual professionals involved in international arbitration may not be lawyers for example engineers and architects. In the case of experts, they are likely to be registered with their own professional institution, which, however, is unlikely to provide any specific rules dealing with arbitration ethical

¹⁷ *ibid.*p33-34

¹⁸ *ibid.*p34

¹⁹ Dattilo (n 9).p643

issues. Their professional codes will be silent as regards the conduct of the arbitration business.²⁰

- **The Sources of Arbitrators' Ethical Obligations:**

The source of arbitrators' ethical obligations is itself a complex topic. The modern trend is for groups whose members provide specialized and expert services to distill into written codes a collective expression of those obligations. There is a range of sources that combine to determine the ethical obligations of arbitrators.²¹

- A. Ethical Codes

The first and most obvious source of ethical rules for international arbitrators is the profusion of ethical codes that have emerged. Several arbitration institutions have appended codes of ethics to their arbitral rules. In addition to those implemented by arbitration institutions, other organizations have also implemented codes of ethics. These codes may become applicable to arbitrators if they belong to an organization that has implemented. For example, organizations such as the Chartered Institute of Arbitrators (the "CI Arb"). In a similar vein, the International Bar Association ("IBA") has also published the IBA Rules of Ethics for International Arbitrators (the "IBA Rules of Ethics") and in 2004 the IBA Guidelines on Conflicts of Interest in International Arbitration (the "IBA Guidelines"). Despite its name, the IBA does not license attorneys or arbitrators. As a result, these rules and guidelines are not generally applicable to arbitrators or in arbitral proceedings unless they are incorporated into parties' arbitration agreements.²²

- B. Institutional Arbitration Rules

Not all arbitral institutions have fully developed codes of ethics, they all have rules that impose certain obligations on arbitrators, most significantly that they are impartial and/or independent and that they disclose certain information that may be relevant to these obligations. For example, the ICC Arbitral Rules and the LCIA Rules provides ethical obligations and requirements that are contained in arbitral rules will be applied by arbitration institutions.²³

- C. National Law

National arbitration laws also contribute to defining the ethical obligations of international arbitrators. National arbitration laws usually have specific provisions, which pertain either to challenges to arbitrators or to award review. In applying these standards, national courts have been developing an increasingly rich jurisprudence to help clarify arbitrator obligations, most specifically regarding the nature of impartiality and/or independence, and the level of proof required to establish a violation.²⁴

- D. International Conventions

International arbitration conventions have no express provisions directly addressing arbitrators' obligations. Thus, parties must argue that alleged arbitrator misconduct implicitly violates one of the exceptions for enforcement of an award. In the

²⁰ Nazzini (n 6).p41

²¹ Rogers (n 3).p3

²² *ibid*.p4

²³ *ibid*.p6

²⁴ *ibid*.p7

Convention on the Recognition and Enforcement of Foreign Arbitral Awards (the “New York Convention”).²⁵

- **The Effects of Ethical Obligations on Construction Arbitration:**

During an arbitration, there are opportunities to challenge arbitrators for inappropriate conduct based upon information he/she disclosed or undisclosed which indicates arbitrators are not acting impartially or independently. Typically, these challenges can either be brought before an arbitral institution and/or a national court. The general trend is to challenge and remove arbitrators where there are circumstances that give rise to justifiable doubts about an arbitrator's independence or impartiality.²⁶

Immediately after the tribunal renders an award, there are also opportunities to address inappropriate conduct. First, parties can seek to vacate the award at the seat for procedural irregularities. But some countries, such as England, provide limited opportunities to review awards for errors of law. Second, during enforcement proceedings, parties might use New York Convention grounds to argue arbitrator misconduct should result in the denial of recognition of the award.²⁷

THE ROLE OF ARBITRAL AND PROFESSIONAL CONSTRUCTION ASSOCIATIONS IN THE DEVELOPMENT OF ETHICAL AWARENESS:

- **The Role of the International Bar Association (IBA):**

There are several sets of rules of ethics that purport to apply in the context of international arbitration. Some of the most well recognised are contained within the International Bar Association (IBA) guidance requiring international arbitrators to be impartial, independent, competent, diligent and discreet. Arbitrators have a duty to proceed diligently and efficiently so as to provide a just and effective resolution. They must remain free from bias and conflict of interest (in respect of the parties, the dispute, any witnesses, and as to the outcome).²⁸

In the late 1980s, the IBA set forth ethical rules to govern the conduct of international arbitrators (the “Rules of Ethics”). The Rules of Ethics cover several areas of ethics including the elements of bias, the duty of disclosure, communications with parties, and the confidentiality of the deliberations. In 2004, the IBA promulgated the IBA Guidelines on Conflicts of Interest in International Arbitration (the “Guidelines”). The Guidelines were subsequently updated in 2014. The Guidelines are not mandatory legal provisions and neither override applicable laws nor the rules chosen by the parties. They were designed with the aim of finding “general acceptance and adherence within the international community.” Although the Guidelines have been criticized from various quarters and have not been adopted by major arbitral institutions such as the ICC International Court of Arbitration and the LCIA, they have largely achieved these results as they are commonly referenced and generally considered a persuasive authority in international arbitration.²⁹

- **The Role of the Chartered Institute of Arbitrators (CI Arb):**

As a centre for arbitration was further marked out by the formation in 1915 of the Institute of Arbitrators, now the Chartered Institute of Arbitrators (CI Arb). This body

²⁵ *ibid.*p7

²⁶ Susan Franck, ‘The Role of International Arbitrators’ (2006) 12 ILSA J. Int’l & Comp. L. p513-514

²⁷ *ibid.*p515

²⁸ Michael Reynolds, ‘Arbitration and Ethical Codes’ (2014) 17 Legal Ethics 458. P 458

²⁹ Halprin and Wah (n 5).p89-90

now has worldwide coverage and uniquely offers training and qualification for dispute resolvers in all the different disciplines. The CI Arb *Code of Professional and Ethical Conduct for Members* sets out the principles that always govern the conduct of its members. A serious breach of the code may amount to misconduct that can result in disciplinary proceedings. Whilst these rules attach obligations to members, they do not provide grounds for legal action or judicial review. These rules are clear and straightforward and include the essential principles applied in international codes.³⁰

The CI Arb maintains a Code of Professional and Ethical Conduct (CPEC) which its members are required to follow. As the Chartered Institute has 15,000 members across 133 countries, many arbitrators may be bound by the CPEC. As explained in the Introduction to the CPEC, the purpose of the CPEC is to serve as a guide and as a point of reference for users of the process and to promote public confidence. CPEC is described as a reflection of internationally accepted principles. As for the rules proper, they cover the following areas: Behaviour, Integrity and Fairness, Conflicts of Interest, Competence, Information, Communication, Conduct of the Process, Trust and Confidence, and Fees. Thus, members of the CI Arb should consult these rules and act accordingly.³¹

- **The Role of Professional Construction Associations:**

There are several professional construction associations which provide codes of ethics for their members. They include the Royal Institute of British Architects (RIBA), Royal Institution of Chartered Surveyors (RICS) and Chartered Institute of Building (CIOB). Most often these professional bodies provide arbitral construction services and also have codes of ethics and professional codes of conduct for their members. However, the RICS is by far the most popular arbitral appointing authority among them. The RICS, as a professional body, is highly organised and motivated and has become a global institution. In terms of marketing and professional organisation, it would appear to have outstripped the CI Arb in the field of dispute resolution, and possibly presents a good business model for other professional organisations engaged in dispute resolution processes.³² All RICS arbitrators are required to comply with the RICS Guidance Note for Surveyors acting as Arbitrators in Construction Related Disputes, as well as the RICS Guidance Note on Conflicts of Interest.

On the other hand, most of the professional associations which have been involved in arbitration have come under some criticism regarding their interest in playing the role of ‘regulators’ of international arbitrators.³³ While some of these institutions have played an important role in developing ethical rules, they have rarely stepped in to actually play the role of ‘enforcers’ of arbitrators’ professional obligations. Instead, arbitral construction associations mostly concentrate on advancing arbitration as a dispute resolution system. Moreover, they most often function as centres where those involved with arbitration get to know each other, exchange experiences and further

³⁰ Reynolds (n 27).p459-460

³¹ Halprin and Wah (n 5).p98-99

³² Michael Reynolds, ‘An Overview of The Use of Arbitration in England’ (2014) <https://www.law.ox.ac.uk/sites/files/oxlaw/a_report_by_dr_michael_reynolds_of_december_2014.pdf> accessed 16 October 2018.p14

³³ João Ilhão Moreira, ‘The “ Professionalization ” of International Arbitrators : What Role for the Professional Arbitral Associations ?’ (*Blog, Kluwer Arbitration*, 2018) <<http://arbitrationblog.kluwerarbitration.com/2018/08/04/brazil-i/?print=pdf>>.

their professional endeavours. These associations should shift their interest into regulating ethical obligations for construction arbitrators.

CONCLUSIONS

Given the importance of the issues described above, arbitrators in international construction arbitration are advised to take a cautious approach to ethical conduct. This approach involves analysing potentially applicable ethical rules and guidelines and looking to the arbitration clause, institutional rules, soft law and guidelines, bar association rules (including those of organizations such as the CI Arb, and potentially applicable national law.

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GRENFELL TOWER FIRE: A LOOK INTO THE ASPECTS OF MINIMUM REQUIREMENTS, RISK AND MODERN TECHNOLOGY (BIM)

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The Grenfell Tower fire resulted in the loss of 72 people. The series of events that led to this tragedy must be scrutinised by the construction industry beyond the level of the currently ongoing public inquiry. The tower had recently undergone a £8,700,000 'revamp', with the addition of a new cladding system, which, from our current understanding, seems to have allowed the fire to spread with such catastrophic consequences. A proper Disaster Risk Management framework was, and still is, non-existent with respect to Grenfell Tower, and possibly many other tall tenanted residential buildings with similar vulnerabilities. The de-centralisation and privatisation of key aspects of control and supervision of safety in buildings has been implemented by the neo-liberal policies by both Labour and Conservative governments over the past 30 to 40 years. Due to this event, a series of questions have been raised regarding the choice of materials, the detailing, the certification process, and the policies and regulations within the industry. It starts by exploring aspects of the established "minimum requirement" strategy employed by many developers and designers, the risk aspects encountered in the process of design, construction and use of buildings and infrastructure; and the possibilities of using modern digital technology to aid the design, construction and occupation process from a risk management framework perspective. What lessons can be learnt in terms of professional development and ethics for such a tragic chain of circumstances to be avoided in the future?

Keywords: BIM, Construction Industry, Digital technology, Minimal requirements, profits, risk.

INTRODUCTION

This paper aims to contribute to the process of finding answers to the challenging aspects of **Ethics in Construction** that are posed by the Grenfell Tower Disaster. It considers three aspects of the Design and Construction Process that involve ethical challenges. That is, it takes a look into the aspects of "minimum requirements", 'risk' and "modern technology". The aim of the research is to use the Grenfell Tower fire event as a case study to examine ethical issues that arise from a tragedy of this scale that could have been avoided. The complex nature of the construction process and the crossover between the disciplines makes it difficult to allocate direct professional liability. Therefore, this tragic event must be viewed as "the before and after" of a chapter in the study of the conflict between public interest and profitable enterprise.

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MINIMAL REQUIREMENTS

The Hackitt Report (2018)² includes a serious criticism of the past and present “cultural issues across the sector” caused by ignorance, indifference, lack of clarity on roles and responsibilities and inadequate regulatory oversight and enforcement tools.

The Police technical report* catalogue and the expert witness reports by **Dr Barbara Lane** (2018)³ and **Jose Torero (2018)** reconstructed the most likely way in which the fire spread through the building and presents a series of damning shortcomings in the choice of design, materials, detailing, installations, system and so on. The initial fire in the kitchen of Flat No. 16, on the fourth floor, most likely affected the uPVC jamb and sills of the kitchen window and fire leaked out into the new combustible cladding which had been installed two years earlier.⁴

Risk Management

Aspects of risk were not fully understood by the different actors involved with the Grenfell Tower project, or perhaps they simply chose to flaunt and ignore those risks in pursuit of profit as the Hackitt Report (2018, p. 3) indicated.

So, appalling was the response by the authorities to the post-disaster phase of the Grenfell Tower Fire, that Kensington and Chelsea Council was relieved of its responsibility for taking care of the survivors of the fire on 19 June 2017, and then the **Kensington and Chelsea Tenant Management Organization** was also dismissed on 27 September 2017.⁵

In terms of urban resilience, a Disaster Risk Management framework was nonexistent at Grenfell Tower. **Mitigation** and **Preparedness** were foreign concepts to the council authorities and the **Kensington and Chelsea Tenant Management Organization**, which repeatedly dismissed both important technical and social concern, by the local occupants of Grenfell Tower (**Hackitt Report, 2018, p8**).

A formal **Risk Management Framework** as post-disaster strategy indicates the need for a coordinated **Response Phase** followed by a **Recovery Phase** and a **Reconstruction Phase** (Abbas, et al 2013, p3). Most worryingly, in this case, the lack of awareness by local and governmental authorities of the scope and seriousness of the tragedy was not apparent during and immediately after the tragedy.

THE TECHNOLOGY ASPECTS

The **Hackitt Report (2018)** refers to the ways in which modern technology can be used in construction and criticizes the construction industry for its lack of effort in adopting it. In addition, the report calls on the industry to adopt the rapid development of digital tools in new projects during the design, construction and occupation phases, to improve the robustness of the Fire and Emergency response when needed. The Hackitt Report (2018, p. 36) highlights the need for a compulsory Digital record and a Fire and Emergency File.

² A Personal View from Dame Judith Hackitt. Forewords to Building A Safer Future- Independent Review of Building Regulations and Fire Safety. Final Report. 23 May 2018 Published by Ministry of Housing Communities & Local Government. Quoted from Here As “Hackitt Report 2018”

³ Dr Barbara Lane's Expert Report. April 12, 2018

⁴ **Professor José L. Torero** Expert Report. May 23, 2018

⁵ Harriet Agerholm, The Independent, 27 September 2017

The building life cycle is further addressed in the recommendations on the Occupation and Maintenance aspects, *“to strengthen resident collaboration and partnership with duty holders in order to resolve issues”* (Hackitt, 2018, p. 51).

Developers have been encouraged to operate by doing the absolute minimum to meet the requirements in the regulations and standards in their projects, by monetary pressure and/or the government re-writing or the abolishing of some regulations. Using advanced Design and Management tools, this trend can be reversed, and a positive outcome attained by incorporating a **Risk Management Framework** within the system which would help the Procurement, Design, Construction and Occupation of buildings and infrastructural projects. The Digital record and the Fire and Emergency File can be part of this process.

Our Proposal is to integrate Risk and safety management into Building Information Modelling (BIM)-like tools used in the design and construction of projects.

RESEARCH AIMS AND METHOD

To understand the competing interest in Land Use when building urban resilience.

The purpose of this section is to clarify the methodological framework used to conduct this research.

The questions that this research attempts to examine relate to what went wrong with the procurement procedure and initiate a critical discussion of issues of Risk, redundancy, and application of modern Digital technology to a Risk Management framework. It asks if the current state of the Building Regulations, the testing of standards, the use of Design and Build and other types of contract are up to the job they were designed to accomplish.

Some relevant questions may be asked. How could a £8.7 million public-sector refurbishments have resulted in the building becoming more unsafe and unfit for purpose? What lessons can be learnt in terms of professional development and ethics in order to ensure that such a disaster can be avoided in the future?

Do any of the above questions imply unethical construction practices in the name of profit are endemic in the UK construction industry? What impact do the government's decisions and policies on the quality of private and social housing have on the construction process and the built product? To what extent does the government have a duty of care on these issues? If the answer is 'Yes', how can this be reconciled with the neo-liberal policies governments of the last 40 years have been pursuing?

To what extent has the neo-liberal thinking made our work more dangerous and “fracture critically designed”, as put by Thomas Fisher (2013) in his book “Designing to Avoid Disasters”. Should the emphasis be placed on designing to avoid disasters?

All these points and questions led to the initial major question in: What lessons can be learnt in terms of professional development and ethics in order for such a tragic event (the Grenfell Tower Fire) to be avoided in the future?

This methodology approach examines, on the one hand, how the competing interests in land (and resources) use process intrinsically contain the seed of conflict (see Figure 1).

The construction industry is out of touch with the safe provision of risk and liability, by flouting the use of building standards. The industry appears to be considering the provisions of the building regulations as “minimal requirements” as the investigation into the causes of the fire at Grenfell Tower is demonstrating.

How should systems be tested and certified to guarantee quality and safety in buildings? Professional consultants and contractors are expected to act and behave with integrity and reasonable care; the liability in terms of quality will depend on the procurement method adopted on the project. On one hand, as the Grenfell Tower procurement process is scrutinized, and new hard answers are found, the construction industry will have to change in important ways. On the other hand, it is important to examine the UK government’s decisions and policies on housing and the building regulations and look at how the privatization of certifying bodies may have had an impact on the ability to deliver fit for purpose buildings.

Once this process of investigation is applied to the Grenfell Tower renovation works, the ethical consequences and conclusions can be analysed, and technological suggestions can be presented that can potentially help to prevent another tragedy occurring. A new, robust set of guidance rules will see the light to critically benefit the production of good and safe buildings.

COMPETING INTERESTS IN LAND USE

It is recognized that a conflict has existed between Grenfell Tower residents and the Borough of Kensington and Chelsea and it's **Kensington and Chelsea Tenant Management Organization** for several years. The underpinning of this conflict is the local community finding itself unable to participate in local decisions regarding the modernization of their homes and area, together with the competing pressure of modern gentrification of sectors in the vicinity of the Estate. These factors put the local inhabitants in a situation of great disenfranchisement.

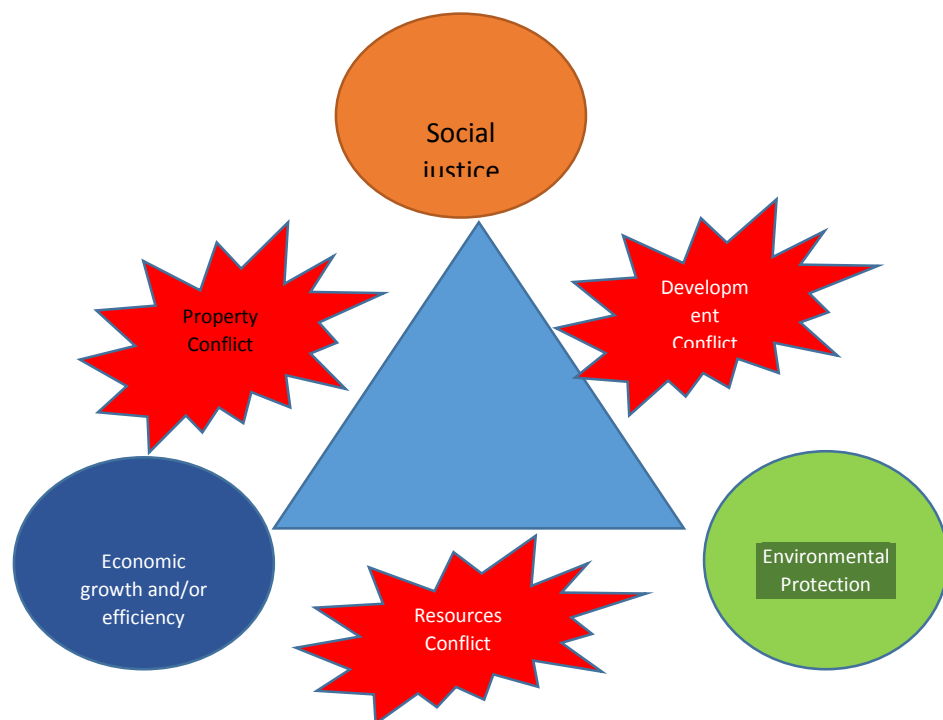


Figure 1; **Competing interests in land use.** Used to shows the economic, social and environmental factors at play in governance approach to urban policy development

and planning. (Jha, Abhas Kumar, Zuzana Stanton-Geddes, and Todd W. Miner. 2013. *Building Urban Resilience: Principles, Tools and Practice*. Washington, D.C.: World Bank.p33)

The complaints of local activists regarding health and safety issues were disregarded. The new additions to the building were felt by many to be a cheap dressing up of the building to produce the beautification of the area for the benefit of the richer adjacent neighbourhoods. The non-existent checks of fire and emergency safety systems indicate a conflict between, on one hand, the social and environmental aspects and on the other hand, the economic aspects seen by the local authority as primordial.

ETHICS AND MINIMAL REQUIREMENTS IN PRACTICE

“Every aspect of fire safety in Grenfell Tower failed long before 14 June 2017, the leader of the Fire Brigades Union (FBU) told delegates at the annual TUC conference in Manchester ...”⁶ ()

THE HACKITT REPORT 2018

The Hackitt report includes a serious criticism of the past and present “culture issue across the sector” caused by Ignorance, Indifference, Lack of clarity on roles and responsibilities and Inadequate regulatory oversight and enforcement tools. (A personal View from Dame Judith Hackitt. There is an unhealthy relationship between the Construction Industry and the establishment, in encouraging a culture of “minimum requirements” to permeate the construction process and avoiding dealing with the issues of Risk, uncertainty and redundancy, rather than committing all effort to an optimal construction and engineering design.

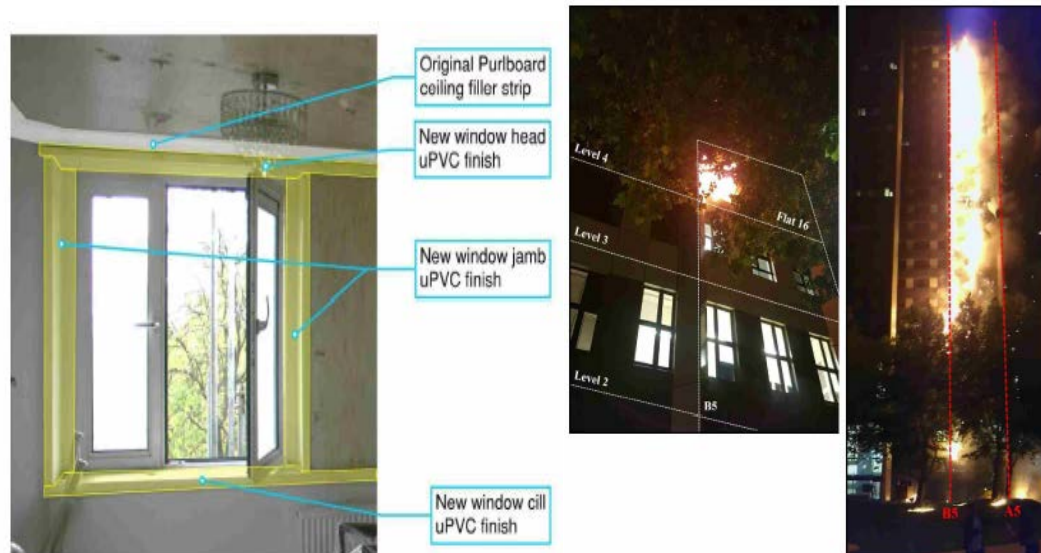


Figure1: Window internal new uPVC elements⁷ **Figure 2:** The origin of the fire in Flat 16, 4th floor + fast vertical spread of the flames

The Police technical report catalogue and the expert witnesses reports by **Dr Barbara Lane** and **Professor Jose Torero** reconstructed the most likely form in which the fire spread through the building and presents a series of damning shortcomings in the

⁶TUC 18: Fire Safety 10 Sept 2018

choice of design, materials, detailing, etc. of the refurbishment work performed at Grenfell Tower.

Most of the materials used in the new work carried out were combustible. Therefore, the egress and ingress of fire were facilitated by the removal of the old windows, the installation of new windows which was shifted out some 185mm from the center-position of the old windows and the use of uPVC elements to fill the gaps produced by the new installations (Lane, 2018).⁷ The initial fire in the kitchen of Flat 16, 4th Floor, affected the jamb and cills of the kitchen window and flames leaked out to the new combustible cladding. The fire rapidly spread vertically, aided by the cavity between the insulation (Celotex RS5000) attached to the old concrete structure and the aluminum and polyethylene core composite material (ACM) Rainobond PE rainscreen (Torero, 2018).⁸

Omnis Exteriors Director declared to The Guardian Newspaper that the company that refurbished the Grenfell Tower asked them to supply Rainobond PE which is £2 per sq metre cheaper than Rainobond FR, a fire-retardant alternative panel which contains a mineral core (The Guardian, 2017).⁹ The material originally requested by 4Architects submission to the council was Rainobond FR, the fire-proof variety.

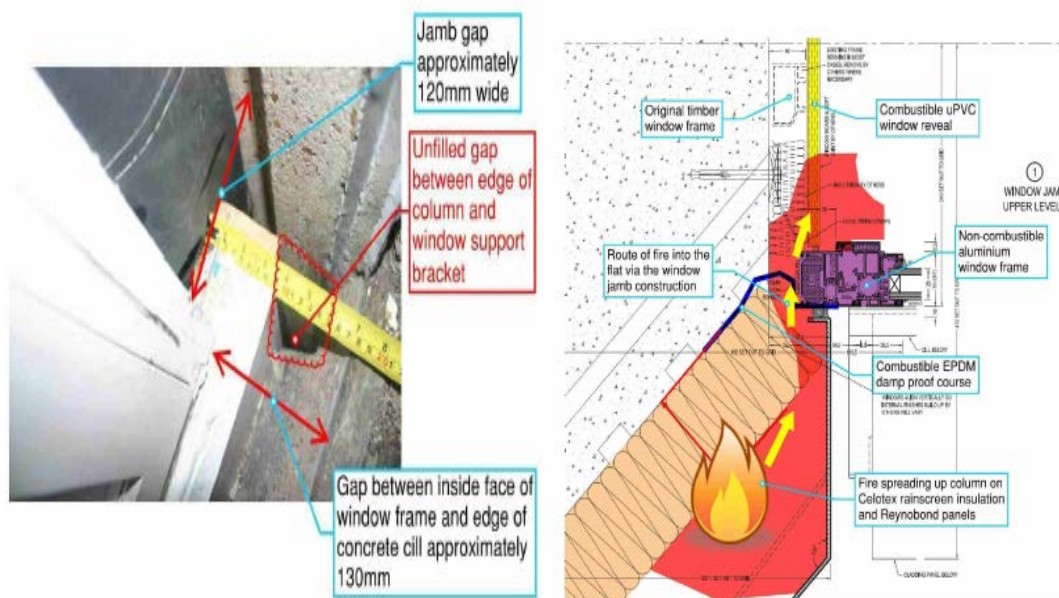


Figure 3: Gaps filled with Insulation and uPVC elements **Figure 4:** Ingress of fire to apartments

CLADDING AND WINDOWS DETAILS; the design and workmanship of the installation of the new windows attached this time to the external cladding rather than to the old concrete fabric of the building were to create the combustible gap filled with combustible uPVC elements. These gaps in the fabric of the building, plus the design and materials of the curtain walling provides ideal conditions for fire and smoke to egress into the cladding and ingress back into de cellular spaces (flats) many times until most of the building was consumed killing 72 tenants.

⁷ Dr Barbara Lane's Expert Report. April 12, 2018

⁸ Prof. Jose Torero's Expert Report. May 23, 2018

⁹ Davies, R, Connolly, K and Sample, I (2017) "Cladding for Grenfell Tower was cheaper, more flammable option." *The Guardian*, June 16.

FIREDOORS DETAILS: One of the unresolved mysteries is the fast spread of smoke and flames through the building bypassing two to three fire barriers; the exterior windows, the fire-rated entrance flat doors and the stairs fire doors.

EXITS AND ESCAPE ROUTES: One line of enquiry in the investigation process of the Grenfell Tower fire is related to the two central aspects of cellular containment to the spread of fire that did not perform as envisaged, that is, the failure of the windows and fire doors to contain the spread of fire, and the inability to contain the toxic gases produced by combustion. The stairwell was provided with positive air pressure to avoid smoke entering the space even when a fire door to stairs remained open. The work for that smoke extraction system was done previous to the refurbishment work.

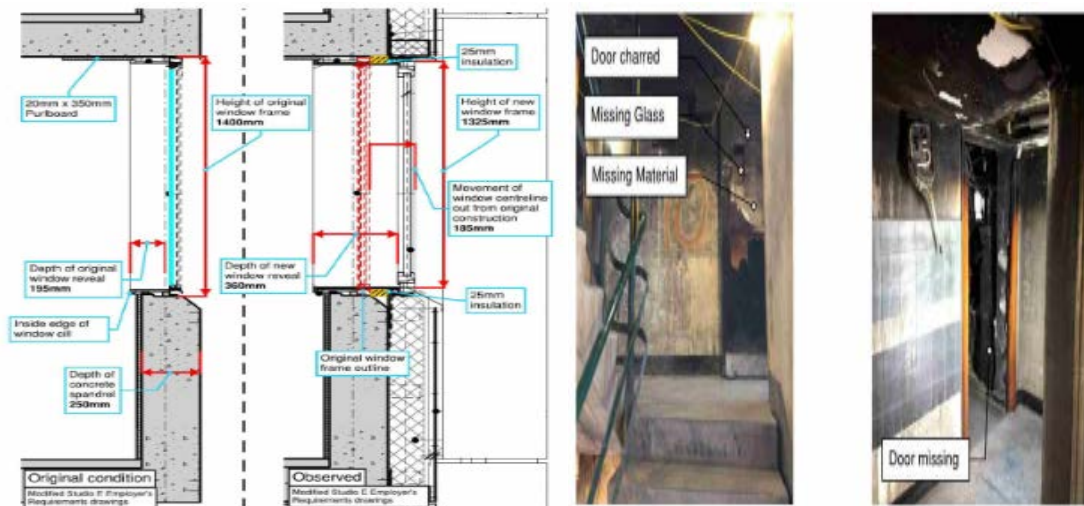


Figure 5: Window installation, old in black & new in red, Figure 6: Damaged or missing flat door shifted 185mm on to the new cladding

RESCUE EFFORTS: The inability of people to escape due to the rapid spread of smoke and flames through 2 or 3 fire doors. The “stay put” instructions that at first were the right strategy in normal conditions, where fire-walls and fire doors would have performed as intended. The narrowness of stairwells (of about 900mm width), and the non-existent rescue plan for disabled people from top floors conspired to create a CASCADE disaster, one which was compounded by several failures in the chain. According to tests performed after the tragedy, the Grenfell Tower apartment main doors were found not to comply with the 30-minutes fire rating. The doors had been replaced a few years before. As a consequence of this test, many thousands of doors of similar characteristics will need to be removed from high-rise buildings elsewhere in the country.

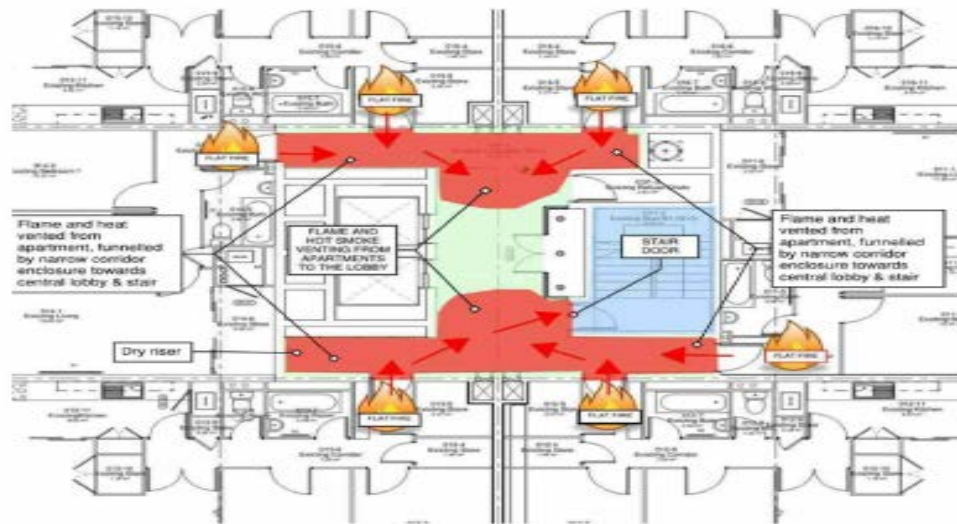


Figure 7: Compartmentation failure of the central corridor, stairwell and lifts

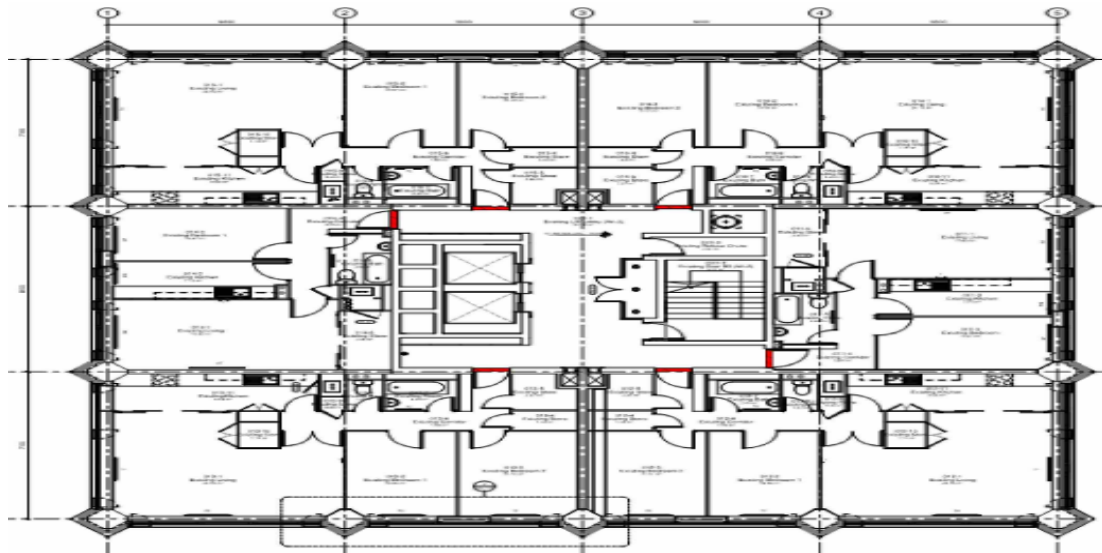


Figure 8: Entrance to flats fire-doors in red

ETHICS AND RISK

RISK, UNCERTAINTY AND REDUNDANCY

QUALITY, RISK MANAGEMENT AND SAFETY, SOCIAL INCLUSION: (The contractual aspects of Grenfell Tower are discussed in the other paper on the subject presented at this conference.) As urban planning in poor areas sets minimum critical needs as objectives of any project, there is always the need for redundancy and alternatives. These redundancies are increased by the size and complexity of the project. The most worrying aspect is the lack of understanding of the tragedy shown by local and governmental authorities, as was apparent during and immediately after the tragedy. A normal **Risk Management Framework** a post-disaster strategy indicates the need for a coordinated **Response Phase** followed by a **Recovery Phase** and a **Reconstruction Phase**. Kensington and Chelsea's council were relieved of responsibility for taking care of the survivors of the Grenfell Tower disaster on 18 June 2017 after severe incompetence in their planning of remedial assistance to survivors of the disaster (MacAskill, The Guardian 18 June 2017).

Soon after Robert Black Chief executive of **Kensington and Chelsea Tenant Management Organization** was forced to resign to “concentrate on assisting with the investigation and inquiry” (Grierson and Siddique, 2017).¹⁰ Then the management team itself, the **Kensington and Chelsea Tenant Management Organization** was also dismissed on 27 September 2017 (Agerholm, 2017).¹¹

INDUSTRIALIST’ LOBBY: The construction industry and principally, manufacturers of materials used in new buildings have been actively lobbying to reduce the impact of new legislation restricting or banning the type of material used on Grenfell Tower. Press reports indicate that a Director of Kingspan, manufacturers of part of the insulation materials used on the tower, gave a speech opposing plans by the government to ban the use of combustible products on new tower blocks.¹²

SILENCING VICTIMS: Barratt Homes has, for a long time, incorporated all minimal requisites and conform to building regulations in their house design processes. Where regulations do not exist, the quality of materials and craftsmanship dropped to the lowest level permitted. Information on cases of bad workmanship and materials is prevented from getting out by gagging orders and contractual obligations imposed on new buyers. As noted by Ruddick (2017):¹³ “Silencing those who have reason to complain will make it more likely to push down standards in the industry rather than pushing them up”. We need to add that the phenomena mentioned in “Introduction and personal view of the Author of Hackitt Report” support the view that some of the corporate actions regarding quality, risk management and safety and social inclusion (as they are acting on behalf of the community at large) has been replaced by greed, negligence, and corruption.

ETHICS AND TECHNOLOGY

DEVELOPMENT OF BIM: Development of BIM-like technology and risk clash-detection system build-in the new digital era is a viable way forward in developing a robust new safety framework. BIM as a system for the design, construction and use of buildings and infrastructure should incorporate a Disaster Risk Management Framework set of tools to deal with uncertainty from the start of the project.

As developers are technically able to incorporate the calculation of minimal requirements into some projects (mainly housing) there is the opportunity to reverse the trend. The application can be reversed to a more positive use or outcome building up redundancy as a good approach to the equation of risk against uncertainty.

The incorporation of a standard Fire and Emergency File to be an integral part of the BIM process and initiated by the Client, Principal Designer, Principal Contractor and the Building Owner (Hackitt, 2018).

CONCLUSIONS

This paper is an attempt to start the process of finding answers to the challenging aspects of ethics in construction. It begins by exploring aspects of the established “**minimum requirement**” strategy of many developers and designers, the **risk**

¹⁰ Grierson, J and Haroon Siddique, H (2017) *The Guardian*, 30 June.

¹¹ Agerholm, H (2017) *The Independent*, 27 September.

¹² Gerad Tubb, Sky News, 19 June 2018.

¹³ Ruddick, Graham. 2017 *The Guardian*. February 16, 2017.

aspects encountered in the process of design, construction and use of the buildings and infrastructure; and the possibilities of using **modern digital technology** to aid the design, construction and occupation process from a **risk management framework** perspective.

There is the need to support all efforts towards a more robust solution to uncertainty and risk not previously encountered. It is necessary to develop a more flexible approach to the solution of constructional problems, not committing large efforts to infrastructure that could soon become obsolete.

The risk of disasters or crisis is uncertain. Therefore, there is a need to build in some redundancy to help to deal with the difficulties of not knowing the unknown risk not yet encountered. To better manage these unknowns, the use of digital technology widely available and in constant development could provide an affordable, robust and safe solution.

This will provide the assurance that, after the long process of proposal, design and construction and during occupancy, it will be possible to plot the history of the development with all the aspects of risk, fire and emergency or other risk factors be available to the users, being the tenants, owners or members of the public services (Fire, Police, ambulance). The incorporation of a standard Fire and Emergency File to be integral part of the BIM process and initiated by Client, Principal Designer, Principal contractor and finally by the building owner would be an acceptable route to take after Grenfell Tower disaster.

The Hackitt (2018) Report asks in Appendix E (p134) that questions on aspects of competence, continuing professional development and so on to be addressed by professional bodies within the construction industry. In particular, professional institutions, engineering, architecture, and building control inspections and many others should collaborate to improve competence.

The repercussions of the fire and changes within the construction industry will also affect the academic world. Aspects of superior quality testing, risk management and its contents of mitigation, preparedness and so on need to be included in tertiary institutions. They will need to be studied in the context of the new ethics of a flexible and dynamic outlook to build resilience further than the merely fulfilling “minimum requirements”.

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GRENFELL TOWER FIRE: THE IMPORTANCE OF ETHICS AND PROFESSIONALISM FOR THE PROCUREMENT OF SAFE BUILDINGS AND INFRASTRUCTURE IN THE CONSTRUCTION INDUSTRY.

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The Grenfell Tower fire resulted in the loss of 72 people. A series of events led to the tragedy that our construction industry must scrutinise beyond the public inquiry which is still underway. The tower had recently undergone a 'revamp' with the addition of a new cladding system which seems to have allowed the fire to spread with catastrophic consequences. A series of questions have been raised regarding the choice of materials, the detailing, the certification, the policies and regulations within the industry. The complex nature of the construction process and the crossover between the disciplines makes it difficult to allocate direct professional liability but what lessons can be learnt in terms of professional development and ethics for such an event to be avoided in the future?

The de-centralisation and privatisation of key aspects of control and supervision of safety in buildings has been imminent in the neo-liberal policy of both Labour and Conservative governments in the past 30 years.

In addition, the general "self-regulatory" approach that the construction industry has taken must be questioned. This tragedy must be viewed as the threshold of "the before and after" of a chapter and the serious study of the public interest versus profitable enterprise.

Keywords: quality, procurement, safety, ethics, privatisation.

INTRODUCTION

The purpose of this research is to examine the ethical consequences of the Grenfell Tower Fire by using the procurement and construction standards of the tower re-cladding exercise that took place in 2015 as a case study to highlight the importance of ethics for the procurement of safe buildings and infrastructure in the construction industry. The sub-topics of the research are:

- 1) Ethics, Profit Margins and Minimal Requirements in Construction**
The industry has an ethical obligation to ensure that safety and quality in construction are not compromised in the name of profit. Developers must not be permitted by governments to be happy with the absolute minimum.
- 2) Ethics & Privatisation of Bodies within the Construction Industry**
The impact of the privatisation of building regulations and material certification/testing bodies which follows the dynamics relating to neo-

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liberalism means that the control of economic factors has been switched from the public sector to the private sector.

RESEARCH AIMS AND METHODOLOGY

The purpose of this section is to clarify the methodological framework used to conduct this research. The aim of the research is to use the Grenfell Tower fire as a case study to examine the ethical issues that arise from a tragedy of this scale that could have been avoided.

The questions that this research will attempt to examine in discussing what went wrong with the very precise UK procurement procedure are now outlined.

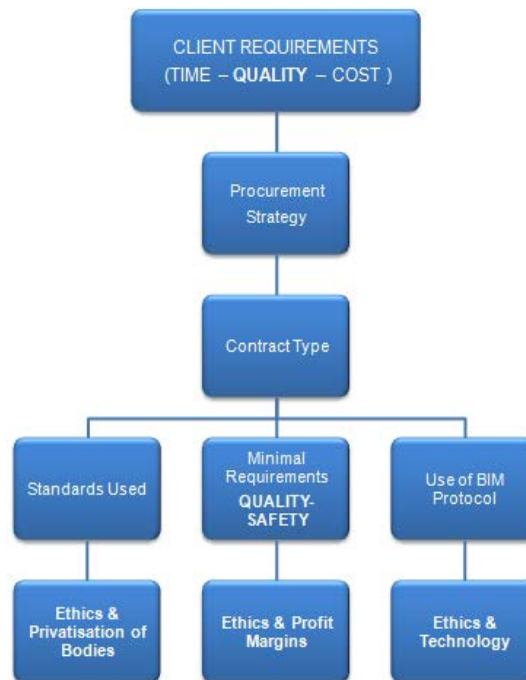
- Do the current state of building regulations, the testing of standards, the use of a Design and Build contract, and government decisions and policies have an impact on the quality of social housing construction and is the appropriate duty of care used to do so?
- How could a tower block which had undergone an £8.7 million pound public-sector refurbishment be more unsafe and unfit for purpose?
- Do any of the above imply the adoption of unethical construction practices in the name of profit?

The approach adopted will examine, on the one hand, procurement, considering how the procurement process (see Figure 1) leads to the selection of contract; how the contract distributes risk and liability as well as implies the use of building standards; how systems should be tested and certified to guarantee quality and safety. Professional consultants and contractors are expected to behave with integrity and reasonable care, the liability in terms of quality will depend on the procurement method. The Grenfell Tower procurement process will be scrutinised.

On the other hand it is also important to examine the UK government's decisions and policies on housing and building regulations and consider how the privatisation of certifying bodies may have had an impact on the delivery of a project which turned out to be unfit for purpose.

Once this process is applied to the Grenfell tower renovation works, the ethical consequences and conclusions can be analysed and technological suggestions will be presented that could potentially help to prevent another tragedy occurring.

Figure 1



BACKGROUND

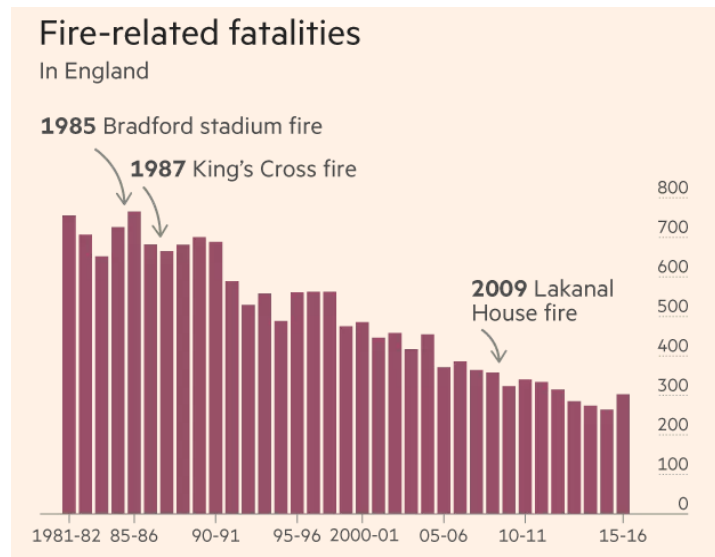
According to Arnold Tarling (member of the Association of Specialist Fire Protection and Chartered Surveyor), if the Grenfell cladding renovation had not taken place, the fire would not have spread so quickly. Experts have reasons to believe that the fire would have been contained within the designated fire compartments, which the existing concrete framed and enveloped design, that met building regulations at the time of construction of the original building design had allowed for.

Concrete as a material rates highly in terms of fire resistance whilst the primarily aluminium cladding that was used to re-clad Grenfell Tower is a flammable material and has high conductivity. The new rain-screen cladding system added on to the existing concrete facade of Grenfell Tower would heat up and spread this heat quickly through windows, and then from one floor to another floor on the exterior of the new cladding system via the air gap between the old and the new facades that acted as a chimney.

It is pertinent to note that this is not the first fire tragedy to take place in the UK (see Graph 1). Arnold Tarling warned government advisors three years before the Grenfell tragedy that an inferno would happen unless they changed rules to ban cheap, flammable insulation used on the outside of buildings. In addition, it has been reported that the Grenfell Tower residents had voiced concerns only months before the fire regarding the fact that a single staircase was their only means of escaping from the building. Beyond these, no sprinkler systems had been fitted within the only means of escape, not all doors were fire-proofed, and according to Dr Stuart Smith, a building surveying and fire safety lecturer at Sheffield Hallam University: “The rate at

which the building was burning suggests that even if the fire breaks were there, they didn't work'' (Dixon, 2017).

Graph 1



PROCUREMENT AND CONTRACTUAL IMPLICATIONS OF GRENFELL TOWER

Types of Client – Private v Public Sector

Walker (1996) suggests that Clients can be classified as: (a) the individual client; (b) the corporate Client; (c) the public client. For the purpose of this research we will narrow this down to two categories, namely: the private client (commissioning the item for own use, or for development/ investment); and the public client.

Masterman (2002) suggests that one of the characteristics of privately financed projects is to maximise profit whilst one of the characteristics of publicly financed projects is that they must not aim to profit. This identifies the key difference between a private and public sector project and highlights that bearing in mind that the privately financed projects could be done for profit (development or investment), compromising quality of specification is common in order to maximise the profit margin.

Public sector construction projects and therefore any specification, testing, quality assurance and safety issues should not be connected to the private sector as there is a conflict of interest to do with profit and in retrospect quality matters and hence safety issues which in many cases, such as that of Grenfell Tower, depend on quality. The cladding system which has been reported to have contributed to the rapid spread of the fire was originally specified to be zinc cladding with a fire resistant core. It was later downgraded to a non-fire rated and cheaper aluminium panel system which led to a £293,368 saving on the cost of the cladding.

Jessel (2018) notes that: “Researchers claim the panel system used for Grenfell had a calorific value equivalent to 12,000 litres of petrol, while the insulation foam added the equivalent of almost another 20,000 litres. The foam has also been shown to release cyanide gas when it burns and it is feared this may have contributed to the death toll”.

The issue of how dangerous low-specification non-fire-rated and non-tested cladding is, had been flagged to the government and other relevant statutory authorities on a number of occasions prior to the Grenfell Tower fire.

Client Requirement – Type of Contract

Any construction project is procured based on the client requirements which will depend on time, cost, quality, risk, the type and size of the project as well as the experience of the client. These requirements will determine the type of contract. There are three main procurement routes in the construction industry.

Traditional Procurement: this is the longest in terms of time as the design and construction phases are separated, and highest in terms of quality as the design team will detail the job. Cost may be higher to guarantee quality but the cost is known before construction commences.

Design and Build Procurement (used on Grenfell tower renovations): this is a contractor-led form of procurement. The designers only commence with the concept design stage and the project is then passed on to the contractor to design and build. It is good in terms of time as design and construction phases can overlap but can compromise quality in that the contractor will provide details but to meet a pre-agreed lump sum which is calculated with minimum design information (the concept design = general arrangement drawings). The contractor may detail and specify lower quality materials with lower workmanship to meet the pre-agreed cost. Standard contract such as JCT Design and Build contracts do try and stipulate quality by adding clauses such as: “The Contractor shall in respect of any inadequacy in such design have the like liability to the Employer... as would an architect or, as the case may be, other appropriate professional designer... who... has supplied such design for or in connection with works to be carried out and completed by a building contractor who is not the supplier of the design” (Githunguri, 2014).

It is therefore implied within the Design and Build contract that as with the Architect, the Contractor must carry out works with reasonable skill and care and must provide a warranty that the completed works will be fit for purpose.

Management Procurement: this is a hybrid and most recent form of procurement with characteristics of both Traditional, and Design and Build procurement. The client takes on all the project risk by contracting designers, a construction manager or management contractor to act as independent advisors and then contracts each sub-contractor’s work package directly. This requires an experienced client that can control the quality via the design team and the independent contractor, can overlap design and construction to speed up the process and can save money by contracting work packages directly (without a main contractor’s hidden profit).

GOVERNMENT DECISIONS AND POLICIES AFFECTING CONSTRUCTION QUALITY AND FIRE ISSUES

The Grenfell Tower renovation was funded by the Royal Borough of Kensington and Chelsea via the government that has a duty to provide affordable housing and to improve the quality of rented housing. It is suggested that, in the past 30 years, a series of government decisions and policies, under Conservative and Labour governments have led to the decrease of construction quality in social housing.

The chronological series of events presented below relates to government decisions and policies that have a direct link to the quality of procurement of the Grenfell Tower renovations.

1667: First system of regulations listed in the London Building Act in response to the 1666 Great Fire of London which saw most of the buildings which were built primarily in wood and thatch in the square mile of London burn down. Brick and stone became the prime construction materials and the new Fire Prevention Regulations included easy access to water and there was the beginnings of a fire hydrant system for the city.

1986: Prior to this point, all buildings in London fell under the London Building Acts. This ensured that external walls must have at least one-hour fire resistance to prevent flames from spreading between flats or entering inside buildings. This would provide firemen adequate time to control the fire. Margaret Thatcher's government replaced these rules with the National Buildings Regulations and the crucial time stipulation for fire spread was scrapped. Instead, materials used on the outside of buildings now only had to meet 'Class O' regulations and show that they did not add to the heat or intensity of a fire.

1999: A fire spread quickly through eight floors of a Scottish tower block killing a disabled resident and injuring five other people. In response, Scotland revised its Building Regulations and made it mandatory for contractors to ensure that any external cladding 'inhibited' the spread of fire. In England, successive governments have been urged to tighten building regulations on fire safety but no action has been taken.

2010: Official Statistics on social housing indicated that the number of government-funded houses for social rent dropped by 97%.

2012: The national planning policy framework gives precedence to expensive private development while discouraging social housing. This policy is often described as a developers' charter.

2013: Coroner Frances Kirkham recommended a review of building regulations on fire safety with particular regard to the spread of fire over the external envelope of a building and urged local authorities to instal sprinkler systems after a blaze at the Lakanal House tower block in London killed six people. The building had been refurbished using some flammable materials. No review was carried out.

2015: Chancellor George Osborne announced that the rent that councils charge tenants would be cut by 1%. This was not received as positively as it may initially appear as the government is aware that this rent money is reinvested in social housing, and knew also that the cut would reduce the money available for repairs, refits and the building of new homes. The policy was read as a deliberate attempt by the government to degrade the quality of social housing, reducing the money available to maintain council houses and thus actively participating in the decline of the social housing quality and maintenance.

2016: 72 Conservative MP landlords vote against the Housing Bill to make “rented properties fit for human habitation” including the Communities Secretary, Sajid Javid, Housing Minister Brandon Lewis (who has also said installing fire-sprinklers could discourage house-building), Minister Nick Hurd, and Mr David Cameron.

PRIVATISATION OF BUILDING REGULATIONS, TESTING AND CERTIFICATION BODIES

Official guidance on building regulations is issued by the Building Research Establishment (BRE), a body that was privatised in 1997, on behalf of the government. The guidance states that any structure 18 metres high or more, must be constructed with external walls made of materials of “limited combustibility” or comply with a testing regime. The tests are carried out by the BRE but are usually commissioned by the manufacturers of the materials. This in itself is slightly problematic as it suggests conflict of interest. It should also be added that real-life fire scenarios do not take place on the systems tested as they would for car safety for example.

The specific cladding system used on Grenfell tower has been banned in the United States in buildings taller than 12 meters for not meeting performance requirements. Why was this cladding system used so widely on tower blocks all over England? In Scotland, it is only local authorities that can sign off a new or refurbished building, but in England, “approved inspectors” who are normally surveyors have been allowed to do the same task since 2005.

According to Mr Steve Cooper, a fire engineering partner at the firm Cundall, “The level of technical knowledge of building control surveyors across the country... varies enormously”. The system of fire risk assessments — to gauge day-to-day issues in buildings — was handed from local fire services in England to building owners and landlords, also in 2005. The sector in England was partly privatised in 1985. The National House Building Council (NHBC) introduced private bodies with approved inspectors to create competition between the private and the public sectors. A heavily criticised neoliberal rhetoric for the promotion of the open market. This has proven detrimental for the public sector as the private market does not look out for the public interest but the private capital and profit.

In May 2018, following the Grenfell tragedy, Dame Judith Hackitt presented an independent review of building regulations and fire safety report to the Parliament. In the report it was identified that a need for the reform of building control procedures must take place, particularly regarding high-rise residential buildings. It concluded that “the part-privatisation of the regulatory function had created “unintended consequences” and a “difficult trade-off” between building control bodies competing with one another for business while still ensuring rigorous certification with all the requirements of Building Regulations” (Gerrard, 2018).

How was the Grenfell cladding system certified?

Building regulations in the UK and specifically Approved Document B states that 'Class 0' is the acceptable standard for the external walls of a high-rise building. The government-appointed an independent fire safety panel to sign off a cladding product similar to that used on Grenfell Tower as 'Class 0'.

For the past 30 years, fire safety experts have warned that the 'Class 0' designation was based on small-scale tests conducted in laboratory conditions and does not properly evaluate cladding in a live fire.

Notwithstanding the above, a certificate was issued by Warrington Certification, a private certification body, in 2014 for a cladding system such as the one used on Grenfell Tower. It certified that the Larson composite panel manufactured by Alucoil "has been appraised as having a Class 0 performance when fire tested and assessed" (Pasha-Robinson, 2018). This was signed by Sir Ken Knight (chief fire and rescue adviser in England and chairman for Warrington Certification). The certificate also states that "a material with a fire performance classification of Class 0 may be used...on external surfaces of multi-storey buildings" (Pasha-Robinson, 2018). Sir Ken is now heading the government's independent panel on fire safety, which was appointed immediately after the Grenfell Tower fire to advise on building safety measures.

The reality is that "to comply with the current regulations, external cladding has to be put through laboratory testing or a "desktop study", which allows a new product to be signed off if experts say they expect it to behave the same way in a fire as a similar product on the market" (Pasha-Robinson, 2018).

A preliminary report by Dame Judith Hackitt found that the system used at Grenfell was not fit for purpose, with confusing rules and a lack of enforcement allowing construction companies to abuse the system.

The Kensington and Chelsea council planning website shows the project's status as 'completed not approved' but the council said this does not mean the project wasn't formally signed off. According to the government website, a certificate should be issued within eight weeks of completion as long as building work complies with safety standards.

CONCLUSION

The information which has emerged indicate that the cladding panels and insulation used on the Grenfell Tower were not tested together before the fire. The cladding panels had been banned from use on tall buildings in the US and warnings had been given about fire risk from that aluminium cladding system.

The Client (Government), the Design and Build Contractor, the Fire department and the Building Control officers did not ensure the project was safe for the end user. This includes making sure neither their workers nor other people would be injured as a result of the building works.

Handing over to the Client a poor-quality project, or one that is knowingly defective is also unethical. Grenfell Tower was done under a Design and Build contract. The decision makers opted for a cheaper cladding system which was not fit for purpose and had banned for tall buildings in the US.

The use of the non-fire rated cladding panel resulted in the fire spreading rapidly, killing many people. The Contractor had signed a contract which binds them to delivering particular quality requirements and specifications. To deliver less is unethical. Moreover, omitting items, or supplying products that do not conform with the project specifications or the contract requirements (such as being fit for purpose) is also unethical. A Design and Build contractor could make a profit by purchasing and using substandard materials; this appears to have been the case at Grenfell.

The Contractor can of course argue that if a material or system is certified they have no reason not to specify it and this is true. A response to this would be that the Grenfell Tower cladding system should not have been certified as it was not properly tested; and this led to the tragedy.

In order to take the issues discussed in this paper forward, a new subject for research has been conceived by the authors. It will investigate whether Building Information Modelling (BIM) can be used as a tool to develop a statement similar to the clash detection report to help identify the risks in construction details that do not conform to adequate quality standards and could compromise the safety of the end user. The authors have embarked on the research to establish the possibilities of such a tool.

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ETHICS AND PROFESSIONALISM IN CONSTRUCTION CONTRACT CLAIMS AND DISPUTE RESOLUTION.

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A well-known feature of the construction industry is that claims for additional payment or extension of time are virtually inevitable and that such claims often lead to disputes. The Latham Report and similar reports into the construction industries in other jurisdictions have highlighted inefficiencies in the methods for resolving them. Parliament responded to Latham's recommendations by passing the Housing Grants, Construction and Regeneration Act 1996 which has entrenched adjudication as the most widely used formal dispute resolution method in UK. Many countries, such as New Zealand, the Commonwealth of Australia, Singapore, Isle of Man, Malaysia and Ireland, have followed the UK innovation with similar legislation whilst the standard forms of construction contracts in some jurisdictions that have not yet legislated contain adjudication clauses. Furthermore, the standard forms of contract sponsored by FIDIC and adopted for many international construction and engineering projects provide for dispute resolution by adjudication. The purpose of this paper is to examine the issues of ethics and professionalism that have emerged from adjudication and related litigation of claims and how these tribunals deal with them. The problems examined are: overvalued claims; conflict of interests in acting as an adjudicator; adjudicators' responses to challenges to their jurisdiction; adjudicating complex disputes; the provision of expert evidence; allegations of forgery and fabrication of invoices and evidence in adjudication; ambushing in adjudication; smash and grab adjudications; loyalty to a party for Opportunity ; differential rates of remuneration of Dispute Adjudication Board (DAB) members; and privilege.

Keywords: claims, adjudication, conflict of interest, fraud, theft, false accounting

INTRODUCTION

There has been a long standing perception in the UK that the construction industry is not as efficient as it could be. In response, successive Governments set up task forces and committees to investigate the causes of this perceived inefficiency and to make recommendations on appropriate improvement action (Murray and Langford, 2003). The Latham Report attributed most of the problem to conflict and disputes within the extensive construction project supply chains that take too long and cost too much to resolve, thus preventing the smooth cashflow essential to project success (Latham, 1994). As remedial action, it advocated greater use of partnering within the supply chain and legislative intervention to entrench a dispute resolution method referred to as "adjudication" for disputes that arise in spite of best avoidance action. This method entails submission of any dispute under a qualifying construction contract to a neutral third party, the adjudicator, for resolution within tight timescales but not acting as an

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arbitrator. The Government then in power responded by passing the Housing Grants, Construction and Regeneration Act 1996 (HGCRA) which provides that every qualifying construction contract must provide that any party to it has a right, at any time, to refer any dispute under it for resolution by adjudication as described in the Act. The Act also imposes a protocol for payment rights and obligations under construction contracts.

Failure of a qualifying construction contract to provide for an adjudication process compliant with certain mandatory procedural requirements in the Act results in the adjudication provisions in a Scheme for Construction Contracts (SCC) being imported into the contract as an implied term. Part I of the SCC contains provisions compliant with the mandatory adjudication procedural requirements whilst Part II is a protocol for payment rights and obligations under construction contracts. Similarly, provisions from Part II of the SCC are imported into construction contracts to make good any non-compliance with the payment protocol specified in the Act. There is therefore no escaping adjudication and the accompanying payment protocol where a contract qualifies as a “construct contract” as defined under the Act.

Qualifying construction contracts are defined very widely under sections 104 and 105 of the Act to include virtually all contracts at all levels of the supply chains normally assembled for the design, construction, maintenance and demolition of infrastructure and built environment assets. Adjudication has acquired the greatest global importance for three main reasons. The construction industry, the main industry to which it applies, is one of the pillars of the UK economy. Secondly, many countries have followed the UK innovation with similar legislation (Bell and Coggins, 2015) whilst the standard forms of construction contracts in some jurisdictions that have not yet legislated contain adjudication clauses (Maritz and Hattingh, 2015). Thirdly, the standard forms of contract sponsored by FIDIC and adopted for many international construction and engineering projects provide for dispute resolution by adjudication.

The standard form contract sponsored by FIDIC provide for provisionally binding determination of contractual disputes by a Dispute Adjudication Board (DAB), which performs the same role as an adjudicator under UK’s HGCRA but with the distinction that the decision maker is a panel of three individuals instead of a sole individual. For small projects, the parties may opt for a sole member DAB. A standing DAB is constituted on commencement of the project and is available throughout its duration to determine any dispute referred to it. An *ad-hoc* DAB is constituted only when a party serves a notice to refer a dispute to the board and is disbanded after delivery of its decision. Each party nominates a member who is appointed only upon approval by the other party. The third member, the Chairman of the board, is agreed by the parties with or without the advice of the first two members. The appointment procedure is designed to minimise the risk of a panel member being influenced, in his or her duties, by the fact of having been appointed by a particular party (Ndekugri et al, 2014).

The increasing body of research literature on claims and disputes from construction and engineering reflects huge growth in the problem. This phenomenon is also captured in the reports of surveys conducted by some multinational multidisciplinary consulting firms (Acadis, 2017; PWC, 2018). Over the years, the involvement of the construction professions has expanded to include services in dispute resolution:

claims consultants, expert witnesses, arbitrators, mediators, adjudicators and members of DABs. The professionals involved in the resolution of construction disputes include engineers, architects, quantity surveyors, lawyers and accountants. All the disciplines have their separate codes of ethics and professional conduct. They have developed disciplinary procedures for dealing with conduct that may be in contravention of the code. The question has been posed whether the multidisciplinary nature of construction dispute resolution calls for a multidisciplinary code of ethics what the nature of such a code should be (Uff, 2003). There is also the separate but related question of whether the traditional codes have caught up with the provision of DRS by the construction professions. Some initiatives have been taken to respond to these challenges. Examples include the production by the Society of Construction Law (SCL) of its Statement of Ethical Principles applicable to construction law generally and not just dispute resolution (Lavers, 2007; Mason, 2009) and the RICS developing and publishing its practice statement and guidance note on surveyors acting as expert witnesses (RICS, 2014).

The role of the professional institutions that regulate the construction professions has traditionally comprised maintaining registers of chartered members, accreditation of courses for the education of new entrants and maintaining and enforcing codes of ethics and professional conduct. The provision of DRS has been secondary, though not less important, to the primary professional activity regulated by these codes. Most of the professional bodies have established internal dispute resolution support services, e.g., maintaining lists of people vetted for competence in providing various categories of DRS, serving as nominators of dispute resolvers where disputants fail to agree the individual. Users of the DRS of the professionals expect their professional bodies to regulate their performance, particularly where the individual concerned had been nominated by the body. For example, research by Levy and Ndekugri (2003) found instances of dissatisfied parties to adjudication proceedings reporting adjudicators to the relevant professional bodies for perceived unethical or unprofessional conduct. The primary purpose of this paper is to examine aspects of the adjudication processes and similar aspects in related dispute resolution methods for possible relevance of ethics and professionalism. It was inspired by the fourth Michael Brown Foundation public lecture delivered by Professor John Uff CBE QC (Uff 2003). The aspects covered include: overvaluation of claims; conflict of interests; adjudicators' responses to challenges to their jurisdiction; adjudicating complex disputes; the provision of expert evidence; allegations of forgery and fabrication of invoices and evidence in adjudication; ambushing in adjudication; smash and grab adjudications; privilege; and how an adjudicator should deal with poor presentation of a good case.

METHOD

A review of the literature found very little on the specific issue of ethics in the delivery of DRS in the construction industry. However, some of the publications cast very useful light into this corner of professional practice, particularly the fairness of arrangements for contract administration. For example, as a follow-on to the Uff lecture, Lavers (2007) reported a survey of of national chapters of the European Society of Construction Law on specific construction law ethical questions. Mason (2009) carried out a critical examination of the application of the SCL Statement of Ethical Principles in the contexts of reported unethical conduct in construction contracting in the UK, US, Australia, and South Africa.

An obvious obstacle to the needed empirical studies into ethics in dispute resolution is the sensitivity of the subject. The research reported here is based on a thematic analysis of adjudication case law, which constitutes a large body of very rich information on conduct in adjudications which cannot be matched, in terms of detail and reliability, by any practically feasible empirical data collection method. The unparalleled reliability is the effect of the risk of criminal liability for contempt of court for untruths in statements and cross-examination practices.

DEFINITION OF ETHICS AND PROFESSIONALISM

There is a large body of literature on the definitions of “ethics” and “professionalism”. This paper does not even attempt to add to the debate. For the purposes of this paper the compendious view is taken that they both concern essentially actions which affects others or the public against which there is neither criminal nor even civil liability and which may be seen by most members of the relevant community as unacceptable or unconscionable. The role of the professional bodies is to ensure that their members take adequate cognisance of the interests of not only their clients and themselves but also those of others who may be affected by their professional conduct.

OVERVALUED CLAIMS

Few with experience in the construction and engineering industries would deny that claims from these industries have given rise to a separate industry in itself with claims consultants as its practitioners. Researchers have established a practice of exploiting such deficiencies in the procurement processes in a variety of ways (Rooke, Seymour and Fellows 2003; 2004). The deficiencies include selection of contractors and designers predominantly on lowest tender price, poor quality drawings and other contract document and shortcomings in the competence of contract administrators. Uff (2003) posits that such claims are made and referred to adjudication at the moment the ink on the contract dries. For example, on noticing a possible deficiency in a document at the tender stage, the contractor, instead drawing it to the notice of the project owner’s consultants, carefully construct a strategy for maximising financial gains from claims. Similarly, there are reactive strategies for exploiting defects in documents that come light or other unforeseen events occur during performance of the contract. The reactive strategies include exaggeration of claims. Whether contract administrators assess claims fairly and impartially even where the root cause of the claim is the contract administrator’s default is well known ethical question. Even judges have taken notice of a culture of exaggeration of claims. In *SG South Ltd. v. King’s Head Cirencester LLP and Another*² Justice Akenhead stated:

“In formulating and applying these propositions, courts need to be aware and take into account what goes on construction sites up and down the country. On numerous occasions, contractors and subcontractors and even consultants will submit bills or invoices which are or are believed by the recipient to overstate the entitlement. Whilst there are some “cowboy” and fraudulent builders who prey on the public, it will only rarely be the case that one can presume fraud to have taken place where an invoice or bill is overstated. The claiming party may believe that it is entitled to what it is claiming; there may be a simple and honest mistake in the formulation of the

² [2009] EWHC 2645(TCC); [2010] BLR 377

claim; the claim may be based on a speculative but arguable point of law or construction of the contract. In none of these cases can it be said that there was fraud on the part of the claiming party. The Court should be astute and cautious on adjudication enforcement applications in assessing pleas of fraud by the party against whom the adjudication decision has been made. I doubt very much whether there will be any significant number of challenges to enforcement on the basis of fraud.”

Ndekugri and Rycroft (2002) and Honey (2005) explain how exaggerating claims can put the individual claim consultants, construction organisations, individual employees concerned at risks of criminal liability under the Theft Act 1968 for fraud, forgery and false accounting. In practice, it would be difficult to achieve conviction in most cases because the need for proof beyond reasonable doubt that any overstatement is not an honest mistake. But the difficulty of conviction should not make this practice ethically and professionally acceptable.

It is even more difficult to convict a company because of the “identification doctrine”. According to this doctrine, for a company to be found liable for a crime, it must have been committed by a human person (or persons) within it who carries so much decision-making power in relation to the business of the company as to be considered its “directing mind and will” or embodiment. The guilt of the natural person is identified as that of the company. Application of this doctrine to the company’s criminal liability in its various forms, there must be evidence to convict a person stationed so high in its management organisation to constitute its “directing mind and will”. This requirement of derivative liability acts as a barrier to convicting companies of theft crimes because, with the exception of very small companies, it is difficult to find an individual who was causally linked with the facts constituting the crime and is also so high up in the corporate hierarchy as to be considered the company’s “directing mind and will”.

EXPERT WITNESSES

There is well established practice of the construction professional being engaged as expert advisers to provide advice on technical issues such as the cause of delay, the collapse of completed work or appropriate remedial work. Claims consultants are usually expert advisers brought in to take over the preparation of a complex claim or to provide support on particular elements of it, for example, the interpretation of applicable contractual terms, the cause of delay suffered, and the financial and schedule consequences of specific events. The provision of this type of service is just an aspect of their general professional services to which the traditional codes of practice and ethics apply. This role has, over the years, expanded to include acting as advocates for their clients in disputes. What is less established is the professional acting as expert witness in court or arbitration proceedings. In such proceedings the practice has been for each disputant to engage its expert on each technical issue in dispute. Such issues include: whether sub-soil conditions encountered at the project site were reasonably foreseeable by a competent contractor at the time of tender; what a reasonably competent engineer would have done in particular circumstances; and the causes of additional cost or delay.

Expert witnesses in construction disputes have come in scathing criticism by judges in recent years. The criticised conduct is attributable to a common misunderstanding of the nature of the role of an expert witness in court proceedings and unjustified claims

to the relevant expertise. A common mistake made by expert witness has been equating their role to that of an expert adviser retained by a party. The mistake is that, whilst the expert adviser's duties are primarily to his or her client, the duty of the expert witness is owed to court. Rather than advancing the case of the party who appointed him or her, the role of an expert witness is primarily to assist the court to understand the relevant technical issue to be able to decide the dispute. The making of this distinction can be challenging to inexperienced witnesses where they had also been retained as expert advisers. Exposure of an expert witness under cross examination at trial as lacking the expertise claimed or acting as the hired gun of one side of the dispute would be disastrous to the case of that side as the court is likely to decide the dispute, on which a lot of money be hang, on the evidence of the expert witness of the other side.

The remuneration of an expert witness is usually far greater than for the primary professional services of the construction professions. As humans, the temptation to hone a public profile for the purpose of serving as an expert witness is difficult to resist. However, as highlighted in too many cases, without appropriate training, an expert in the primary profession, even of the highest order, is unlikely to discharge properly the duties of an expert witness. The competences for which training is essential include full understanding that the duty is to the court and not the party paying the professional's fees, ability to explain technically complex issues to non-experts, the writing of an expert witness report and the ability give impartial evidence in court (Horne and Mullen, 2013). For a long time an expert witness enjoyed immunity from suit by the parties. However, this safety has been removed by the Supreme Court in *Jones v Kaney*³

APPOINTMENTS OF DISPUTE RESOLVERS AND CONFLICT OF INTEREST

With most of the resolution methods, the disputing parties are free to agree the individual to act as mediator, arbitrator, adjudicator or DAB member. Most the standard form contracts allow for an independent third party to nominate an appropriate individual in the event that the parties are unable to agree one. Most of the professional bodies have established internal departments for providing dispute resolution support services including acting an Adjudicator Nominating Body or other appointing third party where parties to a dispute fail to make a consensual appointment.

The term "conflict of interest" in relation to adjudication refers to any association between the adjudicator and the parties or the dispute to be decided that predisposes the adjudicator to a particular outcome. Such an association would render the decision unenforceable if, by the standard of the fair-minded and informed observer, a *prima facie* case for apparent or actual bias or predetermination can be made out. A number of decisions provide guidance on the type of associations that could amount to unacceptable conflict of interest:

³ *Jones v Kaney* [2011] UKSC 13; [2011] 2 A.C. 398; [2011] 2 W.L.R. 823; [2011] 2 All E.R. 671; [2011] B.L.R. 283; 135 Con. L.R. 1

- *Pring & St Hill Ltd v. C J Hafner (T/A Southern Erectors)*:⁴ the same adjudicator having acted on related disputes to which the claimant was a party.
- *Cofely Ltd v Bingham*:⁵ the adjudicator having acted as arbitrator in many previous arbitration proceedings involving one of the parties where there was some evidence appearing to suggest that that party routinely influenced the relevant appointment processes in favour of the particular individual.
- *Beumer Group UK Ltd v Vinci Construction UK Ltd*:⁶ the same individual acting as adjudicator in two sets of undisclosed parallel proceedings between the claimant and a third party

An individual approached to take on the role of adjudicator should therefore decline where there is clear conflict of interest. Where in doubt, the safe course of action is for the adjudicator to declare it and allow the parties to decide whether he should proceed with the adjudication. For the same reason, any conflict of interest that becomes apparent only after the appointment should be drawn to the attention of the parties to decide whether the adjudicator should continue. It is a growing practice for parties, usually the party who did not suggest the particular adjudicator, to make formal requests to the adjudicator to disclose any previous associations with their counterpart. To avoid negative perceptions as to the adjudicator's neutrality, such inquiries should be answered fully, accurately and without prevarication.

The complexities of modern business and globalisation breed a myriad of situations from which a party could rightly or wrongly perceive a conflict of interest. The case law;⁷ on the issue suggests that, in any given situation, the fair-minded and informed observer test must be satisfied if the court is to refuse enforcement. The test is that apparent bias is established if a fair-minded and informed observer would conclude from the circumstances of the connections complained of that there was a real possibility that the tribunal was biased.

The application forms and related procedures of many ANBs for the nomination adjudicators are designed to avoid nominating anybody affected by conflict of interest. Applicants for nominations are requested in the forms to list individuals whom, on grounds of possible conflict of interest, the ANB should not consider for nomination. *Eurocom Ltd v Siemens Plc*⁸ highlights the importance of completing the application form with due care to accuracy. In that case the court decided that the claimant sub-contractor was not entitled to summary judgment to enforce an adjudicator's decision against the main contractor because the latter had a sufficiently strong case that the

⁴ *Pring & St Hill Ltd v. C J Hafner (T/A Southern Erectors)* [2002] EWHC 1775 (TCC); (2004) 20 Const. L.J. 402

⁵ *Cofely Ltd v Bingham* [2016] EWHC 240 (Comm); [2016] 2 All E.R. (Comm) 129; [2016] B.L.R. 187; 164 Con. L.R. 39; [2016] C.I.L.L. 3801.

⁶ *Beumer Group UK Ltd v Vinci Construction UK Ltd* [2016] EWHC 2283 (TCC); [2017] Bus. L.R. 449; [2017] B.L.R. 53; 168 Con. L.R. 113; [2016] C.I.L.L. 3897.

⁷ For examples, see: *Amec Capital Projects Ltd v Whitefriars City Estate Ltd* [2003] EWHC 2443 (TCC); *Fileturn Ltd v Royal Garden Hotel Ltd* [2010] EWHC 1736 (TCC); [2010] B.L.R. 512; 131 Con. L.R. 118; [2010] C.I.L.L. 2912; *AMEC Capital Projects Ltd v Whitefriars City Estates Ltd* [2004] EWCA Civ 1418; [2005] 1 All E.R. 723; [2005] B.L.R. 1; 96 Con. L.R. 142; (2005) 21 Const. L.J. 249; *Andrew Wallace Ltd v Jeff Noon* [2009] BLR 158.

⁸ *Eurocom Ltd v Siemens Plc* [2014] EWHC 3710 (TCC); [2015] B.L.R. 1; 157 Con. L.R. 120; [2015] C.I.L.L. 3593

appointment of the adjudicator had been rendered invalid by the sub-contractor's fraudulent misrepresentation to the ANB about some potential candidates for appointment. The conduct described by the judge as amounting to fraudulent misrepresentation was the naming of certain individuals in the completed application form, for exclusion on grounds of conflict of interest. Not only was the decision obtained at some unenforceable but the judge also ordered the winning party in the adjudication proceedings to pay the costs of failed enforcement proceedings on an indemnity basis against to reflect the fraudulent conduct.

JURISDICTIONAL CHALLENGES

The term “jurisdiction” of an adjudicator refers to the legal authority he or she acquires to make a decision that is binding on the parties. The adjudicator is given this authority by the parties through their contract, his or her appointment and the dispute referred. In the early days of adjudication, some professionals expressed the view that, provided the referring party was prepared to pay his or her fees and expenses at the end of the day, investigation of the question of jurisdiction was none of their business; it was a matter for the court of enforcement to determine. The court have since stated that an adjudicator should normally check whether he or she has jurisdiction before proceeding as a decision reached without jurisdiction is not enforceable and thus a waste of the parties’ money and time. However, the court has also stated that an adjudicator whose decision cannot be enforced for being decided without jurisdiction may still be entitled to remuneration for the work undertaken.⁹

There is an inherent conflict of interest associated with the decision whether there is jurisdiction to proceed with an adjudication, as a conclusion that there is no jurisdiction results in termination of the Opportunity to generate income. There is evidence that many adjudicators are dealing with this conflict professionally for, according to the law reports, many have resigned on account of a determination that there was no jurisdiction.

UNNECESSARY PROCEDURES

A criticism of adjudication raised at conferences and workshops of the Adjudication Society and networking events is that some adjudicators adopt unnecessary procedures, thus adding unnecessarily to costs. Specific procedures mentioned were hearings and site visits. The most criticised procedure was holding hearings on jurisdictional challenges which a reasonable competent adjudicator should recognise as having very little merit. It is fair to add that some of the critics act as adjudicators. The fact that adjudicators stand to gain from such procedures at the expense of the disputing parties give adjudicators’ decisions on procedure an ethical dimension.

COMPLEX DISPUTES AND ADJUDICATION

The purpose of the HGCRA is to facilitate cashflow through the supply chain without which project performance will be disrupted or even terminated. The constrained timetable suggests that it was never intended to be used for resolving complex or final account dispute. Its use on such disputes has raised concerns about Responding Parties being ambushed by Referring Parties and the quality of decisions.

⁹ *Linnett v Halliwells LLP* [2009] EWHC 319 (TCC); [2009] 1 C.L.C. 157; [2009] B.L.R. 312; 123 Con. L.R. 104; [2009] C.I.L.L. 2704.

The term “ambushing” refers to the practice where the Referring Party prepares a claim over a long period to which the Responding Party hardly gets up to two weeks to assemble the appropriate professional team and to respond. In *London & Amsterdam Properties Limited v. Waterman Partnership*,¹⁰ which concerned a complex professional negligence claim, HHJ Wilcox found that, by LAP deliberately withholding some evidence until the last possible moment, there has been evidential ambush that denied the Responding Party reasonable Opportunity to challenge that evidence. He refused to enforce the adjudicator’s decision on the grounds the failure to afford the Responding Party reasonable Opportunity to defend elements of the claim was in breach of natural justice. He went to state that there may well be cases which, because of their complexity and /or the conduct of a Claimant, are not susceptible to being adjudicated fairly and thus impartially and that, in such cases, an adjudicator should not strive to make a decision at all costs. In other words, the adjudicator ought to resign unless the parties agree an appropriate extension of time.

On risk of being ambushed in complex cases, HHJ Toulmin CMG QC commented in *AWG Construction Services Ltd. v. Rockingham Motor Speedway Ltd.*¹¹ that in very complex disputes the conflict between the right to refer to adjudication and the duty of the adjudicator to act impartially may be impossible to resolve because of the time limits laid down in s. 108 of HGCRA. The issue of ambush was soon afterwards put to him in *CIB Properties Ltd. v. Birse Construction*.¹² Birse’s employment under the construction contract was terminated by CIB. An adjudicator appointed pursuant to a reference by Birse decided that CIB had been entitled to do so. That adjudication had come as a surprise to CIB as it had not been warned that such action was being contemplated. The surprise adjudication soured relationships between the parties and that, in the opinion of the judge, influenced CIB’s approach to the subsequent adjudication from which this case arose.

On 4th July 2003 CIB put Birse on notice of a claim. On 28th July 2003 CIB served a written demand for payment of £16,609,154.98 within 30 days. To produce this claim, a large multi-disciplinary firm of cost and project management consultants had been engaged from January 2003 to prepare the necessary valuations. The demand letter enclosed 22 lever arch files and stated that a further 52 files of supporting documents were available for inspection by Birse. Birse responded by asking some general initial questions and suggesting a meeting. It followed this response with 126 detailed questions and its draft final account in 14 volumes.

The Notice of Adjudication was served on 14 November 2003 after an abortive mediation and many rounds of meetings failed achieve amicable settlement. Birse wrote to the appointed adjudicator contending that: (i) no dispute had crystallised, as further meetings had been arranged; (ii) it had been ambushed; (iii) the complexity of the case and the ambush made any adjudication inherently unfair. The adjudicator

¹⁰ *London & Amsterdam Properties Limited v. Waterman Partnership* [2003] EWHC 3059 (TCC); [2003] BLR 179; (2004) 20 Const LJ 215.

¹¹ *AWG Construction Services Ltd. v. Rockingham Motor Speedway Ltd.* [2004] EWHC 888 (TCC).

¹² *CIB Properties Ltd. v. Birse Construction* [2004] EWHC 2365(TCC) (hereafter *CIB v. Birse*)

rejected these contentions and, after several extensions of time, made his decision on 24th February 2004 ordering payment of £2,164,892 to CIB.

In the action to enforce the decision, Birse's main defence was that the complexity of the case and the ambush were such that the extensions of time were inadequate to cure the inherent unfairness. The judge found that CIB had been secretly preparing its Referral Notice since Oct/Nov 2002 and that throughout the period of the mediation CIB had been working on the Referral Notice although there had been no mention of adjudication in the communications between the parties. By the date of the final demand for payment of the claim, a team consisting of an expert contracts consultant, five primary assistants and eight additional support staff had been working on the claim, clocking up 2,500 man-hours. A expert construction lawyer was also brought in to provide legal advice and to drive the strategy for prosecuting the claim. The adjudicator, a renowned civil engineer and QC, stated in his decision that, although the dispute was complex, he was confident he had done the dispute the broad justice required by the HGCRA. The court accepted this and enforced the decision.

In *Dorchester Hotel Ltd. v. Vivid Interiors Ltd*¹³ the Referral Notice comprised 37 lever-arch files including two expert witness reports of 30 and 20 pages in length. The Notice of Adjudication and the Referral Notice were served on 12th Dec and 19th Dec 2008, respectively. The adjudicator accepted the appointment on the condition that the period from 24th Dec to 4th January would be ignored in the reckoning of the 28-day timetable. Time was extended to 28th January 2008. In effect, there were only 18 working days for the entire adjudication. Dorchester applied for a declaration that the timetable was so tight that there was a real risk of breach of natural justice. The judge observed that the timing of the commencement of the adjudication was most probably carefully chosen to take advantage of the difficulties the Responding Party would experience in any attempt to prepare an appropriate Response during the Christmas holiday period.

Most final account adjudications necessitate detailed review of all the valuations over the entire project duration to determine the final account contract price. *Enterprise Managed Services Ltd v Tony McFadden Utilities Ltd*¹⁴ involved final accounts on two projects. The final account claim was based detailed schedules and supporting material running to more than 40 Lever Arch files. The material for the claim on the second contract was of similar volume. Referring to comments by HHJ Toulmin CMG QC in *AWG Construction Services Limited v. Rockingham Motor Speedway Limited*¹⁵ on the conflict between the right to refer any dispute and the duty to comply with natural justice, Coulson J stated at para. 93:

In such circumstances, where the sheer volume/size of a claim may make it unmanageable in an adjudication, the course to be adopted by the adjudicator is clear. As the same judge explained in *CIB Properties Limited v. Birse Construction Limited* [2004] EWHC 2365 (TCC), the adjudicator has to decide at the outset whether or not he can discharge his duty to reach a

¹³ [2009] EWHC 70; [2009] BLR 135.

¹⁴ *Enterprise Managed Services Ltd v Tony McFadden Utilities Ltd* [2009] EWHC 3222 (TCC); [2011] 1 B.C.L.C. 414; [2010] B.L.R. 89; (2010) 26 Const. L.J. 204

¹⁵ *AWG Construction Services Limited v. Rockingham Motor Speedway Limited* [2008] EWHC 888 (TCC)

decision impartially and fairly within the time limit prescribed by the Act. If he cannot, he ought to resign.”

He stated that, in his opinion, the claim was not suitable for adjudication. But this was not the reason for his decision refusing enforcement of the adjudicator’s decision. The point on the unsuitability of final account claims for adjudication was therefore *obiter*. As at the time of writing, the only case the author is aware of in which a court refused to enforce an adjudication decision on the grounds of complexity of the dispute is *Whyte & Mackay Ltd v Blyth & Blyth Consulting Engineers Ltd*.¹⁶ In that case the complexity of the dispute was a key factor Lord Malcolm, in the Outer House of the Scottish Court of Session, considered in concluding that enforcement of the adjudicator’s decision would be unlawful interference with the defendant’s peaceful enjoyment of its possessions, a breach of First Protocol of Article 1 of the European Convention Human Rights.

Although the courts have stated in the clearest terms that ambushing and referral of overly complex disputes are unacceptable, they have refrained from refusing to enforce decisions on those grounds because, by not qualifying the disputes that may referred, the legislation does not give them leeway to do so. They have stated, also equally clearly, that adjudicators are well placed to deal with these issues by resigning in appropriate cases unless the parties agree appropriate extensions of time. As resignation results in loss of the Opportunity to generate income, it raises obvious ethical dilemmas.

SMASH AND GRAB ADJUDICATIONS

The payment protocol operates as follows. Section 109 provides a statutory right interim payment under a construction contract except for the smallest of jobs. The concepts of an ‘amount due’ under the contract, its ‘due date’ and the ‘final date’ for paying it are central to the payment rights and obligations under construction contracts created by the HGCRA. The ‘amount due’ at the end of each payment period (monthly in most cases) is the term used in the Act for the amount to which the payee is entitled to be paid by the payer for work and related obligations carried out during that period. The ‘due date’ of any amount due is generally understood as the date from which the obligation of the payer to make that payment commences. It is standard practice in the construction industry to allow the payer a stated period after the due date within which the payment is to be made.¹⁷ ‘Final Date’ has been understood as the last date for payment without the payer falling into breach of contract.

Three types of notices are central to the operation of the payment protocol embedded by the HGCRA into all construction contracts. They are to be served within specified timetables governing any amount due under the contract. The paying party¹⁸ must

¹⁶ *Whyte & Mackay Ltd v Blyth & Blyth Consulting Engineers Ltd*[2013] CSOH 54; 2013 S.L.T. 555.

¹⁷ Normally 14 days after the due date.

¹⁸ The project owner is the paying party under the main contract; the main contractor is the paying party in the first tier sub-contract; the head sub-contractor is the paying party in any sub-sub-contract at any level of the chain of contracts.

serve a Payment Notice stating the amount due and how it has been calculated.¹⁹ In response to failure to serve a valid Payment Notice, the payee may serve a Default Payment Notice²⁰ stating the amount it considers due to it and how it has been calculated. If the paying party intends to pay only part of the notified amount, or nothing at all, it must serve a Pay Less Notice stating the amount it intends to pay and the reasons for any non-payment.²¹ The paying party must pay the amount stated in the Payment Notice by its final date unless it serves against it a valid Pay Less Notice.²² The obligation is to pay the amount in the latter notice if it is served. The notice requirements are designed to compel exchange of information about the parties' payment intentions and expectations very early during monthly payment processes, thus facilitating early identification of irreconcilable differences for swift resolution by adjudication. The policy justification for mandating such procedures into private contracts is facilitation of cashflow, which is essential for efficient delivery of construction and engineering projects.²³

The effect of the protocol is that an employer who fails to issue any notice at all on interim payment due must pay in full the amount stated in the contractor's application as the amount due. An adjudicator appointed to determine a dispute resulting from the employer's failure to pay would therefore be acting correctly to order payment of the full amount applied for without entering into any investigation as to whether the amount applied for is the correct amount due. Contractors are aware that some employers and their contract administrators lack the competences necessary to comply with the protocol. The "smash and grab" syndrome refers to the practice where a contractor, aware of the competence deficit, submits an over-exaggerated payment application against which no notice is served on behalf of the employer. Starting this process and invoking adjudication could result in payment of the entire contract price although the works are far from complete.

ENFORCEMENT OF DECISIONS WITH PLAIN ERRORS

Parties have insisted on enforcing decisions that are plainly wrong or admitted to be wrong by the adjudicators who decided them. An example of such cases is *Bouygues UK Ltd. v. Dahl-Jensen UK Ltd.* in which the adjudicator decided that £207,741 was payable to Dahl-Jensen. However, the calculation of the payment due contained a palpable error (failure to deduct retention in calculating the interim payment due). Had this mistake not been made, £141,254 would have been payable the other way: by Dahl-Jensen to Bouygues. Other cases include: *Bloor Construction (UK) Ltd. v. Bowmer Kirkland (London) Ltd.*; *Edmund Nuttall Ltd. v. Sevenoaks District Council*; and *Geoffrey Osborne Ltd. v. Atkins Rail Ltd.* The general principle on errors in adjudicators' decisions is that, provided the adjudicator had jurisdiction to decide the issue, the decision is enforceable even if manifestly wrong in law or fact. The

¹⁹ S. 110A. The contract may require this notice to be served by the payee. Generally, the paying party is best placed to serve the notice where the contractor carries out no design and there is a contract administrator or project manager administering the performance of the contract.

²⁰ Section 110B.

²¹ Lawful set-offs include accrued liquidated damages for delay and the project owner's cost of remedying specified contractor's defaults provided the contractual procedure for dealing with the defaults is complied with.

²² Section 111(3).

²³ Costs in the construction industry affect the costs of goods and services generally, taxation and, therefore, the country's competitive position in the global economy.

justification for this principle is that the unsuccessful party can always take the same matter to the court or arbitration for the correct answer. Whether there are ethical issues with enforcing a decision admitted to be, or blatantly, wrong is subject to debate. But the spirit of trust at the centre of the Latham Report is not enhanced by taking advantage of adjudicators' palpable errors.

FRAUD AND ADJUDICATION.

In *Pro-Design Ltd. v. New Millenium Experience Co Ltd.*²⁴ a lighting subcontractor sought to enforce, by a summary application, an adjudicator's decision against the main contractor. The latter contended that the claimant was seeking to obtain money by a fraud and that the court should not assist such an endeavour by enforcing the decision. The fraud alleged was that the subcontractor was essentially a fraudulent vehicle set up by one of the defendant's employees, a senior manager who was in a position to ensure award of the lighting sub-contract works to this vehicle. It would appear that the fraud issue had not been argued before the adjudicator. In the absence of any response to this serious allegation, HHJ Mackay in the Liverpool TCC refused to enforce the decision.

In *Andrew Wallace Ltd. v. Artisan Regeneration Ltd*²⁵ the jurisdictional defence to a summary judgment application was that the defendant developer had contracted with a Mr Andrew Wallace in his personal capacity and that, therefore, there was no contract with the claimant company under which a dispute could be referred to and decided by an adjudicator. The defendant alleged that evidence submitted by the claimant supporting its contention that it was the correct party to the contract were forgeries and fabrications. HHJ Kirkham stated that, to defeat the application, the defendant needed to adduce cogent evidence of the alleged forgery and fabrication and that, as the defendant had failed to do this, the claimant was entitled to have the decision enforced.

In *SG South Ltd. v. King's Head Cirencester LLP and Another*²⁶ the claimant builder was engaged by the defendant property developer to carry out construction works to create a retail shopping arcade and a hotel from two sites with existing structures. Payment was to be made against interim certificates issued by a contract administrator appointed by the employer. In the defendant's response to the Referral Notice referring a payment dispute to adjudication, it asserted that, on account of widespread fraud instigated and orchestrated by the claimant of which it had become aware, the adjudicator should not proceed with the adjudication. The specific complaints in relation to the fraud allegation were that:

- the claimant had removed and disposed of steel, fixtures, fittings and equipment from the sites;
- the claimant had removed some stone quoins from a barn on one of the sites;
- the claimant was claiming for plant not actually used;
- the claimant routinely falsified invoices and cost records;
- duplication of invoices;
- inclusion of invoices from other contracts.

²⁴ *Pro-Design Ltd. v. New Millenium Experience Co Ltd.* (Liverpool TCC, 25 September 2001)

²⁵ *Andrew Wallace Ltd. v. Artisan Regeneration Ltd.* [2006] EWHC 15 (TCC)

²⁶ [2009] EWHC 2645(TCC); [2010] BLR 377

Stating that the issue of alleged fraud was beyond his jurisdiction, the adjudicator declined to consider it and made a decision ordering payment. He further advised the defendant that the appropriate way for dealing with any perceived fraud was to refer it to the police and raise it as a defence before the court of enforcement of his decision. In the action to enforce the decision by summary judgment, the property developer raised the alleged fraud as a defence. Akenhead J started consideration of the fraud issue by stating that fraud, depending on the facts, could be as much a defence in adjudication as it is in court or arbitration proceedings. However, he rejected the defence in the instant case for lack of evidence to support a proper arguable case of fraud. In his opinion, the matters complained were, at their worst, only mistaken or incompetent accounting. He then put forward four propositions as to how allegations of fraud in adjudication enforcement proceedings may be dealt with:

“(a) Fraud or deceit can be raised as a defence in adjudications provided that it is a real defence to whatever the claims are; obviously, it is open to parties in adjudication to argue that the other party's witnesses are not credible by reason of fraudulent or dishonest behaviour.

(b) If fraud is to be raised in an effort to avoid enforcement or to support an application to stay execution of the enforcement judgement, it must be supported by clear and unambiguous evidence and argument.

(c) A distinction has to be made between fraudulent behaviour, acts or omissions which were or could have been raised as a defence in the adjudication and such behaviour, acts or omissions which neither were nor could reasonably have been raised but which emerge afterwards. In the former case, if the behaviour, acts or omissions are in effect adjudicated upon, the decision without more is enforceable. In the latter case, it is possible that it can be raised but generally not in the former.

(d) Addressing this latter case, one needs to differentiate between fraud which directly impacts on the subject matter of the decision and that which is independent of it. Examples of the first category are where it is later discovered that the certificate upon which an adjudication decision is based is discovered to have been issued by a certifier who has been bribed or by a certifier who has been fraudulently misled by the contractor into issuing the certificate by a fraudulent valuation. Examples of the second category are fraud on another contract or cross claims arising on the contract in question which can only be raised by way of set off or cross claim. Whilst matters in the first category can be raised, generally those in the second category should not be. The logic of this is that it is the policy of the 1996 Act that decisions are to be enforced but the Court should not permit the enforcement directly or at least indirectly of fraudulent claims or fraudulently induced claims; put another way, enforcement should not be used to facilitate fraud; fraud which does not impact on the claim made upon which the decision was based should not generally be deployed to prevent enforcement”.

The fraud allegation was invoked in *GPS Marine Contractors Ltd. v. Ringway Infrastructure Services Ltd*²⁷ which arose from a contract for the dredging of a berth. After completion of the work, Ringway disputed the bill presented by GPS and the matter was referred to adjudication. During the adjudication, Ringway challenged a claim for additional costs incurred on the grounds that it was not supported with evidence on the labour costs component. GPS replied that the claim had been with Ringway during the preceding eight months during which no request for any detail had been made and that it was unreasonable to demand the provision of full details within the time constraints of an adjudication. The reply had, as an appendix, only part of the details in the form of timesheets for 15 individuals. Ringway responded

²⁷ *GPS Marine Contractors Ltd. v. Ringway Infrastructure Services Ltd.* [2010] EWHC 283(TCC); [2010] BLR 377.

that the additional evidence was deficient and inconsistent with the claim before the adjudicator and invited the adjudicator to disregard it for that reason.

The adjudicator rejected the challenge and made a decision ordering payment to GPS. In the decision, he stated that the tight timescale of adjudication generally prevents detailed examination of supporting details of claims. Ringway failed to comply with the decision and GPS applied for summary judgment to enforce it. One of the defences ran by Ringway was that the adjudicator's decision was obtained by fraud, which was described as acting recklessly as to the truth of statements made in support of the claim in the adjudication. Ramsey J noted that Ringway had argued the inconsistencies and the deficiencies in the supporting evidence before the adjudicator without raising the issue of fraud; the adjudicator had considered the challenge and rejected. In his opinion, Ringway could not be allowed to reformulate the inconsistencies as fraud to defeat enforcement. Applying *SG South v Kings Head*, he rejected the fraud challenge.

In *Speymill Contracts Ltd. v. Baskind*²⁸ the employer contracted with Speymill to convert a country house hotel for his use as a home. The employer failed to meet payment certified by the employer's architect and the matter was referred to adjudication. One of issues in the adjudication was whether the employer had served withholding notices in relation to the relevant certificates. In response to the contractor's assertion that no withholding notices had been served, the employer contended that he had served them but could not produce copies because the contractor's employees had allegedly stolen the relevant files. He was also unable to produce electronic copies because his computer had been allegedly damaged by a lightning strike. The first instance judge refused enforcement by summary judgment on the grounds that, by the allegation of theft, the defendant had established an arguable defence. The Court of Appeal took a different view. Approving Justice Akenhead's analysis of the effect of a fraud allegation on the enforceability of an adjudicator's decision in *SG South Ltd. v. King's Head*, their Lordships held that mere allegations of fraud were not sufficient to prevent enforcement of an adjudicator's decision and ordered entry of summary judgment.

In *Gosvenor London Ltd v Aygun Aluminium UK Ltd*²⁹ the defendant was a sub-contractor on a project for the construction of a hotel in Southampton. It sub-sub-contracted cladding and related façade installation works to Gosvenor for about £440,000. An adjudicator to whom a payment dispute was referred ordered Aygun to pay nearly £554,000 to Gosvenor. Enforcement of the decision by a summary judgment was resisted on grounds of fraud although no allegations of fraud had been mentioned during the adjudication. Aygun also applied for stay of execution on the same grounds in the event that summary judgment was granted. Particulars of the alleged fraud supported by witness statements by Aygun's site staff were that: Aygun's Project Manager had colluded with Gosvenor to over-invoice Aygun for labour used; the Project Manager had disappeared with the laptop containing Aygun's records on the disputed labour usage and costs; Gosvenor deliberately delayed completion to provide it with greater Opportunity to claim labour costs; the Project Manager offered a member of his site team a bribe to keep quiet about various alleged

²⁸ *Speymill Contracts Ltd. v. Baskind* [2010] EWCA Civ 120; [2010] B.L.R. 257; 129 Con. L.R. 66; [2010] C.I.L.L. 2828.

²⁹ *Gosvenor London Ltd v Aygun Aluminium UK Ltd* [2018] EWHC 227 (TCC).

fraudulent practices on the project; that a member of staff of Aygun had been the victim of threats and intimidation by some employees of Gosvenor in relation to the enforcement proceedings. It was accepted in the defence that these matters of fraud should normally be raised before the adjudicator but that, in the instant case, Aygun had become aware of them very late and, therefore, could not have assembled the evidence to support such a serious allegation within the time constraints of the adjudication.

Gosvenor did not serve any evidence to respond to the allegations to fraud. It was only after seeing the draft judgment issued by the judge that it sought permission to adduce such evidence. This was refused. Fraser J observed that, with the exception of the threats and intimidation, all the matters of fraud alleged could reasonably have been raised in the adjudication if Aygun had not lost control of the management of the project. He stated that, applying the *SG South v King's Head* and *Speymill v Baskind*, the Gosvenor was entitled to summary judgment.

In addition to the evidence of fraud, evidence served in support of the application for stay of execution were that: Gosvenor lacked financial viability; if paid, Gosvenor would dissipate any payment before the conclusion of proceedings for final determination of the dispute; a Mr Poppa, the Director of Gosvenor running the project, had stated at a meeting that Gosvenor would be wound up to prevent Aygun getting a penny of any final determination in Aygun's favour; other companies in Mr Poppa was a director had been liquidated; inconsistencies in the accounts for Gosvenor filed at Companies House. Fraser J described as "extraordinary" and "inexplicable" Gosvenor's failure to serve any evidence to respond to these very serious allegations of fraud. He also stated that it was putting it at its mildest to say that the inconsistencies in the accounts and the failure to explain them added to "the air of suspicion over the financial affairs and probity" of Gosvenor. He concluded that, in all the circumstances of the case, there was a real risk that any payment would be permanently lost by wilful dissipation and stayed execution of the judgment. He went to state that the principles for deciding applications for stay of execution in adjudication cases identified in *Wimbledon v Vago* should be extended to include risk of deliberate dissipation of funds to frustrate enforcement of the final determination.

In *Assesmont Ltd v Brookvex IMS Ltd*³⁰ the defendant's complaint in summary judgment proceedings was that the site manager's signatures on timesheets were forgeries and that there were contradictions between the timesheets and the site manager's diary entries for labour. The fraud defence failed on two of the principles stated in *Wimbledon Construction Co. 2000 Ltd. v. Derek Vago*.³¹ First, the judge stated that the effect of the defendant's failure to raise the fraud defence in the adjudication was that it was irrelevant in the consideration of the summary judgment application. Second, the judge stated that, even if he was wrong on the first point, errors in only three of 21 timesheets did not constitute clear and unambiguous evidence of fraud. For the same reasons, stay of execution was refused.

DAB MEMBERS' LOYALTY TO CLIENT/APPOINTERS

³⁰ *Assesmont Ltd v Brookvex Ltd* unreported, 29 August 2018, TCC, Jefford J).

³¹ *Wimbledon Construction Co. 2000 Ltd. v. Derek Vago* [2005] EWHC (TCC).

The members of a DAB or an arbitral Panel must be neutral. They are usually jointly appointed to ensure the neutrality mind-set operates at a deep psychological level (Matyas *et al* 1996). However, it is convention for each party to accept the other's nominee without question (Ndekugri et al, 2014). Although there is reciprocity in this practice, it could sow the seeds for the perception of a DAB member as an advocate for the party who nominated him/her, which is contrary to best practice in the use of DABs arbitral panels.

Ndekugri et al (2014) pose difficult ethical questions concerning the level of contact between a member and his or her nominator. Should members heed the expectation of each party that its nominee on the Board/panel protects its interests? Is it proper for a member, who notices that the party who nominated him/her is failing to present its case properly, to alert that party to the presentational shortcoming? Is it proper for a member to ensure that his/her nominator's case is fully understood within the DAB/Panel? There is some tension between the parties' interest in these behaviours by their nominees and the basic canon applicable to most forms of dispute boards and arbitral panels that a member must not act as an advocate of the party that nominated him/her. In English law, bias on the part of a member would render an arbitration award open to challenge whilst an adjudicator's decision would be unenforceable.³²

Any *ex-parte* communication, contact between an arbitrator, an adjudicator or a DAB member with one party in the absence of the other, will almost certainly render the award or the decision unenforceable on natural justice grounds. *Glencot Development and Design Co. Ltd. v. Ben Barrett (Contractors) Ltd.*³³ illustrates the effect of such communication. The parties suffer financial loss from the wasted costs of the proceedings. For this reason, an experienced arbitrator or adjudicator will usually take great pains to avoid such contact no matter innocent it could appear.

DIFFERENTIAL RATES OF REMUNERATION

The practice with DABs is for each member of enter into a tripartite contract with the parties. It is therefore arguable that the rate of remuneration is private matter for each member and the parties. Lane and Watson (2009) reported that lawyer members of DABs in South Africa are paid at a higher rate than non-lawyer construction confessionals. The research reported by Ndekugri et al (2014) also found evidence of differential rate of remuneration of DABs member. There was also evidence of differences of opinion on whether paying DAB members, other than the Chair of Board who usually takes on extra responsibility, different rates for doing the same work is ethical.

TURF WARS AMONG THE PROFESSIONS

Research suggests a tendency for the construction professional bodies to nominate from their members when they receive applications for nomination of dispute resolvers (Ndekugri and Jenkins, 1994). The author has also heard complaints by highly experienced dispute resolvers that they are being denied entry into the lists of some professional bodies because their primary profession is different from that of the

³² For example, see: *AMEC Capital Projects Ltd v Whitefriars City Estates Ltd* [2004] EWCA Civ 1418, [2005] 1 All E.R. 723.

³³ *Glencot Development and Design Co. Ltd. v. Ben Barrett (Contractors) Ltd.* [2001] BLR 207.

professional body. Christie (2016) examines developments suggesting turf wars on a wider basis.

PRIVILEGE

The term “privilege” is used to refer to the right of a party to proceedings to withhold a document from the proceedings even if it contains relevant evidence. Two of the classes of documents enjoying this protection from disclosure are referred to as “without prejudice” privilege and “legal advice” privilege. The first applies to any record of compromises, admissions or assumptions made in negotiations towards amicable settlement of a dispute. Such a document could have obvious detrimental effect if brought to the attention of the tribunal (which may be the court, an arbitrator and or an adjudicator). The law provides this protection to disputants to promote settlement by freeing them to try as many settlement offers as possible without the fear that their compromises could be used against them in any subsequent proceedings. Legal advice privilege applies legal advice and relevant communications with a party’s lawyers. An important aspect of privilege is that the tribunal should ignore the protected information if mistakenly brought to its attention. Judges are able to do this by their special training.

Adjudication proceedings are often preceded by several rounds of negotiations in meetings or by correspondence. According to the “without prejudice” rule, evidence from such communications should not be included in submissions to an adjudicator. A problem with this rule in adjudication is that a party may be ignorant of it or think that, in the rough and tumble of the games unfortunately played in adjudication, privilege has no application. A related issue is whether adjudicators, most of whom have not received relevant training, are able to ignore “without prejudice” material wrongly submitted to them but which is highly relevant to the case in hand.

It has been an issue whether legal advice privilege applies to legal advice provided by professions other than lawyers. Some of the claims consultants work in multidisciplinary practices or as dually qualified individuals. The current legal position is that advice from this source is not covered by privilege.³⁴

BRIEF DISCUSSION

Aspects of the conduct of parties to adjudication proceedings would be unthinkable in court. The effect of the CPR and the pre-action protocols is that ambushing in court proceedings would be a losing strategy in the current litigation environment. Exaggeration of claims can be punished by the courts through adverse cost orders (e.g., the winning party paying the cost of the parts of proceedings taken up by points on which it lost). By contrast, an adjudicator has no general power to award the costs of the proceedings. Whilst the courts have powers, including the liability for the criminal offence of contempt of court, to curb some of these practices, adjudicators lack equivalent powers. In view of the mistakes some of them have made, this is not necessarily a bad thing.

³⁴ *Walter Lilly & Co Ltd v Mackay* [2012] EWHC 649 (TCC); [2012] B.L.R. 249; 141 Con. L.R. 102.

Judges are human and are often forced to use their creativity to avoid compliance with existing principles. Court developing new principles to avoid the draconian effect of adjudicators' mistake – introducing complexity to the detriment of all concerned.

The justification for Parliament intervening with adjudication is the advantages to the wider society like to flow from cost effective resolution of disputes in the construction industry. For this reason any conduct by organisations or individuals, including failure to undertake adequate training to acquire the competences required of the relevant roles, must therefore have an ethical dimension.

An adjudicator under a construction contract within the ambit of the HGCRA enjoys statutory immunity in relation to actions and omissions in the course of the proceedings except where they are in bad faith. The same immunity extends to employees and agents of the adjudicator. This means that there is no sanction against conduct of degrees culpability that would be actionable negligence if done in the primary profession. There is a view that this immunity can breed a large element of impunity in the conduct of adjudications (Wakefield, 2011; Atkinson and Wright, 2015). Adverse comments by judges appear not to affect adjudicators' prospects of future appointments. On the contrary, it could have the effect of making an adjudicator with a cultivated robust attitude to certain issues more popular in the market place for the services of adjudicators because the criticised conduct may be exactly what some disputants dream for. The adjudicator nominating bodies have been criticised for not paying attention to judicial criticism of adjudicators (Wakefield, 2015).

The issue of ethics and professionalism is one of the most sensitive issues in construction management research. Not surprisingly, very little empirical studies have been conducted into it. Matters on which research is still sorely needed include greater engagement by wider members of the various professional bodies with their DRS and the need for their codes of ethics and professional conduct to catch up fully with this new area of professional activity. The research should be focused on what the current position is and how it needs to change, particularly with respect to enforcement.

CONCLUSIONS

Adjudicators, mediators, arbitrators, expert witnesses from a construction background provide services of a different nature from that of the primary professions. The provisions of those services require additional sets of skills. For some services the law imposes duties breach of which could lead to liability whilst for others the dispute resolver enjoys statutory immunity except for acts in breach of good faith. However, there is need for codes of ethics and professionalism that regulate the provision of dispute resolution services by the construction professions. The professional bodies should therefore examine their current codes and to take appropriate remedial action.

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ETHICAL PREDISPOSITION OF PROJECT MANAGERS IN THE DELIVERY OF CONSTRUCTION PROJECTS IN THE NHS

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The National Health Service (NHS) is a major client of the construction industry with cost of the healthcare estate estimated to be over £8 billion and capital investment of £2 billion in 2015/16. The aim is to investigate if project team members are ethically predisposed to make decisions based on rules or outcome and to examine its relationship with governance and project outcome. A two-stage approach was used based on survey and interviews with senior project managers. Out of 51 participants, formalism predominated regardless of age or gender with 45 formalists ('*rules followers*'), and 4 utilitarians ('*outcome driven*' or '*ends focused*'). The NHS culture is rules and protocol-driven for patient safety and for its duty of accountability to the tax payer. Project governance was more effective as the corporate governance layer did not have sufficient knowledge about construction projects, risk mitigation, and are often perceived to be uninterested in project details. The findings suggest that NHS projects are managed by people with high ethical standards and the governance process whilst acknowledged to be important was sometimes perceived to be ineffective due to difficulties at the interface between corporate and project governance which needs to be addressed for project 'success'.

Keywords: ethical predisposition, governance structure, NHS, project outcome.

INTRODUCTION

In 2015/6 the cost to the UK's NHS of running the healthcare estate was over £8 billion whilst capital investment was approximately £2 billion (NHS Digital, 2017). The importance of project delivery to time, cost and quality for the NHS is explicitly identified in the Capital Investment Manual (NHS Executive, 1994), which sets out the requirements that hospital trusts must meet to justify expenditure on healthcare infrastructure projects. The importance to the taxpayer of the successful delivery of projects is important because overspends result in cost pressures to the NHS or other government departments and time overruns mean that improved healthcare provision is delayed (NHS Executive, 1994).

Ethical predisposition affects decision-making on healthcare projects. The APM (2018) states that 'integrity, respect and empathy' are attributes of ethics in project management. Ethics is 'how to do it best' which is defined as 'honesty, responsibility, respect and fairness' (PMI, 2018). These qualities are not ends in themselves but are important because they give confidence in the profession and the delivery of projects.

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Ethical theory explains how people judge what is the right and wrong. There are two main schools of thought: formalism and utilitarianism (Brady & Wheeler, 1996).. Formalism is the judgement that an action is right if it is based on following rules. It is not concerned with outcome, so it is: ‘a moral system built not around the notion of some goal that is to be attained but rather around the notions of rules or principles of actions or duties or rights or virtues, or some combination of these’ (Mackie, 1977, p. 149).

Utilitarianism on the other hand is concerned with the outcome of an action. ‘There is nothing intrinsically good or bad about the actions themselves. An action is morally right if doing it would bring about the best possible consequences if everyone performed that action whenever he or she were in that sort of situation’ (Miles, 2012, p. 106). Formalism underpins corporate and project governance, which are both concerned with following rules and principles, such as those set out in The Cadbury Report (1992) or Nolan’s Standards for Public life (1995).

The UK government has taken an active part in writing guidance and supporting corporate and project management techniques to promote good practice based on processes, roles and structures, to help ensure successful project delivery, including HMT Green Book (HM Treasury, 2003) the CIM (1994), (NHS Executive, 1994) and advocating the use of PRINCE2® (NHS Executive, 1994) and Gateway™ (DH, 2006)

The need to identify what makes projects successful has been researched for decades and several factors have been identified. However, the role of ethical predisposition and project governance have not been adequately addressed in the NHS. The CIM (1994) made it clear that poor project performance would result in increased taxes or reduced service (NHS Executive, 1994). Building on previous studies of applied business ethics, one strand of this study examined whether ethical predisposition leads to successful project outcome. The second strand builds on the work of Pinto, Slevin and Covin from the 1980s and 1990s on critical success factors (CSF) and the work of the APM (2015), which are things that need to be in place to help projects succeed.

Following on from the introduction, the paper is divided into a review of the literature focusing on ethics, corporate and project governance and project success; an outline of the research methodology; the findings from the surveys and face-to-face interviews with senior managers in NHS construction projects; an analysis and discussion of the findings and the conclusion.

Applied business ethics

The research in this field has mainly examined whether people are formalists or utilitarian based on their age and gender. Measurement was carried out using vignettes (scenarios) whereby participants were asked to indicate what course of action they would take in each scenario based on a set of choices presented to them. Each choice was categorised as formalist or utilitarian. Alternatively, Brady and Wheeler’s (1996) MEV (Measure of Ethical Viewpoints) was used, which is a list of 20 traits that respondents were asked to grade based on a 7-point Likert scale. This grade respondents as formalist or utilitarian based on a sliding scale, so someone could be more or less predisposed to formalism or utilitarianism. It is argued that rules following results in more ethical behaviour is more ethical than utilitarianism (Fritzsche and Becker, 1984, Schwartz, 2007).

Amongst business managers, there appeared to be a tendency toward utilitarianism and this caused Fritzsche and Becker (1984) to question whether this tendency was

good for society. This view was contested by Brady and Wheeler (1996) who found more evidence of formalism in their subjects than Fritzsche and Becker (1984) had. In relation to gender, the results were mixed. Betz et al (1989), Ruegger and King (1992) and Schminke and Ambrose (1997) suggested that women may be more formalist than men, whilst others could not find a discernible difference (Beltramini, et al., 1984 and Kidwell et al (1997). Results for age seem to be more conclusive with Fritzsche and Becker (1984) and Brady and Wheeler (1996) finding that older people were more likely to be formalists than younger people.

Corporate and project governance

The OECD defines corporate governance as ‘procedures and processes according to which an organisation is directed and controlled. The corporate governance structure specifies the distribution of rights and responsibilities among the different participants in the organisation – such as the board, managers, shareholders – and lays down the rule and procedures for decision making’ (ECB, 2005). Corporate governance is underpinned by principles of honesty, integrity and openness and is important because poor corporate governance is harmful to confidence in business. These included high profile corporate failures such as BCCI and Maxwell Communications; this undermined confidence in business (Sir Adrian Cadbury, 1992).

The consequence is lack of trust, unwillingness to take risk, reduction in company value and the reduced availability of capital (Witherell, 2002). In the public sector, poor performance and behaviour also threatens public confidence in the legitimacy of governments. In the UK scandals such as the 2009 expenses scandal, which Gordon Brown called the ‘biggest parliamentary scandal for two centuries (van Heerde-Hudson, 2011). Tony Benn MP argued that this threatened democracy itself (The Independent, 1994). The rules and processes of corporate governance provide openness and transparency in the dealings of the private and public sectors to uphold trust and confidence. Reports such as the Cadbury Report (1992), the Nolan Report (1995) and the Combined Code (1999) set out the principles, structures and processes which must be complied with to show the best possible standards of behaviour.

The term project governance was not widely used before 2000 but it is now more commonly used. Project governance flows from corporate governance (HM Treasury, 2007). The definitions of project governance are similar to those of corporate governance. “Project governance is a set of formal principles, structures and processes for the undertaking and management of projects, applicable in the context of individual projects, programs or portfolios of projects. It involves appointing a governor (or governing body) for a project, defining and regulating roles, accountabilities, decision making and boundary management, and coordination” (Hazard & Crawford, 2004) (see also, Patel & Robinson, 2010). The need for project governance is the same as the need for corporate governance. The outcome of projects needs to be legitimate and relied on by stakeholders, both internal and external.

‘Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions’ (Suchman, 1995 cited in Muller, 2009, p88). The principles of project governance are created through process and structure, like those identified by Hazard & Crawford (2004) and are linked into the corporate governance arrangements.

Project Success

Project success is traditionally measured as the delivery based on the parameters of time, cost and quality at the end of the project management phase. This is widely used model evidenced by its inclusion on the website of the APM and in the 2006 British Standard on project management (British Standards, 2006). However, its usefulness has been contested for its narrowness of definition of project success, the timing of when success is measured and who measures success. Other alternatives have been suggested, such as the 'Square Root (Atkinson, 1999) which adds three other measures to that of the iron triangle. Joslin & Müller (2016) suggested that the iron triangle should be expanded from the traditional measure of time, cost and quality to include benefits such as project efficiency, impact, benefits to the organisation, stakeholder satisfaction and potential'. Despite these alternatives the iron triangle persists as a model perhaps because of its flexibility and simplicity.

RESEARCH METHODOLOGY

A two-stage mixed methods approach was used to address the research questions. An e-survey was developed to establish ethical predisposition, the effectiveness of corporate and project governance the way that project personnel judged project success. An electronic survey was developed using commercially available software to establish the ethical predisposition of respondents, demographic information, information about the projects, views about project outcome, the effectiveness of corporate governance, project governance and opinions about what factors make project successful. An email containing a link to the e-survey was sent to 138 email addresses. Of 203 approaches (138 emails and 65 LinkedIn requests), 51 usable survey responses were obtained, giving a success rate of 25%.

The first stage was followed by the second stage face-to-face interviews. The results were examined and the findings that emerged were taken forward for further exploration with six face-to-face interviews with industry experts (shown in Table 1).

Table 4: Profile of Experts

Experts	Position and Experience
Expert A	Senior manager and has worked on several NHS projects as an NHS employee
Expert B	Senior manager and an external supplier with extensive experience of working for the NHS on NHS construction projects
Expert C	worked on major NHS projects as a senior manager employed by the NHS
Expert D	Senior manager and an external supplier with extensive experience of working for the NHS on construction projects
Expert E	Senior manager and has worked on several NHS projects as an NHS employee and in the private sector
Expert F	Senior manager and an external supplier with extensive experience of working for the NHS on construction projects.

Responses were coded into themes and were used to further explore the issues identified from the e-survey.

FINDINGS

The findings are presented in three themes: ethical predisposition, governance and the measure of project success. In each theme, the results from the e-survey are given first, followed by discussions from the face-to-face interviews.

Ethical predisposition

Of the 51 usable surveys analysed, formalism predominated regardless of age or gender. There were 45 formalists (*'rules followers'*), 4 utilitarians (*'outcome driven'* or *'ends focused'*) and the remaining 2 who were equally formalist / utilitarian (Table 2).

Table 5: Ethical predisposition

Ethical predisposition	Number	%
Formalist	45	88
Utilitarian	4	8
Equal	2	2
Total	51	100

The predominance of formalism was striking and was further explained by experts in face-to-face interviews who suggested three reasons: NHS culture, the project process and personal values. The organisational culture of the NHS was said to be protocol and rules driven partly because of the significant focus on patient care and safety with significant consequences for non-compliance. Rules and processes in the approvals process need to be followed because the NHS is risk averse and accountable to the public. This culture also flows into senior managers involved in construction projects as part of the NHS capital development programme.

The second theme was the project process itself and the needs to follow it. The process is perceived to be strict, well-defined and rules driven. It is broken down into stages which must be completed so approval and funding can be given and projects can progress from one stage to another. Breaking the rules or derogating from guidance is considered risky for individuals and for the progression of projects, so it is rare that this happens. It is safer to follow the rules than to break them. As Expert C commented, 'the whole process, the project outline and the project delivery, is based on an approval process so that means you are reading the rules, looking at the rules and following the rules to make sure you are able to actually get the project done.' The third theme was personal values. If you are someone who can accept the rules and follow them then it is a culture that you can work in. If you are someone who cannot, then it will be difficult to survive. However, the professions within the NHS and the construction industry are governed by codes of conduct for the protection of the public. There are a variety of punishments for breaching these codes, for example, being struck off the professional register, which prevents an offender from practicing for a period. Expert A noted 'we tend to do things the right way and we've got a code of ethics and we want to adhere to it and know that all the decisions are made correctly, and everyone is consulted and that we will be true to our word about outcomes.'

Corporate and project governance

The relationship between corporate and project governance, and the effectiveness of corporate governance was examined based in the opinion of project personnel in the e-survey and further explored in the face-to-face interviews. For *project governance*, there were 7 elements (1) project sponsor, (2) project board, (3) risk management, (4) quality management, (5) financial management, (6) user groups and (7) stakeholder groups. Each of 51 respondents was scored using a Likert scale from 0-5 (where 5 is very effective was 4; quite effective, 3; quite ineffective, 2; very ineffective, 1; don't know, 0). The responses were organised into three categories: 'effective', not effective and 'don't know'.

For *corporate governance*, there were 8 elements: (1) Trust Board, (2) Chairperson, (3) non-executive directors, (4) Chief Executive, (5) Executive directors, (6) Trust risk committee, (7) Trust remuneration committee and (8) Trust audit committee for each project. Each of 51 respondents was scored using the same Likert scale from 0-5 and the responses were organised into the same three categories.

The averages (mean) of project governance and corporate governance scores were calculated. Project governance was perceived to be considerably more effective than corporate governance with a mean score of 41.29 for project governance effectiveness and 21.38 for corporate governance effectiveness. It was also evident that there was less knowledge amongst project personnel about the corporate governance level with a mean score of 8.63 (Table 3).

Table 6: Mean scores for project and corporate governance effectiveness

Effectiveness	Effectiveness Mean scores	Not effective Mean scores	Don't know Mean scores
Project governance	41.29	7.86	1.86
Corporate governance	21.38	21	8.63

Explanation for the differences between corporate and project governance were given by experts. Themes that were identified were related to the behaviour of key actors in the process.

Project Team/ Board

This group is concerned with positive message upwards to the corporate governance level to reassure the Trust Board that everything is under control and to protect colleagues from the possible repercussions of giving bad news. Expert A noted the tension between reporting problems upwards and protecting colleagues by encouraging a perception that everything is going well in the project. Expert D said that 'Anybody with a certain amount of experience knows how to deal with a board, very much you give them what they want to hear until it's far too late probably which I think is one of the issues with corporate governance approach.'

Project Director

The Project Director sits between the Project Board and the Trust Board and is seen, by some, to have a pivotal role. The Project Director is the person in the project who is closest to corporate governance. He or she are more likely to know and understand the priorities of the Trust Board. They were thought to be the person that decides what information goes up to the Trust Board and when information goes up to the Trust Board. They were also thought to have their own priorities in the project.

The Project Director manages upwards to the corporate governance layer. This takes the form of deciding what information is communicated and the timing of communication to the Trust Board. The key role of the project director as the main interface between corporate and project governance was identified. Expert F noted that ‘The Project Director will decide what they think corporate governance needs to know about.’

Trust Board

The corporate governance level (the Trust Board) was perceived to be operationally focussed rather than project-focussed. Their main role is to manage the running of the Trust. The wide role of the Trust Board was acknowledged but respondents identified some apparent limitations in this layer of governance. Like project teams, Trust Boards also engage in positive messaging. Parts of Trust Board meetings are held in public and it was thought that Trust Boards did not want to say that a project was not progressing well. From the point of view of project personnel, Trust Boards do not fully understand how large capital projects work. They are inexperienced in such projects, which are infrequent, but this means that whilst they may understand the risks of such projects they do not know how to mitigate them. Trust Boards want complex and detailed information presented in a simplified way, perhaps through dashboard reporting. This lack of understanding of detail, or even willingness to engage with the detail, means that they base their decisions about the project on potentially over simplified information. The Trust Board is seen to delegate to Project Teams but not to understand what this means or what the implications are. They are not always seen as informed clients and this, in the opinion of respondents, makes them less effective than they should be. Finally, Trust Boards are seen to want solutions, not problems and project personnel suggested that it was not advisable to present a Trust Board with a problem unless there was a proposed answer to it. Expert C said ‘I thought there was a disconnect between the reality of what was going on day to day and governance right at the top at Board level....I think the people on the project board understood, but when it got to the next level, corporate governance, I don’t think they had an understanding of what it meant, what they were actually involved in.’

Communication

Communication was not always thought to be effective and communication between the project team and the Trust Board could be reduced to sterile reporting rather than a positive discursive activity. Furthermore, informal networks were used, such as ‘corridor conversations’ to help smooth the governance of projects. Expert D noted that project governance does not always achieve very much because of the ‘sterile reporting structure’ and Expert A noted the difference between performing governance and achieving it.

Measurement of Project Success

Of 50 respondents to this question, 45 ‘claimed’ that their project had been successful. Only 5 respondents caveated their answer to suggest that project success had been partly, not completely, achieved. No project was identified as being an outright failure (Table 4). The comments for the partly successful projects were: that the project was delivered but there were significant issues during delivery and construction; the project was only partly successful because of procrastination of the client and Trust Board; the facility was superb but the build quality is poor, the

performance of the contractor was poor and that the project would be successful if teething problems could be overcome.

Table 7: No. 'claimed' success projects

Claimed success	Number	%
Yes	45	90
No	0	0
Other	5	10
Total	50	100

All 51 respondents answered the supplementary question about performance to time, cost and quality. Of these only 11 projects met all three - time, cost and quality criteria, representing 22% of all projects. The APM (2015) also found the same or similar level of success in all three criteria. Across the whole sample, 43% projects were completed on time, 47% achieved cost targets and 80% met quality targets (Table 5).

Table 8: Projects meeting time, cost and quality criteria

Sample	Achievement of time Nos. (%)	Achievement of Cost Nos. (%)	Achievement of Quality Nos. (%)
51 projects	22 (43%)	24 (47%)	41 (80%)

Experts explained that quality was the most important criterion in judging project success. Expert B noted the following: 'I would mainly evaluate it against my concept of quality - time and cost would not be a massive factor for me, I don't think... If a healthcare building gets through that complex process we have already spoken about, that is a success on its own...If this building reaches financial close even a year late I think most people would say you made it, that was a success, you got there in the end. Not, "why has it taken a year?"...If we're benefiting from it, it was painful but we got there, so it was a success.' This sentiment was repeated by several experts (Experts A, B, F) and the concept of quality was extended beyond the quality of the building into the operational phase and the delivery of benefits to the NHS and to patients. Expert F was strongly of the view that the quality of the product is the most important thing: that it is the right size, that patients are getting a better experience, that you are getting the efficiencies you planned for. It is more than getting a hospital built, it is delivering what you said you were going to deliver. Missing cost targets or time targets by a few weeks, is not as important because the build period is short compared to an operational phase of maybe 60 years. That is not to say that time and cost are unimportant, but they are not equal to the quality of the product.

CONCLUSIONS

The study found that ethical formalism underpins construction project delivery in the NHS with the prevalence of rules and processes which govern the delivery of construction projects. The NHS is a rules-based, protocol-driven organisation based on the imperatives of patient safety and the fact that it has a duty of accountability to the tax payer to ensure money is spent properly. Approval rules set out by HMT Treasury and corporate governance rules underpinned by the principles in Cadbury

(1992) and Nolan (1996) to ensure high moral standards are based in ethical formalism. It showed that project personnel's own ethical predisposition was formalist and suggested two reasons. First, to get projects through the approvals process the rules have to be followed and second, utilitarians might find it too difficult to work in such a predominantly formalist culture. The study also showed that project governance was thought to be more effective than corporate governance based on the experience of project personnel. However, some difficulties were found at the interface between corporate and project governance which needs to be addressed. The corporate governance layer did not appear to have enough knowledge about construction projects to be able to monitor them nor did they have sufficient knowledge about risk mitigation, even though they knew about the importance of risk management. The corporate layer was also perceived to be uninterested in the detail of projects and preferred to be given solutions rather than asked to solve problems. Project teams and in particular the project manager/ director were able to control the content and timing of information that passed to the corporate layer and this resulted in a formulaic reporting of the project to the corporate layer. The project team also controlled the flow of information to the corporate layer to protect team members from censure. Finally, the study identified the continuing problem with the definition of project success as project personnel overwhelmingly identified their projects as being 'successful' even though most projects did not meet the three criteria of time, cost and quality. Project personnel identified other measures including performance of the project in the operational phase in terms of improved quality of both the buildings and of the service. This emphasis on quality was reinforced by the fact that 80% of projects were thought to have met quality criteria compared to 22% that met time and 24% that met cost criteria.

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ETHICAL IDEOLOGY AND NIGERIAN BUILDING PROFESSIONALS' AMBIVALENCE TOWARD ETHICAL ISSUES

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The building industry is susceptible to corruption and other ethical lapses and the Nigerian building professionals are not immune to these ethical lapses. The morality of an action is multifaceted as it is subject to individuals' ethical ideology. The objective of this study is to examine the dimension of ethical lapses within the building industry in Nigeria, and also identify the influence of professionals' ethical ideology on the perceived ethical lapses. The study depends on a questionnaire survey among professionals in client, consultant and contractor organisations. The conclusion from the study is that contractor pre-qualification, tendering procedure and award of contract are most prone to unethical practices. The dominant ethical ideology of the Nigerian building professionals leans towards 'situationism'. The connection between construction professionals' ethical behaviour and ethical ideology is significant in understanding the value held by professionals as well as providing the basis for altering behaviour where necessary in the interest of society

Keyword: bribe perception, building professional, ethical behaviour, ethical ideology, procurement process.

INTRODUCTION

The professionals in the Nigerian building industry are not immune from the perceived national trend in corruption and other unethical practices. Opportunities for corrupt practices abound at every phase of the procurement of building projects; during planning and design, in the award of contracts, during the construction process, and post construction stage including maintenance of completed projects. Professionals involved in any aspect of the phase of project procurement may find themselves struggling between public expectations and their moral philosophy.

It is well accepted that individuals' moral philosophy or ethical ideology influences their reasoning about morality of issues and consequent behaviour (Fritzsche & Becker 1984). Ideology comprises relativism and idealism. Relativists believe there is no universal standard by which an ethical decision may be evaluated and that moral principles depend on the situation. Idealists, on the other hand, believe in the existence of universal standards, and rely on such guiding principles or laws to evaluate the ethics of an action (Forsyth 1992). Each of the ethical ideologies is derived from a specific category of ethical philosophy as shown in Table 1. The

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highly relativistic individuals (situationist and subjectivist) endorse an ideology related to moral philosophy known as ethical scepticism. Situationists believe that an action is judged ethically right or wrong depending on the situation; when a corrupt act, for example, can produce benefit for most, if not all people, then they can be adjudged ethically right. Subjectivists would be categorised as ethical egoists because of their practical approach to evaluating their actions (Forsyth 1980). Ethical egoists believe that any action that results in harm to others is ethically wrong. In contrast, individuals with low relativism (absolutist and exceptionist) believe in moral or ethical guiding principles. Moral absolutists are of the belief that all of morality consists in inflexible axiomatic principles which must be followed exactly. Exceptionists, on the other hand, endorse the notion that morality of an action depends upon the consequences produced by it. Generally, the debate on what is ethically right or wrong is not based on shared norms, values and beliefs (culture) of the society or group but on the individual's philosophy.

Table 1: Taxonomy of ethical ideologies

RELATIVISM		
IDEALISM	High relativism	
	Low relativism	
	Situationist	Absolutist
	Subjectivist	Exceptionist
High Idealism	Rejects moral rules; advocates individualistic analysis of each act in each situation; relativistic <i>Justice concepts</i>	Assumes that the best possible outcomes can always be achieved by following universal moral rules <i>Norm, Rights & Rule concepts</i>
	Appraisals based on personal values and perspective rather than universal moral principles; relativistic <i>Egoism concepts</i>	Moral absolutes guide judgments but pragmatically open to exceptions to these standards; utilitarian <i>Categorical imperative & utilitarian concepts</i>
Low Idealism		

Source: Modified from Forsyth (1980:176)

Several studies have sought to identify ethical practices of built environment professionals and factors responsible for such practices (Abdul-Rahman, Wang & Yap, 2010; Shah & Alotaibi, 2017). The objectives of the current study are to examine the dimensions of ethical lapses within the building industry in Nigeria, and identify the influence of professionals' ethical ideology on the perceived ethical lapses. The expected benefit of this study is that unethical practices among key stakeholders in the building industry would be unveiled and the underlying professional ethical ideology is significant in understanding their disposition when faced with ethical issues. This serves as bases for altering behaviour, where necessary, in the interest of society.

RESEARCH METHOD

The study adopts a descriptive research design. The target population comprised core building industry professionals involved in the procurement of building projects in three major cities of Nigeria (Abuja, Lagos and Port-Harcourt). The population sample was drawn from professionals in client, consulting and contracting organisations in the building industry. Convenience sampling technique was adopted for professionals in all categories of organisations because of the unavailability of a sample frame from which an accurate sample size could be drawn.

Data for the study were generated through a questionnaire survey. Ethical ideology was modelled after Forsyth (1980) Ethics Position Questionnaire (EPQ), which contains 20 attitude statements to measure ethical ideologies and moral philosophy held by individuals. The first ten questions of the EPQ form a subscale to measure idealism and the next ten measure relativism. Deviating from Forsyth's (1980) study, instead of a nine-point Likert scale, a four-point Likert scale was used for measurement, with 4 indicating "strongly agree" and 1 indicating "strongly disagree". The choice of a 4-point Likert scale in this study is for simplicity in rating respondents' degree of agreement.

To classify the respondents into one of the four ethical ideologies, idealism and relativism scores were used. This was done by using the median scores of idealism and relativism as cut-off points. The median scores for idealism and relativism were both 20. The maximum score an individual can attain for either idealism or relativism subscale is 40. A scale above 28 out of 40, i.e 70% and above is considered high for both idealism and relativism while any score below 20, i.e 50% is considered low for both subscales. Respondents who scored high on idealism and on relativism were classified as situationists ($n = 136$). Those who scored high on idealism and low on relativism were classified as absolutists ($n = 40$).

RESULTS AND DISCUSSION

Demographic profile of respondents

From the biographical information of the respondents presented in Table 2, 53% of the respondents are in client organisations, 27% are in consultancy organisation while the remaining 18 are in contractors' organisations. In terms of professionals' work experience in the industry, 10% have less than 5 years experience, 23% have 6-10 years experience, 33% have 11-20 years experience, 27% have 31-40 years experience while a few have above 40 years experience in the industry. This implies that information provided by the respondents pertaining to ethical issues in the industry could be relied upon.

Table 2: Demographic profile of respondents

	Frequency	Percentage	Graphical profile
Organisation type			
Client	102	53	<p>A pie chart representing the distribution of respondents by organisation type. The chart is divided into three segments: a large blue segment for 'client' (53%), a red segment for 'consultant' (27%), and a green segment for 'contractor' (18%). A legend to the right of the chart identifies the colors: blue for client, red for consultant, and green for contractor.</p>
Consultant	55	27	
Contractor	35	18	
Industry experience			
Less than 5 years	20	10	<p>A pie chart representing the distribution of respondents by industry experience. The chart is divided into six segments: a large green segment for '11 – 20 years' (33%), a red segment for '6- 10 years' (23%), a purple segment for '21 –30 years' (27%), a blue segment for 'Less than 5 years' (10%), a small cyan segment for '31 – 40 years' (9%), and a very small orange segment for 'Over 40 years' (2%). A legend to the right of the chart identifies the colors: blue for Less than 5 years, red for 6- 10 years, green for 11 – 20 years, purple for 21 –30 years, cyan for 31 – 40 years, and orange for Over 40 years.</p>
6-10 years	45	23	
11-20 years	64	33	
21-30 years	52	27	
31-40 years	9	05	
Over 40 years	2	01	
Over 40 years			

Dimension of ethical impropriety at Planning and Design phase

Professionals' expertise is essential at the early stage of a project. They are involved at the planning stage in setting the project technical parameters, preliminary cost estimate and then advise the client on the choice of contractors. These functions involved a significant degree of judgment and discretion, which are often abused for personal gain. During the construction phase, they play important roles in project administration. The most common ethical impropriety at the various stages as presented in Table 3 include those discussed below.

(i) *Inadequate quality communication*: Sometimes, design quality is not properly communicated to the site team. Ambiguity deliberately included in the design documents by the professional architect or engineer creates opportunities for corruption. Statements such as "...to architect or engineer satisfaction" are subjective and often misinterpreted on site. Sometimes, vital aspects of the design are deliberately omitted from the document to create design variation during construction. The contractor prices these variations very high and the professional gets a bribe.

(ii) *Over measurement of quantities*: This is applicable to both new works and maintenance or re-construction works. Often, the quantities of various trade items are over measured in the Bills of Quantities. For example, instead of 50m³ of concrete, the professional may indicate 70m³. The cost of the additional quantity of cement in 20m³ of ratio 1:3:6 will be 80 bags (50kg) at N2,700 = 216,000 Naira. This is often shared between the professionals and the contractor on pre-agreed percentage. The additional cost of all quantities fraudulently measured might be quite substantial

because the cost of materials and labour as well as the contractor's mark up are considered in building up the rates.

(iii) *Cost inflation*: Some projects involve demolition, renovation or conversion work, which involves measurement of various spot items. Sometimes, professionals inflate the labour cost or the cost of such spot items. The contractor gets the money and gives a bribe to the professional.

(iv) *Over measurement of day-works and variation*: It is rare for a contract to be completed in the same form as originally agreed. Changes to the initial design or construction method may be necessitated by error in the original design, intervening circumstances such as unknown ground conditions, and the client's decision to change the requirement after the start of the project. These changes are usually reflected as variations to the contract document. Since design and material variation are subject to re-measurement and the quantity surveyor has to determine a fair rate for the new item in the variation, sometimes, extra rates, over and above the 'fair rate' are added in connivance with the contractor who gets the money and give the professional a bribe.

Table 3: Dimension of Ethical Impropriety ranked by organisation types based on procurement phase.

Ethical impropriety	Client org. N = 102		Consultancy org. N = 55		Contractor org. N = 35		Overall	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Design and Contract documentation stage								
Making undue allowance for provisional & prime cost sum in bills	3.18	1	2.76	1	3.04	1	3.09	1
Poor communication of quality standard to site personnel	2.91	3	2.72	2	2.88	3	3.03	2
Inflating quantities of measured items in bills	3.03	2	2.65	3	2.90	2	2.89	3
Intentionally withholding production information which result in variation	2.55	4	2.22	4	2.40	4	2.29	4
Tampering with tender figure in favour of desired contractors	2.48	5	2.11	5	2.34	5	2.26	5
Contractor pre-qualification								
Non adherence to pre-qualification guidelines	3.51	1	3.16	1	3.42	1	3.57	1
Bias in recommendation of contractor during pre –qualification	3.25	2	2.91	2	3.12	2	3.09	2
Writing favourable report on contractors' claim of competence without verification	3.25	2	2.73	3	3.02	3	2.83	3
Tendering procedure and award of contract stage								
Awarding contract to friends/acquaintances/companies in which they hold interest	3.52	1	3.17	1	3.45	1	3.66	1
Award of contract to unqualified contractor based on relationship	3.08	4	2.42	5	2.88	3	3.06	2
Bias in tender evaluation in favour of desired contractor	3.16	3	2.64	2	2.97	2	2.97	3
Requesting and accepting gratification before awarding contract	2.86	5	2.50	3	2.76	5	2.86	4
Allowing a contractor to submit more than one tender with different company names	3.21	2	2.28	7	2.86	4	2.76	5
Accepting tender after closing date	2.57	7	2.30	6	2.52	7	2.69	6
Revealing estimates to desired contractor	2.79	6	2.45	4	2.67	6	2.63	7
Building construction and final account stage								
Inflating prices of items of fluctuations	3.05	1	2.69	1	2.91	1	2.83	1
Over measurement of day works, variation etc	2.90	2	2.65	2	2.79	2	2.69	2
Indirectly requesting for gratification before carrying out professional duties	2.40	5	2.17	4	2.36	5	2.54	3
Concealing bill item not executed by contractors	2.73	3	2.24	3	2.54	3	2.46	4
Turning blind eyes on defective workmanship	2.55	4	2.06	5	2.37	4	2.31	5
Approving or allowing poor quality/inappropriate materials	2.31	6	2.04	6	2.19	6	2.09	6

Professionals' ethical violation in the building industry

The respondents were asked to indicate how frequent they observed an ethical violation or misconduct among project team members in the building industry by indicating “Very often”, ‘Often’, ‘Rarely’ or ‘Never’, as the case may be. The results presented in Table 4 indicate that virtually all of the building industry professionals have witnessed ethical violation among project team members. The quantity surveyor and the builder ranked first (both with a mean of 2.85) in terms of observed incidence of ethical violations or misconduct among project team members. This result is in tandem with that of that found by Bowen, Pearl and Akintoye (2007) in South Africa where 79% of the respondents had experienced some form of breach of professional responsibility. The builder/construction managers and quantity surveyors have observed higher ethical violation than the other professionals. In the South African study, the quantity surveyor observed greater violation of professional responsibility and this was attributed to their greater contact with both upstream (client and consultants) and downstream (contractor, suppliers, sub-contractors) participants in the construction supply chain (Bowen et al. 2007).

Table 4: Ethical violation by project team members

Profession	Very often	often	Rarely	Never	N	Mean	Rank
Quantity Surveyor	9	16	15	-	40	2.85	1
Builder/ construction manager	6	28	13	-	47	2.85	1
Architect	3	25	12	1	41	2.73	3
Services Engineer	2	5	6	-	13	2.69	4
Structural Engineer	5	18	22	-	45	2.62	5
Mean	3.15	2.51	2.99	1.00			
Variance	1.735	1.715	1.814	-			

Bribe perception index of professionals

An important step in the fight against corruption is to identify those who are engaged in (or most susceptible to) corruption. Since corruption usually leaves no paper trail, perceptions of corruption based on individuals' actual experiences are the best, and often the only available information. The research sought to find out which of the construction professional groups is most susceptible to receiving bribes/gratification. The results are presented in Table 5.

Table 5: Bribery perception index of building professionals

Professional	N	Mean	Rank
Quantity Surveyor	191	3.28	1
Builder/Construction Manager	191	2.87	2
Architect	191	2.73	3
Structural Engineer	191	2.67	4
Services Engineer	191	2.28	5

The perception-based measure of corruption was adopted. This involved sampling respondents' perception of the profession most susceptible to bribery. The justification for using this measure despite its many problems is based on the assumption that "how a person perceives or understands their colleagues would be a significant determinant of their decision-making or behaviour in their day to day practice". Therefore, while perception surveys do not constitute an actual measure of behaviour, they offer an indication of how a person may behave in the real sense given certain perceptions. Table 6 shows the overall ranking of the professionals in terms of the degree of their susceptibility to bribery. Susceptibility to bribery here means those who demand or receive the bribe.

As indicated in Table 6, the quantity surveyor ranked overall as the most susceptible to bribery, followed by the builder/construction manager and the architect. It is pertinent to note that all professional groups rank well above 2.0 on the bribe perception index. CIOB (2006) found that 41% of the respondents to its survey had been offered a bribe on at least one occasion. Vee and Skitmore's (2003) study in Australia and that of Pearl *et al.* (2005) in South Africa indicate that builders/contractors are considered to be the most likely group to participate in unethical practice (including bribery).

The outcome of this investigation may follow social comparison error known as "the theory of pluralistic ignorance" in the perception of unethical behaviour. Buckley, Harvey and Beu (2000) and Halbesleben *et al.* (2004) assert that individuals mistakenly believe that others are more unethical than they actually are. They argued that a primary mechanism leading to the overestimation of unethical behaviour is the media's heavy coverage of unethical behaviour in business. It is not surprising that the quantity surveyor was ranked as being the most susceptible to corruption. This is because of his roles in estimating the cost of a project, interim valuations of works and cost control functions during project execution stages.

Professionals' ethical ideology

There is much empirical support for the notion that an individual's ethical beliefs or ideology influences their approach to ethical judgement and consequent behaviour. Table 6 presents the ethical position of all respondents according to Forsyth's taxonomy. The result indicates that the overwhelming majority of respondents (77%) were found to be situationist while only 23% were absolutist. Situationists believe that people's situation, rather than their character, is a powerful determinant of why different people behave differently in a given situation. Considering the award of contract as an example, the rule tends to be that of: "the lowest bidder wins the contract". An absolutist would use the ethical principle of justice, no malfeasance, autonomy and beneficence to arrive at his/her decision. That may mean upholding that rule, whether the bid price is sufficient for execution of the project or not. The situationist would consider how a good outcome can be achieved and that may lead to rejection of that rule where, for instance, it is believed that the bid price will not be sufficient to complete the project and the work is likely to be abandoned, which will not be in the public interest. There are instances where an absolutist ethical ideology

is preferable to a situationist ideology. Those who implicitly or explicitly support the views of situationism would someday act against the public interest.

A few studies have used Forsyth's (1980) EPQ. Singhapakdi et al. (1994) found Thai managers to be high in moral idealism. Davis, Johnson and Ohmer (1998) found that Indonesian MBA students scored high on relativism, while US respondents scored high on idealism. Lee and Sirgy (1999) found that Korean managers were higher on idealism than US managers; relativism was not significantly different between the two groups. Redfern (2005) found Chinese managers in highly industrialised region to be high on both the idealism and relativism dimensions.

Table 6: Ethical ideology of professionals involved in the procurement of building projects.

Profession	N	IDEALISM		RELATIVISM		ETHICAL POSITION			
		High	Low	High	Low	SITUATIONIST		ABSOLUTIST	
		Percentage		Percentage		N	%	N	%
Architect	39	100		74	26	29	74	10	26
		0							
Builder/Construction Manager	42	100		79	21	33	79	9	21
		0							
Quantity Surveyor	38	100		82	18	31	82	7	18
		0							
Structural Engineers	44	100		73	27	32	73	12	27
		0							
Services engineers	13	100		100	0	11	85	2	15
		0							
Total	176	100		77	23	136	77	40	23
		0							

The result of one way analysis of variance (ANOVA) presented in Tables 7 indicates that there is no statistically significant difference ($p < 0.05$) in the ethical ideology of different categories of building professionals. This implies that similar moral philosophy influence the ethical behaviour of professionals in the Nigerian building industry.

Table 7: ANOVA for professionals' ethical ideology

	Sum of Squares	DF	Mean Square	F-statistic	P	Level of Significance	Decision
Between Groups	1.298	3	0.433	0.607	0.611	NS	Accepted H_0
Within Groups	111.266	159	0.722				
Total		162					

NS= Not significant at $p < 0.05$

CONCLUSION

This research set out to investigate the dimensions of ethical behaviour in the Nigerian building industry and the influencing factors. The aspects of the procurement phase which were most prone to ethical impropriety are contractor pre-qualification, tendering procedure and award of contract. The quantity surveyors were perceived as the most susceptible to bribery. Nigerian building industry professionals are high in both idealism and relativism. The identification of situationism as the dominant ethical ideology of the Nigerian building industry professionals portends grave implications for interpreting ethical rightness or wrongness of issues in a profession where a great deal of discretionary powers are exercised by professionals. To curb

professionals' ethical impropriety in the procurement of projects in Nigeria, the study recommends that since knowledge improves the chances of ethical behaviour, the professional institutions should organise periodic training sessions as part of Continuous Professional Development (CPD) where case studies and trending ethical issues are discussed.

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EXPLORING INHERENT CRUELTY AND SOCIAL HOUSING: ETHICAL DILEMMAS FOR BUILT ENVIRONMENT PROFESSIONALS

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This paper examines the ethical dilemma faced by built environment professionals in mediating between clients and end users where in general, society hold a particular view on issues in question. In this study, the focus is on the architectural profession and social housing, social housing has become a protracted problem across global cities relating to quantity and quality. Several reasons have been advanced for shortages of social housing and so also have been solutions, however, questions are being asked of built environment professionals to reflect on their professional and ethical code of conduct in the practice of their professions. In other words, it is recognised that built environment professional have a critical role to play, in this case, in ameliorating pronounced social housing shortages and the attendant homelessness across global cities. This is in recognition that built environment professionals exercise huge influence on housing development, including site locations, design, selection of materiality, chosen energy strategy, and construction methods and processes. There is a debate about how much influence-built environment professionals can exert on social housing in view of clients' wishes, in this case, the government, and the perception of the wider society on issues such as social housing. In other words, can and should the architect rank ethical considerations as well as users' requirements above those of clients and society? The authors tackled this question by appealing to architectural history and psychoanalytic reasons for the disparate views society holds of social housing, and how built environment professionals can draw inspirations from the work of Bernard Tschumi in redressing housing problems of La Villette in Paris.

Keywords: Social Housing, Ethics, Dilemma, Built Environment, Professionals

INTRODUCTION

Social housing was an issue for the ancient Romans and the medieval Christians. Today's social housing owes much to the Enlightenment of the 1700s (Frier, 1980). It was an era that valued reason over superstition, it valued science and commerce, it believed all men were created equal, it believed in democracy, the greatest good for the greatest number, and a fair distribution of the wealth of the nation (Bristow, 2010). Social housing carries on with the Enlightenment project. Since the end of WWII, 'the good' of social housing remains with us, but opinions differ over what the good is. If measured by a modernist standard, 'the good' in social housing means the power to give shape and order to the chaos and malaise that can prevail in life. If measured by a postmodern standard, 'the good' in social housing provides freedom from the artificial constraints and limits of a functionalist rationality so residents can

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live a direct, meaningful and authentic life. One's choice of 'the good' would seem to be a matter of one's philosophy, of how one reads the Enlightenment and its values.

We could expand and reflect upon the different philosophies of social housing. We could even speak of the history of the philosophy of social housing (King, 2017). But, this is not what we want to do. The difference between these two positions is not just a set of *a priori*s and philosophical schools, or historical and cultural traditions. What is interesting here is not the story of those in favour of social housing, but the story of those who object to it. This is because there is an objection to social housing that seems to be the product of a recurring human character and disposition. It is broadly heard from ancient Rome to Napoleonic France and contemporary America. In 2017, for example, the US Secretary of Housing and Urban Development, Ben Carson, repeated this objection when he said, "Don't make housing for the poor too cozy" (Alcindor, 2017).

Ben Carson was originally a neurosurgeon, but the basis of his objection is not neurobiological or even scientific. His objection is indeed an ancient one, and hard to see without some kind of metapsychology as formulated by Freud. In his *Civilisation and its Discontents*, 1930, he pointed out how bourgeois norms require repressing the instincts or drives (Freud, 1930). The middle classes are of the view that a person needs to repress their urge for instant gratification in exchange for a larger long-term prize. If you want big prizes like money, status and property, you have to demonstrate responsibility, self-control, duty, and adherence to the law. In return for all this sacrifice, you get proper prizes and rewards. You get an official protected identity, long-term security and good housing. Social housing should be meagre because residents do not repress their wishes, thus the prize is much smaller.

Seen from a Freudian perspective, the many historical examples of this objection are not a matter of science, philosophy or ethics. This objection is foundational to civilisation. Civilisation only works if people love following the law rather than their instincts. Yet, when submission to the law goes too far, neurosis is the result.

The function of neurosis in social housing is an interesting topic. It might be wise, for those unfamiliar with psychoanalysis, to stay with this topic and develop it further. This we could, but it might be of little real value if we did not first take this method one step further. Although it may predominate, the neurotic issue is not the only psychoanalytic issue. We would be content to leave it here were it not for the way history also shows us a blacker and more difficult problem of outright cruelty. Here we are in a rather taboo area of social housing that goes beyond the meagreness of a neurotic scenario into a truly perverse meanness. We can all think of examples of built environment administrations that professes the best of intentions but actually punish people for their situation without providing a way to change things for the better. In this case, you have to wonder whether the administration is just enjoying the punishments under the cover of good intentions. This is where built environment professionals really should draw the line, where they should have active ways to stop this kind of cruelty. How should the built environment professional respond when he or she senses an inherent cruelty in the social housing system? Part of this requires an ability to spot the emotional difference between neurotic meagreness and sadistic cruelty.

SPOTTING CRUELTY

Built Environment professionals operate in many social spheres and interact with a wide variety of clients. A certain percentage of this population has a cruel streak that, if we look a little closer, affords them a direct form of enjoyment. Indeed, they cannot enjoy without this cruelty. People of this type are often very successful and found in positions of power. They can also be very good at covering their cruel intentions with the best of intentions. We can all think of examples of public figures in positions of trust who have turned out to be perversely cruel. This cruelty may not come from any individual but from unspoken institutional aims and objectives.

Many psychologists have studied the clinic of human cruelty, including Freud, and it is worth focusing on sadism partly because it is such a fundamental question when considering the social and political laws around social housing (Freud, 1905). As the psychiatrist Jacques Lacan has pointed out, it is difficult to stop cruelty using the law; you have to work at the level of the structure of the law. Sadism is less a matter of law-breaking and more a matter of a structure. (Lacan, 2008) Lacan was particularly struck by the way the sadists relate to ‘the big other’ (a god, an authority figure, an ideology). The pervert assumes the position of an object-instrument of the will-to-enjoy of the big other. Because they serve the big Other, sadists seem to enforce the law, but one of the sadist’s favorite games is to figure out what people want (even if they do not know it themselves) and then taunt them by not giving it to them. “In contrast to the neurotic, the pervert knows what he desires. He thereby disregards the other’s desire, not by forcing the other to do something she does not want to do, but on the contrary, by calling forward the other’s desire he can thereafter refuse to satisfy the demand” (Hyldgaard, 2004). Cruel social housing punishes residents for having needs while refusing any way to satisfy those needs.

This is not the place to present a case study of a sadist. It is a good place, however, for a case study of a built environment professional dealing with a sadistic institution. For this case study, we want to take Bernard Tschumi’s Parc de la Villette, 1984, in northern Paris (Tschumi, 1989). How did Tschumi’s proposals for the Parc de la Villette find specific ways to thwart a system he found to be fundamentally sadistic? What can built environment professionals learn from this example?

The area of La Villette was traditionally used for the slaughtering of animals. In the 1960s and 70s, the area surrounding La Villette was treated to a Modernist functionalist redevelopment of low-income housing that left the slaughterhouses and animal enclosures bordered with *béton brut* apartment blocks and an elevated highway. This *Banlieue* quickly became an inescapable ghetto known for its deprivation. In the 1980s the slaughterhouses were relocated outside the city creating the largest Parisian redevelopment site in a hundred years.



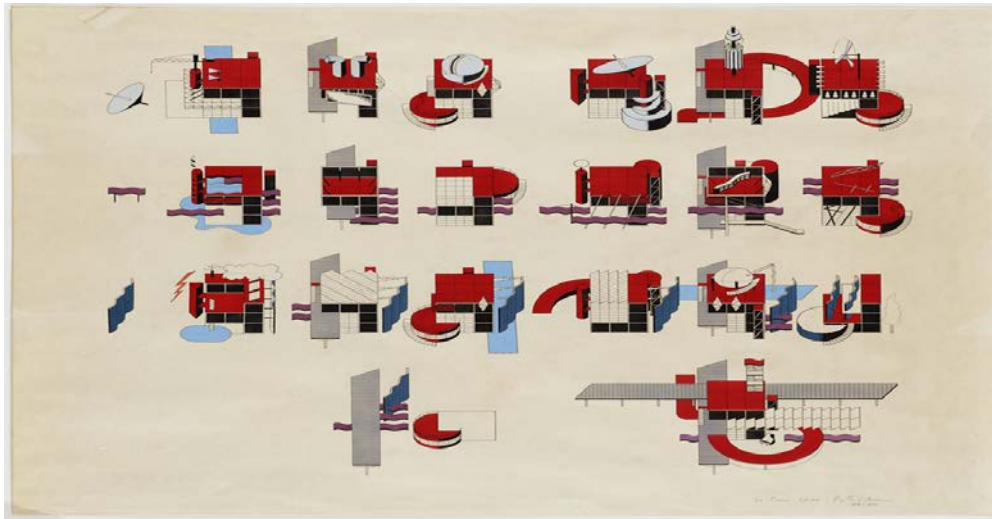
Source: Parc de la Villette, Paris, showing existing canal and social housing and three of Tschumi's 'Follies', 2003.

Tschumi's response to the Opportunity at La Villette was carefully considered. For some years, starting with *The Pleasure of Architecture*, 1977, Tschumi had been prompting architects to think of Modernist architecture as something fundamentally Apollonian, bound by reason, order and function. What Tschumi was getting at was that Modernist public housing can seem high-minded yet allow the instrumentalisation of individuals, a kind of Apollonian despotism. Following the philosopher Friedrich Nietzsche, Tschumi proposed that, without the infractions of a second god, Dionysus, Apollo would create functional rational structures that controlled and devoured everything, including the erotic pleasures of excess (Tschumi, 1996). For Tschumi the danger was that Modernist architecture could be sadistic. By over-regulating life, its paternalistic administration was quite faulty, cruel even, toward real people when it failed to give credence to the discourse of Dionysus.

Using the Greek gods of Apollo and Dionysus, Tschumi teased other architects, asking them whether they just accepted the law or whether they questioned it. This became more than a tease when Tschumi started work on La Villette. He suggests there was a lurking sadism in the public housing system. Apollonian Modernist architecture, when put in the hands of the French welfare state, was cruel. The system seemed to be quietly punishing the poor and enjoying it. To some degree, Tschumi's battle between two kinds of gods was a metaphor for left and right wing political administration. But, it went deeper than this. For Tschumi the rules of Apollo, (a.k.a. Modernist Functionalist Rationalist architecture) were only half the story.

What Tschumi was getting at is that the architect loves the rules but, unlike the sadist, he takes them with a pinch of salt. He does not want to destroy the rules but neither is he a slave to them. He acts in the name of changing the rules, making them more responsive, inclusive and nuanced. "By stressing its transgressive nature, Tschumi insists that the pleasure of architecture does not result from the absence of rules but from their infraction" (Taylor, 1992). Tschumi puts it like this: "...the game of architecture is an intricate play with rules that one can accept or reject. These rules, like so many knots that cannot be untied, are generally a paralyzing constraint (Tschumi, 1996). When manipulated, however, they have the erotic significance of bondage" (Tschumi, 1996). To make these rules obvious, and to remove their constraints, Tschumi worked with the philosopher Jacques Derrida to deconstruct Modernist architecture by isolating its basic construction units such as columns, beams and staircases, and the rules of their assembly. When he started assembling these units without all the rules the results were architectural follies, incomplete buildings that had no meaning or

programme. These follies were then placed in the park on a grid to create a park of well-ordered architectural nonsense.



Source: Bernard Tschumi, Parc de la Villette, Le Case Vide, Paris, France, Axonometric of folly, pen, ink, gouache, and airbrush on paper, 1984. © 2018 Bernard Tschumi



Source: Bernard Tschumi, Folly, Parc de la Villette, Paris, 1982-1998.

For Tschumi, the lurking sadism of Modernist social housing can be deconstructed, dis-jointed and reassembled (Tschumi, 1996). The deconstructed columns, beams, walls and floors of the follies have been likened to Rabelais' *Gargantua* who roughs out a beneficent order into social chaos (Voldman, 1985). The parks' follies were architectural beginnings, partially completed structures that awaited the desires of the residents. It was for them to decide what to do with the follies, not the architect or the administration. For Tschumi you undo cruelty with incomplete metaphors that await local public participation in the project of completion. The residents immediately asked for certain follies to be programmed including a burger shop by the underground station, a children's theatre workshop, and an outdoor cinema. Later conversions were made at the request of the local community including an adult theater workshop and a no-questions-asked medical clinic where illegal immigrants could be treated. To prevent prostitution in the park, one folly was converted for the prostitute's labour union. Other changes have been more spontaneous. On our last visit to the park, we noted a small bamboo grove next to an empty folly, turned into a memorial site for local youths who had died from addiction, accident, crime and

AIDS, their bodies cremated by the state. When a converted folly is no longer needed it is returned to its initial state as a folly, awaiting its next transgression into what is needed. According to Tschumi, La Villette is, "...that event, that place of shock, or that place of the invention of ourselves. The event is the place where the rethinking and reformulation of the different elements of architecture, many of which have resulted in or added to contemporary social inequities, may lead to their solution" (Tschumi, 1996).

In this case study, an architect spotted a cruelty in the built environment. Modernist social housing used a meagre number of construction units applied according to strict rules of repetition. Its strict rules were meant to serve a greater good, but ended up ignoring the needs of the inhabitants. He found that modernist, functionalist Apollonian architecture struggled to answer the question of what people desire. When controlled by a cruel administration, it ended up creating inequality, dependency, and a trap you could not escape. The social housing around La Villette left the residents feeling threatened and wondering what they were, as objects, to be enjoyed by the administration.

Having spotted this cruelty, he tried to do something about it. By deconstructing the syntax of modernist social housing, Tschumi opened up its possibilities. He found ways of hijacking the sadist's rules to make new rules that worked for the general advancement of residents, even those who do not yet know what they want. Tschumi was highly attuned to the strategies of the sadist, and his success lay in playing the role of an Other that did not instrumentalise people. In Tschumi's hands, the park produced rules that are not absolute; the Other is bivocal, split between two gods, and requires and invites local participation in its completion. The follies are therapeutic because they invite the traversal of a fantasy by presenting an incomplete desire. In one sense they mock the illusion that wishes can be fulfilled, or that one could "breach want with a span" (Beckett, 1977). And yet the joke is that the follies offer exactly that: a chance to satisfy instincts and rise to the challenge of completing desire.

CONCLUSION

A psychoanalytic approach to the problem of cruelty in social housing can, then, help built environment professionals. It shows how, if they are not careful, they can get caught up in satisfying some rather disturbing social dynamics when working with social housing. They become instruments in the hands of an administration and may need to play 'Dionysus to their Apollo' (Tschumi, 1989). It also shows how built environment professionals can change a cruel situation by addressing the structure of the rules, allowing them to change.

In the built environment, cruelty might be thought of as providing a bare minimum existence that people can never escape, and kindness might be thought of as a way of adding decoration and finding ways to spend the budget to make something beautiful or meaningful. Tschumi's strategy for making things better was obviously different. The kindness lay in not finishing the building or the programme. The kindness lay in not knowing what others desire. If social housing is able to deliver civilised forms of desire it needs a degree of order and a degree of free play.



Source: Banksy, Dismaland, Weston-super-Mare, 2015.

In other words, we need to stop thinking we know what is desired and needed. We do not. What needs to be provided is an unfinished architectural infrastructure that the residents can finish for themselves, not in the sense of building it, but in the sense of deciding what is needed and needs to be built. This is not about interactional design where we listen to residents and then go back to the studio and design for them. What we are talking about is more radical and foundational. It is about creating a constructional language that is assembled according to basic rules but says nothing. The building itself invites a completion of its fabric and its programme. This is a more radical approach than anything previously tried in the UK, perhaps with the exception of Banksy's Dismaland. We can imagine that local authorities could think about how to buy up derelict parts of the built environment and give them a basic disjunctive 'non-sense' makeover without any further programming. The availability of this space would spark imagination and become sites for numerous important and unforeseen needs, and even a place where people with no roof can take root.

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TRANSPARENCY AND OPEN CONTRACTING

RESILIENT INFRASTRUCTURE DELIVERY, TRANSPARENCY AND GOVERNANCE IN SANTA CATARINA, BRAZIL

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Santa Catarina in Brazil is affected by adverse climatic events such as floods, flash floods, landslides, windstorms, tornadoes and coastal erosions. Floods have caused fatalities and major damages to infrastructure and continue to do so routinely. Many people live in high-risk areas of coastal flooding and landslides and without a robust risk management, mitigation and adaption strategy, communities are prone to major disasters and displacement. Problems related to lack of city planning, lack of integrated urban drainage networks and lack of robust infrastructure networks are blamed for poor city resilience. Governments are known to react rather than plan and prevent. Lack of transparency, political interference, governance and institutional fragility of local administrations are blamed for not implementing long-term city-planning measures. This paper examines the policy framework and the governance structure that is in place to improve the resilience of the infrastructure projects. Literature review, case studies and action plans for the region provide an understanding of the current debate. It establishes the need for joined up integrated coastal and land zone management and governance solutions to be implemented by all stakeholders.

Keywords: governance, infrastructure, resilience, Santa Catarina– Brazil, transparency.

INTRODUCTION

Climate Change has long been predicted to cause and increase extreme weather incidents and there are many instances that these predictions are coming true (Carrington, 2018). According to the Intergovernmental Panel on Climate Change (IPCC, 2012), ‘a changing climate leads to changes in the frequency, intensity, spatial extent, duration and timing of extreme weather and can result in unprecedented extreme weather and climate events’. Heat-waves, destructive hurricanes and typhoons, intensive rain and flooding have become the new norm and resilience, the capacity to cope, of the built environment and communities have become the major challenge and focus of many governments and communities.

Brazil is the world’s fifth largest country in terms of land size and has the world’s fifth largest population (FIESC, 2009). It is also home to the world’s largest river basin and has about 12% of the planet’s fresh water (World Bank, 2016). The Atlantic coastline extends from the extreme south to the north of Brazil making it more

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vulnerable to coastal disasters. A number of extreme weather events and their devastating impacts in this decade have reignited the debate about how climate change is affecting Latin America's largest country, home to most of the world's biggest rain forests. In 2008, the coastal areas of Santa Catarina in Southern Brazil, were severely affected by hurricane Catarina and had devastating effects on communities, housing and infrastructure. Subsequent analysis resulted in the knowledge that communities were living on land that were prone to river and coastal flooding, exposed to flood risk damages to assets. Researchers have estimated that one-third of the impact of landslides and half of flood damage could be avoided by altering human practices related to land occupation and improvements in the socioeconomic conditions of the population in areas at risk (Pivetta 2016). There is an urgent need to empower local governments and stakeholders to incorporate Disaster Risk Management (DRM) and socio ecological resilience systems to the decision making processes. While over the years, the state has shown significant progress in these practices there is still room to significantly improve its DRM strategy (World Bank, 2016) that minimises disruption and displacement and improves resilience.

With this context, this paper aims to review the policies, legal framework and governance structure in place to deliver resilient infrastructure projects in Santa Catarina, Brazil and examine how governance, transparency and engaging communities influence the implementation of long-term city development solutions. The objectives include reviewing the policies and institutional and legal framework that governs the delivery of infrastructure systems in Santa Catarina, identifying challenges in delivering resilient infrastructure management systems and analysing how forces such as governance structure, lack of transparency, political interference and institutional fragility of local administrations influence the long-term city-planning measures. The method is based on a broad-ranging literature review including coverage of government and stakeholder reports and action plans for the region; information gathered from interviews; and case studies. The paper establishes the need for all stakeholders to be involved and contribute to joined-up integrated coastal and land zone management and governance solutions.

BACKGROUND & CONTEXT

The state of Santa Catarina in Southern Brazil has 3% of the Brazilian population (> 6 million) and in terms of land size, it is Brazil's seventh smallest state (95,346km²) (The World Bank, 2016). In comparison to other states, Santa Catarina has outstanding socio-economic indicators; its per capita income is the fourth in Brazil. Levels of education and health are also among the highest in the country (FIESC, 2009). The state is affected by a diversity of natural adverse events: droughts, floods, flash floods, hail, mass movements, windstorms, tornadoes, and coastal erosion. It was adversely affected by Hurricane Catarina (2008), the only hurricane recorded in Brazil so far (The World Bank, 2016). The resulting flooding affected about 60 towns and over 1.5 million people. At least 135 people were killed; over 78,700 were forced to evacuate their homes; 27,400 were left homeless; 7,154 homes were completely destroyed (CEPED UFSC, 2016); and 186,000 were left without electricity for many weeks (BBC, 2008).

Again in September 2011 the state was flooded, when 6 people died, 489,703 people were affected, 43,066 houses were damaged, and R\$112 million of public losses was registered (CEPED UFSC, 2016). Between 1980 and 2011, there were 11 major episodes of flooding (Garcia et. al., 2011), and the recent flood events in 2014

(Smithsonian 2014) and 2015 (Floodlist, 2015), which suggests that flooding is a persistent and relevant hazard in the state.

Among the effects of climate change that are of greatest relevance to cities are the increase in Earth's average surface temperatures, forecasted to rise by between 2 and 4°C in some regions of Brazil by the end of the 21st century. Such increases in temperature may modify moisture flows and create atmospheric conditions that are more susceptible to extreme events (Ministry of Environment, 2016). There is thus increased risk of a rise in the frequency and intensity of extreme rainfall events in the more urbanized and populated regions of Brazil, especially the South, Southeast and along the Brazilian coast (Riebeek, 2010). This, combined with other evidence from studies on a global scale (IPCC 2012, 2016; World Bank 2016, 2018) indicate that climate variability already poses a significant challenge and that future climate change effects seem inevitable. This makes it vital to develop strategies for adaptation, in view of the issues of ethical and social justice these entail.

Climate change impacts heavily on the poor, especially communities and settlements that are situated in high-risk areas with limited access to services and resources (Marengo, 2009). These communities are particularly vulnerable to extreme events. Analysis of the impact of climate change on coastal ecosystems illustrates the importance of maintaining and restoring areas for displacement or mobility of such ecosystems. With the increase in average temperatures it is expected that mangrove ecosystems will migrate to the southern regions of Brazil, beyond their current climatic limits that nowadays extend down to the state of Santa Catarina (World Bank, 2012). Addressing such challenges requires inter-institutional and joint collaboration, social-policy formulation strategies, and effective long-term integrated nationwide adaptation programmes (Marengo, 2009).

Urban development policies are known to be effective in bringing about adaptation to climate change in cities. These means of systemic approaches will address current issues such as frequent flooding and anticipated problems such as displacement. In Santa Catarina there is a need for such integrated approaches that are viable to be implemented as scientific knowledge and research in relation to disasters advances.

Over the years, there have been instances where transparency and governance has been brought to question in relation to Brazil's infrastructure development projects. Overpricing and bid rigging have resulted in steep price escalations (Martini 2017). In Santa Catarina the problem is focused more on non engagement of communities and stakeholders in the decision making process which has resulted in the displaced returning to the disaster prone areas many times over. This failed relocation process has illustrated the need for resilient Social Ecological Systems to achieve long-term sustainability. Local Community participation, their perception of the value of long term solutions, life long education measures that inform and transparent governance systems with accountability, have been identified as key factors in this process.

CURRENT POLICY AND LEGAL FRAMEWORK

In Brazil, The National Policy for Civil Protection and Defense brought into effect by Law 12608 of 10th April 2012, states that it is the duty of the Union states, Federal Districts and Municipalities to adopt measures necessary for reducing disaster risks, and that these may be applied in collaboration with public, private or civil society bodies (MMA, 2016b). This policy encompasses actions for prevention, mitigation, preparation, response and recovery, targeted at promoting civil defense. It provides

for the National Protection and Civil Defense System, comprised of federal, state and municipal administrations, and of public and private organisations with significant engagement in the field of protection and civil defense (Figure 1).



Figure 1- Overall organisation of National Protection and Civil Defense System (MMA, 2016b)

The National Secretariat for Protection and Civil Defense (SEDEC) is the focal point for its implementation, in coordination with the Secretariat for Climate Change and Environmental Quality of the Ministry of Environment (MMA). Other collaborators include the Ministry of National Integration, the National Centre for Monitoring and Early Warning of Natural Disasters, the Brazilian Geological Service, the Ministry of Planning, Budget and Management, the Ministry of Cities (MCid) and the National Institute for Space Research.

The MMA in Brazil adopted ‘The National Adaptation Plan’ (NAP) in May 2016 to promote reduction and management of climate risk considering the effects of climate change, by taking full advantage of emerging opportunities, avoiding losses and damages, and building instruments to enable adaptation of natural, human, productive and infrastructure systems (MMA, 2016a). According to this vision all government-policy sectors considered vulnerable to the impact of climate change were to have strategies in place for climate-risk management. Measures for adaptation were to be aligned with national socioeconomic development goals, and with coordinated federal, state and municipal public policies for reduction of inequalities. The NAP acquires importance not merely as a tool for directing guidelines and actions, but also as the connection for inter-sectoral and inter-governmental coordination. A crucial aspect for implementation of national urban development policy relates to consonance of the actions of federal authorities with those of the states and municipalities, other branches of government (legislature and judiciary), and participation of civil-society in coordination and integration of investments and action for cities, targeted at reducing social inequality and strengthening sustainability (MMA 2016b).

MAJOR CHALLENGES IN DELIVERING RESILIENT INFRASTRUCTURE MANAGEMENT SYSTEMS

Most Brazilian cities face socio environmental problems associated with accelerated growth and transformations of urban space. Climate change exacerbates the effects of hazards, such as flooding, landslides, heat waves and water shortages. Historically, issues relating to changes in climate patterns and extreme weather events have been overlooked by governments and, consequently, themes such as urban development,

risk management and adaptation to climate change have been treated separately. In recent years, Brazil has advanced in the implementation of public policies for urban development that combine urban planning and risk management within a prevention perspective.

Economic losses due to disasters

An assessment by the World Bank, State Governments, and the National Secretariat of Civil Defense, found out that as a result of four natural disasters in Brazil between 2008 and 2011 the country lost as much as US\$9 billion and the housing sector was the most affected, with losses above US\$4 billion (Cruz, 2012). In Rio de Janeiro, reconstruction works for roads and highways took US\$373 million (MMA, 2016a). Such damages to the transport infrastructure cause interruption of economic activities with hard-to-measure losses and would only be realised in the long term thus making it difficult to invest further. As a result, most projects will aim to reconstruct and attain the previous state rather than improve and be resilient. The impacts of the disasters were felt more by low-income segments of the population, who lived in hills, river shores, and other vulnerable areas (MMA 2016b). Besides delivering emergency cash transfers, local governments helped people to resettle and financed housing reconstruction. Impacts on infrastructure services, education, health, agriculture, and commerce can also be significant. Hence the solutions could be short term to address the recovery phase rather than investments in long-term solutions (Viana, 2011).

Cultural change of organisational processes

With the devastations due to a number of flooding incidences, it is hoped that the economic effects and losses for the built assets, infrastructure and communities will drive a cultural change in organisations that deliver urban city planning solutions. Federico Pedroso, World Bank Consultant cited in Cruz (2012) states ‘Only recently has the importance of disaster risk management gained visibility in Brazil. Setting preventive measures takes urban and financial planning, and a long-term commitment’. A first step towards the implementation of public policies was taken in August 2014, when Brazil’s government launched the National Plan for Disaster Risk Management (2012-2014). US\$11 billion were earmarked for the initiative, of which 83% will fund construction works aimed at avoiding and mitigating the effects of natural disasters (Cruz, 2012). It is now acknowledged that these processes are essential, urgent and must be embedded in urban development projects to achieve the long-term resilience of the cities.

Long term Disaster Risk Management

The impact of climate change is regarded as one of the contributing factors to increased disaster risk. Risks stem from the intersection of three factors. Firstly, the threat stemming from extreme weather conditions, exacerbated by current climate-change trends. Secondly, vulnerability of populations to disasters, i.e., their capacity to prepare and recover effectively in the aftermath of a disaster. Thirdly, exposure of human systems and settlements in areas susceptible to phenomena such as flooding and landslides, referred to as “risk areas” (MMA, 2016b). Widespread unplanned urban expansion over the past 60 years in Brazil and Santa Catarina has resulted in concentration of vulnerable populations in risk-prone areas. Such populations are thus exposed, both to sudden disasters, such as landslides and floodwaters, and to gradual natural processes, such as drought and flooding. Substandard housing in ill-suited locations near hillsides or flood-prone areas; poor infrastructure, such as roads or paths that hinder easy access to highly vulnerable areas; lack of a functioning civil defence; overcrowded, impermeable cities that do not channel away rainwater—all of

these unnatural factors related to human culture can influence the final outcome of a risk situation (MMA, 2016a).

Innovation and new knowledge

In setting sectoral and thematic strategies of the NAP (2016), the major bottlenecks identified for climate-risk management are: information and knowledge gaps relating to exposure and sensitivity of human, productive and infrastructure systems to climate change; identification and spacing of the potential impacts of climate change on Brazilian national territory; and decentralized dissemination of climate data and information in plainly understandable language (MMA, 2016b). In this respect, initiatives that prioritise knowledge management, targeted at generating new knowledge and technologies, management and access to information are essential for fostering Brazil's sustainable development and economic competitiveness, within the context of climate change, mitigation and adaptation.

Governance and transparency

According to UNISDR (2015), DRM requires shared responsibilities by central governments, local authorities and other sectors and stakeholders, and must protect people and their property, their livelihoods and productive assets, including the right to development (Eyerkauf et al 2016). Thus, the process requires the whole society's commitment and partnership, in a clear designation of responsibilities between public and private stakeholders. It is said that the expression 'long-term planning' is rarely found in Brazil's political dictionary and short-term, eye-catching public works and winning elections are the aim, focus and the main driver of cities' growth (Viana, 2011). Profit is understood to be the main concern (Martini, 2017) and there have been instances where governance, transparency and accountability of decisions and actions have been clouded. Corruption and bid rigging in construction procurement have been highlighted and there is evidence of over-billing in the 15 Brazilian infrastructure projects that have already been subject to technical reviews and audits by the courts and federal police (Martini, 2017).

TRANSPARENCY AND GOVERNANCE IN DELIVERING RESILIENT INFRASTRUCTURE SYSTEMS

Brazil's territory represents an array of economic, social and urban-development issues among municipalities and reflects the diversity of its urban settlements (MMA, 2016b). Such heterogeneity has repercussions on the affordability, capability, transparency of municipalities and their ability to adapt to climate change, which also relates closely to aspects of governance and democratic management (Oliviera *et al.*, 2006). From an urban standpoint, local administrations are better able to deal efficiently with issues of infrastructure and essential public services for public well-being, and more capable of regulating and exercising control over the local-level actions of individuals and companies (Satterthwaite, 2008). In practice, there seems to be many external factors including political pressures, unfair procurement of contracts and other corruption measures that influence the delivery of infrastructure projects.

Intensive rains and severe floods are becoming routine in most parts of Brazil and cities do not have the capacity or the infrastructure systems that can cope with such extreme events. Long-term integrated urban planning has not been a part of the political agenda in Brazil and governments react, rather than plan and prevent (Martini, 2017). The ministry in charge of monitoring urban planning, the Ministry of Cities, was created in 2003 and The Supreme Court is still deciding if all cities will

have to set out and follow an urban plan as defined in 1988 in new federal constitution. The national 'Plan of Growth Acceleration' (2009), the major project for infrastructure works, earmarked £4.4bn for disaster containment and will be used for drainage and containment caps for hills. According to the National Secretary of Urban programmes, these are short-term emergency works purely to reduce the repetition of tragedies and fail to address the long-term urban planning issues (Viana, 2011).

In Brazil and Santa Catarina, many communities live in high-risk areas, such as the slopes of mountains. Land in the city centres is too valuable for social housing and often governments do not compel the efficient use of urban land nor influence the private sector to do so. Social inequality and the stimulus to maximize property gains during recent decades have worsened the exposure of poor communities, lacking resources and other alternatives, who have been forced to settle in high-risk areas (MMA, 2016b). The Brazilian cities have put forward measures to avoid this problem, such as the creation of social interest zones and progressive taxing of unoccupied or sub-utilised buildings. The problem is seen to be excessive pressure from estate agents and private property developers with the governments tending to yield (Bonduki, 2011 cited in Viana, 2011). Building Contractors and estate agents are known to donate large amounts of money to political campaigns (Martini, 2017) to exert influence over local government decisions.

The development of risk prone areas and subsequent disasters are not only affecting the poor but the other social classes as well. In many cities the houses that came down in the landslides belonged to middle class families and were built due to beautiful locations, good views and the authorities not being able to stop the development. This institutional fragility of local administrations has led to fragile eco-systems that have adverse effects on the community.

CONCLUSIONS

Societies looking for sustainable, long-term development are characterised as being resilient, responding in an organized manner and recovering more efficiently from a disaster. Incorporating risk management into an integrated urban planning process, having clear hierarchical accountability for all stakeholders allow authorities and governments to have better chance of achieving mitigation and adaptation goals in resilience with a short recovery phase with minimum damage and long-term investment plan that can provide balanced socio-ecological systems. This new form of governance, planning and implementation presents several challenges. One being the inter-institutional, inter-community and intra institutional and community coordination that need to clearly define the risk-management roles and responsibilities of the different participating entities. The second is engaging all stakeholders, including the affected communities in the decision making process so that their voices are heard and incorporated in to the solutions that are provided. This type of open inclusive governance strategies can improve the transparency of authoritative decision-making and improve the citizenship of city dwellers resulting in many positive socio-economic and environmental actions.

A major re-think of organisational culture and hierarchy and mind change is necessary to achieve social ecological systems that are resilient in the long term. This will only be achieved by community and local participation at grass root levels, learning and education, governance systems that are not driven by political gains and influences, and complex eco-system services supported by legislation that can be truly implemented.

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TURNING INFRASTRUCTURE DATA INTO COMPELLING INFORMATION: HOW THE CoST ASSURANCE PROCESS CAN BE A CATALYST FOR SECTOR REFORM

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CoST addresses the challenges of corruption, mismanagement and inefficiency by working with government, industry and civil society in 12 countries to promote greater transparency and accountability in public infrastructure. This helps to inform and empower citizens and enables them to hold decision-makers to account. Informed citizens and responsive public institutions help drive reforms that reduce mismanagement, inefficiency, corruption and the risks posed to the public from poor quality infrastructure.

One of the tools that CoST promotes is an assurance process that turns infrastructure data that has been disclosed to the public by clients into clear and compelling information, prompting questions and actions. In this paper, we will show how the assurance process complements and adds value to existing audit mechanisms, why it can be a deterrent for poor performance and how it can be used as a catalyst for project improvements and sector reforms.

Keywords: accountability, data, infrastructure, performance, transparency.

INTRODUCTION

Investing in public infrastructure is a vital part of efforts to meet pressing global challenges such as climate change, poverty, rapid urbanisation and ageing populations. According to the International Finance Corporation (IFC), infrastructure investments which are well planned and executed tend to boost GDP and offset any increase in debt, or in other words, they pay for themselves (IFC 2012).

However, it is estimated that up to a third of investment in public infrastructure could be lost through corruption, mismanagement and inefficiency (Stansbury 2005). With US\$78 trillion expected to be invested in infrastructure between 2014 and 2025 (Oxford Research 2014), the potential financial losses are enormous. Unless we stem these losses, the anticipated social and economic benefits will be unrealised and the poorly constructed assets could become a public liability which in extreme cases may fail, causing injury and death.

CoST addresses these challenges directly. It works with government, industry and civil society in 12 countries to promote greater transparency and accountability in public infrastructure. This helps to inform and empower citizens and enables them to hold decision-makers to account. Informed citizens and responsive public institutions help to drive reforms that reduce mismanagement, inefficiency, corruption and the risks posed to the public from poor quality infrastructure. This approach has the potential to significantly reduce losses and if successful, could increase productive investment by up to a third without having to mobilise additional investment.

One of the tools that CoST promotes is an assurance process that turns infrastructure data that has been disclosed to the public by clients into clear and compelling information, prompting questions and actions. In 2018, countries as diverse as Afghanistan, Guatemala, Honduras, El Salvador, Ethiopia, Thailand and Uganda will

have engaged independent experts from the infrastructure sector to prepare these reports that will set out how taxes have been spent on public infrastructure.

In this paper, we show how the assurance process complements and adds value to existing audit mechanisms and why it can be a deterrent for poor performance. It is work in progress as we look to compile data from assurance reports that have been published over the last three years. What is presented is indicative of the type of information that the assurance reports generate and how it can be used as a catalyst for project improvements and sector reforms. Initially, the paper sets out the CoST approach to transparency and accountability.

THE CoST APPROACH TO TRANSPARENCY AND ACCOUNTABILITY

CoST provides a range of tools and standards that support the disclosure of data into the public domain. It also helps to process and organise the data into information that informs and empowers stakeholders and enables them to hold decision-makers to account. Ultimately, this supports the delivery of good quality infrastructure and services that improve lives.

Our approach is based on four core features: disclosure, assurance, multi-stakeholder working and building social accountability. CoST provides a flexible delivery model that supports implementation across diverse political, economic and social contexts. Our members at the national and sub-national level decide how this approach must be adjusted to address their challenges. These adjustments are typically informed by the results of a scoping study that is completed in the early stages of a programme. This section describes the core features and how they function together to deliver systemic change.

Disclosure

CoST increases transparency by enabling clients to disclose data on public infrastructure investments. The CoST Infrastructure Data Standard (CoST IDS) comprises 40 data points that are disclosed proactively by clients at key stages throughout the entire project cycle (see Figure 1). It includes data that summarises the project itself and the individual contracts of which it is comprised. CoST also promotes a list of information consisting of 26 documents that clients disclose following a request by citizens or other stakeholders.

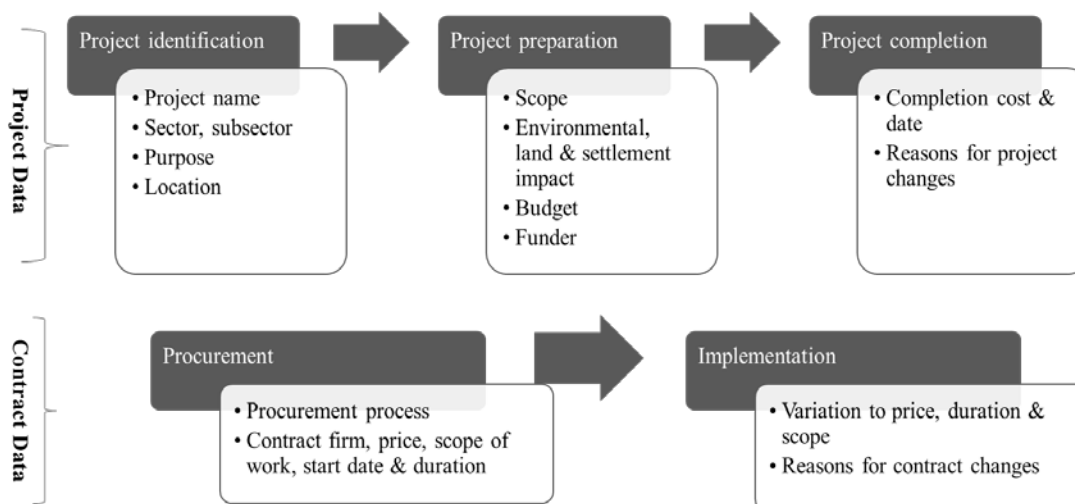


Figure 1: A summary of the CoST Infrastructure Data Standard

Clients are responsible for disclosing data and CoST helps build their capacity to meet this obligation. This typically includes developing disclosure manuals and training officials in their use. CoST has also been driving digital innovations that enable the disclosure of data from public infrastructure investments and improve access for stakeholders. This includes enhancing existing e-procurement portals in [Guatemala](#) in addition to creating new information platforms in [Costa Rica](#), [Ethiopia](#), [Honduras](#) and [Thailand](#). This has led to data being disclosed on almost 15,000 infrastructure projects over the last three years (Figure 2).

CoST programmes often start on a ‘voluntary’ basis, i.e. in the absence of any statutory requirement to disclose information. However, governments are expected to eventually establish a legal mandate to make disclosure a statutory requirement across the public sector. Legal mandates can also include the other CoST core features of multi-stakeholder

working, assurance and social accountability. Honduras and Guatemala are good examples of where the introduction of such a legal mandate has led to an exponential increase in the transparency of public infrastructure with citizens having access to data from hundreds and thousands of projects respectively.

CoST Honduras, in partnership with the World Bank, developed [SISOCS](#) – a subsystem of the national e-procurement portal – which provides easy access for citizens on data from over 1000 infrastructure projects. Pulling data together into a single source, SISOCS aggregates and discloses data on projects with a total value of US\$880 million with the proportion of projects currently being disclosed representing about 80% of public infrastructure investment. The system has been replicated in Malawi and Panama and will soon be available as an open source system.

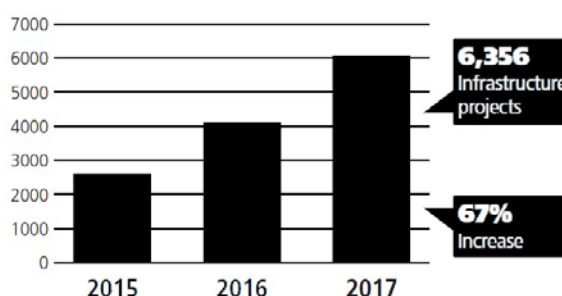


Figure 2: Number of projects disclosed in line with the CoST Infrastructure Data Standard

Guatemala has gradually strengthened the legal mandate to disclose data in line with the CoST IDS initially through annual budgetary decrees and now as part of public procurement legislation. This has led to data being disclosed on over 4000 projects in 2017 on the e-procurement platform Guatecompras.

Multi-stakeholder working

Multi-stakeholder working refers to representatives of government, industry and civil society coming together to address complex governance challenges. Typically, this is achieved through a multi-stakeholder group (MSG) that oversees a CoST member programme. By bringing the three stakeholder groups together into a structured process with equal voice, a consensus can be reached that helps to ensure that the solutions developed are realistic, practically focused and likely to receive broad support. The support and participation of each stakeholder group also brings a high-level of legitimacy to the reform effort, which can help sustain it during periods of political or social disruption.

A good example of this is Guatemala where during the 2015 political turmoil which saw the President and Vice President jailed for corruption, the MSG continued to function and operate successfully. This required considerable support from the CoST International Secretariat to convince reluctant partners, especially from civil society, to continue to work with the reformers in Government. It also required clear rules of the game, to ensure each stakeholder group felt they had an equal voice in the decision-making process. Since the political turmoil, the MSG has published three assurance reports and seen new procurement legislation provide an enhanced legal mandate for disclosing data in the CoST IDS format. In addition, the Malawi MSG was able to operate despite a lack of political support exacerbated by a major corruption scandal. Known as ‘cashgate’, an estimated US\$32 million was stolen from government coffers in a six-month period in 2013 including from public infrastructure projects (CoST 2017). Since then the MSG has become a trusted partner with the Malawi Government requesting that it examines two projects where it had some concerns.

Multi-stakeholder working provides definite benefits, but it can be difficult to introduce where it is unfamiliar and where trust between stakeholders is low. It is vital to provide capacity building support in the formative stage of MSGs to build trust and establish the ‘rules of the game’ for its operation. MSGs are typically convened on a voluntary basis. They do not, therefore, have their own legal status and in most cases a host organisation is appointed to execute the decisions of the MSG. In addition, ‘host organisations’ administer grants, employ staff and appoint consultants on the instruction of the MSG.

ASSURANCE

What is assurance?

Assurance is an independent review that highlights the accuracy and completeness of the disclosed data and identifies issues of concern and areas of good practice for the public. An assurance team of independent experts is usually appointed by the MSG to assess the accuracy of disclosed data, and its completeness compared with both applicable regulations and the CoST IDS. Whilst the CoST IDS was designed to

provide some basic facts that a non-technical expert can understand, it may require some expertise and analysis to turn the data into information that can shed light on issues and potentially give rise to evidence-based questions or concerns.

In reviewing what is disclosed on a sample of projects, the assurance team may then ask for additional information and interview the procuring entity officials or members of the supply chain to clarify any potential issues or areas of good practice. It may also visit the site to help with this task to ask questions of the contractor and site supervisor, to identify the accountability systems that are in operation and to observe the quality of infrastructure. Figure 3 below provides an illustrative step by step guide to the assurance process.

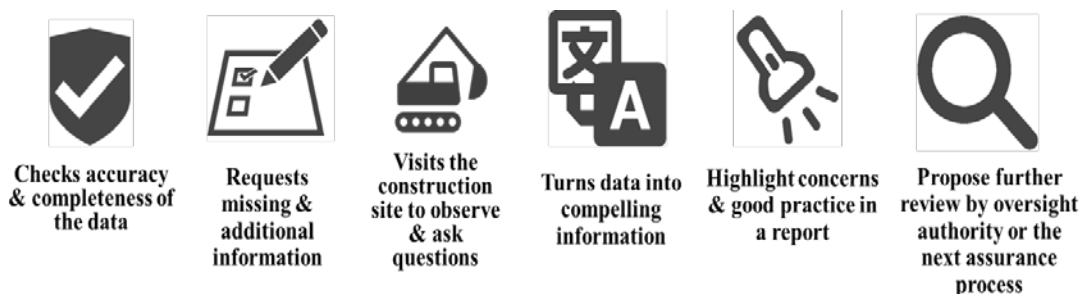


Figure 3: Step by step guide to the assurance process

CoST Guatemala has developed an assurance manual based on the above steps as follows:

- Check Guatecompras (the Government's e-procurement website) to see if data disclosed by procuring entities is complete and accurate on up to 500 projects.
- Identify a sample of projects for further in-depth review.
- Carry out a site visit to interview the contractor's staff to verify the disclosed data and observe the physical progress of construction against the specification, programme and financial progress.
- Request additional information from the CoST list of information for reactive disclosure.
- Analyse the disclosed data to identify issues of concern for the public.
- Draft a report that summarises the amount and quality of disclosed data, identifies broad performance issues across the sample of projects and highlights points of interest specific to the individual projects.

The assurance team compiles a report that provides a compelling narrative on each project, communicating the key facts to a non-technical audience. The in-depth report is typically accompanied by an infographic summary of the key finding which is the principal means for communicating with the media, civil society and key decision-makers (Figure 4 shows an example from Honduras). Those projects that exhibit 'red flags' can be referred to an oversight authority such as an audit or anti-corruption commission for further review.

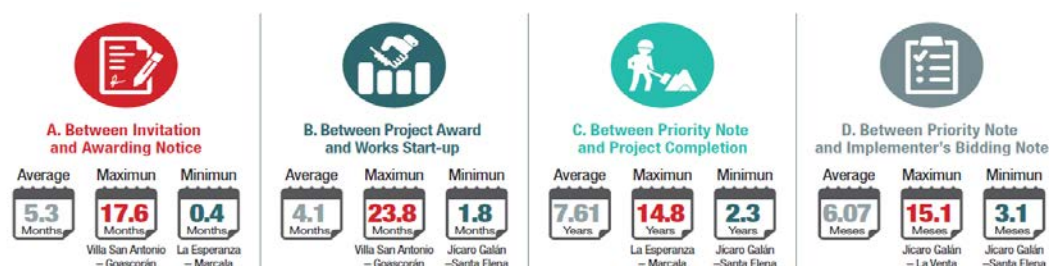


Figure 4: An infographic summary from Honduras highlighting red flags on the time it takes to complete a road project stage

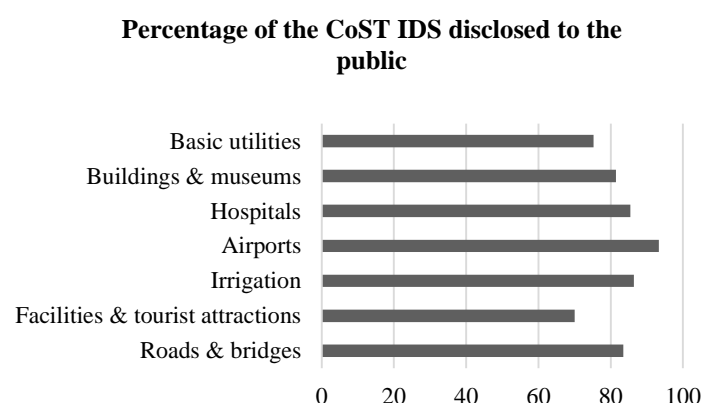


Figure 5: Measuring sector level transparency in Thailand

The assurance report also provides a measure of transparency based on the amount of data disclosed to the public across the different clients or sectors. The example in Figure 4 is based on data from the CoST Thailand 2018 Assurance Report that measured transparency from 147 infrastructure projects with a total value of Baht 113 billion (GBP 2.659 billion) (Kasetsart University 2018).

How does assurance differ from an audit?

It is important to convey how assurance differs from a technical audit and adds value. An audit is concerned with checking whether the construction work has been undertaken as specified. The assurance process is interested in this, but it differs in several respects.

Firstly, unlike an audit, its primary focus is on the bigger picture on how improved transparency and stakeholder engagement can help address any apparent shortcomings in existing quality management, audit or other accountability mechanisms.

Secondly, the assurance process is focussed on adding value by turning disclosed data into compelling information, highlighting both examples of good practice and red flags that other competent authorities could use as a basis for further investigation. If handled well, this could potentially lead to a trusted audit institution adopting key aspects of the assurance process as part of its functions.

Finally, unlike a technical audit, the assurance process can occur at any stage of a project so can contribute to ongoing monitoring functions. This increases the potential for areas of improvement to be identified and implemented by the procuring

entity that will enhance the prospects for a project's outputs contributing to the intended purpose of the investment and to broader sector reforms.

How does it deter poor performance?

In the early stages of a CoST programme, the number of projects where data is disclosed is relatively small with the majority included in the assurance process. As a programme matures and the number of projects where data is disclosed rapidly scales up, only a small percentage of these projects will be subject to an in-depth review as part of the assurance process.

MSGs are encouraged to use a randomised approach to identify a sample of projects for an in-depth review based on citizens' needs. This then helps to provide a deterrent across the hundreds of projects from which the sample will be selected and serve to engender a broader sense of accountability by providing a powerful incentive for procuring entities to ensure that shortcomings do not occur in the first place. The roads directorate in Guatemala reported that the possibility that any project could find itself subject to assurance led to substantial improvements in the integration and coordination of suppliers and the quality of road construction.

In addition, mature programmes where data from several hundred or thousands of projects can be disclosed normally involves sophisticated web-based disclosure platforms that can generate robust performance statistics such as time and cost increases at a sector level (e.g. roads, water or housing). This compares to the more indicative performance data that is published in the early stages of a programme.

Highlighting performance issues

In November 2018, CoST will hold its first assurance week where four countries will publish assurance reports on 67 projects. Over the course of the year 11 reports from nine countries from four continents covering 127 infrastructure projects will have been published, almost a 100% increase on 2017. As you can see from Table 1, half of the projects are from the roads sector.

Table 1: Projects subject to in-depth review as part of the 2018 assurance process by sector

Country	Sector									Total
	Roads	Education	Ports	Airports	Energy	Water	Housing	Health	Other	
Afghanistan	6	0	0	0	1	0	0	0	1	8
El Salvador ¹				0						20
Ethiopia	0	14	0	0	0	0	0	0	0	14
Guatemala	8	3	1	0	0	2	0	1	7	22
Honduras	23	1	3	0	0	0	0	1	1	29
Tanzania	1	0	0	0	0	1	1	0	0	3
Malawi	0	1	0	0	0	0	0	0	0	1
Thailand	7	1	0	1	0	2	0	2	1	14
Uganda	5	2	0	0	0	0	0	0	1	8
Ukraine	0	0	0	0	1	0	0	0	0	1

¹ We are waiting for the sector breakdown from El Salvador.

Total	50	22	4	1	1	5	1	4	11	120
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Over the next few weeks, the CoST International Secretariat will be drawing together the data from the 11 reports to see if there are any common trends. For example, from the reports that we have been able to initially review that has assessed 86 projects we can see that the length of the construction contract has increased on average by 90% and the cost has increased on average by 23% (see Figure 5).

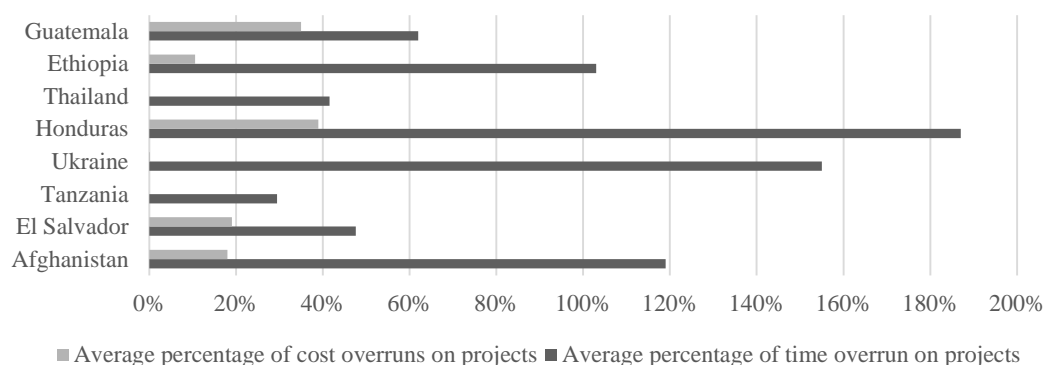


Figure 5: Average increases in construction time and cost²

For a CoST member, the value of this type of data is comparing the performance of the various clients in delivering their infrastructure projects to time and budget. Our Theory of Change presumes that greater transparency and accountability will lead to improvements in performance. Whilst time and cost indicators may be considered to be unsophisticated indicators of performance to the sector, it is data that will become relatively easy to gather on a consistent basis which, in time, can be obtained at scale from the disclosure platforms. They are also readily understood by all stakeholders.

As well as improvements in time and cost, our Theory of Change indicates that greater transparency and accountability will also lead to reducing the risk of entering the market and level playing field when competing for contracts. Consequently, we also expect to see a change in the market place with more companies encouraged to bid.

The real value of the assurance reports are the issues of concern that the assurance teams identify. These provide key messages that allow stakeholders to challenge decision-makers. However, it is critical that the issues identified are simple, factual statements with minimal subjectivity. Table 2 provides some examples of issues of concern that have been raised in this year's assurance reports.

² Please note this does not include data from the Thailand and Honduras reports that have been recently finalised. We are also still clarifying the cost increase in Tanzania. Finally, cost increases in Thailand are illegal hence why it is zero.

Table 2: Examples of issues of concern identified in 2018 assurance reports

Project	Project phase	Issue of concern
Tourist Corridor public private partnership (PPP) Road Scheme, Honduras	Project identification	Incorrect data in the study of road traffic affects the fulfilment of the expected income in some toll booths. Citizens do not pay the toll fee due to the location of the booths. No evidence to support the financial model is made in the contract (Monthiel et al. 2017).
Lilongwe University of Agriculture and Natural Resources, Design and Supervision of the Construction of Gateway Administration Complex and Teaching Facilities Block & Associated External Works – Consultancy Contract, Malawi	Design & Supervision	Initial Contract for design and supervision was K47,906,776.88 comprised of: <ul style="list-style-type: none"> Phase I - Design work undertaken by the Consultant for the project was paid in full at K30,883,789.51 Phase II Supervision contract was K17,022,987.37. However, during the course of the contract, the scope was revised and the Consultants' fees were based on a percentage of the works Contract at 14% of the revised BOQ K4,821,798,110.41. These new terms were not negotiated and agreed with the client. The consultant's payments were being claimed through the contractor's payment certificates. (CoST Malawi 2018)
Kamal Khan Dam, Afghanistan	Procurement	The reason for limited international competitive bidding is ambiguous. According to clause 6, rule number 21 of the Procurement Rules "...from one country two bidders cannot be invited". Questions are raised why Turkey was considered the sole source for approaching qualified companies and why most of the nominated companies are Turkish (Mangal et al. 2018 p16-17).
Construction of a classroom at Wollo University, Ethiopia	Implementation	Lack of proper and complete design work, especially the building design with respect to the condition and topography of the site during the design stage which incurred unexpected additional cost (Shiferaw 2018).
Flyover construction project at Bor Win Industrial Estate intersection, Thailand	Implementation	Client is non-responsive to complaints from citizens due to inadequate supervision of construction (Kasetsart University 2018).

By tabulating the issues of concern we can begin to see if any patterns emerge that provide an indicator of the key risks or red flags within the project cycle. For example, CoST Ethiopia accumulated the performance data from the first 52 projects that were subject to assurance and the issues of concern that were identified. Figure 6 demonstrates that the high increases in construction time in the roads, buildings and water sectors were due to incomplete design, design changes, changes in scope and changes in quantity (Taddese et al. 2016).

In their first report, CoST Afghanistan have been able to identify that the high increases in construction time is directly linked to poor project preparation – see figure 7 (Mangal et al. 2018). This is a common theme that has been identified in previous reports. For example, the Malawi 2016 Assurance Report highlighted how projects funded by multilateral or bilateral donors were better prepared and

consequently suffered fewer delays and cost increases than nationally funded projects (CoST Malawi 2016). We intend to look at this issue in addition to other potential patterns in more depth as we draw

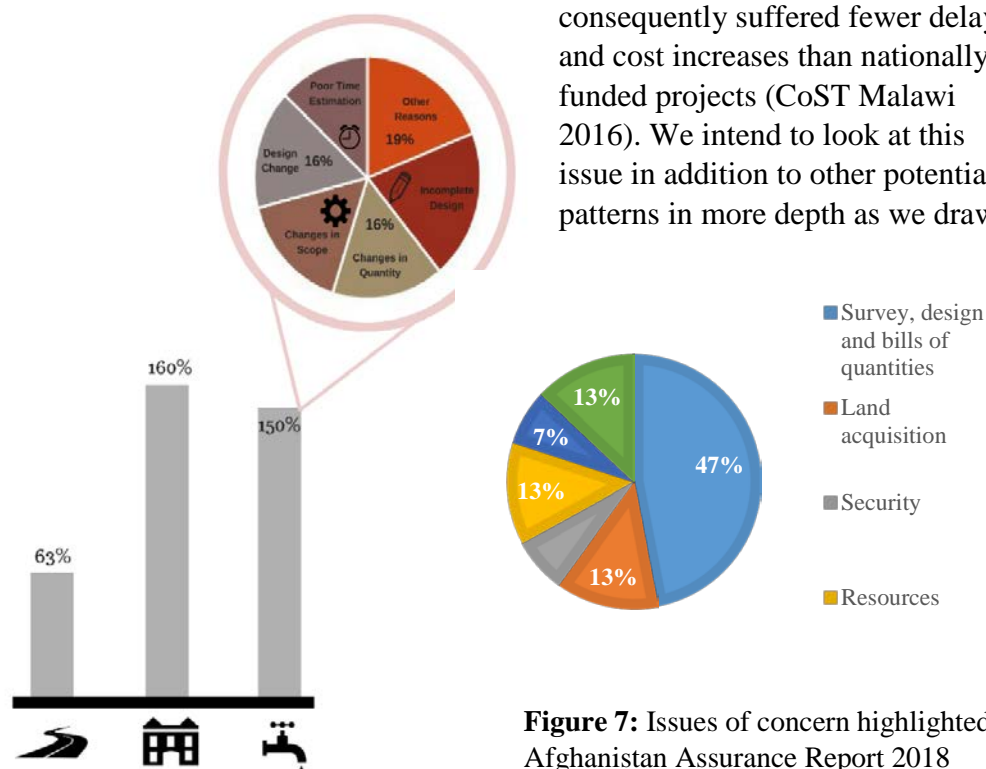


Figure 6: Linking issues of concern with extensive increases in construction time in Ethiopia

Figure 7: Issues of concern highlighted in Afghanistan Assurance Report 2018

will also be encouraging MSGs to include projects in the assurance process prior to construction. This could potentially help to mitigate the risks of cost and time increases and encourage better project preparation.

Social accountability

Mature programmes have begun to go beyond transparency by using the disclosed data to mobilise collective action and demand social accountability. It has always been recognised that social accountability is essential to translate transparency into practical improvements, but until now our focus has primarily been on the supply side of this equation. To date, we have allowed member programmes to use and develop social accountability mechanisms that reflect the political and social context of the country. Examples of this include:

- Training over 200 citizen transparency commissions in over 60% of municipalities in Honduras to use the data disclosed on SISOCs to monitor road projects and to report back issues that are identified to the Assurance Team by WhatsApp. The trained citizens also accompany the Assurance Team on their site visits.

- Holding regular live radio debates in Malawi where questions from listeners are posed to a panel from government, industry and civil society, allowing citizens country-wide to have their say on the findings from an assurance report.
- Providing citizens in Malawi with an innovative toll-free SMS platform with real-time reporting mechanism for infrastructure related problems. All information received is submitted to the relevant authorities who are provided an Opportunity to respond through the radio debates and to address the concerns through remedial actions.
- Organising a 'Baraza' or community meeting in Uganda to discuss the findings from a local road project that was included in the assurance report and providing citizens with the Opportunity to give feedback.

A CATALYST FOR PROJECT IMPROVEMENTS AND SECTOR REFORMS

Over the last two years, we have seen an increasing number of examples where the findings and recommendation from an assurance report have led to government action. The actions were initially on individual projects such as repairing a bridge that was prematurely degrading in Ukraine, improving the design of road drains reducing the flood risk of homes and businesses in Uganda and cancelling road contracts in Malawi that stopped the ongoing waste of public money and at a broader sector level. We have also seen cost savings of US\$3.5 million in Ethiopia following the realignment of a rural road and US\$5 million in Guatemala following the cancellation of a bridge project that did not require rehabilitation.

We are now seeing the introduction of reforms such as the introduction of independent supervision of construction contracts in Ukraine, changes to the Uganda Roads Act that will improve the health and safety of construction workers and road users and the acceleration of road construction in Malawi by breaking up large road construction contracts into smaller and more affordable packages. These actions will have a long-term social and economic impact with citizens able to use more affordable and accessible infrastructure.

On occasion we have also encountered examples of good practice that have then been more widely shared. This includes a major road interchange in Tanzania which had zero accidents amongst its construction workers. The principal reason for this remarkable outcome was the health and safety practices of the Japanese contractor. The project was funded by the Japan International Cooperation Agency (JICA). The lessons from the project have been shared within the Tanzania Roads Authority.

In Uganda, Wakiso District Council had persuaded local citizens to provide land without compensation. The land was required to develop drainage ditches alongside the rehabilitated road but the Council could not afford to compensate the land owners. The Council persuaded the citizens that the drainage ditches would reduce the risk of their homes and businesses being flooded during the rainy season. Proactive citizen engagement is now standard practice for Wakiso District Council on all its road schemes. We are now encouraging CoST members to highlight more examples of good practice as it is likely to lead to the increased support from the participating clients.

There have been two critical factors in this success. Firstly, the MSGs have engaged the media and civil society with the assurance report, empowering them to demand action. An example of this approach is in Honduras where there were 25 newspaper, radio and television reports on its fourth Assurance Report. Secondly, MSGs with representatives from government, industry and civil society have used their unique position to influence decision-makers and encourage them to take action. Figure 8 overleaf provides an example of how the Malawi MSG engaged the media with the findings from their 2014 assurance report and used their internal influence with the Minister of Public Works to cancel three road contracts which prevented on-going leakage and waste of public money (Hawkins et al 2015).



Figure 8: How the assurance findings were used to cancel Malawi road contracts

We are now encouraging MSGs to take a more strategic approach to following-up on the findings and recommendations from an assurance report. CoST Honduras has taken the lead by developing an action plan with three clients that sets out how each client will respond to recommendations. This has led to government action on three PPP road schemes including a new financial model for the tourist corridor toll road highlighted in Table 2, ensuring private financing is approved before construction commences, and new safety plans during periods of heavy traffic publicised to workers and users through posters and brochures. The Port Authority has also introduced a sector-wide reform by introducing a management process for identifying environmental risks according to the type of project. This demonstrates the potential for the CoST approach to open up and improve the outcomes of what are often controversial and opaque private sector financed infrastructure projects.

CONCLUSIONS

This paper has highlighted how CoST provides an approach to promoting transparency and accountability in public infrastructure that can be adapted to the political and social-economic context. It has demonstrated the potential for the CoST assurance process as a tool for turning data into compelling information that the media and civil society can use to hold decision-makers to account. It also shows how the data from assurance reports from a diverse set of countries can be aggregated and used by a range of stakeholders including academia. The multi-stakeholder approach provides a space for dialogue amongst government, industry and civil society that can build trust amongst the stakeholders. With the right organisations and people around the table, the MSG can informally engage with key decision-makers in government to

persuade them to act on the assurance report findings and recommendations. Finally, the use of assurance process should be earlier in the project cycle to identify potential issues of concern prior to construction.

In the coming weeks, MSGs in Afghanistan, El Salvador, Guatemala and Uganda will be engaging their communities and decision-makers with their respective reports to encourage action to be taken that will ultimately lead to better infrastructure for all.

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EDUCATION, TRAINING, AND THE DEVELOPMENT OF PROFESSIONALISM AND ETHICAL AWARENESS IN STUDENTS

TEACHING ETHICS FOR QUANTITY SURVEYING STUDENTS IN SOUTH AFRICA – ARE WE DOING ENOUGH?

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Construction professions have to deal with ethical issues on a daily basis. Unfortunately, the number of such cases is on the increase, mostly because of the continuous downswing in the construction market leading to less work for professionals. The aim of the paper is to investigate how quantity surveying students are being taught about ethics in the construction industry as they are the professionals of tomorrow who will have to be prepared on how to deal with ethical issues. The methodology discussed in the paper is a literature review, a look at the content of professional codes of conduct, how ethics are being taught abroad, and a survey among quantity surveying students. The main finding is that students do not get adequately prepared to deal with ethical issues by only discussing the codes of conduct. The conclusion therefore is that universities must include a more comprehensive module on ethics in their curriculum.

Keywords: construction professionals; ethics; quantity surveying.

INTRODUCTION

Much has been said and written about ethics and ethical behaviour in the construction industry worldwide – mostly not very complimentary. Adnan, Hashim, Yusuwan and Ahmad (2012) quote Transparency International (2005) which states that “The construction industry is the most fraudulent industry worldwide”. Such unethical behaviour occurs in all aspects of the construction industry and among all stakeholders such as contractors, clients and construction professionals. The situation is currently exacerbated by the current economic climate, especially in South Africa, where the construction industry has been in an economic downward spiral for the past number of years, resulting in fierce competition among all role players (contractors, sub-contractors and professionals) and low margins. PWC (2016) confirms this by reporting as follows: “The construction industry, a significant contributor to employment and growth in South Africa, has been in a slump since 2009. The 2016 financial year once again got off to a poor start, with margins under pressure, tight liquidity and decreasing order books”.

Resulting from this situation that the construction industry finds itself in, is the question how to prepare students, who represents the future professionals, to deal with ethical questions. To what extent should tertiary institutions teach students about ethics, or should it be left to industry to educate the newly qualified professional candidates about ethics once they have entered the workplace environment?

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This paper looks at what the current state of knowledge is amongst third year and honours quantity surveying students in South Africa and makes recommendations regarding whether this knowledge can be deemed adequate, or effort should be made to increase the students' ethical knowledge before leaving university.

LITERATURE REVIEW

Ethics in the construction industry

Although the focus of this paper is the teaching of ethics to quantity surveying students, it is prudent to first look at ethics and ethical behaviour in the construction industry at large. After their studies, quantity surveying students will work in various sectors in the industry where they will undoubtedly be exposed to situations that will challenge their ethical standards.

According to Abdul-Rahman, Wang and Saimon (2011) the construction industry can be seen as a perfect environment for ethical dilemmas due to its low-price mentality, thin margins and highly competitive nature. Unethical practices can take place in all stages of a construction project such as the planning and design stage, when tendering, and during the execution of the project (Adnan et al., 2011). Adnan et al. (2011) observe that ethical issues in the construction industry comprise bribery, corruption, conflict of interest and collusive tendering. Poon (2009) is of the opinion that an industry that constantly portrays a negative ethical image, will encounter less demand for its service, and withdrawal of approval by the public.

Another aspect of unethical behaviour that must be considered is the cost associated with it. Adnan et al. (2011) quote Transparency International (2005) which stated that corruption can add up to 25% to the cost of public contracting, generating waste of public resources, development opportunities that are missed, as well as causing an unstable environment for business. Poon (2009) supports this by indicating that these additional costs are not only for the companies delivering the service but for the whole industry. Poon (2009) quotes a survey conducted by FMI Corp where 61% of respondents believed that the cost to get projects built is effected by unethical behaviour, 35% of respondents estimated that 1% to 2% of the total project cost is that of unethical behaviour and 25% of respondents were of the opinion that 2% to 5% of the total cost of projects is lost because of unethical conduct by the project team.

With the increase in unethical conduct in the construction industry, Adnan et al. (2011) state that contractors have been perceived to be the main culprits and are mostly blamed for the defects and other problems that happen in the industry. In this regard the thousands of successfully completed projects without defects that have stood the test of time, are mostly ignored by the media when they are reporting on the defective projects. It is further argued by Adnan et al. (2011) that it is generally forgotten that there are two other parties to construction namely the client and the consultants who may contribute to the defects in projects. Vee and Skitmore (2003) support the above by pointing out that professionals are not exempt from ethical behaviour such as obligations, duties and responsibilities. This observation is highlighted in a survey among professional consultants by Vee and Skitmore (2003) where 77% of the respondents indicated that they had witnessed or experienced breaches of professional responsibility such as conflict of interest, confidentiality and propriety information infringements as well as breaches of environmental ethics.

Professional ethics and codes of conduct

Professional people have always been linked to the notion of providers of service. The formation of professional bodies or associations stems from the need for the specialised activities performed by the people forming these bodies. The group of people who formed the body also developed criteria for admission to membership of such an association, normally in the form of some type of qualification, experience in practicing the occupation and successful completion of an examination. Vee and Skitmore (2003) state that building professionals gain integrity and respectability through professional bodies. In South Africa, quantity surveyors are represented by professional bodies such as the South African Council for the Quantity Surveying Profession (SACQSP) and the Association of South African Quantity Surveyors (ASAQS).

Law (1985) states that the Transvaal Society of Quantity Surveyors, formed in 1903, developed into the South African Institute of Quantity Surveyors in 1908 which was the first recorded nationally representative body of the profession in South Africa. After a long process that started in 1967, the new Quantity Surveyors Act (No. 36 of 1970) was published in August 1970. Law (1985) mentions that this led to the establishment of the SACQSP and resulted that there was, from 1 March 1971 when the Act came into force, two bodies – the SACQSP (or Council) as the statutory body and the ASAQS (or Association). The professional Acts regulating the built environment professional sector were again overhauled in the late 1990s with the establishment of the Council for the Built Environment (CBE), empowered as the over-arching umbrella body for the built environment. A new suite of Acts for all built environment professions were promulgated in 2000. One of the primary functions of the CBE is to protect the interest of the public by applying ethical standards applicable to built environment principles (ASAQS, 2010). According to the ASAQS (2010) the new Act (Act 49 of 2000) introduced a principle whereby registration with the Council is mandatory to become a registered professional quantity surveyor, while the Association is a voluntary organisation and membership to it is not mandatory.

The above means in practice that the Council looks after the interest of the public, while the Association looks after the interest of its members, i.e. quantity surveyors. This concept is reflected in the mission of the Council which states “To ensure that the Council fulfils its mandate in developing and maintaining standards, in the achievement and integrity in the enhancement of the status of the Quantity surveying profession, and the protection of the public within an evolving environment” (SACQSP, 2018). Coupled to the mission of the Council it also has a set of core values, two of which are “Professionalism – commitment to ethical behaviour” and “Integrity – honesty and ethical behaviour”.

This relationship between a profession and the public can be, according to Harshman, Gilsinan, Fisher and Yeager (2005) conceptualised as a social contract. In this contract, the members of the profession agree to restrain self-interest and to advance the ideals of the public whilst maintaining high performance standards. Harshman et al. (2005) further mention that the public (or clients) must be able to trust any professional to act in the client’s best interest.

Bowen, Pearl and Akintoye (2007) highlight the problem that confronts professional bodies, namely that when there are lapses in ethical behaviour, it can influence the credibility of such a profession negatively. Bowen et al. (2007) ask whether it is

possible for a professional community to apply ethical quality control by regulating itself and hold its members accountable if they do not adhere to the body's ethical principles, in order to ensure that its clients are enriched by the activities of the profession.

Another problem encountered by professions is whether all members truly adhere to the principle that the interests of the public is of the utmost importance. Fan, Ho and Ng (2010) conducted a study on ethical behaviour among quantity surveyors in Hong Kong. One of the outcomes of this study was that the older, senior members believed that the interests of the general public to be the most important in decision making. The responses of young quantity surveyors were however much different with this group rating the interests of employer, self and client as more important than that of the general public.

One of the features of the South African Act is the requirement in clause 27 that each professional body must draft a code of conduct applicable to its members. Bowen et al. (2007) observe that a profession's code of ethics is its most visible formulation of its professional norms. Such a code is a declaration of the group's collective attitude towards what it morally represents.

A code personifies the body's moral dimension. Abdul-Rahman, Wang and Saimson (2011) state that a code of ethics acts as a control system for members of professions to use as guidelines to be more ethical and disciplined in their professions. Such a code, according to Bowen et al. (2007) is also a means of assuring the public and clients that members of a profession can be deemed as competent, to have integrity and will aim to maintain and keep in place high standards in what they do. Poon (2009) mentions the importance of self-regulation which is a fundamental principle for any profession. In this regard the Rule of Conduct for Members, published by the Royal Institution of Chartered Surveyors (RICS) are mentioned. According to Poon (2009), the aim of these principles is to help members to take care of difficult circumstances or situations where members' professionalism is in danger of being compromised.

However, whether the adoption of a code of ethics by an institute results in improved conduct by its members is, according to Bowen et al. (2007), open for debate. Bowen et al. (2007) state that codes of ethics are mostly "window dressing" as well as "self-serving, public relations efforts". In a survey conducted by Fan et al. (2010) among Hong Kong surveyors, many respondents did not find the RICS Rules of Conduct helpful when facing complicated ethical issues. Similarly, Abdul-Rahman et al. (2011) found that in a survey on unethical conduct in the Malaysian construction industry, "code of ethics in an organisation" was the lowest ranked way to minimise unethical conduct in the construction industry. The reason for this, according to respondents, was because any code of ethics is meaningless if not enforced by the professional body (Abdul-Rahman et al., 2011).

Teaching ethics to university students

Scalza (2008) is of the opinion that teaching ethics at tertiary level is about framing what they already know, into the context of their new field of study. It can be assumed, according to Scalza (2008), that students were taught by their parents about the ethics of right and wrong and what their responsibility is towards the correct outcome. The question that therefore can be asked is what must be taught to students at university in addition to what they already know when they arrive from their homes.

Wang and Buckeridge (2016) state that current programs in construction education provide students with excellent technical knowledge. Construction managers, however, increasingly need the intellectual tools to understand the diversity within different cultures and disciplines. These differences can arise due to varied cultural, religious, environmental, legal and political perspectives. In a South African context, the above is relevant because of the diverse nature of the local population (for example, South Africa has 11 official languages), as well as the fact that a number of professional firms are currently conducting business in other African countries, each with its own language, culture, laws, and so on.

When looking at the literature describing the teaching of ethics at universities in different countries, it is clear that although the teaching of ethics is considered important, there are differing opinions on how and to what extent it should be done. Sands (2014) mentions that teaching ethics assists construction students to think critically about various situations that may present ethical questions. Sands (2014) also considers the teaching of ethics to be essential for ethical behaviour in practice, but is of the opinion that in construction education, there is no official standard of ethical competency evaluation.

Wang and Buckeridge (2016) observe that the American Council for Construction Education (ACCE), as the accreditation body of most construction management programs in the USA, does not require a mandatory ethics course for an undergraduate construction management curriculum. On the other hand, the Accreditation Board for Engineering and Technology (ABET) requires that engineering programs must demonstrate that their graduates have an understanding of professional and ethical responsibility (Wang and Buckeridge, 2016). According to Sands (2014), both these bodies leave the art of teaching ethics to the relevant institution. Sands (2014) considers this to be a problem for educators who are technically trained and therefore view ethical issues as secondary to primary coursework.

Reid (2010) makes the observation that there has been a growing expectation in the western world during the past 15 to 20 years that educational institutions should prepare students for ethical decision-making in practice, especially in the application of modern technology. In this regard Reid (2010) argues that ethics must be taught at universities because “it challenges students to gain the ability to respond to in a disciplined, rigorous and sensitive way to the various crises and ethical challenges that they may encounter in their profession”.

Reid (2014) conducted case studies of how ethics are taught in engineering courses in various countries. In Australia, at the University of Technology, Sydney and the University of New South Wales, the subject of ethics was introduced in the first year and taught throughout the course. At the Auckland University of Technology in New Zealand (UAT) Reid (2014) quotes Geddes (2001) who indicated that at the time, in order to gain accreditation of the Bachelor of Engineering degree, it was not necessary to show that the teaching of ethics was incorporated into the course. Another observation by Reid (2014) was that the advancement of technology in engineering studies resulted in an increasing amount of technical data that were included in the undergraduate engineering curriculum which in turn led to the marginalisation of ethics from technologically orientated curricula.

Reid (2014) also discusses the Washington Accord that was drawn up in 1988 as an agreement between professional engineering bodies of the USA, UK, Australia,

Canada and New Zealand. This Accord was earmarked to serve as a benchmark for engineering degrees as well as a road to professional registration. Hong Kong, South Africa and China later also became members to the agreement.

The objective of the Accord, according to Reid (2014) was to develop a uniform standard for professional engineering practice. Although the Accord offers guidelines towards the standards of a four-year engineering degree, professional and advisory bodies in the signatory countries are expected to incorporate ethics into their curricula. Wang and Buckeridge (2016) state that most engineering programs in the USA require one academic hour insert to each core course covering ethics related topics. Furthermore engineering programs must demonstrate that their graduates have an understanding of professional and ethical responsibility.

METHODOLOGY

The research methodology that was followed in this paper is a combination of three types of data capture. Firstly the extent of ethics teaching of quantity surveying students at the University of Pretoria (UP) as well as at other universities was investigated, secondly the Code of Conduct of the SACQSP, which seems to form the basis of ethics teaching to students was evaluated and compared with similar codes by other professions in South Africa as well as that of the RICS. Lastly a survey was conducted among quantity surveying students in two years of study at UP in order to gain insight into their perception of ethics teaching at university.

Ethics teaching at South African Universities

The National Qualifications Framework (NQF) is a system approved by the Minister of higher education for the registration and classification of quality-assured national qualifications in South Africa. In order to advance the objectives of the NQF, the South African Qualifications Authority (SAQA) is responsible for the content of each level of the NQF. All tertiary qualifications are guided by “level descriptors” as published by SAQA. The definition of a level descriptor according to SAQA is “that statement describing learning achievements at a particular level of the NQF that provides a broad indication of learning achievements or outcomes that are appropriate to a qualification at that level” (SAQA, 2010). It is further stated that the purpose of a level descriptor shall be to ensure coherence across learning in the allocation of qualifications and to facilitate the assessment of the international comparability of qualifications (SAQA, 2010).

A BSc (honours) degree, equal to a NQF level eight, has ten level descriptors, one of which is “Ethics and professional practice”. This level descriptor is in respect of which a learner is able to demonstrate an ability to identify and address ethical issues based on critical reflection on the suitability of different ethical value systems to specific contexts (SAQA, 2010). It is interesting to note that at NQF level five, which is on first year level, the level descriptor for “Ethics and professional practice” reads that it is in respect of which a learner “is able to demonstrate an ability to take account of, and act in accordance with prescribed organisational and professional ethical codes of conduct, values and practices and to seek guidance on ethical and professional issues where necessary”. Judging from this, it seems that to familiarise honours students just with the code of conduct in terms of ethical teaching, is, according to SAQA, not sufficient.

A web-based search was conducted to gather information on the modules in which ethics are currently being taught to quantity surveying students at South African

universities. For this paper the five residential universities in South Africa that offers quantity surveying courses at BSc and BSc (honours) levels, viz. Universities of Pretoria, Cape Town, Free State, Nelson Mandela, Witwatersrand and Kwa Zulu Natal were investigated. There are universities of technology in South Africa that also offer quantity surveying courses, but those are at diploma and BTech level and is therefore excluded from this study. After the information was drawn from faculty yearbooks, it was verified orally by contacting the respective heads of department at these universities. The results of the search is indicated in Table 1.

Table 1: Teach of ethics modules at universities

University	Module	Level	Description
Pretoria	Quantity Surveying practice	Honours	Quantity Surveying Professions Act
Cape Town	Professional Practice	Honours	Quantity Surveying Professions Act, and the implications of the Code of Conduct for practitioners
Free State	Professional Practice	Honours	Be attuned to professionalism, personal conduct and the principles of good practice and ethics
Nelson Mandela	Quantity Surveying	Honours	Professional bodies' Acts
Kwa Zulu Natal	Construction Economics	BSc (2 nd year)	Codes of practice and ethics relevant to construction management
Witwatersrand	Construction Law	Honours	Professional Councils Act such as SACQSP

As SAQA only indicates a broad description of learning achievements in a level descriptor and is not being prescriptive on the format the contents much be in, it is left to each institution to prescribe its own modules with its specific content. This is clear in Table 1 where each university has its own module name, each with a different content. It must be noted that the description as given in Table 1 is only reflecting the ethics content of that module and not the content of the complete module. The full module Quantity Surveying Practice of the University of Pretoria for instance is “Construction procurement guidelines; standards of uniformity, contract administration; conditions of appointment and fee accounts; consortiums; tendering for professional services; professional indemnity; Public Private Partnerships, Quantity Surveying Professions Act; Council for the Built Environment Act, CIDB Act and Preferential Procurement Policy Framework”. From this it is clear that the code of conduct of the SACQSP only forms a small part of the module’s contents. It is also pertinent to note that only the University of Kwa Zulu Natal teaches ethics at undergraduate level; all other universities bring it in only at honours level. This creates a problem when a student at one of these universities decides to leave after completing the BSc degree.

SACQSP and other professions’ codes of conduct

The Code of Conduct (hereinafter referred to as the “Code”) has been compiled by the SACQSP in terms of the Act and has been revised from time to time. The latest version is dated 7 March 2013. The Code is written under the following headings: Definitions; Objects; Rules of conduct; Establishment of a quantity surveying practice and carrying on of business; Disciplinary procedures; and Repeal of previous rules.

Space prohibits the discussion of the codes of conduct of other professions and it is sufficient to also indicate the headings under which the Codes of the Engineering

Council of South Africa (ECSA) and the South African Council for the Architectural Profession (SACAP) are written (Table 2)

Table 2: Table of contents of ECSA and SACAP

ECSA	SACAP
1. Objectives	Definitions
2. Rules of conduct: Ethics	Preamble
3.1 Competency	Rule 1: Unprofessional conduct
3.2 Integrity	Rule 2: Technical competence and professional work
3.3 Public interest	Rule 3: Promotion of services
3.4 Environment	Rule 4: Professional responsibilities
3.5 Dignity of the profession	Rule 5: Establishment of an architectural practice and carrying on of a business
4. Administrative	Rule 6: International work
5. Repeal of rules	Repeal of previous rules
6. Short title	

As can be seen when comparing the three Codes, although under different headings, the overall gist is much the same, the “Rules” that occur in the SACAP code correspond with the “Rules of conduct” of that of the SACQSP. It can also be seen that SACAP includes a rule on establishing a practice similar to the SACQSP, but not ECSA.

The Code of the SACQSP has been refined over time and has had input on legal matters from specialists who served on the various Councils throughout the years (the current Council is the 5th that has been appointed since inception of the 2000 Act). The ASAQS also has its own Code that is much the same as that of the Council, in order not to confuse practicing quantity surveyors.

One of the peculiarities of SACQSP’s Code is that it has a section on the establishment of a practice (section 4). Currently the Council is, according to the Act, responsible for registering individuals with no mention in the Act of practices. Since the ASAQS has a register of practices, it can be assumed that the Council, in order to stay in line with the ASAQS, decided to also include practices in their Code. The question though is whether they will have any legal standing if, say, a practice contravenes one of the clauses in this Code.

As seen above, all universities use the Code as a basis for teaching ethics to quantity surveying students. This is not per se a bad way of introducing students to what their profession’s attitude and views are on ethics, but the question is whether it is enough to equip them for their future careers as professional quantity surveyors. Will they understand what it means when the Code states in point 3.7 that they “must provide work or services of a quality, scope, and to a level, which are commensurate with accepted standards in the profession”? (SACQSP, 2013). When their practice, for instance, have won a tender because they offered a 60% discount on professional fees and the employee is told “not to spend too much time on the job” because of the reduction in their fees, is the fact that inordinately low fee tendering is becoming the norm, that it now qualifies as “acceptable standards and practices”? Or, if they do a feasibility study and later get told by one of the directors that he “tweaked” the feasibility a little so that it “looks better for the client”, will the young graduate deem it as “acceptable practice”, or will it make him/her uncomfortable?

Other documents that can be looked at in terms of international guidelines are firstly those published by the RICS. The “Rules of conduct for members” are mandatory for all RICS professionals regardless of their geographic location. This is important for

South African quantity surveyors who are also members of the RICS. The RICS also publishes Regulations in which they lay down five ethical standards: Act with integrity; always provide a high standard of service; act in a way that promotes trust in the profession; treat others with respect and take responsibility. By adhering to these standards, RICS professionals demonstrate their adherence to ethical behaviour. Again the contents of these documents do not differ much from the Codes published by South African professional bodies. One document that provides additional information, is RICS's guide to conflict of interest. Although South African codes refer to possible conflict of interest situations, this is a much more comprehensive document that can be used by the professions as well as university departments when teaching ethics. The last international document that can be looked at is the "International Ethics Standards" published by the International Ethics Standards Coalition (IESC), a body comprising over 100 global independent non-profit organizations (IESC, 2016). In this publication, ten ethical principles are discussed. These principles are accountability, confidentiality, conflict of interest, financial responsibility, integrity, lawfulness, reflection, standard of service, transparency and trust.

Survey among students

A questionnaire was distributed among quantity surveying students at the University of Pretoria. The population was all the quantity surveying students in the Department, but it was decided to concentrate on the third and honours years students. The reason for this was to see whether the students did have exposure to any education in ethics by their third year and if not, then in their honours year before completion of their studies. It must be remembered that it is not compulsory for students to progress to honours studies after completing their undergraduate BSc degree, although it is recommended by the Department.

The survey was conducted by means of accidental sampling, meaning that questionnaires were completed by third and honours year students who showed up for their respective classes on that particular day. The sample size was 30 third year students from a population of 48, and 16 honours student from a population of 40.

The same questionnaire was completed by all students in an effort to see whether there was progress from undergraduate to postgraduate years in terms of ethics knowledge. The discussion of the questionnaire is as follows:

The first question was to indicate in which year of study the student was. The second question asked whether the students have been taught about professional ethics up to now in their studies. Five third year students replied yes, while 25 answered no. this was expected since the module containing the code of conduct is only taught at honours level. It was a bit disconcerting that two of the honours respondents answered that they have not been taught about any ethics up to now.

In question 3 students were asked in which module they have been taught about ethics. All honours students who answered that they have had ethics teaching, answered correctly that the module is Quantity Surveying Practice 700. The third year students on the other hand provided a number of modules such as Quantities, Building Science, Financial Management, etc. which can only be described as guessing.

Questions 4 and 5 related to the codes of conduct of both the SACQSP and the ASAQS where students were asked whether they have had exposure to it (Q4) and in which module (Q5). Here 25 third year students answered yes to the ASAQS (5 no)

and 22 yes to the SACQSP (8 no). In the first year of study students get exposed to the structure and role players in the built environment through a module called Building Organisation. In this module mention is made of the different professional bodies as well as the fact that these bodies each has a code of conduct, and it was expected that students will provide this in their answer, but only 10 students answered correctly. A range of modules were mentioned such as Quantities 101 (16), Quantity Surveying Practice 300 (3) and Building Science (1). The honours students on the other hand mostly got it right with 15 students replying that it was discussed in Quantity Surveying Practice 700.

In questions 6 and 7, students were asked whether they think that they need more teaching of construction ethics at university than currently, and if yes, whether a semester module would be justified. Third year students replied positively: 28 answered yes and 21 of those considered also that it should be a semester module. Honours students were equally positive with a yes answer of 12 and all 12 thinking that it should be a semester module.

In the last question students were asked to rank in terms of importance the following: Employer, Client and Public. The response was as indicated in Tables 3 and 4.

Table 3: Ranking by third year students

Rank	Employer	Client	Public
1	8	18	6
2	15	11	0
3	6	0	23
Total	29	29	29

Of the 30 respondents, 29 answered the question. As can be seen, third year students rank the Client to be the most important, second the Employer and third the Public.

Table 4: Ranking by honours students

Rank	Employer	Client	Public
1	8	8	5
2	4	8	2
3	4	0	9
Total	16	16	16

Because the honours students would already have discussed the Codes of Conduct in class, one would have expected the Public to be ranked first, but this did not happen. Although the spread between the three options is much closer than is the case with the third year students, there is still uncertainty with both the Client and Employer seen to be a little more important than the Public.

CONCLUSION

It is clear from the above that ethics are being taught at South African universities mostly by discussing the Code. To only do this does not prepare students adequately to deal with the ethical issues that they are going to be confronted with once they enter the working industry. It can also not be expected from the firms that they are going to join to fulfil this function – some of the ethical problems may even emanate from the firms themselves.

It is therefore suggested that quantity surveying departments introduce more comprehensive modules on ethics into their courses where, apart from the Code,

topics such as business and professional ethics, conflict of interest, integrity, responsibility, transparency and accountability are discussed in detail.

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PREPAREDNESS OF BUILT ENVIRONMENT STUDENTS ON SUSTAINABILITY AND GREEN BUILDING ISSUES: HOW ARE SOUTH AFRICA HIGHER EDUCATION INSTITUTIONS FARING?

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Construction education is the fundamental requirement for a career path in construction and civil engineering. Since the concepts of sustainable development and green building were introduced to halt environmental degradation, it is imperative to assess the level at which construction students are being equipped with the necessary skills and knowledge to develop a green built environment. This study seeks to investigate the level to which the construction education curriculum captures sustainable development as well as green building pedagogy. Data were sourced from both primary and secondary sources. The respondents were built environment students from a South Africa higher institution. The study found that the curriculum shallowly cuts across sustainable development; it was found not to have covered the fundamental elements of sustainable development and how it can be achieved in practice. The study recommends that construction education curriculums should be reviewed to incorporate green building tracing and its practicability. This would facilitate the smooth transition of students into environmentally responsible professionals that will ensure the sustainability of the built environment.

Keywords: construction education, built environment, green building, sustainability, sustainable development.

INTRODUCTION

Over the past two decades, sustainable development has become one of the most important phenomena within the built environment, which is aimed at improving quality of life as well as conserving natural resources (Pearce and Ahn 2012). It has also rapidly become a globally acknowledged concept as it involves improving environmental quality, thereby increasing general life expectancy (Akadiri et al. 2012). The terms ‘sustainable development’ and ‘green building’ are often used interchangeably by researchers as they seek to achieve the same outcome (Nurick 2012; Kiggundu 2014). However, Samari et al. (2013) established that green building serves as the basis by which sustainable construction development can be achieved. Bakar et al. (2011) defined green building as the process of employing environmental and resource efficient techniques in development and construction projects. In the recent past, green buildings have been given other names; Howe (2010) called it ‘high performance building’; while Hwang and Tan (2012) termed it ‘sustainable building’.

In general, sustainable development and green building are aimed at revolutionizing the construction industry, by optimizing energy consumption, indoor air quality and

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use of resources (Lapinski et al. 2006). Xolisa (2006) submitted that if the natural environment and general quality of life are to be sustained, the wellbeing of the ecosystem needs to be preserved and protected. Since the construction industry is continuously responsible for the physical change in the ecosystem of every built environment, there is need to integrate sustainable development in every aspect of the industry to meet the needs of the future generation. This can only be achieved by raising competent professionals who can fully and effectively integrate sustainability and green technology into every development within the construction industry. Murray and Cotgrave (2007) noted that the construction industry mainly on relies higher education institution to provide training on sustainable development and produce professionals who are experts in delivering sustainable projects. Learning about sustainable development, its designs, and principles is crucial for students training to pursue a career in the construction industry, as they are responsible for the future built environment (Clevenger and Ozbek 2013).

It is important that construction education and its training align to a certain extent with professional practises industry requires. However, as a result of the constant development and modernisation associated with the construction industry, ensuring that academic curriculums meet the requirements of the industry remains a major problem (Berceric-Gerber et al. 2014). Johnson and Gunderson (2010) acknowledged that little information is available on how construction management programs adapt to the constant transformation in the industry. This problem is compounded by the constant revolution which necessitate the continuous improvement of professionals in the industry. Since there is little empirical data on integration of emerging technologies and ideas such as sustainability into the curricula of construction programs in higher institutions, there are no established benchmarks for further improvements (Berceric-Gerber et al. 2014). To produce competent graduates who will measure up to the industry's expectations and professional needs, sustainable development should be the fundamental concept on which construction education curricula are built (Lim et al. 2015). In view of this, the aim of this study is to establish the extent that South Africa construction education and training meets the required industry expectations for green building and sustainable development. This is with a view to facilitate the smooth transition of students into environmentally responsible professionals that will ensure the sustainability of the built environment.

SUSTAINABLE DEVELOPMENT AND GREEN BUILDING

The construction industry is one of the largest consumers of energy, resources and water by virtue of its size and nature (Akadiri et al. 2012). Thus, the natural environment and quality of life are greatly affected by construction activities. Today's construction industry must harmonize the design; environmental; economic and sustainability requirements of construction projects (Saroop and Allopi 2013). In practice, sustainability is integrated into every stage of a construction project, starting at that the pre-construction stages until deconstruction, to reduce the negative impact of construction activities on the environment by utilizing more resource efficient prototypes of construction (Hwang and Tan 2012). Sustainable building comprises techniques used to design, develop, build and control a project with a view to mitigating the project's adverse effects on the environment (Zainul Abidin et al. 2013).

Heerwagen (2000) submitted that one of the ways to pursue veritable sustainable development is through the design and use of green buildings and infrastructure. The

green agenda has transformed design and building techniques used by construction stakeholders in all phases of a building life cycle (Nobe and Dunbar 2004). Tinker and Burt (2004) also noted that it has led to the invention of various green building materials. The advent of green technologies has enhanced the demand for sustainable development (Nazirah et al. 2013). In order to swiftly adapt to this ever-growing demand, construction professionals are beginning to tweak their operation and execution methods to suit the new technology requirements (Ahn and Pearce 2007). Furthermore, various construction professionals and other stakeholders must work together, integrating design and construction processes (Shenoy 2009). Darko et al. (2018) opined that to achieve full global sustainability of the built environment, green building techniques must be fully adopted in the construction industry. Du Plessis (2007) proposed two main strategies for developing countries embracing sustainable development; the first step is to ensure that the local construction industry possesses the capacity required for sustainable development; while the other is to ensure that the industry is capable of absorbing the demand for sustainable development.

Sustainability in Construction Education Curricula

The construction industry has been criticised for its tardiness in implementing new technology and adaptability to change, but in recent times, new trends are emerging in a bid to modernize the industry (Johnson and Gunderson 2010). To keep up with a fast-developing world and maintain high standards, construction professionals must be able to adapt to several things which include: constant revolution in technology; the world becoming a globalized village; as well as other complicated issues of the modern age such as environmental, political and socio-cultural issues (Berceric-Gerber et al. 2014). As evident from recent events, the green revolution as a means of sustainable development is the future of the construction industry (Gou et al. 2013). Various governments agencies, professional associations, construction professionals, as well as other construction stakeholders perceive that green building will be the benchmark on which the standard of building in future will be based (Ahn and Pearce 2007). With the constant increase in the request for green building and how essential it has proven to be to every construction project, the knowledge and practicable skills of green building has become quite important for all professionals and other stakeholders within the construction industry (Tinker and Burt 2004).

In recent times, there has being an outcry for the construction industry to mitigate the environmental impact of its activities and enhance the performance of the environment. This has emphasized the need for the integration of sustainability in construction education programs (Lim et al. 2015). Besides the three fundamental issues of every construction project which are cost; quality; and time, Cotgrave and Kokkarinen (2011) forwarded that students in the construction career path must see sustainable construction and development as one of their future fundamental professional responsibilities. They must ensure that clients and the public are aware of its benefits as well as propose policies to promote sustainable development. However, full integration of sustainability principles and processes into existing modules and curriculums might be difficult to achieve because individual educational institutions designed their own curricula and modules with no system to aid uniformity with respect to sustainable development. (Coral 2009; Wang 2009; Bhattacharjee et al. 2011).

Ahn and Pearce (2007) surveyed green building practices in construction firms and the expected green knowledge and skills from construction graduates in the US. From

the study carried out by Ahn and Pearce (2007), 61% of the respondents believed that it is important for construction education programs to teach sustainable development. Also, 65% of respondent construction firms expected new hires, especially graduates, to possess green building knowledge and skills as well as its rating system and how it can be applied practically. The study concluded that the construction industry expects construction curricula to cover areas of green building rating systems (LEED), its materials and methods as well as fundamental understanding of sustainable development. This is to ensure that construction students are familiar with the concepts of green building sustainability (Ahn and Pearce 2007).

To ensure that Africa is ready to fully adopt sustainable development, Du Plessis (2005) propose that sustainable development must be integrated as a fundamental part of construction education programs in universities by introducing curricula checked and evaluated by relevant professional associations and construction education regulatory councils. Murray and Cotgrave (2007) also informed that professional bodies within the construction industry should take up the responsibility of ensuring gradual integration of sustainable development to the curriculums of construction programs. Ahn and Pearce (2007) noted that apart from sending staffs to green building conferences and trainings, construction firms also rely on the skills and knowledge of new staffs even in entry level positions. To meet this knowledge requirement of firms, various construction related education institution must fully integrate sustainability and green building modules in their curricula. This will produce construction graduates who can easily transit into professionals that will be valued in the workplace.

Johnson and Gunderson (2010) believes that the available construction programs in the universities do not adequately prepared construction graduates for the professional world. Understanding the professional requirements of sustainable development is imperative to developing strategic means to enhance construction programs curriculum to incorporate sustainable development (Lim et al. 2015). In the study carried out by Darko et al. (2018), “unfamiliarity of construction professionals with green building technologies” ranked highest among five human related barriers of green building adoption as well as second highest among all twenty-five barriers measured by the study. In the same light, the result of the study carried out by Darko and Chan (2018) ranked “green building technologies educational and training programs for construction stakeholders” as second among fifteen strategies to promote the adoption of green building. These two studies established that for green building to be fully adopted in our societies, construction professionals must versatile in the subject right from education and training days.

Over the years, studies such as that of Johnson and Gunderson (2010); Berceric-Gerber et al. (2014) were carried out to uncover how best upcoming construction professionals can meet the present needs of the 21st century construction industry while assessing the technical and personal skills they might need to achieve this. The outcome of these studies revealed that it is of great necessity that present day graduates within the construction industry possess cooperative skill for good teamwork; acquire a deeper understanding of important professional subjects such as social, environmental and economic; and lastly, understand the basics of engineering technology and computer systems as well as their application in practice. However, Berceric-Gerber et al. (2014) noted that construction training and education should be the trendsetter instead of chasing the construction industry and trying to keep up with

its trends. Furthermore, construction education must be designed in such a way that it adjusts to deal with current and impending problems.

RESEARCH METHODOLOGY

The nature of the research design is descriptive as the research seeks to establish the extent that South Africa construction education and training meets the required industry expectations for green building and sustainable development. The survey method was adopted as the research strategy. The method for this research is the quantitative approach. A five-point Likert type scale questionnaire was designed to collect data with the goal of achieving the aim of the study. Data was collected from students currently in their penultimate and ultimate year of study within two departments of the built environment of a South Africa Higher Education Institution. A total of 120 questionnaires were distributed to the students in both departments. While 111 questionnaires were retrieved from the respondents, only 109 were useable after they were checked for completion and validity.

The data collected through the questionnaire were analyzed using mean item score (MIS) and presented in tables. The collated data were tested to check the reliability with the aid of Cronbach's alpha test. The test returned values of 0.778, 0.932 and 0.953 for the three areas measured by this study, which are; how the construction curriculum covers sustainable development; knowledge in areas of sustainable development and; familiarity with sustainable development terms respectively. This indicates that the collected set of data is reliable since Cronbach's alpha test scores a set of collated data between 0 and 1, where 1 means the data has maximum consistency (Oke et al. 2018).

FINDINGS AND DISCUSSION

All students surveyed are in the second to the last and last year of their study. Background information shows that over 85% of the respondents have worked in the construction industry for less than 5 years which makes their response valid for the purpose of this study.

Table 1: Student's response on how curriculum incorporates sustainability

Description	Mean	Std. Deviation
We are being taught Sustainable development in specific courses	3.17	1.067
Green building courses are compulsory (i.e. not electives)	2.60	1.270
Sustainable development was mentioned conceptually in some courses.	3.39	1.113
Most of our departmental courses incorporate principles of sustainable development	3.11	1.117
We are being taught how to incorporate green building in practical projects	2.73	1.214
We carried out a required sustainable development or green building-based research projects	2.55	1.228
We are expected to learn sustainable development concepts ourselves	3.43	1.040

Table 1 displays how the construction curriculum incorporates sustainable development through the modules taught in the university from students' perspective. The table shows that all mean item scores of the seven items measured in this section are around the average, 3 on a scale of 1 to 5. The mean item score for whether students are expected to learn sustainable development concepts themselves is 3.43

out of 5, which means majority of students believes that they are to device other means to acquire knowledge about sustainable development.

An average mean item score on all questions does not portray a strong integration of sustainable development into the construction curricula. Instead it reveals that the construction education is still struggling to fully integrate sustainable development and green building values into curriculums within the built environment. From the table it can be deduced that the construction curricula do not fully incorporated sustainable development into all aspect of it modules. According to Lim et al. (2015) Sustainable development must be the basic concept on which all construction curriculums and modules be built. As only then can industry competent graduates be produced for the future.

The construction industry expects that graduates in construction related fields to be familiar with new technologies including the trending ‘methods of project delivery’ as well as the modern materials and methods that are easily accessible for sustainable building (Smit et al. 2005). Hayles and Holdsworth (2008) concluded that the best way to completely adopt sustainability in the built environment is to integrate sustainability principles and processes into all modules offered by construction programs curriculum. Nasibulina (2015) recalled that the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 established that education remains a major player in the pursuit of sustainable development.

Table 2: Knowledge of respondents in areas of sustainable development

Description	Mean	Std. Deviation
Basic understanding of sustainability	2.89	1.108
Green agender	2.86	1.109
Basic understanding of green building	2.84	1.148
Basic understanding of green building processes	2.61	1.147
Green building design principles and application	2.23	1.111
Green building rating system; LEED	2.13	1.019
Sustainable building methods and materials	2.75	1.055
Management of sustainable efforts	2.44	1.101
Green techniques and products	2.54	1.093
Energy efficient systems for buildings	2.62	1.112

Table 2 displays how knowledgeable the respondents are in the different areas of sustainable development and green building. The data show that in all ten areas of sustainable development covered by this study, the mean item score was below average score 3 on a scale of 5. Basic understanding of sustainability scored 2.89 out of 5 the highest in this section of the survey. This is closely followed by green agenda and basic understanding of green building with mean item score of 2.86 and 2.84 respectively. The lowest in this section is the knowledge of ‘green building rating system; LEED’ with a mean item score of 2.13.

Table 2 revealed that the respondents do not have a clear and definite knowledge about various essential areas of sustainable development. It can be interpreted from the table that the students do not feel confident about their general knowledge of ‘sustainable development’ and ‘green building’. Knowledge in other areas falls below these two according to the survey.

Ekundayo et al. (2011) established six major learning sections of sustainable development required by construction professionals to practice sustainability. They include: general knowledge; processes and principles; technology and its practical

applications; environmental concerns; social concerns; and economic concerns. The result from the study shows that the students' knowledge base in these areas is inadequate. The study also revealed that the students do not really know anything about the rating system for sustainability widely known as LEED. The study carried out by Ahn and Pearce (2007) concluded that the construction industry requires educational institutions to educate students about green building materials, methods and rating systems (LEED) as well as the fundamental practices of sustainable development to make them better professionals upon graduation.

Table 3: Familiarity of respondents with sustainable development terms

Sustainable development terms	Mean	Std. Deviation
Carbon footprint	2.63	1.207
Environmental analysis	2.91	1.191
Energy conservation	3.24	1.105
Energy Efficiency	3.25	1.029
Indoor Environmental Quality	2.94	1.108
Environmental conditioning	3.01	1.206
Green building	2.98	1.232
Life cycle assessment	3.08	1.195
Sustainable development materials and Resources	3.06	1.193
Renewable energy	3.14	1.158
Smart grid	2.29	1.204
Sustainable design	2.88	1.207
Sustainable construction practices	3.10	1.209
Water Efficiency	3.25	1.172
Nanotechnology	2.31	1.296

Table 3 displays how familiar the respondents are with various sustainable development terms. The respondents are scored averagely in their familiarity with sustainable development terms. Energy efficiency and water efficiency scored highest with a mean item score of 3.25 each on a scale of 1 to 5, closely followed by conservation of energy with 3.24 mean item score. At the bottom of the list is nanotechnology and smart grid with mean item scores of 2.31 and 2.29 respectively.

Table 3 reveals that the respondents are not so familiar with sustainable development terms and their knowledge about the practicable applications of these terms is questionable. Murray and Cotgrave (2007) categorized the knowledge and skills expected of a "sustainable development literate" construction professional into: discipline-specific sustainability knowledge and skills; generic sustainability knowledge and skills; and sustainability relevant values. Results from the study shows that students are not acquainted with these categories of sustainability knowledge and skills. Furthermore, Markovic et al. (2014) established that nanotechnologies and smart grids are the future of sustaining the physical world. Students' familiarity with these two concepts scored very low which depicts that competence of young professional to deliver project that incorporate these technologies in the near future is still uncertain.

CONCLUSION

Sustainable development has been projected to be the future of construction and green building is a veritable tool to achieving full sustainability. To meet up with the needs of the fast-evolving world, construction professionals must be equipped with various skills and knowledge that are essential to deliver sustainable projects. One of the best ways to produce fully sustainable literate professionals that will take up the

responsibilities of delivering future projects is to educate them during their training in the university.

The study revealed that the students are familiar with concepts of sustainable development and green building, but they are not equipped with the skills and knowledge of practically applying it to construction projects. As established in the earlier section of this paper, students in the construction career path must see sustainable construction and development as one of their future fundamental professional responsibilities. They can only fulfil this responsibility if they are educated to do so.

It is recommended that construction curricula in the universities should not only cover sustainable development in specific modules but fully incorporate the concept as the basis of which all modules are built. Construction professional associations and regulatory councils should be effectively involved in this process to monitor and ensure that higher institutions are complying with the required standard. Students should be trained on how to design and implement green and sustainable technologies into projects. This will ensure that the next generation of professionals in the construction industry are able to deliver projects that are technologically up to date and meet the needs of the modern world.

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QUANTITY SURVEYORS' COMPLIANCE WITH THE ETHICAL STANDARDS

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Knowing that the construction industry has a poor image in most countries from the ethical point of view, this study appraised the practicing quantity surveyors' level of compliance with the ethical standards in Delta State, Nigeria. This is with a view to enhancing adherence of the practitioners to the ethical practices of the quantity surveying profession, thereby increasing client's satisfaction. To achieve the aim, the survey method was employed. Not only were the respondents knowledgeable about the existence of quantity surveying ethical standards but also, they attested that significant numbers of quantity surveyors in the study area were known to comply with the standards. The top three included compliance with the relevant laws and regulations, being honest, and acting with integrity. The least of the ethical standards, being not withholding information, had rating of 3.58 which is well above the 2.5 benchmark of average. Kruskal Wallis test carried out indicated that out of the thirteen ethical standards collated from the literature, there were significant differences in the opinions of the respondents on avoidance of conflict of interest, respecting confidentiality and being objective at all times. It is recommended that quantity surveyors should hold in high esteem the ethical standards stipulated by their regulatory body, the Nigerian Institute of Quantity Surveyors (NIQS), while also developing an ethical compliance culture among quantity surveyors in order to promote integrity and ethical conduct in the construction industry.

Keywords: ethical conduct, ethical standards, ethics, Nigeria, quantity surveyors.

INTRODUCTION

Not all the literature supports the view that codes of conduct are necessary to improve ethical behaviour within a firm. Valentine and Barnett (2003), based on responses to a questionnaire in the United States of ethical perceptions in firms, reported that there exist no connection between ethical perceptions and the use of written codes. However, Kaptein (2009) stated that the first step for companies in developing their integrity is to introduce a code of conduct. This is a document that articulates company's business values, principles and standards. The ground for maintaining standards of professional conduct is compliance with the particular institution's regulations, bye-laws and codes of conduct. The Royal Institute of Chartered Surveyors (RICS) Rules of Conduct for Members (2007) (The Rules) centered on "proportionality, accountability, consistency targeting and transparency" in providing better regulation over members professional practice.

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Bamisile (2004) opined that regulations which are supposed to collate all relevant standards for incorporating them in the construction projects, and which constitute the key document for quality management, are frequently absent in Nigeria. The Minister of Works noted that many practitioners find it tough to uphold their professional ethics; this is a development that is impacting negatively on the nation's economy (Valentine and Barnett, 2003). The major dilemma for implementing effective Codes of Ethics remains that no law or Code will be of much value if individual civil servants lack the technical competence to recognize an ethics problem for what it is, or if they do not know what standards their organization expects of them, or (worst of all), if they consider it to be not in their interests, personally or professionally, to take a stand for integrity and against corruption (Transparency International 2001). This study therefore appraises the level of quantity surveyors' compliance with ethical standards in Delta State, Nigeria. This is done in order to develop recommendations to the profession which achieve a move towards the successful compliance with ethical standards among the quantity surveyors.

LITERATURE REVIEW

The Nigerian Construction Industry and Ethics

Aje and Awodele (2006) opined that the image of the construction industry lies on ethical conduct within the industry. Stephens (1994) argued that ethics are not placed over business and that business itself is an ethics, defined by ethics, and made conceivable by ethics. Oyewobi, Ganiyu, Oke, Ola-Awo and Shittu (2011) stated that the Nigerian construction industry is susceptible to ethical erosion due to the heterogeneous nature of the industry, which makes it imperative for construction professionals to exhibit high levels of professional ethics. Ameh and Odisami (2010) noted that professional ethical lapses in Nigeria led to project abandonment, capital flight and huge economic loss in the form of additional costs on a project.

Odugbemi (2008) argues that accountability helps citizens, civil society, and the private sector to scrutinize the actions of public institutions and officials to hold them accountable. The challenge among government officials in Nigeria borders on behavior that is unethical, which is a common occurrence. This manifests in lack of adherence to rules and regulations for the promotion of ethics and efficiency in the public sector (Anyim, Ufodiana, & Olusanya, 2013).

Whereas personal ethics constitute the perception of beliefs, values, personality and background, any tendency of an individual towards ethical conduct is strongly influenced by the value systems reflected by the employing organization (Mason, 2009). The major notable unethical misconduct in the construction industry according to Zarkada-Fraser and Skitmore (2001), Zou (2006) and Nawaz and Ikram (2013), are administrative interference, the illegal award of contracts or subcontracts, the exposure of confidential information to certain tenderers and the extortion of kickbacks by client and government officials.

On the other hand, contractors are found guilty of offering bribes to clients or tender committees in order for them to closeout tenders, collusive tendering and bid rigging, invoice fraud, the use of cheap materials that do not conform with acceptable standards and collusion between contractors and other supervisory authorities. The

European Council defines corruption as requesting, offering, giving or accepting, directly or indirectly, a bribe or any other undue advantage or prospect thereof which distorts the proper performance of any duty or behavior required of the recipient of the bribe (Fewings, 2009). Transparency International (2005) observed that corruption and other unethical practices in procurement especially of construction projects leave many developing countries saddled with substandard infrastructure and excessive debt.

Kenny (2007) noted that the impact of corruption goes beyond bribe payments to poor quality of constructed infrastructure with low economic returns, and low funding for maintenance. Corruption plays a major role in the awarding of contracts in terms of bribery. Oyewobi et al (2011) observed that ethical problems are evident in all the stages of building project from pre-tender stage to completion and a relationship exists between corruption and activities at different stages. It was revealed that project abandonment, delays and cost overrun among other things are the consequences of unethical behavior. Unethical or corrupt practices tend to distort construction process and thereby hamper economic growth. Unethical performance hinders the free play of market forces, discourages economic aid from foreign donors and makes it difficult to attract international investors which shun the corrupt environments to the detriment of the economies and communities of the countries (Kadembo, 2008).

Many features of the construction industry provide opportunities for corruption to flourish. There are few companies with financial capability to implement the construction of building projects where contracts tend to be huge in terms of monetary value (Shakantu, 2006). According to CIOB (2015), corruption and wrongdoing may always exist. By nature, it is very hard to eradicate, but it must be leaned against continuously through developing a strong culture, greater transparency and meaningful, policed discipline and punishment. The effects of unethical practices have a lasting impact detrimental to construction and engineering companies such as wasted tender expenses, tendering uncertainty, increased project costs, economic damage, blackmail, criminal prosecutions, fines, blacklisting and reputational risk.

Ethics is important to the practice of quantity surveying because it enhances the standard of services, reduces infiltration of quacks and also makes the profession command respect from the general public. Inadequate remuneration, the present economic climate and inadequate education and training are seen as the prevalent factors contributing to the decline in ethical standards of the quantity surveying profession in Nigeria (Aje and Awodele, 2006). Good governance can only be judged within a context and this context is influenced by the cultural environment within which either the organisation or its stakeholders operate, or by an externally imposed set of standards, such as might be required by a professional body seeking to use a code of ethics to regulate its membership. Four guiding governance principles have been identified: (Dallas 2004): (1) **Fairness** – the equality of treatment of all financial stakeholders; (2) **Transparency** – Clear and equal access of material company information on a regular basis allowing monitoring of company activities; (3)

Accountability – legitimate systems of control; and (4) **Responsibility** – adherence to prevailing laws and management of relationships to promote long term sustainability.

ETHICAL PRACTICES OF QUANTITY SURVEYORS

Ethics is a major challenge to professionalism in Nigeria according to the Minister of Works, Housing, and Power of Nigeria (Ibrahim, 2018). Cunningham (2011) sets out nine core values, or principles, which may guide members in managing difficult situations or where their professionalism may be compromised. Members are expected to know and understand and be committed to these principles in order to maintain the integrity of the profession. Table 1 reveals the nine principles that serve as a guide to the practicing quantity surveyor in upholding ethical values. These principles are also based on a recently issued RICS Guidance Sheet Maintaining Ethical Standards (2010). These three additional principals require members to comply with relevant laws and regulations and avoid any action, illegal or litigious that may bring the profession into disrepute; avoid conflicts of interest and declare any potential conflicts of interest, personal or professional, to all relevant parties; respect confidentiality maintain the confidentiality of your clients' affairs. Never divulge information to others, unless it is necessary (RICS, 2007).

Table 1: Principles that serve as guide to Quantity Surveyors

Principles	Description
Act with integrity	Never put your own gain above the welfare of your clients or others to whom you have a professional responsibility. Respect their confidentiality at all times and always considers the wider interests of society in your judgments.
Always be honest	Be trustworthy in all that you do -never deliberately mislead, whether by withholding or distorting information
Be open and transparent in your dealings	Share the full facts with your clients, making things as plain and intelligible as possible
Be accountable for all your actions	Never commit to more than you can deliver, take full responsibility and don't blame others if things go wrong; know and act within your limitations
Act within your limitations	Be aware of the limits of your competence and don't be tempted to work beyond these
Be objective at all times	Give fair neutral advice, and never let your own dealings or interests cloud your judgment; never discriminate; against others
Always treat others with respect	whatever their gender, race, religion or sexual orientation
Set a good example	Remember that both your public and private behavior could affect your own, the Society's and other members' reputation
Have the courage to make a stand	Be prepared to act if you suspect another member of malpractice.

Source: Cunningham (2011)

According to the Code of Professional Conduct Standards for Quantity Surveyors (2008) Quantity Surveyors should recognize and accept that they have a responsibility to the public and should at all times, in the conduct of their professional business, act in a manner which affirms this. They should, in their day to day practices, adhere to an ethical standard of business practice and behave with independence, integrity, and fairness towards the public, their clients and fellow professionals. Quantity Surveyors should, in the conduct of their business, act in a manner consistent with the good reputation of the profession and refrain from any conduct which might discredit it. For the avoidance of doubt, the latter conduct does not include: normal competitive commercial activity, advertising is not prohibited elsewhere in this Code. A Quantity Surveyor shall not take over the work of another quantity surveyor without communicating to that quantity surveyor that they have taken over such work. Where a client transfers from one Quantity Surveyor to another, the second quantity surveyor shall inform the client that he may be liable to fees for both. Quantity surveyors should, at all times, act objectively, with honesty and free of any conflict of interest and not allow their actions or advice to be unduly influenced by others.

The practice of quantity surveying in Nigeria is regulated by Decree No 31 of 1986, which set up the Quantity Surveying Registration Board of Nigeria (QSRBN). The members of the Nigerian Institute of Quantity Surveyors (NIQS) are governed by its constitution, bye laws and the code of professional conduct, in addition to the general laws of Nigeria. One of the fundamental characteristics of a professional body is the adoption and adherence to a code of professional conduct. Thus the sustainability of the standards and public confidence in the profession depend on the establishment of high ethical values based on broad principles and mandatory rules of conduct for service provided (NIQS, 2000). The NIQS code of conduct represents the essential minimum framework within which members provide their services; it reflects the ethics and culture of quantity surveying profession and the spirit of the laws governing the profession, also it identifies the key principles and values that should guide the day to day practice and emphasizes the core values that should be honored. It requires quantity surveyors not only to recognize their responsibility to their client but also their responsibility to the public and fellow professionals.

The NIQS code of professional conduct shall be the reference guide here, as its purpose is to regularize the level of discipline/skill and the behavior of all categories of Quantity Surveyors in the pursuance of the practice of the profession in Nigeria. Practitioners are expected to be conversant with all the provisions and apply the rules in their dealings with fellow professionals and the public in general. Failure to adhere to the general standard of conduct indicated in this code will be adjudged incompatible with the status of a practicing quantity surveyor and shall attract such disciplinary measures of reprimand, suspension or expulsion set out in the current constitution and bye-laws of the NIQS and the provisions of Decree No 31 of 1986 (now known as CAP 383 Laws of the Federal Republic of Nigeria) setting up the QSRBN.

Principals and partners of practicing firms shall be held responsible jointly and severally for any contraventions of this code committed by any of their member of staff in the performance of their official duties provided always (it is established beyond reasonable doubt) the member staff did not commit tortuous act or misrepresent the good intention of the partnership or acts on his/her own selfish interest. The NIQS has put in place certain guidelines as regards the ethics of members and those who wish to practice quantity surveying in Nigeria. These are presented under the following headings: Professional Obligation, Professional Conducts, Remuneration, Firms/Companies, General Practice Rule, Advertisement and Publicity, and Relationship with other Professional Colleagues.

RESEARCH METHODOLOGY

The study adopted the survey method with primary data collected through structured questionnaires that were administered on both the practicing quantity surveyors and other allied professionals in Delta State, Nigeria. Tables were employed for data presentations while analysis of the collected data was carried out using both the descriptive and inferential statistical tools. Percentiles was used in analyzing the general characteristics of the respondents such as years of working experience, academic and professional qualifications, while the mean was not only used in determining the average years of working experience acquired by the respondents but also in ranking of items rated on a 5-point Likert scale. Kruskal Wallis test was employed in this research work to determine the existence of significant difference or otherwise in the opinions of the respondents regarding the level of quantity surveyors' compliance with the ethical standards.

Research Rigour

The consistency degree of the data collected for this study was undertaken via reliability analysis according to Aftab et al. (2010). The Cronbach α coefficient is a measure of the inner consistency (Kothari, 2009). Reliability is taken to be low when Cronbach α is less than 0.3 and it cannot be accepted while reliability is in high level when Cronbach α is greater than 0.7. (Aftab et al., 2010). In furtherance of validating the questionnaire, the test of internal consistency was carried out using Cronbach's alpha. The internal consistency of the measured attributes in this study as perceived among the respondents within the Likert scale (1 to 5) was explained by the reliability coefficient that is based on the average correlation among the attributes and the total number of attributes in the sample. Using the Statistical Package for Social Sciences (SPSS), the Cronbach's alpha (α) was computed and presented on Table 2.

Table 2: Reliability Analysis of the Construct

Scale of measures	Alpha value α	Nr. of items
Level of compliance with ethical standards	0.898	13

Table 1 shows reliability analysis undertaken with the result of Cronbach's Alpha value being 0.898 for the research instrument used in measuring the level of practicing quantity surveyors' compliance with ethical standards. The values are far greater than 0.7 thresholds; therefore, based on Sushil and Verma (2010), the data collected with the instrument is acceptable while the instrument itself is reliable and valid.

DATA PRESENTATION, ANALYSIS AND RESULTS

Background information of the respondents to the survey

Out of 271 questionnaires that were randomly administered, 152 were retrieved and this represents 56.09% of the total questionnaire administered. This is considered sufficient for the study based on the assertion of Moser and Kalton (1999) that the result of a survey could be considered as biased and of little significance if the return rate was lower than 20-30%.

Table 3, shows the demographics of respondent. 9.9% of the respondents are Quantity Surveyors, 12.5% are Architects. The Builders were 14.4% while Engineers comprising Structural/Civil Engineers, Mechanical and Electrical Engineers are 50% of the total respondents. The remaining 13.2% are other professionals such as Estate Surveyors, Land Surveyors and Town Planners.

Regarding the respondents' years of working experience, it is evident that most of the respondents have 6-10 and 11-15 years of experience being 34.9% and 27.6% respectively of the total respondents. The respondents had an average of 13 years of working experience. Based on the foregoing, the experience and information of this group of professionals are considered adequate and reliable for the analysis.

While 46.7% of the respondents are corporate members of their respective professional bodies, 25.7% are probationer members and 13.1% have fellow membership status. The remaining 14.5% are not affiliated to any of the professional bodies yet they are practicing their respective professions.

Table 3: Demographics of the respondents

Category	Classification	Frequency	Percent
Profession Of Respondents	Quantity Surveying	15	9.9
	Architecture	19	12.5
	Building	22	14.4
	Engineering	76	50.0
	Others	20	13.2
	Total	152	100.00
Year Of Working Experience	1 – 5	14	9.2
	6 – 10	53	34.9
	11 – 15	42	27.6
	16 – 20	28	18.4
	21 – 25	6	3.9
	26 – 30	9	6.0
Mean	12.54	Total	152
			100.00

Professional			
Membership	Probationer	39	25.7
Type/Status	Corporate	71	46.7
	Fellow	20	13.1
	Non Member	22	14.5
	Total	152	100.00

Table 4: Respondents knowledge of quantity surveyors ethical standards

Parameters	Frequency	Percentage
High	97	63.8
Low	18	11.8
Uncertain	17	11.2
Very High	17	11.2
Very low	3	2.0
Total	152	100.0

Table 4 shows that quite a number of the respondents are knowledgeable about the ethical standards put in place for the quantity surveyors. Taking the level of knowledge into consideration, 63.8% of the total respondents had a high level of knowledge while 11.2% of the respondents had a very high level of knowledge of the quantity surveyors' ethical standards in the study area. Based on the aforementioned, the total number of the respondents with adequate knowledge of ethical standards guiding the practice of the quantity surveyors outweighed those with little or no knowledge regarding the quantity surveyors ethical standards.

Table 5: Quantity Surveyors compliance with the ethical standards

Parameters	Frequency	Percentage
Average	60	39.5
High	82	53.9
Low	7	4.6
Very High	3	2.0
Total	152	100.0

Table 5 shows that the level of quantity surveyors' compliance with the ethical standards in Delta State is quite encouraging consequent upon the perceptions of the respondents who had previous working relationship with the practicing quantity surveyors. While 53.9% of the total respondents rated compliance level to be high, 39.5% viewed compliance to be at average level and 2% rated level of quantity surveyors' compliance with ethical standards as being very high. Based on the aforementioned, in Delta State, the level of compliance exhibited by the quantity surveyors towards the ethical standards of practice as stipulated by the NIQS can be said to be 55.9% (53.9% and 2.0%).

Table 6: Allied professionals view-point regarding quantity surveyors adherence with ethical standards

Ethical Standards	Architects			Builders			Engineers			Others			Average	
	MIS	STD	Rank	MIS	STD	Rank	MIS	STD	Rank	MIS	STD	Rank	MIS	Rank
Compliance with relevant laws and regulation	4.47	0.772	2	3.95	0.722	3	4.18	0.795	1	4.15	0.988	1	4.19	1
Being honest	4.00	0.667	4	3.50	0.722	10	4.16	0.834	3	3.90	0.968	7	4.04	2
Acting with integrity	3.95	0.715	6	3.73	0.883	5	4.18	0.743	2	4.05	0.945	4	4.02	3
Being objective at all times	4.47	0.841	1	3.45	0.596	12	4.11	0.793	4	4.05	0.826	6	3.98	4
Being accountable for all actions	3.95	0.705	7	4.09	0.610	1	4.00	0.938	8	4.10	0.718	3	3.95	5
Respecting confidentiality	3.42	0.692	12	3.95	0.844	2	4.03	0.923	5	4.15	0.813	2	3.89	6
Being open and transparent	3.89	0.737	8	3.73	0.767	6	4.00	0.993	7	3.90	0.852	8	3.89	7
Do not distort information	4.37	0.831	3	3.45	1.224	11	3.91	0.969	10	4.05	0.887	5	3.88	8
Being aware of the limitation of competence	3.58	0.769	10	3.55	1.262	8	4.01	0.959	6	3.80	0.894	10	3.79	9
Not falsifying material or advertisement	3.84	0.688	9	3.91	0.684	4	3.84	0.834	12	3.55	1.099	12	3.74	10
Avoidance of conflict of interest	4.00	0.577	5	3.23	0.869	13	3.97	1.006	9	3.70	0.923	11	3.73	11
Not taking over other quantity surveyors work without communication (supplanting)	3.42	0.607	13	3.64	0.902	7	3.88	0.879	11	3.85	0.988	9	3.70	12
Not mislead by withholding information	3.47	0.964	11	3.50	1.012	9	3.67	0.999	13	3.50	0.946	13	3.54	13

Having realized that high quantum of the respondents are knowledgeable concerning the compliance of quantity surveyors with ethical standards (Table 4), opinions of the allied professionals were sought on the quantity surveyors' adherence with the ethical standards. Table 6 shows the descending order of mean scores that Architects rated "being objective at all times" and "compliance with relevant laws and regulations" as most significant. This is partly in line with the engineers who believe that "acting with integrity" and "compliance with relevant laws and regulation" is the most significant. The builders were of the opinion that "being accountable for all action and respecting confidentiality" is the most significant. In the view of other professionals, "acting with integrity" and "not distorting information" is seen as being most significant. Taking all the opinions of the respondents into consideration, on the average the top three ethical standards that were perceived to be strongly adhered with among quantity surveyors are compliance with relevant laws and regulations (Mean Score, MS = 4.14), being honest (MS = 4.04) and acting with integrity (MS = 4.02). The least ethical standards adhered with among the quantity surveyors included not mislead by withholding information (MS = 3.70) and not taking over other quantity surveyors' work without communication (supplanting) (MS = 3.54).

Table 7: Quantity Surveyors (Qs) adherence with ethical standards – Qs viewpoint

Ethical Standards	Quantity Surveyors		
	Mean	STD	Rank
Compliance with relevance laws and regulation	4.27	0.884	6
Being honest	4.33	0.617	5
Acting with integrity	4.40	0.507	4
Being objective at all times	4.27	0.594	7
Being accountable for all actions	4.33	0.816	3
Respecting confidentiality	4.47	0.516	2
Being open and transparent	4.47	0.640	1
Do not distort information	4.00	1.195	11
Being aware of the limitation of competence	4.13	1.061	9
Not falsifying material or advertisement	4.13	1.187	8
Avoidance of conflict of interest	3.73	1.223	12
Not taking over other quantity surveyors work without communication (supplanting)	4.13	1.060	10
Not mislead by withholding information	3.47	0.915	13

Table 7 shows the viewpoint of practicing quantity surveyors regarding their order of adherence with professional ethical standards guiding quantity surveyors practice. The top three from as reflected in the table are being open and transparent (M.S = 4.47), respecting confidentiality (M.S = 4.47) and being accountable for all actions (M.S = 4.33). None of the variables for measuring the ethical standards is found to be below benchmark/average of 2.50, this therefore further attests to the high importance attached to the standards among the practicing quantity surveyors. The least ethical standard rated is "not mislead by withholding information" as evident in the mean score of 3.47 and avoidance of conflict of interest (M.S = 3.73).

Table 8: T-test on the adherence of quantity surveyors to ethical standards

	<i>Allied Professionals</i>	<i>Practicing Quantity Surveyors</i>
Mean	3.8723	4.1638
Variance	0.0295	0.0851
Observations	13	13
Pooled variance	0.0573	
Hypothesized Mean Difference	0	
Df	24	
t Stat	-3.1056	
P(T<=t) one-tail	0.0024	
t Critical one-tail	1.7109	
P(T<=t) two-tail	0.0048	
t Critical two-tail	2.0639	

Table 8 reveals the t-test regarding the order of quantity surveyors adherence with ethical standards with recourse to the respondents.

Null Hypothesis (H_0): there is no significant difference between the perceptions of allied professionals and quantity surveyors on the level of adherence of practicing quantity surveyors with ethical standards.

Alternative Hypothesis (H_1): there is a significant difference between the perceptions of allied professionals and quantity surveyors on the level of adherence of practicing quantity surveyors with ethical standards.

Decision: Based on the analysis carried out as shown in Table 8, T-critical < t-cal (P-value < 0.05, two-tail), therefore the null hypothesis is rejected while the alternate hypothesis is accepted. Therefore, there is significant difference between the perceptions of allied professionals and quantity surveyors on the level of adherence of practicing quantity surveyors with ethical standards.

DISCUSSION OF FINDINGS

This study found that other allied professionals are well informed and knowledgeable on the existence of ethical standards for quantity surveyors, this finding is in consonance with Adeyinka et al. (2013) that professionals in the industry know the importance of conformity with ethical standards. Also, that most organizations subscribed to a professional code of ethics while many had an ethical code of conduct in their employing organizations (Vee and Skitmore, 2003). The finding is contrary to Babalola and Anifowose (2015) that the general public is not fully aware and sensitized with the existence of code of conduct. The noticeable difference in the outcome of the studies might be consequent upon the different choice of location where the studies were undertaken. Beside the aforementioned study locational factor, while the general public might not be in the know of the existence of code of conduct, allied professionals might not claim ignorance being a professional and such code of conduct is equally inevitable in such profession as also opined by Adeyinka et al. (2013). The study undertaken according to Babalola and Anifowose (2015) was also based on the perceptions of the general public and not actually the reflections or point of views of the quantity surveyors or other allied professionals as undertaken in this present study.

While other allied professionals regarded compliance with relevant laws and regulations, being honest and acting with integrity as the top three ethical standards

exhibited by the quantity surveyors among others. Quantity surveyors believed that of all the significant ethical standards assessed, being open and transparent, respecting confidentiality and being accountable for all actions topped the list. The diverse opinions are not unexpected between quantity surveyors and other professionals because while the quantity surveyors focus on cost management for construction projects others tilted towards aesthetics, strength and buildability among others. Having realized that both the quantity surveyors and allied professionals are quite knowledgeable about the quantity surveyors' ethical standards and codes of practice, Rooley (2001) noted that the codes cannot change inherent behavior because everyone involved in construction has a personal code of professional behavior.

CONCLUSION AND RECOMMENDATIONS

The respondents are knowledgeable about the ethical standards put in place for the quantity surveyors by the NIQS and the level of compliance/adherence exhibited by the quantity surveyors towards the ethical standards of practice is high.

The top three ethical standards that were strongly adhered to by the quantity surveyors, based on the view point of allied professionals, are compliance with relevant laws and regulations, being honest and acting with integrity while Quantity Surveyors believed the top three ethical standards adhered with are being open and transparent, respecting confidentiality and being accountable for all actions. There is a significant difference between the perceptions of allied professionals and quantity surveyors on the level of adherence of practicing quantity surveyors with ethical standards yet none of the variables for measuring the ethical standards is found to be below benchmark/average of 2.50. This further attests to the high level of importance attached to the standards among the practicing quantity surveyors.

It is recommended that quantity surveyors should hold in high esteem the ethical standards stipulated by their regulatory body, the NIQS, during the discharge of their professional duties. Also the culture of standard ethical compliance should be developed among quantity surveyors in order to promote integrity and ethical conduct in the construction industry knowing that everyone involved in construction has a personal code of professional behavior.

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THE REAL ESTATE MANAGER: TOWARDS A FINANCIAL KNOWLEDGE AND SKILLS FRAMEWORK FOR PROFESSIONAL DEVELOPMENT

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The real estate manager's financial knowledge and skills are a critical factor to secure funding for projects. The decision to borrow involves a series of complex considerations related to current available resources, expected income, perceived needs, cost of borrowing and risks. The growth of financing options means that real estate managers have to be financially knowledgeable and skilful to make the best decisions. The aim of the study is to investigate the types of knowledge and skills required by the real estate manager and develop a financial knowledge and skills framework to access funding for real estate projects. The methodology adopted is a desk review of relevant literature and information from interviews and online survey. The study found that the real estate manager needs different types of financial knowledge and skills to access and effectively use funding from different sources. The study provided a matrix of financial knowledge and skills needed by real estate managers, which will act as a guide for training needs and professional development.

Keywords: financing options, financial knowledge, innovative finance, real estate manager, and skills.

INTRODUCTION

The problem of access to funding for real estate projects remains a global one (Moldoch, 2009). Arguably, a major contributor to this challenge is the lack of financial knowledge and skills for sourcing of funds for real estate development (Ogbenjuwa et al, 2018). Knowledge, the nature and level of skills can be attributed to formal or informal training and work experience. The contemporary manager in the real estate sector needs knowledge and skills sets which requires understanding of the global financial markets, ability to take advantage of the impact of international economic coordination, entrepreneurial skills, and ability to lead in multiple and virtual organisation (Fulmer & Conger, 2004). Enhanced managerial knowledge and skills is increasing important too as it helps to meet certain demands of lenders or financiers (Nitz, 1996; Rector, 2002). The real estate manager needs knowledge and critical skills, particularly financial knowledge. The increasing change and complexities in the built environment raises important questions about the nature and types of knowledge and skills set required by real estate managers involved in sourcing funding (Dale & Iles, 1992). However, to do this effectively, there is a need to understand what financiers require in applying for funding. The knowledge and specific skills needed by the real estate manager to access funding for projects has not been adequately addressed in the literature. Financial knowledge and skills are required for estimating, planning, gaining, spending and controlling resources (IPMA, 2015). The aim of this study is to document the financial knowledge and skills required by managers to source funding for real estate development and to develop a knowledge and skills matrix that will act as a guide to managers involved in sourcing funding for real estate projects.

STUDY METHODOLOGY

This study adopted a three-pronged approach (Table 1). The first stage involved an extensive review of existing literature focusing on manager's knowledge and skills required in the real estate sector from various journals. The second stage involved a pilot survey and preliminary interviews with managers involved in real estate project to capture their experiences and views on key knowledge and skills required to access funding. Thirdly, the findings from the literature and the interviews form the basis for developing a knowledge and skills framework consistent with the International Project Management Association's (IPMA) (2015) individual competence baseline.

Table 1: Study methodology



Table 2 shows the number of participants in the preliminary/exploratory survey and interviews conducted so far. Most of the managers were identified through Royal Institution of Chartered Surveyors (RICS), the Association of Real Estate Developers of Nigeria (REDAN) and real estate developers in South Africa.

Table 2: The overview of semi structured interview and online survey participants

Category of participants	Managers in the real estate development sector
Number of participants in pilot survey	13
Number of participants for interview	9
Region of coverage	United Kingdom , South African and Nigeria

Members of RICS were contacted via LinkedIn and emails and others were established based on contacts in ARCOM 2018 conference held in Belfast. As part of an ongoing study, the interviews were digitally recorded and transcribed using content analysis while the survey was conducted using the online survey platform provided by London South Bank University. The link for the survey was sent to respondents via email.

LITERATURE REVIEW

Knowledge and skills are often interchangeably used but there is a slight difference in both terms. According to Spencer (1993), skill is the ability to perform physical or mental task and it can be acquired through training and practice. Boyatzis (1982) sees skills as 'actions that lead to positive outcomes'. This study will use the definition of the IPMA (2015) and RICS where 'skill' is defined as the application of knowledge. Knowledge is the collection of information and experience that the manager in the real estate development sector possesses; it means that to skilfully execute a task, having knowledge will be a precondition to effectiveness.

Knowledge and skills needed for funding of real estate projects

For every development project, the cash inflows and outflows must be managed appropriately. Such inflows and outflows must be calculated and evaluated on a regular basis so that appropriate actions can be taken to ensure sufficient financial resources are available (IPMA, 2015). The IPMA (2015) recommended a number key areas for developing financial knowledge which includes financial accounting basics, finance options, funding sources, financial management, knowledge of relevant conventions, legislation, international commercial terms, methods of monitoring and controlling expenditures and others. All of these knowledge components are necessary for effective sourcing and management of project development funding (IPMA, 2015; Grizzle, 1985). Earlier work by Mann (1965) explored a three-skill approach focusing on technical, human and administrative or conceptual skills. Katz (1971) argued that if managers were to perform effectively in their roles, they needed managerial skills which followed a similar classification into technical, human and conceptual. More recent research by Sunindijo et al (2017) also classified the manager's skills into conceptual, human, political and technical skills.

The technical skills involve specialised knowledge, analytical ability and specialisation in the job roles and responsibilities. Individuals are promoted to managerial positions because they have showed a level of technical competency in their respective fields (Muthuveloo et al., 2017). According to Katz (1955), technical skills primarily means working with things and not people. Managers especially at the lower and middle levels should have technical skills because it enables them to train, direct and evaluate subordinates in performing specific tasks (Muthuveloo et al, 2017). In contrast to technical skills, the human skills are primarily about people (Katz, 1971), the ability to work cooperatively with others, to inspire enthusiasm, to motivate, get the best out of people and build trust (Muthuveloo et al., 2017). Human-related skills also include, team work, dealing with conflict, leadership, and creating enabling organisational climate. Findings from studies have shown that human skill is the prognosticator of managerial effectiveness (Boyatzis, 1982; Muthuveloo et al, 2017).

While human skill focuses on people and technical skills on things, conceptual skills focuses on ideas and concepts (Katz, 1955). Conceptual skills entail seeing the organisation as a whole, the need for interdependency of the firm to the industry, community, and political, social and economic forces of the nation (Mustapha, 1990). Conceptual skills are central to creating a vision and strategic plan for an organisation and is very important to senior managers. The uniqueness of Katz's (1955) analogy is that skills can be taught.

Political knowledge and skills are needed by managers to effectively influence stakeholders which include subordinates, superiors, government agencies and financiers (Montalvo & Byrne, 2016). These skills are innate as well as learned but are an important antecedent of performance outcomes, particularly when increased social interactions are part of the manager's job requirement (Banister and Meriac, 2015). Political skills includes social astuteness, savvy and positioning (Mintzberg, 1983). Social astuteness is the skill to observe and accurately comprehend others and keenly attune to divers social situation (Junqi and Chen, 2012). A manager can be considered politically skilled when he has social intelligence which is the ability to understand and predict other people's behaviour and feelings (Banister and Meriac, 2015). A manager should also be skilled in agreeableness which signifies that the manager is sympathetic, kind, altruistic, generous, fair and eager to help others (Banister & Meriac, 2015).

The manager needs core financial knowledge and financial management skills to be able to access funding for their projects. These skills are considered amongst the critical management skills (Grizzle, 1985; Trimble & Trimble, 1993). They include, for example, budgeting, cost-benefit analysis and taxation skills. Lenders often have requirements to make them comfortable in providing funds for real estate projects. Traditionally lenders commonly use ratios, debt to worth and cash flow analysis to determine repayment ability of potential customers. However, in contemporary lending, additional requirements are often stipulated because of the increasingly complex nature of the financial markets (Rector, 2002). Some of the things the lender takes into consideration before lending include the company's current situation and repayment histories. Lenders need to know how the company has reacted to downturns, review its forecast and understand why the client needs the requested sum (Rector, 2002). Lenders also look at the long-term records of accomplishment of the firm to determine if it can repay the loan.

Lenders generally do not like re-financing to pay-off accounts that are past due as they are prone to further default. Lenders look at three areas of risk to justify lending and they are credit risk, collateral risk and structure risk. To mitigate against credit risk, the lender looks at three financial statements, which are balance sheet, income statement and cash-flow statement. These sets of accounts are then analysed using various tools for ratio analysis such as turnover ratio, debt-to-equity and current ratio (Nitz, 1996). These ratios will indicate the financial health of the company at different points in time, while the income statement helps the lender in analysing the revenue, income, profitability and margin trend of the company. The cash flow statement helps the lender to determine how a company generates cash. It will help the lender to ascertain if the company generates sufficient cash to meet up with its obligations. Collateral risk encompasses the type, age and value of collateral. The lender analyses the potential of selling the collateral property as well as the risk of keeping it. There are various collateral types acceptable to lenders for real estate projects and they include the real estate to be financed, stocks, equipment and other investments. The risk can be mitigated through how the loan is structured by allowing, skips in payments, reduced payments or over-extending credits could be a potential risks that may crystallise (Charles and Mori, 2016). Lenders traditionally look at three basic repayment sources and they are cash flow, guarantor and liquidation of collateral (Rector, 2002). The cash flow enables the lender to know if the developer can liquidate the proposed loan from his current financial position and / or in addition to

the increased revenue from the project. Furthermore, a strong guarantor can support debt repayment prospects. Liquidation of collateral is the least preferred by lenders. It is often considered as a back-up source of repayment.

Creative and innovative financing for real estate projects

There is a need for real estate development managers to have the knowledge and skills to access innovative and creative financing (Ogbenjuwa & Egbu, 2017). There are various definitions of creative and innovative financing. The World Bank defines innovative finance as involving non-traditional forms of funding through private mechanisms, solidarity mechanism, public-private partnerships (PPP) and catalyst mechanism (Grishankar, 2009). For example, tax-exempt bond financing is a product used in the United States and it is authorised by the Congress. It is a platform where the State and Federal governments issue tax exempt bonds to provide finance for developments such as real estates (Guggenheim, 1999). This product has been in use in the US since 1986 and can be replicated in other countries (Mittereder, 2013).

Residential mortgage backed securitisation (RMBS) is a good funding option for real estate developers. Securitisation is a financing technique where debts are sold to investors. Despite the profitability of securitisation to stakeholders, it could be very dangerous if backed by poor credits, inadequate valuation methods and insufficient regulatory oversight. This was the danger that led to the credit crunch because of the actions and inactions of the rating agencies; regulatory agencies and financial institutions with large and unrestrained risks appetite (Smith, 2017). PPP / Private Finance Initiative (PFI) provides funding for different projects such as airports, highways, schools and communication including housing and residential development (Gibson et al, 1992).

Crowd funding as another innovative finance option that can be used by developers at the start of a new project before other means of innovative funding such as venture capital is sourced. It enables commencement of projects with some degree of independence that is commonly not considered for bank financing or investment by large financial institutions (Lam & Law, 2016). Crowd funding is relatively new as compared with other types of innovative financing but the use of social media and the internet has enhanced its effectiveness and popularity. The risk is widely spread because it taps relatively small contribution from a large number of individuals using internets, without assistance of financial intermediaries. It is a relationship between the entrepreneurs, investors (crowd funders) and the intermediaries (crowd funding platforms).

Syndicated loan is also a viable innovative finance option which can be used to finance real estate projects. Syndicated loans are parcelled amongst banks, ranging from two (2) lenders to more than thirty (30) in some cases (Berlin, 2007). Large real estate's development firms that are involved can borrow very large sums at lower rates and longer tenures when no single lender is too heavily exposed. The developers and financiers can then put in place long-tenured mortgages on the strength of properties developed with the proceeds of the syndicated loans. Housing microfinance is another option that has been used to develop housing projects for low-income communities in India and Latin America (Smets, 2001). A good example is the community mortgage programme used in the Philippines to help the lowest income to access land and housing. The assessment of this finance option shows high cost

effectiveness, beneficiary reach and high loan repayment. The programme enables informal settlers in slums or tenants of blighted areas of over 10 years to own the land they are living on, or the property where they will be relocated through community mortgage (UN Habitat, 2009).

INITIAL ANALYSIS AND FINDINGS

A conceptual framework is presented in Table 3, drawing from the literature and building on previous works of Boyatzis (1982), Katz (1971), Egbu (1992), IPMA (2015) Grizzle (1985), Whetten and Cameron (2015) and Muthuveloo (2017) to identify the knowledge and skills required to access funding for real estate projects.

Table 3: Knowledge and Skills Framework

Human skills	Technical knowledge & skills	Conceptual knowledge & skills	Political knowledge & skills	Financial knowledge & skills
Team work	Quantity surveying	Logical thinking	Social astuteness	Cost benefit analysis
Conflict resolution	Architectural skills	Analytical abilities	Savvy	Budget processes
Leadership	Fluency in multiple cultures	Deductive reasoning	Positioning	Finance option
adaptability	Construction safety	Decision making	Interpersonal influence	Financial trend analysis
collaboration	Technological skills	System skills	Relationship management	Cost-effectiveness analysis
Emotional intelligence	Virtual skills	Strategic planning	Self-awareness	Finance source
Strong work ethics	Environmental analysis	Crisis management	Agreeableness	Financial accounting basics
Communication	Design skills	Risk management	Social intelligence	Strategies for managing risks
Self confidence	Construction skills	System skills	Conscientiousness	Professional regulation
Time management	Procurement skills	Information literacy	Network ability	Financial management
Planning skills	Project management skills	Organising	Positive impression management	Debt management
Diligence	Quality assurance	Change management	Apparent sincerity	Fiscal impact analysis

The real estate manager needs a blend of skills from the project initiation stage to hand-over stage (RIBA, 2013). However, financial knowledge and skills are considered amongst the most critical management skills (Grizzle, 1985; Trimble & Trimble, 1993). A detailed matrix for financial knowledge and skills is currently being developed using data sourced from the survey and interviews is as depicted in the Table 4.

Table 4: Core financial knowledge and skills

S/n	Key Knowledge & Skills	Interview response	Survey response
1	Strategies for managing risk & uncertainty	-	✓
2	Cash flow, debt-asset ratio, return on investment and rates of return	-	✓
3	Finance sources	-	✓
4	Finance options	-	✓
5	Finance and accounting basics	-	✓
6	Research skills/ market intelligence	-	✓
7	Developing confidence and building relationships	-	✓
8	Interpreting financial data and identifying trends	-	✓
9	Developing a project budget / planning skills	-	✓
10	Costing skills	✓	-
11	Budgeting skills	✓	-
12	Financial management skills	✓	-

The on-going analysis from the survey and interviews will determine the core financial knowledge and skills required at each stage of the development process to effectively secure and utilise real estate project financing. Examples of the types of knowledge and skills required at the pre-development phase (exploration, idea generation and pre-approval stages) are provided below.

Table 5: Examples of financial knowledge and skills required at the pre-development phase

	Stage 1	Stage 2	Stage 3	Stage 4
	Exploration – scanning for opportunities in the market	Idea generation - Identifying potential projects and real estate sub-sectors	Pre-approval - Contact financiers and prepare viable project proposal	Approval - Secure funding for project
Financial knowledge (examples)	+Finance sources and options + Risks and returns in real estate sub-sectors + market intelligence. +Acceptable return on investment	+ Acceptable debt-equity ratio in the sub-sector +Acceptable return on investment and rate of return	+ Funding options to reduce borrowing costs +Pricing risk and uncertainty + Credit enhancement techniques	+ disbursement schedule +conditions for loan effectiveness
Financial skills (examples)	+ Confidence and relationship building with financiers	+ Project budgeting and planning Cash flow +Risk profile of different projects	+ Budgeting + Cost planning + Interpreting financial data and identifying trends +cost benefit analysis + Other evaluation methods	+ financial management +stage payments

CONCLUSION

The interplay of knowledge and skills is significant in the ability of managers to secure funding for their projects. This study has classified knowledge and skills into human, conceptual, technical, political and financial management. A single manager might not have all the skills. However, it is recommended that managers build up teams with the required knowledge and skills. Real estate managers also need different types of financial knowledge and skills critical to access and effectively use

funding from different sources. The paper is part of an on-going study to develop a financial knowledge and skills framework needed for real estate managers. This framework is currently being developed for real estate managers and when completed will act as a guide for identifying training needs and career pathways for professional development through higher education and continuing professional education (CPD).

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NURTURING LEADERSHIP CAPABILITY FOR CONSTRUCTION MANAGEMENT MAJORED STUDENTS

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Current construction management programs provide students with sound technical knowledge. But in the 21st century, construction projects have become more sophisticated – to include complex sustainable design and construction. Further, the market is more competitive internationally. Thus, the leadership capability of construction professionals must also become more sophisticated, in all aspects of the industry. It is imperative that educators in institutions of higher education nurture leadership in our students before they enter the construction industry. Leadership capability has three dimensions, i.e., leadership skills, leadership vision, and ethics and professionalism. To enhance leadership capability in all three of these dimensions, it is necessary that leadership capability be enhanced for senior construction majored students by micro-inserting basic leadership knowledge skills, leadership vision, professionalism and ethical decision making to train students to be successful in all three dimensions of leadership. The method does not alter, but complements current curriculum. The effectiveness of the learning is promising from students' feedback after receiving weekly leadership capability nurturing learning materials.

Keywords: construction management students, ethics, leadership capability, professionalism..

INTRODUCTION

As 21st century constructed facilities become more sophisticated, commensurate construction management capabilities, approaches, and attributes will be required of engineers. This development occurs when superior transportation and technologies are making the world a smaller place; in light of this, more engineering and construction companies are taking the Opportunity to “globalize”, and operate across diverse geographic and cultural boundaries (Wang and Buckeridge 2015; 2016). In principle, globalization and free trade promote global economic growth, create jobs, make industry competitive and lower consumers' prices. Although these are positive outcomes, they are not always realized; while globalization has improved the lives of people in developing economies, it has often done so at the expense of jobs in the developed nations. It has also led to greatly imbalanced international trade. But at the same time, it has greatly benefitted a small sector of society in all countries – those in management and leadership.

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The impact of globalization on professionalism and ethical practices of those in leadership is poorly addressed. The focus on undergraduate construction management programs is to provide academic preparation for students entering the construction industry. Students are provided with a sound **technical** knowledge. However, their skills in leadership are somewhat deficient and today, leadership is critically important in all aspects of the construction industry. Each construction project is unique and involves numerous discrete and interrelated tasks. Large projects are expensive and technically demanding, with diversified, local or global, project teams' involvement. More importantly, pre-construction, construction and post-construction phases can be long, drawn-out processes that have the capacity to impact long-term socioeconomic development in society. Poor performance on projects will have severe implications for the project location and its citizens. Therefore, the need for effective leadership education for leaders in construction management is critically acute. It is imperative that educators in institutions of higher education cultivate students' leadership capability before they enter the construction industry. Leadership capability is classified into three practical dimensions:

- leadership skills
- leadership vision
- ethics and professionalism in leadership

It is known that leadership skills and leadership vision are fundamental tools in management. But inculcation of ethical decision-making skills in students is a somewhat more complex process, as ethical leadership involves a fundamental appreciation of the moral frameworks under which professionals must operate (Buckeridge 2011). Ethical managers are crucial in the construction industry: to ensure quality processes and facilities, and to minimize failure. In the globalized market, new and varied professional attitudes have arrived in technologically developed countries as agencies and companies are increasingly employing managers from developing nations to undertake commercial and infrastructure engineering projects. Students graduating with construction management degrees are highly likely to enter a business world that they did not expect and for which they were unprepared. To fill in the discrepancy in this area and to enhance leadership capability for senior students in construction management, a "micro-insert" in the current curricula, incorporating leadership skills, leadership vision, and professionalism and ethical decision making will, it is expected, increase the likelihood of student capabilities with these leadership levels.

THE TREND OF THE CONSTRUCTION INDUSTRY

As noted, constructed facilities are becoming increasingly complex, becoming not only more technical but also harder to manage. This is applicable to a variety of projects such as hospitals, schools, shopping centres, highways, bridges, dams, harbours, and power plants. Just a single construction project can require a skilled group of professionals, including engineers, architects, consultants, safety experts, contractors, and suppliers.

During various stages of construction, numerous parties participate in the decision process that will carry the project to completion, each of whom may contribute to the success or failure of the project. The project will usually be managed by the contractor or a representative of the owner, but decisions about the project will also be made by government officials and independent third parties, in regard to such matters as quality control, quality assurance, and periodic inspections of the project.

Simultaneously, the globalization trends affect all aspects of culture and economies, as the functioning of each country or geographic entity become increasingly more influenced by the actions of countries all over the world. Global level competition among international companies is increasing rapidly, due in large part to improvements in international transportation and communication, including the worldwide web which permits almost instantaneous communication with computer users in other countries. One dominant consequence is the globalization of culture, with material aspects such as music and clothing styles and nonmaterial aspects including ideas, values and ethics similar over time. Globalization has also affected economic relations, with an increasing number of goods and services now being shifted across geographic boundaries. Recent international trade agreements have also led to a reduction in tariffs and import and export fees, encouraging more international trade and cooperation between different countries in economic ventures. On the other hand, *internal* tariffs, such as VAT and GST ensure that free trade is perhaps not so free (or so fair) as it could or should be. When “fairness” becomes part of the globalization of economies equation, the issue becomes a moral one.

Not surprisingly, this globalization trend has heavily impacted the construction industry and many engineers now look for employment in foreign countries, or place bids for contracts for international projects. Of course, even before the recent trend toward globalization, engineers and construction managers have always had to consider some global factors; for example, worldwide environmental factors such as global warming obviously impact the entire globe and not just individual countries (Bird 2003; Watts and Buckeridge 2013). But new impacts of globalization are becoming apparent. For example, in the US, there is an increasing trend for foreign engineers and construction managers to win contracts to help build US infrastructure facilities; at the same time, more foreign investors are participating in joint ventures with domestic companies. This globalization of the engineering and construction industry demands an international ethics standard for public safety to protect the welfare of those who must rely on these internationally completed engineering projects. It is critically important that an international ethics standard synthesizes the best features and highest ethical standards of the participating countries, so that the resulting globalized ethical code raises, rather than lowers, the overall quality of engineering and construction projects.

Corruption that occurs in international projects may be seen partially as a byproduct of globalization. Although the US has passed the Foreign Corrupt Practices Act (FCPA), which issues heavy fines and prison sentences for US managers who bribe foreign officials for business contracts, there are some countries where bribery is not considered inappropriate (Fadiman 2016). The World Bank, which monitors corruption and bribery in the construction industry, and recently imposed a 10-year ban on a Canadian construction firm from bidding on its sponsored projects due to its involvement in bribing officials in Bangladesh (Haggett and Orr 2013). In another example of punitive action, China Construction America (CCA) is being sued for \$2.5 billion by the owner of the Baha Mar Resort in the Bahamas, claiming that the foreign construction company engaged in systematic fraud, deception, breach of contract, bogus filings, the use of unqualified staff, understaffing, deliberate sabotage, cost inflation, and defective construction while building a resort in the Bahamas (Slowey 2018). Corruption is a significant ethical issue that must be confronted by leaders in the construction industry.

LEADERSHIP ESSENTIALS

The differences between being a manager, a leader, authentic leadership and hierarchical structure are important to understand. Managers can be characterized as people who initiate, establish clear targets, make short-term decisions, solve short-term problems, enact visions and do things right. They employ the so-called “hard” skills such as planning, directing, organizing and keeping score. On the other hand, leaders employ many of the “softer” skills. They direct and guide people, influence thoughts and behaviour, motivate, encourage work towards goals, take risks, innovate, have a long-range perspective, have their eye on the horizon, create visions, and do the right thing. In most cases, managers are appointed whereas leadership has to be earned (Ofori and Toor 2009; 2012). An authentic, responsible leader is self-aware and guided by a set of positive values, i.e. high moral standards. Such leaders are viewed as honest and as possessing integrity demonstrated through transparency in their actions, resulting in fair and balanced decisions, or doing “what is right and fair” for both the leader and their followers (Lloyd-Walker and Walker 2011). Recent research shows that authenticity is fundamental to good leadership; it is the basis of effective leadership that is ethical, moral, trustworthy, and inspiring. There are many examples where beliefs and moral practices differ in countries that are now being increasingly drawn together through the globalized world.

The definitions given in many references are more focused on the skills level rather than leadership vision or ethics and professionalism. As future leaders in the 21st century, college educated students must realize that ethics is the heart of leadership. Ethical decisions by leaders determine the success or failure of projects and an organization – and ultimately public welfare. According to McCoy (2007),

Leadership is not a genetic gift or a family legacy; we have sympathetically observed some failures of those assumptions. It is not a warranty with a degree from an excellent graduate business school, though a rigour of that experience can provide valuable returns. Becoming a leader is an intentional process of growth that must be lived out experientially. One must have the will to say “yes” and even “no” to an unending series of tests, large and small, each demanding that we take one more step toward a definition of all who we are. We must be ready to define our values, our character, and our leadership style. For durable, strong leaders, the process will not end. It will become a way of life, not only in business, but within our families, our various communities, and the world.

CURRENT PRACTICES IN THE PROGRAM

In the US, construction management programs in institutions of higher education are typically accredited by the American Council for Construction Education (ACCE). ACCE, as the accreditation body, currently does not require an ethics or leadership course for the undergraduate construction management curriculum. However, according to the goals of ACCE, for four-year bachelor degree construction management programs, having ethics education in the curriculum provides students with an appreciation of human relationships, psychology, sociology, social science, political science, literature, history, philosophy, art, and language, i.e. an embodiment of the skills needed to be an effective leader in the profession. ACCE requires the above to be addressed and met in the degree programs, but provide no credit hour requirement for the topical content that includes written and oral communications, social science, and ethics. Most programs require one academic hour insert to each

core course covering ethics-related topics. This is in contrast to the engineering programs which are normally accredited by the Accreditation Board for Engineering and Technology, Inc. (ABET). As required by ABET, ethics and professionalism requirements are mandatory for undergraduate engineering program students. For example, in 1985, ABET reformed educational standards by adding engineering ethics courses as a condition of accreditation for US engineering programs. ABET emphasizes the nature of the accreditation and claims a criteria-based outcome for engineering ethics education. Engineering programs must demonstrate that their graduates have an understanding of professional and ethical responsibility. A broad education is necessary to understand the impact of engineering solutions in a global and societal context. The document, “Criteria for Accrediting Engineering Programs Effective for 2015-2016 Accreditation Cycle”, issued by ABET to civil engineering programs requires “the curriculum program must prepare graduates to analyze issues in professional ethics.”

MICROINSERT METHOD

The construction management program at East Carolina University, follow ACCE’s requirements by using a “micro-inserts” one hour of ethics- related module with ethics-related information included depending on each instructors plan. Some disadvantages of using micro-insert to teach construction management students have been noted. For example, there is sometimes a lack of classroom hours to cover basic ethic topics and principles; some instructors may repeated use the same materials in different courses; nonsystematic course materials and the lack of measurable learning outcomes. In an effort to enhance the effectiveness of the micro-insert leadership related selected quotations have been sent to students via email each Friday morning during the semester for the last several semesters. The selections are drawn from a pool of over 200 quotations and educated students about leadership skills, leadership view and vision, ethics and professionalism.

THREE LEVELS IN LEADERSHIP CAPABILITY

Leadership is a multidimensional concept by its nature. Theories of leadership are extensive in content, and leadership has been written about in various approaches or styles. Thus, the entire complexity of the concept of leadership is beyond the scope of what is needed to train senior undergraduate students before entering the construction industry. Hence the focus described in this paper is placed on basic leadership capability and differences of leadership and management. In preparing the micro-insert materials for students, three levels of leadership capability were considered, i.e., basic leadership skills, leadership vision, and ethics and professionalism. Selected examples of the quotations in the three aspects are excerpted as follows.

Basic leadership skills

- Communicate as efficiently as possible – Make your expectations and feelings clear, in the appropriate medium as often as possible.
- Listen to your team – Always listen to what your team has to say, even if you don’t like it.
- Talk less – Sometimes saying nothing is better than saying just anything.
- Be consistent. Be consistent in your behaviour so your team knows what to expect from you.
- Leaders who can instil an atmosphere of working together gain respect, taking charge without taking control.

- You need to know who the movers and shakers are – and cultivate them.
- Interfere only when necessary. If you trust your team to do good work, don't interfere unless absolutely necessary.
- Encourage team members to keep learning and wanting to know more.
- The three rules for any workplace are: (i) politeness; (ii) friendliness and (iii) kindness. People are entitled to (i) respect, (ii) civilized behaviour and (iii) dignity.
- It is a poor work person who blames their tools. Your team is your tool for getting your management job done.
- Ground everything with data - Back up all your decisions, opinions and thoughts with hard, objective facts and evidence.
- **Don't ignore signs of stress** - Stress is real and can interfere with your ability to lead. If it starts setting in at abnormal levels, take action to reduce or relieve it.
- **Give feedback** – Let your team know what they're doing well and what needs further improvement.
- **Transform your methods when necessary** – if something isn't working, change your approach.
- Differences between smart and wise bosses (Table 1)

Table 1: Comparison of actions from different leadership styles (Sutton 2012)

Smart Bosses: Have the <i>confidence</i> to act on what they know, but fell and express <i>little doubt</i> (in public and private) about what they believe or do	Wise Bosses: Have the <i>confidence</i> to act on what they know and the <i>humility</i> to doubt their knowledge
Actions of Smart Bosses	Actions of Wise Bosses
Make definite statements	Make statements (often “backstage”) that reveal uncertainty and confusion
Answer questions	Ask questions
Talk well	Listen well
Give help, but don't ask for help and refuse it when offered	Give help, ask for help, and accept it when offered
Defend and stick to current course of action – have strong opinions that are strongly held	Challenge and often revise course of action – have strong opinion that are weakly held

Leadership vision and view

- If you haven't got a plan, you don't have a map. If you don't have a map, you'll never find the treasure.
- A team doesn't pull together well when each individual member focuses on their own target.
- “Set realistic targets – no, really realistic”, “Let's make a dent in the universe.” – Steve Jobs, former CEO, Apple.
- Most of life's problems are because of two reasons, we act without thinking or we think without acting.
- Be passionate. If you aren't passionate about your business, you're in the wrong business.
- What you need to be concentrating on is the real job of management – the strategy.

- Stay focused and keep the object in your sights at all times – whatever it may be.
- Don't make excuses. If you make a mistake, take ownership of it and don't pass the blame to someone or something else.
- "Working hard for something we don't care about is called stress; working hard for something we love is called passion" – Simon Sinek
- A manager's job is to create stability and deal with reality. A leader's job is to stir emotion and set audacious, grandiose goals that shake the status quo. Too much management and you stagnate. Too much leadership and you get nowhere. Embrace the challenge of striking the balance. Do it well, and the results will surpass your wildest dreams.
- **Temper your reactions.** Hold back your reactions until you have a moment to clarify your internal thoughts and feelings.
- The really good managers are also leaders – they inspire and motivate, encourage and enthuse.
- **Be rational** - Make decisions logically; **Be reasonable** - Listen to dissenting opinions, and be fair.
- Make firm decisions. Don't leave things undecided for long, and don't waver about a decision once you've made it (unless it is subsequently shown to be wrong).
- Ensure people know exactly what is expected of them – Let them know right from the start.
- "Leadership is of the spirit compounded of personality and vision; its practice is an art. Management is of the mind, more a matter of accurate calculation, of statistics, of methods, timetables, and routine; its practice is a science. Managers are necessary; leaders are essential - Field Marshal William Slim.

Ethics as the core of leadership

- "Work for something because it is good, not just because it stands a chance to succeed" - Vaclav Havel, President of the Czech Republic.
- "Do what is right, not what everyone else does" - Robert Sutton
- "Be sure you put your feet in the right place, then stand firm" - Abraham Lincoln
- "Nearly all men can stand adversity, but if you want to test a man's character, give him power" - Abraham Lincoln
- It's much better to work in an organization where reward is used instead of fear to get things done.
- A lot of managers don't know that their attitude sets the standard for how their staff treat each other and their customers.
- "I simply wish to encourage you that, irrespective of what you have learnt in the school, always be ready to unlearn and relearn. Don't give up dreaming. If we all dream about a better world, I can guarantee you we'll get there." – Muhammad Yunus.
- Be humble. Don't get big-headed about your wealth, influence or position as a leader.
- "Courtesies of a small and trivial character are the ones which strike deepest in the grateful and appreciating heart." – Henry Clay, 19th-century American politician.

- If you can't give them these things you shouldn't be a manager. Creating a good atmosphere is easy. It comes from the top down. It is your job and your responsibility to be cheerful, considerate, polite and helpful...without them you are nothing, with them you are a team. Use them kindly and don't abuse them. Be genuinely interested in them and their lives. If you don't have time – make time.
- “Gie fools their silks, and knaves their wine;
A Man's a Man for a' that;
For a' that, and a' that,
Their tinsel show, an' a' that;
The honest man, tho' e'er sae poor,
Is king o' men for a' that”. (Robert Burns, Scottish poet, 1795).

FEEDBACK FROM STUDENTS

The following feedback is from 2017 and 2018 Fall semester students in the course Introduction of Infrastructure Construction, Methods and Materials. Over 50% of the 120 students made comments and shared their thoughts after receiving and reading the weekly leadership capability quotations. All these respondents (100%) confirmed the positive way this micro-insert technique enhanced their understanding of leadership capability in the short and long term. Some examples of comments from these students are presented below:

- *There is more to being a good manager than just having knowledge of construction. You have to be able to motivate your coworkers and subs. I am enjoying reading the weekly leadership quotations. Thanks for sharing!*
- *Thank you for the leadership quotes each week. I think it's extremely important to be able to lead in construction. My favourite quote so far: “The really good managers are also leaders – they inspire and motivate, encourage and enthuse.”*
- *I think all of these leadership quotes are true and should be used in daily life as well on the job site.*
- *I have definitely enjoyed reading these emails, and have seen some quotes that really can be applied to situations I have encountered in my experience with construction management. I recommend this as something you continue in the future.*
- *I really enjoy numbers 7, 8, 9, and 10 and agree with them completely: 7: Ten basic things that require zero talent: (i) Being on time; (ii) Work ethic; (iii) Effort; (iv) Body language; (v) Energy; (vi) Attitude; (vii) Passion; (viii) Being coachable; (ix) Doing EXTRA; (x) Being prepared. 8: Choose your partners carefully. Work only with people you can count on and trust. 9: Do good - Commit yourself to be a good person and giving back to the community when possible. 10. Meet new people all the time. Take every Opportunity to expand your network and expose yourself to [new experiences and perspectives](#).*
- *You always need to be able to count on your partners to get everything done on time. Also, being a good person will more than likely get you further in your business career. People in general respond better to people that stand with what that say and are kind about it. Lastly, networking is one of the biggest things you can do for a business. You should always capitalize on opportunities to expand your future.*

- *I really enjoyed quote number one the most out of all of these. Listening is key especially at the age that most us college students are at in our soon to be careers, listening is how you learn from those far wiser than yourself.*
- *I really appreciate you sending us the quotes. The leadership capabilities you send us is very inspiring and will be put to use in the soon near future.*
- *I enjoyed ready your weekly leadership quotes. I like how they all encouraged us to try new things and to never give up. It reminds me of a book I read back in high school "How to win friends and influence people". Both the book and the quotes relate to each other in many ways.*
- *Numbers 2: "Understand the roles of others – You don't need to be able to do a role as well as your team member does – that's what you pay them for" really shed some light on how I should go about certain situations in my life. I tried to apply these to my life last week and the response I received was my coworker smiling at me with a sense of appreciation for someone noticing their work whether or not it was hard work or mediocre work the fact that I made them feel appreciated improved my own character.*
- *Thanks; this was an interview question from the last career fair "Describe a moment in your life where you showed leadership?" I had difficulty answering this but now I know what I can say and will hopefully help me land a job at my future interviews.*
- *This week's Leadership email was very insightful for me. I especially liked the James 1:19 verse that is a verse I try to abide & live my life by. Nowadays, everyone is so quick to judge, anger and form their own opinion about topics or even other people without knowing the facts or getting to know the person first. I have read the "Smart Bosses versus Wise Bosses" and I have to agree on what was said. There is a difference between being smart and being wise, and I believe that if more people took to understanding the difference, the management culture that is in the United States would be much better off.*
- *Thank you for sending these out, it always makes my morning to see these encouraging and thought-provoking messages.*
- *In any case, I appreciate the varied quotes of wisdom, it's great to see different perspectives on how success is achieved.*
- *It was interesting to read and analyze the difference between a smart and wise boss. All of these emails are interesting, and I can take these to my life and job. I appreciate that you take the time to compile these quotes and send them to us, students.*
- *I look forward to reading these on Friday's and illustrate them to my life.*
- *I very much enjoy these "share with you" emails. They are very encouraging and hold so much wisdom for young men and women transitioning into the workplace.*
- *I have read them all so far. They have been very helpful to me. I am saving them all so that I can read them throughout my career and life.*

CONCLUDING REMARKS

Leadership capabilities are needed today, and for leaders in the 21st century, vision with ethics is central. Leadership matters on construction projects both nationally and internationally because (i) projects are large and technologically complex, (ii) clients are more knowledgeable, more demanding, (iii) the operating environment is competitive, chaotic, changing, dynamic, sensitive; (iv) many companies participate

in one project that includes various relationships; (v) knowledge workers involved with projects, often in remote locations, have their unique perspectives and opinions that must be managed; (vi) the numerous project stakeholders with diverse, even competing interests must be managed; and (vii) cross-cultural interactions must be mediated and managed. To minimize the negative consequences of poor leadership capabilities and unprofessional and unethical behaviours, an intentional educational effort is required to enhance the individual's and organization's competitiveness from a humanistic, individual, and corporate perspective. This ethics based orientation should start in higher education before students enter the business markets. In summary, filling the gap in leadership education is extremely important for students majored in construction management. The "micro-insert" method described here has evidence of effectiveness based on students' feedback. Educating students about the three levels in leadership help students understand and appreciate leadership's multidimensional nature. All the aspects of leadership are important. In conclusion, this example of a micro-insert provides senior students with basic leadership preparation before they graduate and enter the industry where a diversified environment exists; and educators can graduate students with a higher level of professional and ethical capabilities.

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DEVELOPING ‘GRADUATENESS’ THROUGH SCENARIO TEACHING OF ETHICS

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With changing conceptions of the contemporary construction and property professional, recent education research has been on preparing students in these fields with more than technical knowledge to better manage in the workplace. This paper engages with different levels of the quality of ‘graduateness’ which must, perforce, meet the requirements of the professional bodies of the various construction and property institutions. An essential part of ‘graduateness’ is knowledge and application of how to negotiate within ethical boundaries. Professional Communication Studies (PCS) is a skills-based support unit complementing the core technical construction and property courses. Instead of teaching only communication principles, PCS has moved to training students in professional practice through their discussion of typical workplace scenarios. PCS courses allow students to engage with their professional responsibilities from a managerial perspective which includes ethics and class debate. Opportunity is given for graduate skills such as ethical judgement to be practised and applied.

Keywords: construction, property, ethics, professionalism, ‘graduateness’.

INTRODUCTION

South Africa continues to be poorly rated for corruption in the Transparency International (TI) Corruption Perception Index (CPI), at 71st out of 180 countries (Transparency International, 2018). This is reflected in the construction industry with areas of unethical practice being particularly evident in bribery and general misconduct of business. All of this leads to major failures in industry outcomes as described by Bowen *et al.* (2012). The demands of the complex workplace of the built environment can place inherently ethical individuals in invidious positions where they find themselves acting unethically (Helgadottir 2008, Nudelman and English, 2018). This is despite the implied contract a professional has to his or her profession, colleagues, employers, clients and the public, an act which requires maturity of judgement (English *et al.* 2017, Fan, Ho and Ng 2001). If that maturity is lacking and the pressures are great, construction practitioners can find themselves flouting the codes of ethics of their governing bodies.

The professional bodies responsible for maintaining the qualifications in construction and property graduates, namely the South African Council for the Quantity Surveying Profession (SACQSP), the South African Council for the Property Valuers’ Profession (SACPVP), The South African Council for Project and Construction Management Professions (SACPCMP), and the South African Council for the Built

Environment (CBE), recognise the importance of managerial qualities or 'graduateness', such as teamwork and ethics. Other, international, professional bodies are Chartered Institute of Building (CIOB) and the Royal Institution of Chartered Surveyors (RICS) also emphasise the need for professionalism. The building problems of the 21st century concern sustainability, economics and the impact of technology and development on societies and require not only technological understanding but an expansive suite of professional skills (see Table 1).

Table 1: Analysis of Professional skills

Adherence to ethical principles	Effective interactions with clients	Effective interactions with other people in the engineering environment	Reliability	Commitment to improvement of competence and autonomy
Honesty	Clarity of Communication	Clarity of Communication	Accountability	Life-long learning
Integrity	Courtesy	Teamwork	Punctuality	Openness to seek and receive feedback
Confidentiality	Respect	Professional boundaries	Organisational ability	Reflectiveness

Source: Adapted from Wilkinson *et al.* 2009

A study by Archer and Verster (2011) on 52 construction students at the University of the Free State recognised the essentials of their having knowledge and practice of ethics. The results of the survey showed the following as deemed the most important aspects of professional development: ethics (94%); communication (88%) and people skills (84%) were also indicated as a major contributor to professional development (Archer and Verster, 2011:812). Thus, it can be seen that knowledge of ethics is particularly important in the education of built environment professionals. The codes of practice and watchdogs of the professional bodies are not able to reach across all areas and activities. Furthermore, the rapidity of technological advances in the construction fields make an equally rapid impact on society and thus the importance of practitioners being cognoscent of ethics in their field is critical (Nudelman, 2018) and should be considered as something for which the student also takes responsibility (Archer and Verster 2011). The professional must be able to make informed decisions – skills which need to be taught within university curricula for this to happen. To quote a practitioner from the work by Bowen *et al.* (2012:895): "Combating [sic] corruption is largely to be promoted through the consciences of people in the industry. Where there is an Opportunity for dishonesty dishonest people will be dishonest. Integrity must be promoted through tertiary training and professional societies."

Aim

This paper considers the reaction of the Professional Communication Studies (PCS) unit to the initiative taken by the University of Cape Town (UCT) to enhance 'graduateness', in particular as regards the teaching of professional skills to undergraduates. The work described reflects the engagement of this topic by professional communication studies unit over the last 10 years.

BACKGROUND TO THE STUDY

Rapid change in the development of the student cohort at the University of Cape Town resulted in strategies which emphasised graduate outcomes beyond hard results to include professional behaviour. 'Graduateness' is defined as the quality that

accompanies intellectual development and which students require to meet the challenges of their future professional lives (CHED, 2010). The Centre for Higher Education (CHED) report of 2010 gave guidelines for development of curricula to inculcate 'graduateness' in the student body. With this emphasis came an increasing need to include managerial skills which rested on a baseline of ethics (Conradie *et al.*, 2010).

The concept of 'graduateness' thus became the keystone to UCT's aims and performance, and underlies its mission statement. The attributes of 'graduateness' emphasised by the UCT policy documents on Teaching and Learning are affirmed and, indeed, echo many of the South African Council for the Quantity Surveying Profession of South Africa's specified outcomes (Griesel and Parker 2009; CHED, 2010).

The Faculty of Engineering and the Built Environment (EBE) needs to turn out increasing numbers of highly qualified and competent architectural, town planning, geomatics, construction and property professionals and engineers to drive economic and social transformation within a sustainable framework. PCS is situated within the Faculty of EBE at UCT – an institution reputed to be a leading university for teaching and research both in Africa, where it is in position 171 (Times Higher Education). PCS, as a skills development unit is mandated to respond to the requirements of external standards' boards and the challenges of institutional policy priorities as regards the teaching of ethics as is the case in many institutions (Hall and Williams, 2011). At faculty level, PCS has had sustained engagement with and analysis of the teaching and learning environment which resulted in a process of curriculum review (Fraser *et al.* 2011). At a professional level, PCS, together with the rest of the Engineering Faculty, is accountable to the professional and industry councils which accredit the particular curricula of the different degrees.

Thus, PCS has had a lengthy engagement in the teaching and learning environment for which it is accountable for students acquiring communication skills, written, oral and managerial. At the end of the course, the desired outcome is for each student to write up technical reports and business proposals, and deliver presentations to a high standard and have the ability to negotiate and problem solve whilst engaging with the underlying ethical challenges. Inclusion of this work in their course programme comes out of work with both industry (Sulcas and English, 2010; Gwynne-Evans and English, 2014) and academia (Morreale and Pearson, 2008; Hondonga, 2011).

Ten years ago, PCS introduced students to new formats and technical skills, for example, PowerPoint and Referencing programs, but over the last decade the focus gradually shifted to the professional and ethical application of the skills (Sulcas and English, 2010, Newton *et al.*, 2011). The activity of engaging with policy such as UCT's strategy for graduate, in a continuous and reflective manner is essential to the process of improving practice and what are founded in the long-established yet still current, constructivist and problem-based methodologies (Sulcas and English 2010, Savery and Duffy 1995).

Professional Communication: content and methodology

In its courses to students from the Department of Construction Economics and Management PCS aims to equip students for their immediate academic future in terms of technical and thesis writing and for their professional careers (Sulcus and English, 2010). The department has developed two related but parallel activities: the teaching of hard skills required by the professions and engagement with soft skills such as

problem-solving, teamwork, negotiation skills and ethics. The unit's approach has been a combination of lectures and student engagement in workshops where they explore exercises based on relevant scenarios. With this high level of student participation, problem-based learning and the learner-centred input of the flipped classroom comes improvement in the learning outcomes attained (Hall and Williams, 2011, Abeysekera and Dawson, 2015).

PCS's course curricula have responded to the mandate to produce 'graduateness' in students so that they function effectively as professionals in their fields (Conradie *et al.*, 2010; Gwynne-Evans and English, 2014). A wide range of skills was introduced, with students being exposed to interpersonal and social elements such as their media profiles, ability to work in teams, manage meetings and negotiate. Other upskilling includes business correspondence, curriculum vitae, letters of application for work, research methodologies, referencing, report-writing, executive summaries, business proposals, presentation skills, visual literacy, graphics and posters.

PCS sees students in different years of their degree programmes. For the engineering cohort, the input and engagement with ethics was left to the latter part of the degree. For example, in mechanical engineering students have an ethics questionnaire in their fourth year; likewise, in the final year of chemical engineering students look at the ethical outcomes, be they social or environmental or both of new industry projects. However, more recent thinking by both educators, professional bodies has emphasised the need for teamwork and ethics to be integrated into thinking and behaviours earlier in the degree - as early as curricula permit (Levecque *et al.* 2018, Barry and Herkert, 2015).

Consequently, the new curriculum in the Faculty of Engineering Built Environment has become more project and group work intensive. Key professional skills are built up through the years – now from the first or second year – and not only addressed in the fourth year as was the case historically. Topics addressed are health and safety, computing, the environment, ethics, communication and citizenship. These are all known to be components of 'graduateness'. (Levecque *et al.*, 2018). This method of engagement invites students to expand their individual and professional worldview so that they become aware of their professional role within the workplace and within society.

“Graduateness” and Ethics

'Graduateness' is inclusive of all attributes relating to student development, for example: reflective thinking, scholarship, moral citizenship and lifelong learning (Steir *et al.*, 2011) and which are not mere acquisition of skills (Martin, Maytham, Case, and Fraser 2005). UCT consolidated and explored its own understanding of these attributes in the 2010 CHED report on Teaching and Learning at UCT. The stated aim was to stimulate the love of life-long learning; cultivate competencies of global citizenship; support programmes that stimulate the social consciousness of students; expose students to the excitement of creating new knowledge; offer access to courses outside the conventional curricula; and guarantee internationally competitive qualifications. In particular, the area defined “support programmes that stimulate the social consciousness of students” (CHED, 2010:4) resonates with the ethics module given by PCS, a unit which is well positioned to teach and facilitate the growth of these skills.

The curriculum of PCS overlaps with the goals of UCT's Teaching and Learning Strategy in several ways. This is particularly evident in the focus on professionalism and ethics that is carried through the courses to stimulate the social consciousness of students and encourage a critical reflectiveness on method (CHED 2010; Gwynne-Evans and English, 2014). The PCS curriculum focuses on developing skills that the students can take with them and apply practically in the professional environment. This enables the graduate to engage actively and ethically in the environment they find themselves part of and to contribute meaningfully. Differences in students' experiences and expectations can be incorporated meaningfully into the learning experience in their engagement with the scenarios worked in the ethics module (Nudleman and English, 2018; Gwynne-Evans and English, 2014; Davies, 2009).

Teamwork and Ethics

Interventions within the course work of PCS address ethics within the framework of teamwork. The understanding of teams and groups working through scenarios was introduced first to students through theory and experiential activities. In this understanding, groups are a collective body of people with no necessary intentions to work together. A team, on the other hand, is defined as a number of people who gather with a shared aim of achieving certain outcomes. The team exists because of interdependency within the team i.e., each of the team members cannot accomplish the shared aim individually or in smaller teams (English *et al.* 2017).

Through the theory, the emphasis is on the characteristics of effective teams with regards to interdependency and to solving difficult problems and conflicts, including those with ethical issues. Characteristics of effective teams were defined as having a range of elements (English, *et al.* 2017; Jones and Jones, 2008) and goals which have been closely defined (The Foundation Coalition, 2018; Hall and Williams, 2016). Leveque summarises these goals (2018):

- Promotive interaction: Members do real work, usually face to face and are aware of other members.
- Positive interdependency: Members focus on a common goal with complementary contributions.
- Individual and group accountability: Everyone takes responsibility for his/her own work and the overall work of the team.
- Teamwork skills: Each member practises effective communication, decision making, problem solving, conflict management and leadership.
- Group Processing: Goal: The team periodically reflects on how well the team is working.

This analysis of professional skills involves many of the target outcomes that PCS undertakes to teach and demonstrate: teamwork; courtesy and respect; integrity; accountability and punctuality and clarity of communication. The challenge is to provide an environment where students can practise these skills and assess the value of the skills to their professional practice. Role-playing, interactive scenarios for debate and focus group discussion allow for empathy and reflection. They are effective tools for teaching ethics and have proved viable for construction practitioners (English, 2002; Barry and Hekert, 2015).

The difference between personal identity and a professional role is evident. More than merely demonstrating professionalism as a series of skills to be acquired, emphasis is placed on the importance of taking on professional identity as a conscious role – an essential in holding personal responsibility for ethical actions. Here personal identity

is subordinated to the professional role (English *et al.* 2017; Collier, 2012). In particular, this engagement has for the building professional increasing responsibility to recognise the effects of:

- ethical matters pertaining to employment; complex contracts
 - the risk of negative capabilities;
 - pressure to meet targets and costs;
 - a general acceptance of unethical practice; and
 - the recognition of the limitations of the processes of government and law.
- (Bowen *et al.*, 2012:646)

Use of scenario teaching can challenge the students to situate themselves with their abilities and professional identity alongside the theoretical ethical issues. It makes space for students to explore how their professional identity affects their engagement with ethical issues concerning values and judgements. Finally, review of scenarios has the students engaging with ethical issues at different levels.

Scenario teaching offered by PCS

Approximately 50 each of Construction Management and Property Studies students take professional communication studies in their second and third years, respectively. Although the classes are not small in size, they do allow for approximately 10 discussion groups. This is a different experience from the traditional lecture. By the time they take PCS, the students have got to know each other and there is a spirit of trust and cooperation. It is possible to flip the classroom and, after some input, draw from the students learnings around ethics which are more likely to be bought into by their peers (Rule, 2016). The lecture material and texts broadly cover basic ethical theory concerning utilitarianism, deontological ethics, virtue ethics and the ethics of care (English *et al.*, 2017:43).

There is a double layer to the ethical issues. First, the student works within the team, maintaining his or her individual function and contributing. This way students learn to be a contributing member and to benefit from co-team members; to communicate well and to enhance their colleague's work. Secondly, they apply ethical judgment within the scenarios and debate viewpoints accordingly. Each group received a specific practical scenario which required each individual to engage with ethically, to consider different perspectives and to suggest actions to be taken. They were advised to discuss the topic too in terms of conflicts of interest. Through this exercise, they displayed understanding of the choices and the ethics thereof; reasoned and employed ethical judgement in decision-making. This process was in line with the long established approach to inculcating ethical behaviour as propounded by Webb (2000) which describes a sensitising stage (empathy), a display of competence and a reflective dimension.

The brief was to discuss the scenario (Table 2) whilst being critically aware of the

- impact of activity on society and the environment;
- impact of technology, to be employed, on society and the personal, social, and cultural values and requirements of those who will be affected; and the
- requirement to act professionally and ethically, and to take responsibility within own limits of competence; and to exercise judgement commensurate with knowledge and experience.

Table 1: Samples of Scenarios for Discussion on an Ethical Decisions

	Scenario	Action
1	You are a project manager of a firm which has won a tender for a low-cost housing project on the Cape Flats. Because of the politics involved, the commencement of the project has been delayed by two years. Your superiors take the decision to decrease the area of each house by knocking 1m off the length in an attempt to offset increases in building costs. The resultant houses no longer meet the description in the tender document. You are aware of this discrepancy.	As project manager, what do you do? Discuss the reasons for your choice.
2	You are a partner in a firm. One of your suppliers of roof sheeting 'phones you to offer you two air tickets to Tokyo for the 2020 Olympics. You have a long history of working together and have, in the past, offered him your personal attention and time.	On what grounds do you accept/reject your suppliers' offer?
3	Gillian was aware of a recent memo reminding employees that office supplies were for use at work only. Yet she knew that most of her colleagues thought nothing about occasionally taking home notepads, pens, memory sticks, etc. Her student sister had asked her for a company-inscribed folder like the one she saw her carrying. The folder costs less than R130, and Gillian recalls that she has probably used that much of her personal stationery during the past year for work purposes.	Is it all right for her to take a folder home without asking her supervisor for permission?

CONCLUSIONS

Whilst brief and not formally assessed, the intervention on ethics within the PCS course is successful in initiating thought and projection around difficult issues. In having the students negotiate from a base of ethics, they perceive a problem as not a set of elements to fix, but a set of elements to be managed according to the criteria set by the relevant ethics. The students addressed the scenarios given, but inevitably in the discussion following, brought up personal examples and experiences beyond the immediate topic. The intervention allowed the students to explore the difference between morals and ethics; between personal and professional ethics; and between business pragmatism and the need for sustainable ethical practice.

The experience of the brief module on ethics has shown what it is to be a professional, the reality of conflicts of interest, the difference between personal morality and professional ethics, and the different positions taken by different role players. Ethics is not necessarily an innate quality, but can be viewed as a skill to be nurtured and expanded as are other professional skills. Thus the teaching of ethics as a skill to be identified, be accessed easily and practiced regularly, is an essential and non-negotiable part of the student's training and his or her 'graduateness'.

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RESEARCH, DATA COLLECTION AND ETHICAL ISSUES: LESSONS FROM HINDSIGHT

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Research involves a systematic process of investigating a problem or phenomenon with a view of solving the problem or providing a new insight in the problem. The essence could be to describe, explain, predict, analyse, control or prescribe solutions to the problem. Whatever the goal of the research, there are expected processes to be followed for it to qualify as scientific research whose findings will be accepted. In PhD research, a student is expected to collect and analyse primary data in addition to the findings from the literature. The process of data collection, especially in the social sciences where the built environment arguably belongs, often involve interaction with people. In order to protect the fundamental right of the participants in research and ensure their anonymity, certain ethical guidelines and issues must be carefully considered before setting out for the data collection. The paper is aimed at creating awareness about these delicate issues regarding ethical considerations during research. The authors drew on their own experience, as PhD researchers, to create awareness about salient ethical issues regarding research data collection. The paper highlighted the process for ‘scientific research’ and different types of data collection for qualitative research. The paper discussed ethical issues related to data collection and concluded by signposting the likely ethical pitfalls and how to avoid them.

Keywords: data collection, ethical issues, research process, researcher, qualitative data.

INTRODUCTION

One of the generally acceptable ways of expanding the frontier of knowledge is through research. Research often involves a systematic process of gathering data and information for analysis with the aim of advancing knowledge in any field of learning. Bajpai (2011) refers to ‘a systematic and scientific procedure of data collection, compilation, analysis, interpretation, and implication pertaining to any problem’. The essence of research is to provide answers to intellectual questions and solutions to practical problems through the application of systematic methods. However, for a process to be regarded as research, it must meet certain requirements. According to Kumar (2008), every research must be undertaken within a framework of a set of philosophies; use procedures, methods and techniques that have been proved to be valid and reliable; and be designed to be unbiased and objective. A good research process must be controlled, rigorous, systematic, valid and verifiable, empirical and

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critical (Kumar, 2008). In addition to these requirements, there is growing concern about ethical issues in research, especially where human beings are involved.

The current ethical considerations specifically in the context of scientific research suggests that the 'ethicism' is one of the four main tendencies in contemporary scientific research. The others include empiricism, instrumentalism and postmodernism (Edwards and Mauthner, 2012). While scientific research is dependent on empirical investigations, the tendency to see scientific research in ethical terms, as if its aim were to achieve ethical goals or to exemplify ethical ideals is exceptional. Unlike in early traditional research which was enclosed within customary boundaries, studies are now beginning to see ethical considerations as a 'must' rationale for every research (Miller and Bell, 2012).

In this paper, the most important ethical issues are addressed as drawn from the authors' personal experience while collecting data for their doctoral research. After a short description of the data collection process for qualitative research, and the advocacy role of construction professionals towards research objectives, the authors will attempt to highlight the hindsight issues, pitfalls and conflicts that contemporary scientific researchers have to deal with, especially in the built environment context.

The next section of this paper reviews the relevant concepts regarding research types, research paradigm data collection methods and ethical issues. This is followed by consideration of research methodology; analysis of the ethical issues encountered by the authors while collecting primary data via semi-structure interviews as part of their PhD research; and the ethical pitfalls during data collection via interviews and how to avoid them, based on the experience of the authors. The paper contributes to knowledge by providing practical hints about the ethical issues during data collection, especially in qualitative and mixed methods research, drawing on the life experiences of the author. Early researchers in the fields of social sciences and the built environment are expected to benefit from the insight provided in the paper.

REVIEW OF LITERATURE

Definition of Research

Literarily, the word 'research' is made up of two syllables: 're' and 'search', meaning 'to examine closely and carefully again' (Kumar, 2008). According to Kerlinger (1986: 10), 'scientific research is a systematic, controlled empirical and critical investigation of propositions about the presumed relationships about various phenomena'. Burns (1997) defines research as 'a systematic investigation to find answers to a problem'. Grinnell (1993) adds that 'research is a structured inquiry that utilises acceptable scientific methodology to solve problems and creates new knowledge that is generally applicable.' It can be deduced from the above definitions that research is a structured process of finding answers in an enquiry in a systematic way through data collection, analysis and interpretation. The process must be conducted in an ethical manner, especially when human interactions are involved in the process of data collection.

Classifications of Research

There are different classifications for research typologies from the literature. Kumar (2008) classified research into three perspectives: based on the applications of the research findings (pure and applied research), objectives of the study (descriptive, correlational, explanatory or exploratory research), and mode of enquiry used in conducting the study (structured and unstructured). According to Dudovskiy (2016),

research can be classified according to the methods for data collection (e.g. quantitative or qualitative research), based on the period of data collection (longitudinal or analytical research), the nature of the research (descriptive, or exploratory research), application of the research findings (action research or policy-oriented research), or according to the research design (for example, exploratory, explanatory or conclusive research). Research can be classified broadly into two according to the purpose of the research: fundamental or basic research and applied research. While basic research seeks to investigate the basic principles and reasons for the occurrence of a particular event, process or phenomenon, applied research, on the other hand, aims at finding practical solutions to real life problems using well known and accepted theories and principles. Irrespective of the field of study, research is usually performed in line with a set of rules, concepts and procedures which are generally well accepted by the authorities working in the field of study.

Also known as theoretical research, basic research is not concerned with solving any practical problems of immediate interest. Its goals are to provide a systematic and deep insight into a problem, facilitate extraction of logical explanations to the problem, and draw conclusion on it. Basic research outcomes tend to form the basis for applied research. Examples of basic research are found in most natural science studies. Applied research is directed at solving real problems, using the acceptable research paradigm. The outcomes of applied research are meant to provide immediate application and practical use to address current societal or organisational problems. Examples of applied research include experimental, case studies, and interdisciplinary research as commonly found in applied sciences, social sciences, engineering and the built environment.

Research Paradigms

Since research is meant to solve societal problems and enhance knowledge, the solutions provided are therefore, likely to be influenced by the researchers' paradigm. A research paradigm, according to Kuhn (1962) is a set of common beliefs and agreements shared between scientists about how problems should be understood and addressed. It is a shared world view that represents the beliefs and values in a discipline and that guides how problems are solved within the discipline (Schwandt, 2001). The chosen world view will affect how we think about the problem and we also influence how we go about investigating the problem. Every researcher has an opinion about what is truth and knowledge, and this view affects our thinking, beliefs and assumptions we make about the world, the society and ourselves. In the social sciences, a paradigm is informed by philosophical assumptions about the nature of social truth and reality. Research paradigms are characterised by its ontology, epistemology and, axiology as summarised in Table 1 (Guba, 1990).

Table 1: Summary of Research Paradigm and Philosophy

Research Paradigm (What is your worldview?)	Ontology (What is reality?)	Epistemology (How is reality known?)	Axiology (What is the value of the reality?)
Positivism	Scientism/Empiricism (There is only single reality)	Objectivism (Reality can be objectively measured)	Value-free
Constructivism	Idealism/Interpretivism (There is no single reality; but multiple realities)	Subjectivism (Reality is subjective; it is socially constructed)	Value-laden
Pragmatism	Critical Realism (Reality is constantly negotiated)	Relativism (Reality is relative; best method solved the problem)	Rationality (Value-bound)

There are many paradigmatic positions that can be adopted by a researcher (positivism, interpretivism/constructivism, subjectivism, pragmatism, critical realism). There is no 'right' or 'wrong' approach as long as they are matched with appropriate assumptions in terms of ontology, epistemology, axiology, methodology and method. Ontology is the philosophical position about the nature of reality and the existence of the entities (Easterby-Smith et al., 2012; Saunders et al., 2009). It is the study of being (Crotty, 1998) and answers the question: what is the nature of truth or reality? Epistemology is concerned with the nature and forms of knowledge (Cohen et al., 2007). Epistemology focuses on what constitute valid knowledge and how such knowledge can be obtained. It is about the most appropriate ways of enquiring into the nature of the world (Easterby-Smith et al., 2012). Axiology, on the other hand, is the aspect of research philosophy that focuses on the place of value and ethical issues in the research process. Axiology is the study and nature of values and ethics. It answers the question: what do we believe is true?

Methodology refers to the strategy, plan of action, process or design lying behind the choice and use of particular methods (Crotty, 1998). It answers the question: How should we study the world? It answers the question: How should we study the world? Methods are the chosen techniques or procedures used to gather and analyse data related to some research question or hypothesis.

DATA COLLECTION METHODS

Depending on the researcher's paradigmatic position, research can be further divided into three based on the data collection methods: (1) Quantitative research, (2) Qualitative research, and (3) Mixed-method research (Johnson *et al.*, 2007).

Quantitative Research: According to Bryman and Bell (2005), quantitative research entails 'the collection of numerical data and exhibiting the relationship between theory and research as deductive, a predilection for natural science approach, and as having an objectivist conception of social reality'. Fellows and Liu (2003) defined it as a means of investigation that is related to positivism and seeks to gather factual data and to study relationships between facts and how such facts and relationships accord with theories and findings of any previously executed research. Some of the research strategies often adopted in quantitative research are survey, experiment and questionnaires. The most popular methods of data collection and analysis for this approach include survey, close-ended questionnaires, experiments, correlation and regression analysis.

Qualitative Research: This is a form of an ‘inquiry process of understanding based on distinct methodological traditions of inquiry that explores a social or human experience’ (Creswell, 2013). It is aimed at providing an interpretation and depth of understanding of a particular phenomenon. With emphasis on people’s life experience, it operates under the assumption that reality is not easily divided into discrete, measurable variables. It emerged because quantitative methods were considered to be unable to capture and express human feelings and emotions. It helps to provide rich data about people and situations while making sense of human behaviour and understanding behaviour within its wider context. Qualitative research method uses inductive reasoning by making specific observations, and then draws inferences about larger and more general phenomena. Some of the research strategies used in qualitative research include: ethnographic research, grounded theory, phenomenological study, action research and case studies (Creswell, 2009). The most popular methods of data collection include interviews, case studies, observations, focus groups and questionnaires with open ended-questions.

Mixed-methods Research: According to Creswell and Plano (2007), mixed method research is a research design with philosophical assumptions as well as methods of inquiry. It involves a mixture of qualitative and quantitative data. It is a research in which the researcher uses the qualitative research paradigm for one phase of a research study and quantitative research paradigm for another phase of the study. It is based on the premise that the use of these approaches in combination provides a better understanding of research problems than either approach alone. Table 2 compares the three research methods in terms of their approach, strategies, purpose and data collection.

Table 2: Comparison of the three research methods

	Quantitative Method	Qualitative Method	Mixed Method
Approach	Deductive	Inductive	Abductive
Strategy	Experiment Survey	Grounded theory Phenomenology Ethnography	Mixed strategies Grounded theory and survey
Purpose	Generalisation	Contextualisation	Theory building
Process	Established guidelines	Flexible guidelines	
Procedures	Standard procedures	Particular procedures	
Focus	Narrow-angle lens. Testing specific hypotheses	Wide-angle lens. Exploring understanding	Multi-lens focus. Research questions
Nature of observation	Study behaviour under controlled condition	Study behaviour under natural environment	Study behaviour in more than one condition
Data Type	Statistical	Theoretical	Statistical and theoretical
Data collection	Questionnaires Experiments Survey	Interviews Observations Case studies	Mixed data collection

RESEARCH METHOD

Qualitative data collection is one method the authors employed to achieve certain objectives of their research. For the purpose of this discussion, qualitative data collection method - ‘interviews’ is focused upon to identify and explain the ethical issues encountered.

Interviews can be defined as controlled conversations that the interviewer uses to obtain data required from the respondent by means of asking serious questions verbally under a controlled set of conditions (Creswell, 2009). Interviews are a key qualitative data collection method for scientific research. They are mainly useful in cases where there is need to attain highly personalised data, as well as in cases where there are opportunities for probing to determine underlying factors for a pre-established phenomenon (Gray, 2004). They can also be considered as a valuable option when researchers need to obtain different perspectives from different sample populations such as different job roles in the same organisations, same job roles in different organisations, and specialised experts in a single area). Where there are limited respondents and a good return rate is important, again interviews become one of the most viable methods. The capability to offer a complete description and analysis of a research subject without limiting the scope of the research and the nature of the participant's responses is one of the main advantages of interviews.

As the information sought, usually has to be in-depth, accurate, and reliable, the interviewer has to find the right individual who has the desired information. These individuals can be purposively sampled or randomly sampled depending on the extent to which the investigation is for the individuals directly involved in the work, or those directly affected by the work.

The interviews discussed in this paper were conducted in three ways: face-to-face, telephone and web. Face-to-face and web interviews were found to be more successful. From these two ways, the interviewer was able to pay attention to body language and expressions which may indicate levels of excitement or discomfort brought about by certain questions. Such questions can highlight where there is a chance of information being falsified. The interviewer obtains a good understanding of what is being said and what they actually feel to validate most of the points being discussed. However, there is always a significant role of the interviewer for his skill level to be able to keep the data collection process in focus. The authors used semi-structured interviews to avoid the situation where an interviewee directs an interview in a direction best suited to their world view. This gives the process some balance.

ETHICAL GUIDELINES IN DATA COLLECTION

All research is expected to conform to some laid down codes of practice and meet certain ethical requirements. The degree of severity of these requirements may vary, depending on the nature of the research and type of people to be involved in the process. Every institution and discipline have their own peculiar ethical guidelines such as the LSBU Code of Practice. In addition, it is good practice to be conscious of the general ethical issues and professional/association guidelines. To determine this, a researcher may be asked to answer some questions regarding the research on a standard form. The questions will help determine whether the research qualifies for ethical approval or not. Some of the questions include: *Does the research involve vulnerable groups? Does the research involve secure data, or publically available data in which individuals can be potentially identified? Does the research involve access to records of personal or sensitive information concerning identifiable individuals? Does the research involve members of the public in a research capacity? Does the research involve visual or vocal methods where identifiability may be a concern?*

Once the answer to any of these questions is positive, the research automatically qualifies for full ethical approval by a panel. The essence of the ethical application is

to ensure that the researcher is aware of all the ethical issues surrounding the research and is well equipped on how to address them. Some of the issues are now discussed.

1. **Safety:** Any possible risk to the researcher, the participants, other personnel and the environment must be identified and means of mitigating them suggested. The essence is to ensure that the research is conducted with minimal risk to all the parties involved.
2. **Autonomy:** Every participant must be informed of the right to freely choose to participate or not in the research, and the choice to opt out or withdraw from participation and any time. The researcher must make sure that the participants are made aware of this freedom before they give their consent to participate. Their decisions and opinion must also be respected accordingly.
3. **Informed Consent:** The consent to participate in the research must be obtained in an informed manner. The participant must not be cajoled. The informed consent can be written (in the form of a letter), verbal (in the form of a telephone conversation) or implied. Where the consent is verbal or implied, the researcher may be required to explain further why this option is chosen and to document it. If the interview is going to be recorded, the consent of the interviewee must also be sought and obtained before the interview.
4. **Anonymity and Confidentiality:** The identity of all the participants must be protected and their right to privacy ensured at all time. This includes their contact details which must not be shared with a third party without their consent.
5. **Data Protection:** The collected data must be protected, used only for the purpose for which it was collected and destroyed in an ethical manner at a stated time. In the case of an interview, the interviewee should be given a copy of the interview transcript to ensure that the transcription truly represents his/her opinion.

ISSUES ENCOUNTERED

The authors collected qualitative data from people, in unknown conditions and circumstances with considerable social, ethnical, cultural, religious and gender differences. The issue of ethics in scientific research arises for several reasons. By analysing interviews conducted, authors gather and interpret issues related to research ethics and copyrights.

There are two main linked issues associated with qualitative data collection. First, there is a concern that researchers should retain their academic freedom. The said 'academic freedom' should exclude from the acceptance of any type of contractual conditions that conflict with ethical practice, such as confidentiality of data and protection of participants' interests. Careful consideration needs to be given when publishing and promoting such findings to avoid a breach of the participants' interests and confidentiality. Given that, it is arguable about the role of the government in restricting funding for such disputable research.

Second, and conversely, there is also substantial concern that researchers need to protect themselves from any legal consequences that might arise if they unwittingly contractually agree to research funders' restrictions and then break that agreement. It is pertinent to note the litigation concerns behind the implications of breached contractual obligations.

Apart from above two major ethical issues that are directly associated with researchers, the following are few other issues that affect interviewers as well.

First, it is important that the procedures for conducting interviews are clearly written and distributed among all participants in advance. The process need to be clearly explained to the interviewees beforehand. Any necessary permission should be sought prior to the interview. Doing so, can avoid many misinterpretations during the interviews (i.e. if the interview process involves any audio/ video recording, the participants need to be well informed and that their informed consent is validated. Misinformation can lead to sudden withdrawal of the participation). In practice, it is sometimes impossible to obtain written consent from all the interviewees. In such circumstances, the interviewee should be well informed that his/her acceptance to participate is treated as an 'informed consent'.

The term 'informed consent' can be problematic, when the participants are not well aware in advance about the questions being asked. In such cases, informed consent needs to be a continuous process. For example, for a particular questions that the researcher decides require more clarification, verbal informed consent can be obtained by asking, 'Is it alright if we talk a little more about that?' In such circumstances, the researcher need to hold the full responsibility to ensure that the interviewee does not to feel obliged to continue.

Second, when inviting the participants for interviews, it is essential to make them aware about the interview location. This need to be offered with possible alternatives to prevent inconvenience for the participants. Alternative interviewing methods such as web interview can be proposed. Third, the interviewer should be well aware of the issues associated with his/ her own safety when conducting the research. In a case where the researcher needs to travel to conduct face-to-face interviews, the interviewer should follow possible risk mitigation methods to avoid likely risks and hazards.

Privacy and confidentiality of the interviewees is the other important concern. Participants should normally be anonymised and efforts made not to reveal their identities as well as their companies' identities. Unless their permission has been explicitly sought and only when it is extremely essential for the research objectives, might the names can be used. If the material is to be published or preserved as a public resource, then permission will need to be explicitly obtained, preferably in writing for all the specialities (i.e. use of name, recorded tape, pictures, and so on). However, privacy was a significant issue as interviews sometimes probe unexpected areas. For example, to describe a complex and subjective topic such as 'company culture', many of the cultural settings would be revealed during the interview.

Interviews can delve into areas unanticipated at the outset. Furthermore, there is a danger of voyeurism and the temptation to focus on the most preferable elements of a study. The most common threat of breaching privacy and confidentiality is identified is in the writing up of reports and, particularly, the use of quotes from the interviews. Whilst individuals may not be identifiable to the general public, they may well be recognisable to, say, the peers also others involved in the study. For similar reasons, it is difficult to give full information of the nature of a particular interview at the outset; hence, informed consent is problematic. There are other specific issues such as taking sides in an interview or being biased. Bias comes with politics and power. At the outset, the participant may feel obliged to take part in the interview, considering their relationship with the interviewer. In such circumstances, during the interview, the interviewer has some power over the direction of the conversation. On the other hand, the interviewee may be drawn to discuss issues he/ she would rather have kept

silent about because of the relationship he/ she has with the interviewer; this might lead to falsified information.

CONCLUSION: AVOIDING ETHICAL PITFALLS

Considering the lessons learned, it is apparent that there is no single “trustworthy ethical formula” that can be applied in undertaking interviews particularly in scientific research. However, a critical evaluation of likely pitfalls can help in developing a fair and ethical data collection process. In response to many of the ethical issues confronting the qualitative interviewer, it is recommended that researchers engage with the participants, with ongoing reflectivity whilst responding sensitively to participants’ needs.

To protect confidentiality, authors suggest the use of pseudonyms or initials and, where possible, that the researcher change all other identifying details in reports. Another issue around privacy is the tendency to unconsciously reveal the identity of other participant through bulk invitation for interview.

It is also notable that some participants may not wish to remain anonymous. Providing detailed information to participants about the nature of the research and the need to gain written informed consent is also recommended.

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FUTURE OF BUILT ENVIRONMENT PROFESSIONS

BIBLIOMETRIC ANALYSIS OF CORRUPTION RESEARCH IN THE FIELD OF CONSTRUCTION MANAGEMENT

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The construction industry is regarded as the most corrupt industry and many construction management (CM) researchers have produced a large amount of literature on the subject. The aim of this study is to investigate the status quo of research on corruption and trends in the CM area. Bibliometric techniques were adopted to analyse data obtained from Web of Science. Results demonstrated that most existing studies emphasize the forms of corruption and anti-corruption strategies. Three new directions were proposed: firstly, the degree and extent of research in developing countries where corruption is concentrated have not been sufficient. Secondly, to enhance the practical impact of the research, more attention should be paid to anticorruption responses at the medium and micro levels. Thirdly, the research approach to the study of corruption in CM is mostly qualitative analysis by the questionnaire-based survey or literature research; there should be more systematic and rigorous methods for the study and evaluation of corruption in CM.

Keyword: corruption, construction management, bibliometrics, CiteSpace, literature review.

INTRODUCTION

Corruption, which exists in various political and economic systems of both advanced economies and emerging and developing economies, has a strong association with economic growth and development stages (Ehrlich and Liu 1999). As a consequence of continuous economic growth and rapid urbanization worldwide (World Bank 2010), the amount of investment in construction, especially infrastructure construction, has sharply increased, which brings up the potential risk of corruption in the field of construction management (CM). In addition, Transparency International suggests that the construction industry is the most corrupt industry.

In order to find a solution to the corruption issue in CM, researchers have devoted themselves to this area and a great deal of literature has been produced. For example, Le *et al.* (2014) undertook a review based on 56 corruption-related papers published in the period of 1990 to 2012 which includes three current areas of research interest: forms as well as impacts of corruption in construction and anti-corruption strategies; and three future research directions including the identification of corruption in

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construction in developing countries, the evaluation of corruption in construction, and the examination of the effectiveness of anti-corruption strategies.

Chan and Owusu (2017) present 28 different forms of corruption in construction from 39 selected publications in order to help industry practitioners, anti-corruption institutions and decision makers to recognise the occurrence and impact of corruption in the short term and consider measures for eliminating it in the long term.

Compared with other fields, the analysis of corruption in CM is still at the initial phase and the research measures have been still been based on the subjective analysis by authors. Thus, it is essential to figure out the status quo and emerging trends at this stage. A bibliometric analysis through an appropriate tool such as CiteSpace would be beneficial for this purpose.

Tools of bibliometric analysis, such as CiteSpace, HistCite, VOSviewer and Network have provided the Opportunity to quantitatively analyze and map a certain research field based on historical research on the Database. Among the foregoing tools, in this review, we demonstrate a scientometric software, namely, CiteSpace, and then use CiteSpace to clarify the status quo and research trends of corruption in CM.

Our study is unique in two aspects. First, compared with the status quo of research on corruption in management, we discuss the emerging trends of corruption in CM, which provides a broader perspective. Second, based on the scientometric analysis by CiteSpace, the results of this analysis are not only in the form of visualization, but the exercise is also repeatable with new data and provides abundant space for discussion among experts.

METHODS

The data resource

In this paper, unless stated otherwise, the literature reviewed is as at September 2018. The Web of Science (WoS) has 88 records between 1900 and 2018 based on a topic search of the term “corruption and construction management” in the core space of WoS. However, if the scope of topic research has been expanded into the term “corruption and management”, there would have been 1548 records on this term, which proves again that the research of corruption in CM is still at an initial stage, and it has great potential.

The brief introduction of applied methods

The bibliometric method created by Alan Pritchard in 1969 makes full use of computer technologies, database management and statistical analysis to quantitatively analyze academic papers and describe characters or the nature of distribution within a given topic, field, institute or country (Portner, 2008). Based on the search of databases such as WoS and CNKI, the bibliometric can be assessed to declare development trends or future research orientations using keywords within author keywords, title keywords and keywords plus (Chen et al. 2016).

CiteSpace, a scientometric software developed by ChaomeiChen, can develop the Mapping Knowledge Domains (MKD) including co-citation network, co-cited author, co-cited journal and co-words network (Li and Chen 2015). In this paper, CiteSpace is used to generate and analyze the cooperation networks of authors, institutions as well as countries, networks of co-cited references, and the co-word network based on bibliographic records retrieved from the core space of WoS.

The detailed applications

In the cooperation network analysis, aiming to provide reference for the introduction of academic resources, cooperation and evaluation of academic achievements, we analyze the main distribution of research power on corruption research in construction management by setting the time slicing as between 2000 and 2018, the selection criterion as top 200, and the rest as the default options but separately setting the node type as Author, Institution or Country.

In the co-citation network analysis, the cited references have built the knowledge foundation while the citing references have formed the research fronts. Clusters of knowledge foundation which can be considered as the research fronts are noun phrases derived from citing references. Specifically, the relationship can be described as follows: a research field can be conceptualized as a time map from a research front's time function to a knowledge-based time function. The function that CiteSpace implements can identify and display new trends and bursts that evolve over time. The time function of the research frontier is closely related to new trends and mutations over time which can be referred to in frontier terms. The time function of the knowledge base consists of many articles cited by the citing references (Li and Chen 2015). For this review, settings are determined as follows: the timing slice is from 2000 to 2018, the node type is cited reference, the selection criterion is top 10%, and the rest are the default options.

The cluster analysis is undertaken based on Log-Likelihood Ratio (LLR), the algorithm of the cluster recommended by ChaomeiChen. The silhouette, which is an indicator of its homogeneity or consistency, reflects the quality of a corresponding cluster's quality, and the mean year states the average year of the cluster's members. Each node is made up with a set of Tree Ring History across the time slices from 2000 to 2018 whose sizes indicate how many citations the associated reference received, colour represents the cited time, thickness is in proportion to the number of citations in the corresponding time zone, and if there is a purple ring, it declares that a key annotation of the node with high betweenness centrality, that is to say, this citation is a critical hub linking two different fields, and the red ring by burst term represents the new trend of research. The link between the rings is the year of the first citation (Li and Chen 2015).

In the co-word network analysis, co-word network based on keywords or terms can represent the research hotspot by choosing keyword as the node type and other settings same with co-citation analysis. The size of the node represents how many papers related to this keyword have been issued, which states the hotspot of the research.

RESULTS AND ANALYSIS

The amounts of related academic literature in CM and Management

After removing duplicates, 88 records were obtained from WoS by searching for "corruption and construction management", and the time scope is reduced due to this process of duplicates removal, namely from 2000 to 2018. Figure 1 represents the gradually increasing amounts of the papers of corruption research in construction management within the 15-year period, especially in 2017.

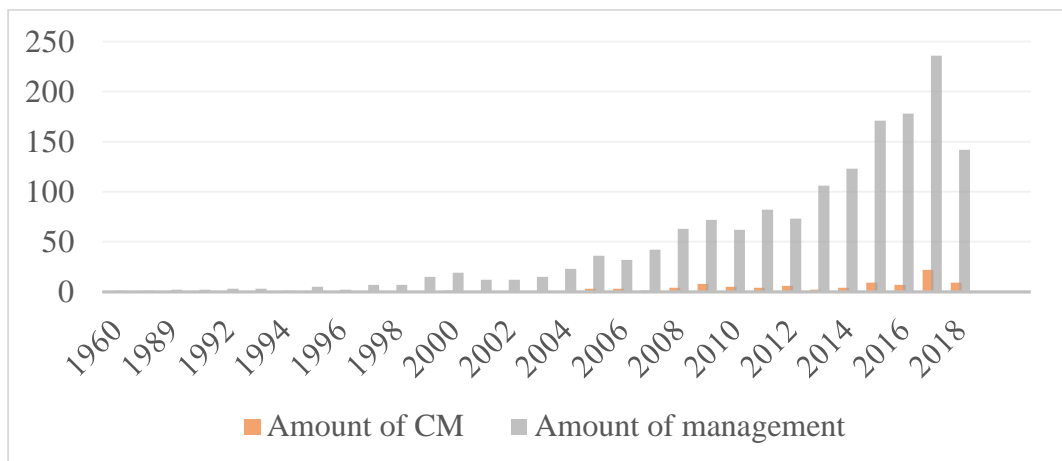


Figure 1: The statistics of documents on corruption research in construction management and management.

To enable a comparison to be made, “corruption and management” was also searched in the WoS core space, and the initial search resulted in 1548 records including 1134 articles, 373 proceedings papers, 55 reviews, 18 editorial materials, four book reviews, three book chapters and one retraction. After removing duplicates, there remained 1546 records in the dataset whose distributions by year of publication is indicated in Figure 1, which represents the sharply increasing number of papers since 2014.

3.2 Cooperation analysis of authors, institutions and countries

In the analysis process of cooperation network of authors, as a result, it must be declared that Chinese researchers occupy the main roles of corruption research in the field of construction management, according to the WoS database. Furthermore, based on this, we can figure out that two groups have developed in this field: one consists of LI S. R., LI X. and XU B., who research on an evaluation of advanced project management systems of public construction; and the other is made up of LE Y., HU Y., CHAN A. P. C., and SHAN M. focusing on causes and responses to Chinese public projects. Moreover, the score of centrality indicates that this citation is a critical hub linking two different fields, that is to say, the zero centrality and the short year of cooperation state the short-term cooperation and no strong links between researchers.

In the analysis of the cooperation of institutions, the settings are not changed except that the node type is turned into an institution. Consequently, four major institutions emerged, including Hong Kong Polytechnic University, Tongji University, Bournemouth University, and Chongqing University. However, among these four institutions, only Hong Kong Polytechnic University and Tongji University have been cooperating with each other. The zero centrality also proves that there has not been a formation of a central institution.

In discussion of cooperation among countries, the settings are still the same with in the foregoing analysis, except that the node type is changed into the country in this test. Consequently, combining the information of Figure 2 and Table 1, China and Australia are the countries with the most research in this field, and China is the country which has the earliest research work (since 2006) with more papers than the

rest of the world. Moreover, both China and Australia have betweenness centrality of 0.8 and play an indispensable role in the global cooperation network.

Table 1: The results of cooperation network of countries

Count	Centrality	Year	Countries
38	0.80	2016	PEOPLES R CHINA
7	0.80	2015	AUSTRALIA
7	0.53	2008	ENGLAND
3	0.00	2017	USA
3	0.00	2016	RUSSIA
3	0.53	2017	NEW ZEALAND
2	0.00	2018	GHANA



Figure 2: The cooperation network of countries

3.3 The results of co-citation analysis

Figure 3: The results of the cluster by LSI

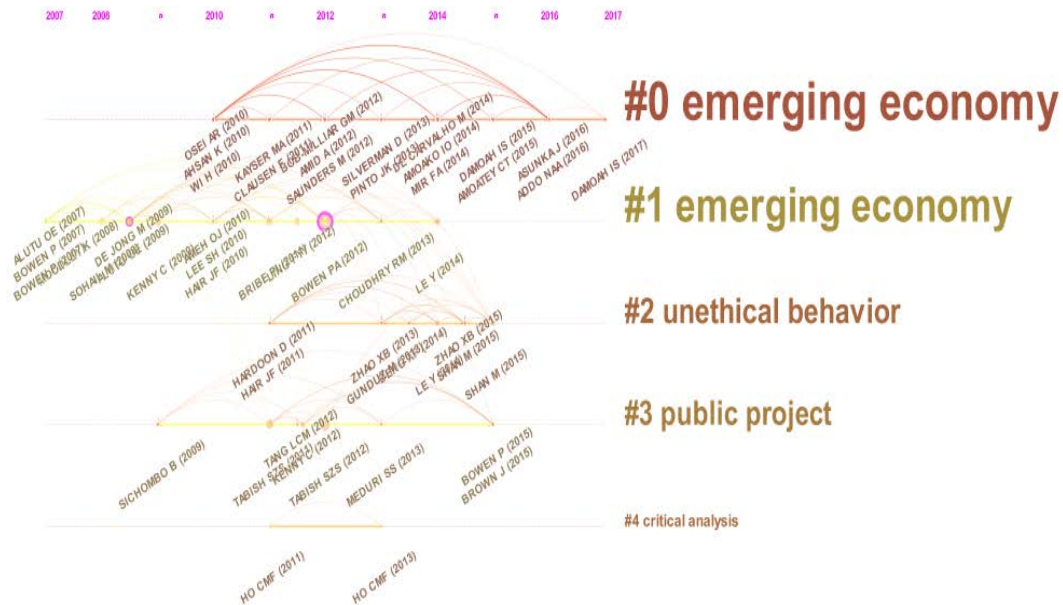
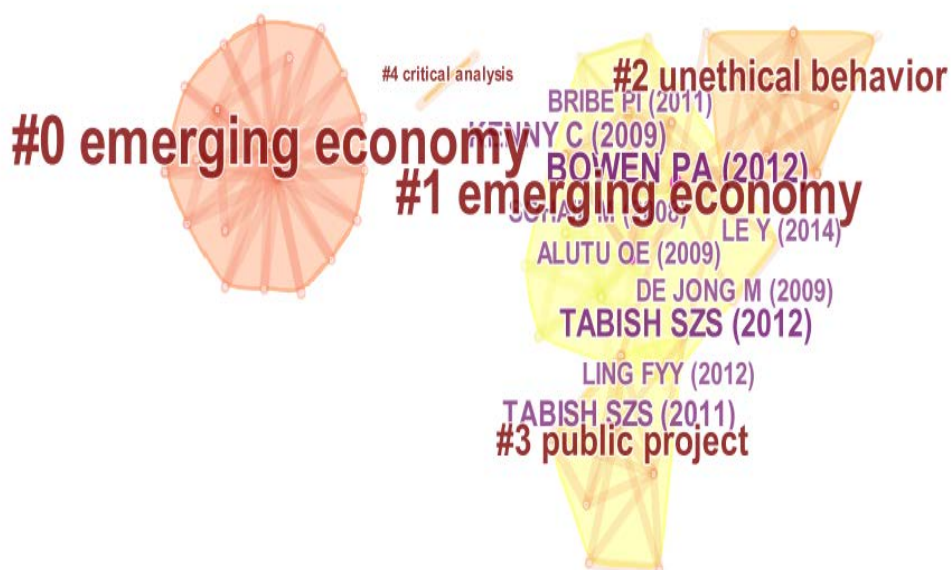


Figure 4: The timeline of co-citation analysis

Based on the connectivity between nodes, CiteSpace divides the co-citation network into a set of clusters of citing references. Figure 3 displays major clusters by their size according to LLR. The largest cluster #0 labelled as emerging economy by LLR has 20 members, and the most active citer to the cluster is Damoah, IS (2018) in “Causes of government construction projects failure in an emerging economy: evidence from Ghana”. The second largest cluster #1 has 16 members with the label as emerging economy by LLR, and the most active citer of cluster #1 is Le, Y (2014) investigating the causal relationships between causes of and vulnerabilities to corruption in the Chinese public construction sector. These two clusters demonstrate that there exist two cited groups whose citers are mostly focusing on the emerging economy during



their research on corruption in CM, which not only states the emerging economy is the important research frontier but declares the rare communication among recent

researchers of this field. In addition, the cluster#2 and cluster#3 demonstrate two other research keywords, namely unethical behaviour and public project, and the isolation birth of cluster#4 indicates that critical analysis will be the next trend (Li and Chen 2015).

The top-ranked item by centrality is Bowen P. A. (2012) in Cluster #1, with centrality of 0.22. The second is Alutu O. E. (2009) in Cluster #1, with centrality of 0.15. The third is Tabish S. Z. S. (2011) in Cluster #3 and Shan M. (2015) in Cluster #2, with centrality of 0.10. According to Figure 4, Bowen P. A. (2012), providing the basic method of how thematic analysis is used to explore the verbatim comments by survey participants, is the linkage between emerging economy and unethical behaviour. Alutu O. E. (2009) which demonstrates a typical investigation in a developing country of unethical practices within projects based on many surveys has formed a bridge between emerging economy and public project.

The top-ranked item by citation counts is Bowen P. A. (2012) in Cluster #1, with a citation count of 8. The second is Tabish S. Z. S. (2012) in Cluster #3, with a citation count of 7. The third is Kenny C. (2009) in Cluster #1 and the 4th is Tabish S. Z. S. (2011) in Cluster #3, both with citation counts of 5.

Table 2: The top 8 list of betweenness centrality

Centrality	References	Cluster #
0.22	Bowen PA, 2012, CONSTR MANAG ECON, V30, P885	1
0.15	Alutu OE, 2009, J MANAGE ENG, V25, P40	1
0.10	Tabish SZS, 2011, CONSTR MANAG ECON, V29, P261	3
0.10	Shan M, 2015, SCI ENG ETHICS, V21, P683	2
0.09	Ahonen JJ, 2010, J SYST SOFTWARE, V83, P2175	0
0.09	Addo NAA, 2016, GHANA NOW BYWORD COR, V, P	0
0.06	Le Y, 2014, J CONSTR ENG M, V140, P	2
0.06	Alutu OE, 2007, J PROF ISS ENG ED PR, V133, P84	1
0.05	Brown J, 2015, ENG CONSTR ARCHIT MA, V22, P372	3
0.03	Tabish SZS, 2012, CONSTR MANAG ECON, V30, P21	3

Other information is shown in Table 3. In detail, Tabish S. Z. S. (2012) discusses the impact of anti-corruption strategies on corruption-free performance in public construction projects and Tabish S. Z. S. (2011) analyzes and evaluates irregularities in public procurement in India, which primarily discusses the form of corruption and anti-corruption strategy in construction management. In addition, Kenny C. (2009) leads a discussion on transport systems construction, corruption and developing countries, aiming to reduce corruption by a range of interventions including publication of procurement documents, independent and community oversight, physical audit and public-private anticorruption partnerships.

Table 3: The most cited articles

Citation counts	References	Cluster #
8	Bowen PA, 2012, CONSTR MANAG ECON, V30, P885	1
7	Tabish SZS, 2012, CONSTR MANAG ECON, V30, P21	3
5	Kenny C, 2009, TRANSPORT REV, V29, P21	1
5	Tabish SZS, 2011, CONSTR MANAG ECON, V29, P261	3
4	de Jong M, 2009, LEADERSHIP MANAGEMEN, V9, P105	1
4	Sohail M, 2008, J CONSTR ENG M ASCE, V134, P729	1
4	Alutu OE, 2009, J MANAGE ENG, V25, P40	1
4	Le Y, 2014, J MANAGE ENG, V30, P	1
4	Bribe PI, 2011, BRIB PAYERS IND 2011, V, P	1
4	Ling FYY, 2012, CONSTR MANAG ECON, V30, P1087	1

3.4 Hot spots and Emerging trends

3.4.1. Co-word analysis of corruption in CM: Hot spots

According to Figure 5, the node which has the strongest betweenness centrality is management, which means that most of the research works have focused on the management level of knowledge, analysis and governance of corruption in the engineering field. In addition, the keyword, China, also shows China's strong concern in this field, which is consistent with the aforementioned cooperative network.

On the other hand, in Figure 6, the analysis of terms reflects that the research has been centred on public projects in developing countries, and the research will be guided by practical operations and literature review, with a view to guiding the theory and practice. At the same time, the main research method is the questionnaire-based survey approach, which indicates that there are opportunities for further study on the precise evaluation of corruption in construction.

**Figure 5:** Co-keyword network



Figure 6: Co-term network

3.4.2. Co-word analysis of corruption in management: Emerging trends

Considering no bursts in the analysis of corruption in CM, we choose the co-word network of corruption researches in management as a comparison. Because the field of construction management is a segment of management, and the research on corruption in management has a longer history and more completed system, emerging trends of the research on corruption in construction management can be likely deprived of a co-term network of corruption research of management.

Table 4 is the list of top ten most Noun Phrases of corruption in management, which shows the future study will develop around emerging economy and public projects, and the practical implementation, namely anticorruption responses at the medium and micro levels, will be enhanced. Moreover, combined with the analysis of the recent hot spots within the co-word analysis of corruption in CM, the precise evaluation of corruption in construction should not be ignored.

Table 4: The list of top ten most Noun Phrase of corruption in management

Count	Centrality	Year	Noun Phrases
64	0.02	2000	Developing countries
59	0.02	2000	Public sector
51	0.03	2007	Practical implements
47	0.11	2008	Public administration
39	0.04	2000	Public service
35	0.07	2007	Economic development
30	0.02	2003	Policy makers
27	0.04	2006	Corporate social responsibility
25	0.01	2008	Corporate governance
24	0.03	2004	South Africa

CONCLUSIONS

Results based on the analysis of CiteSpace indicate that research on corruption in CM is still at an initial stage, with little cooperation among authors, institutions or countries, but there is great potential for it to rapidly increase. The research frontiers are focused on emerging economy, unethical behaviour, public projects and critical analysis. Besides integrating the research of corruption in management with our opinions, research trends are as follows: firstly, developing countries, are facing a greater challenge in preventing corruption owing to insufficient legislative systems and poor institutional support (Ofori 2000); there has been a recent increase in research from several developing countries, including South Africa, Nigeria, Pakistan and India (Alutu 2007; Bowen et al. 2007a, 2007b, 2012; Alutu and Udhawuve 2009; Ameh and Odusami 2010; Tabish and Jha 2011; Choudhry and Iqbal 2013). However, the degree and extent of the related research have not been sufficient, so more efforts should be made in developing countries to further research on corruption. Secondly, although there have been suggestions of various anti-corruption strategies by many researchers and institutions around the world, macro-level strategies (Johnston 1986; Doig 1995; Tanzi 1998; Ehrlich and Lui 1999; Treisman 2000) which had been provided in the past still occupies attention to a certain degree. Thus, to enhance the practical impact, in determining possible anticorruption responses, more attention should be paid to the medium and micro levels in future research. Thirdly, the method of analysis in research on corruption in CM is mostly qualitative and based on questionnaires or review of the literature (Bowen 2012; Tabish 2011, 2012; Le 2014). Considering the lack of systematic methods for the evaluation of corruption in CM, there are great opportunities for the next steps of research.

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A MONITORING SYSTEM OF PROFESSIONAL ETHICS FOR THE CONSTRUCTION INDUSTRY BASED ON BLOCKCHAIN

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Unethical behaviour of professionals is quite common currently in the construction industry. Based on a review of the literature, the most effective solution is to promote the integration of heteronomy and self-discipline. A decentralized monitoring system of professional ethics is established, combined with Blockchain technology to realize the unification and to overcome the advantages of centralized supervisory institutions. For structure construction, consortium Blockchain is chosen as the toolchain in which qualified practitioners are nodes with individual professional archives. For cooperation establishment, each node elects bookkeeping nodes through Delegated Proof of Stake (DPoS) mechanism to investigate content to be recorded. For incentive measures, tokens are used as a dual indicator of professional ethics and degree of participation. The system enhances the levels of professionalism of professionals and overcomes the advantages of centralized supervisory institutions in the construction industry. It can be regarded as an innovative attempt which can be the subject of further research on the monitoring of professional ethics in the construction industry.

Keywords: professional ethics, Blockchain, encrypted keys, decentralized supervision, tokens.

INTRODUCTION

The construction industry is one of the most complicated and risky industries, which also plays an important role in a country's economy. There is a wide range of associated professionals with different roles in the construction industry, such as architects and engineers. Their behaviour has a significant impact on the whole process and the final results of construction projects, and even on society. If professionalism is regarded as the intellectual skills and competence of professionals, then professional ethics is the bottom line that must be observed.

Professional ethics in the construction industry

According to Bayles (1989), professional ethics is defined as a system of norms so that both the morality and behaviour of professionals could be dealt with in their day-to-day practice by this system. It ascribes moral responsibility not to an individual, but to all professionals practising in the whole industry (Abdulrahman 2014). The International Ethics Standard Coalition (IESC) is an organization aiming at promoting and strengthening the ethical conduct of professional practice for participants in the

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construction industry. The committee generalizes ten ethical principles, i.e., accountability, confidentiality, conflicts of interest, financial responsibility, integrity, lawfulness, reflection, standard of service, transparency, and trust. If two or more principles come into conflict, the professional should give precedence to the one that best serves the public interest in the context of the circumstances (ISC 2016). However, from a survey conducted by FMI (2004), 63% of the respondents, who are practitioners in the field of construction, feel that the construction sector is tainted by unethical conduct. Australian researchers Vee and Skitmore (2003) identified unethical professional behaviour in construction such as collusive tendering, bribery, fraud, negligence can easily lead to quality-related issues, potential safety hazard and other adverse consequences. How to ensure that every participant in a construction project abides by the professional ethics is an important issue.

The occurrence mechanism of professional ethics

To develop a better understanding of this issue, it is necessary to begin by tracing the origins of professional ethics. Boehm (1982) proposes that morality began when a society of hunter-gatherers punished a member for violating its rules. Levin (2009) holds an opposite view that morality originates from the evolution of the cooperation and group cohesion, while punishment is only a means of restraint. When it comes to professional ethics, Jacobs (2005) reckons that it is the product of division of labour. Professionals take their long-term interests and reputations into consideration so that they act responsibly and efficiently. If they do not do so, they will be penalized by their superiors or even de-registered by the industry (Sripada 2005). With the development of the industry, the guild then makes a systematic standard or a set of rules to guide as well as restrict professionals. Those guidelines are constantly strengthened and improved in the process of cooperation and competition among people and finally regarded as one's code of conduct.

Human beings are the unity of natural and social attributes, and morality is the unity of self-discipline and heteronomy. For an individual person, the formation of professional ethics is a gradual process from heteronomy to self-discipline during his or her professional career (Cao 2006).

From the discussion above, the occurrence mechanism of professional ethics can be conceptualised as following these four stages:

- Stage 1: the accumulation of working experiences – practitioners act responsibly and efficiently in consideration of their long-term interests during working process.
- Stage 2: the formulation of industrial regulations – the industry guilds formulate a set of systematic standards or rules based on the accumulated experience and instances of misconduct.
- Stage 3: the internalization of personal awareness – practitioners regard the guidelines as their code of conduct as their sense of professional ethics is gradually strengthened.
- Stage 4: the stimulation of professional dedication – the sense of professional ethics stimulates practitioners' dedication to, awe and enthusiasm for, their career.

Among these, the internalization of professional ethics is the most important stage.

Measures to ensure the internalization of professional ethics

There are three measures at three different stages to help ensure that practitioners internalize professional ethics as their own code of conduct. Professional education is required by every practitioner before he or she gets to work. It is of great significance for them to learn sufficiently about ethical codes and professional rules. According to Carr (1999), there is a difference between professional expertise and professional autonomy. People can obtain the former by learning and practising, while the latter depends on ethics education which the person would have had beforehand.

There is usually a penalty mechanism which is used to punish those who violate moral norms for their selfish interest and cause economic losses to the organisation, or society. Mason (2009) points out that one way of promoting ethics is to crack down on those incidences where unethical behaviour transgresses into breaches of the criminal law. The main public agencies are encouraged to enforce existing laws and procedures by setting a standard code of ethics and a set of penalty clauses.

Professional education beforehand only helps people establish self-discipline. Meanwhile, punishments cannot make up for the bad consequences. However, a real-time monitoring system of professional ethics has great significance for maintaining the ethical behaviour of each participant during the whole process of construction projects. It can not only keep them with bounds but also prevent potential damage from happening. However, little research has been done in this field. There are numerous participants with complicated interest relationships in construction projects. A dynamic evaluation of professional ethics is normally hard to be conducted on such a long time span.

The advantages in building a monitoring system of Blockchain

Blockchain, mostly known as the technology running the Bitcoin cryptocurrency, is a public ledger system maintaining the integrity of transaction data (Swan 2015). The idea was first coined in 2008 and immediately attracted the attention of persons and organisations in many industries. Research areas then came into application (Jesse 2016). Nasdaq in the United States initially launched Nasdaq Linq, a stock exchange platform based on Blockchain which enabled users to enjoy "digital" ownership to strengthen information security. This has become a milestone in the trend of decentralization of the financial sector (Yuan 2016). Blockchain can also be very useful in the medical field where patients' private information frequently leaks out. Philips Medical in the Netherlands and Tierion have collaborated to protect private medical data from being tampered with through Blockchain. In addition, Blockchain has also been widely applied in government management and the development of the credit system.

The assessment and evaluation of professional ethics in the construction industry are mostly conducted by industry associations or other fixed central institutions. Opaque information and autocracy breed unethical behaviours such as corruption and injustice. The emerging Blockchain technology, featuring decentralization, tamper-resistant, high-trust and traceability, can effectively solve problems of adverse selection and moral hazard. The remote operation and anonymity characteristic of Blockchain would substantially contribute to the establishment of a decentralized monitoring system of professionals in the construction industry.

A MONITORING SYSTEM OF PROFESSIONAL ETHICS BASED ON BLOCKCHAIN

Framework

To get rid of the control of centralized institutions, the construction industry within a certain region should be included in a Blockchain. Some nodes in the Blockchain can write information in the chain, while others have no right to participate in the bookkeeping and consensus process. Therefore, it is necessary to analyse the type of Blockchain which should be selected as an underlying toolchain.

The three types of Blockchain are: public Blockchain, consortium Blockchain and private Blockchain (Zhang 2016). Public Blockchain, known as the earliest and most widely used Blockchain, is completely open to every individual or group in the world. People are entitled to initiate transactions that can be validly identified and participate in the consensus process. Consortium Blockchain is controlled by a specific organization in which some members are nominated as bookkeeping nodes. Only these pre-selected nodes can take part in the bookkeeping process, while other members have no right to be involved in it. Private Blockchain is almost a centralized structure with a conductor where nodes have exclusive bookkeeping rights. Features of different Blockchain are presented in Table 1.

Table 1: Features of three types of Blockchain

	Public Blockchain	Consortium Blockchain	Private Blockchain
Degree of Centralization	Decentralization	Multi-centralization	Centralization
Participants	Everyone	Members of the organization	Up to the controller
Bookkeepers	Everyone	Pre-selected nodes by the organization	Up to the controller
Consensus mechanism	Proof of work	Decided by the organization	Up to the controller
Pros and Cons	Pros: easy deployment of applications Cons: limited trading volume, high power consumption.	Pros: easy to control, high scalability. Cons: difficult for information interaction	Pros: low power consumption, fast response Cons: unavoidable autocracy

Based on the comparative analysis, consortium Blockchain is applicable to establishing rules within specific industries. Each node does not trust or even know any of the other nodes, and this guarantees the decentralization of the chain. Only practitioners who have passed the vocational examination and obtained professional ethics education can become one of the nodes. The massive project data cannot be recorded on the chain since the volume of data must be limited to ensure the efficient operation of the Blockchain. Each node can upload an encrypted key which matches databases of projects that he or she has participated in, which can substantially save storage space on the chain. These traceable confidential data will be recorded with the same timestamp of the key, which can provide a basis for investigation and evaluation of professional ethics. A professional must revise the previously encrypted key if he or she wants to modify project data. However, other nodes will find that the data has been tampered with because the corresponding timestamp has changed, which ensures the authenticity of the data uploaded by professionals.

An individual professional archive will be built for each node, which includes two groups of indicators. One is for the assessment of professional ethics. The other is the record of participation in the Blockchain. Related affairs should be elaboratively identified before this process to find out what kind of behaviour is against professional ethics. For example, a professional who has been complained by clients or other participants during a project probably has not committed an unethical act for it may be the other party's fault. A detailed review is needed to avoid misjudgement.

There is usually a fixed committee, with a chairman, which takes charge of investigating and examining the above contents in a centralized supervisory organization. The institution leads everything but also undertakes everything, which inevitably leads to autocracy, possible dereliction, corruption or harbouring. For instance, if one of the primary members is bribed, it can affect the overall assessment results. It would be harmful to the health of the whole construction industry. However, in the decentralized situation based on Blockchain, every node will abide by the pre-set rules in the intelligent contract voluntarily and honestly to maximize its own interests. Information will be authenticated by bookkeeping notes and finally recorded into the professional archives. The framework and operation of monitoring system based on consortium Blockchain are shown in Figure 1.

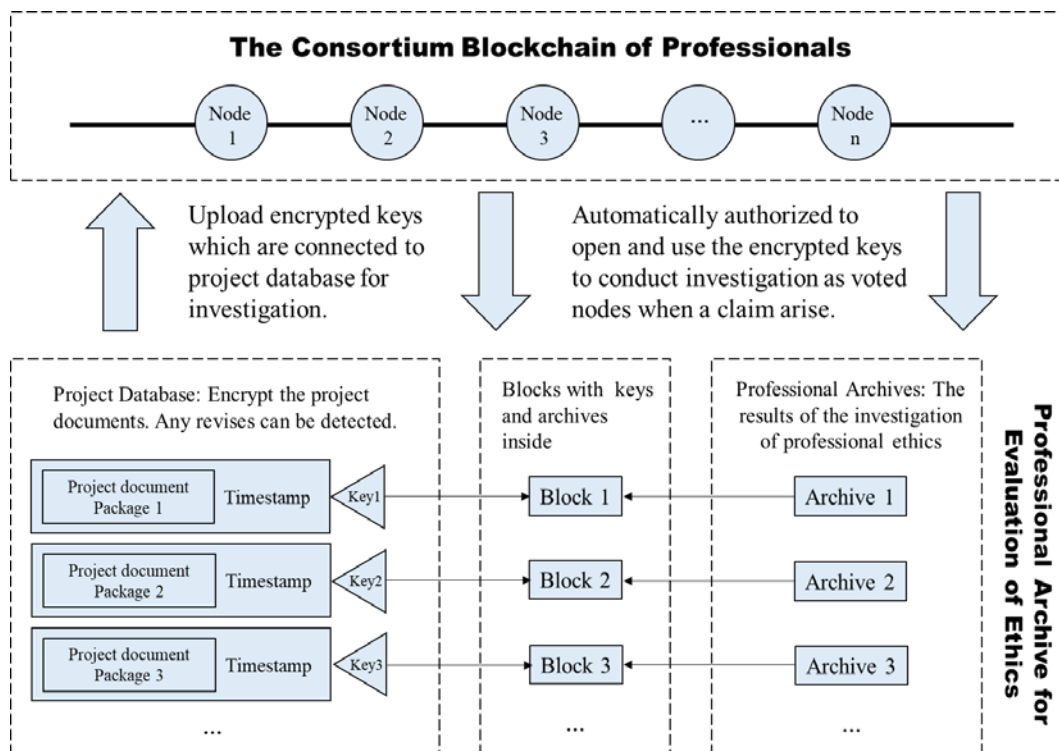


Figure1: Framework of the professional ethics monitoring system

Consensus mechanism

Blockchain is a public account, an open database, and a point-to-point collaborative network. Each node has a full identical backup of data. They can find transaction records or add transactions locally and remotely. Since there is no central authority to direct or coordinate the process, a consensus mechanism is essential to facilitate collaboration and agreement among nodes worldwide.

There are four main consensus mechanisms in Blockchain at present. Proof of Work (PoW) mechanism is the earliest mechanism which is highly dependent on the computational power of bookkeeping nodes. The Proof of Stake (PoS) mechanism

puts forward the concept of “age of coin” and emphasis on rights and interests. Delegated Proof of Stake (DPoS) mechanism is similar to the board of directors’ max-wins-voting strategy. A Verification pool based on traditional distributed consistency technology has a prominent characteristic of not using tokens (Han 2017). This paper briefly compares the characteristics and applicability of the four consensus mechanisms.

Table 2: Comparative analysis of four main consensus mechanism in Blockchain

	PoW	PoS	DPoS	Pool
Consistency	Poor	Poor	Poor	Good
Error-tolerant rate	High (<50%)	High (<50%)	High (<33%)	High
Scalability	Poor	Good	Poor	Poor
Efficiency	High-delay	Low-delay	Sub-second response	Sub-second response
Resource consumption	Massive	Low	Very Low	Low
Mining	✓	✓		
Token	✓	✓	✓	
Decentralization	✓		✓	
Application	Cosmic intelligence, mathematics	Financial sector, big data	Community governance	Multicenter commercial area
Disadvantages	Not suitable for small transactions	High network synchronization is required	Fail to respond to malicious nodes in time	Advanced hardware is required

In the monitoring system established by this paper, members of the supervisory institution can be selected as bookkeeping nodes to assess and investigate the performance and behaviour of all nodes through appropriate consensus mechanism then record them in professional archives. According to the comparative analysis, the highly centralized PoS mechanism and Verification pool does not fit the decentralized circumstances. PoW mechanism wastes massive time and resources. DPoS mechanism, which aims to use the trust and power of the stakeholders to vote for bookkeeping nodes, is the most suitable consensus mechanism.

At the beginning of the operation of the consortium Blockchain, senior experts from different guilds in construction industry form a group which acts as a disciplinary committee. As the number of nodes in the chain increases, common nodes vote for some more capable nodes according to certain criteria (number of tokens). When a project is completed, or a professional receives a complaint, the consensus mechanism will take effect and the investigation will automatically start. These representative nodes are entitled to obtain the encrypted keys and investigate the behaviour of the involved professionals according to their project databases then write the results into their archives. Personnel who share a direct interest with the party concerned, which may affect the impartiality of the investigation, shall withdraw.

Common nodes can change the team members of bookkeeping nodes at any time through voting. If there is any objection to the results, the second round of investigation can be initiated. To ensure its rationality, the initiators need to pay a certain number of tokens in advance. If the results remain unchanged, the tokens will be deducted from the initiators’ accounts. If the results of the first round are proved to be wrong, the supervisory nodes will bear the loss. This democratic mechanism not

only ensures the fairness of bookkeeping but also greatly shortens the verification time.

What if some bookkeeping nodes intend to destroy the consensus or tamper with the records? Consensus in Blockchain adheres to a long-chain principle, that is, nodes always add and update information in the chain with the largest number of blocks. Only if 51% of nodes betray the consensus are destructive, while it is almost impossible to occur because the cost is too high in practice. Furthermore, the entire review process is conducted anonymously and remotely, which guarantees a high degree of trust in decentralized organizations.

It is worth mentioning that DPoS is the only consensus mechanism used by EOS, the most up-to-date Blockchain operating system. However, there are still a few drawbacks in this mechanism, mainly reflected in low participation of voting nodes and irresponsibility of bookkeeping nodes. To solve these problems, this paper next introduces some corresponding incentive measures.

Incentive measures

Unlike the incentive method in a centralized organization which is usually embodied in bonuses or dividends issued by the owner or manager, there is no profit for sharing in the industry Blockchain. It relies on tokens which can be distributed automatically by the intelligent contract to attract nodes to participate in the consensus cooperation.

In this system, tokens can be regarded as a dual indicator of professional ethics and degree of participation, which not only restrict professionals' behaviour but also guarantee efficient operation of the entire industry Blockchain. For evaluation of professional ethics, professionals without unethical records on their archives receive tokens periodically. If a professional is proved to have conducted any bad behaviour against professional ethics, or to have uploaded false information, his or her tokens will be cleared out; if there is a serious violation of the law and regulations, he or she will be labelled as a bad node and evicted. For participation in the chain, if a common node votes for bookkeeping committee, a certain number of tokens will be given; if a bookkeeping node participates actively in the bookkeeping process without violating the consensus mechanism, it will also get tokens; otherwise its tokens will be deducted. Tokens cannot be sold and transferred in any form. These rules will be written into the intelligent contract in advance and automatically triggered when conditions are met, which reduce the difficulty of manual execution.

Reputation incentive is adopted since the system is non-profit. People who get more tokens will receive ranking titles that represent professional ability. The titles are also recorded in their professional archives. The industry chain covers a wide range of areas, thus people with more tokens can also attract more partners and projects.

CONCLUSIONS

Based on the emerging Blockchain technology, this paper establishes a decentralized professional ethics monitoring system of professionals in the construction industry. In the industry consortium chain, each node votes to elect bookkeeping nodes through DPoS mechanism to complete the real-time investigation. Tokens are regarded as a carrier to carry out reputation incentives. The system, which realizes a dynamic evaluation of professionals' working performance, is an innovative and unprecedented vision for professional ethics monitoring. It can strengthen the internalization of professional ethics and promote the integration of heteronomy and self-discipline, which are crucial to solving the common problem of unethical behaviour from the

origin. More importantly, the decentralization structure of Blockchain and the realization of remote participation can subvert the traditional form of centralized disciplinary committees and curb corruption.

As a pioneering attempt to apply Blockchain to the construction industry, the system proposed in this paper still has many shortcomings which are mainly reflected in the design of underlying technology and the difficulty of implementation. Blockchain is still in continuous development. We hope to contribute not only to the innovation of professional ethics monitoring in the construction industry but also to the development of Blockchain technology itself. Future research will conduct scenario experiments on whether the scope of the industry chain should be regional, national or global. The accurate rules of token allocation based on game theory are also worthy of further study.

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A NEW PROFESSIONALISM IN CONSTRUCTION: IMPORTANCE OF TRUST

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The features of the construction industry, the construction process, the construction project and constructed items include: the high cost and invisibility of the built items; the long period of gestation of projects; the large number of participants in a project; possible impact of the project and product on the health and safety of the workers, occupants and the community; and wide extent of governments' involvement in the process. These characteristics make trust important in construction. There is a need for trust in the industry, among the organisations and practitioners involved in projects; between the industry and its clients; within the project value chain; and between the industry and other stakeholders. The extent of trust at each of these levels, how professionalism among construction practitioners helps to build this trust, and what should be done to engender trust in construction are addressed. The study is based on an analysis of recent studies on professionalism in the UK construction industry which are compared with mainstream conceptions, and national aspirations and strategies for the industry. It is suggested that action should be taken to build trust at all the levels outlined above. It is argued that the construction industry needs a new professionalism, based on the features of the construction industry.

Keywords: characteristics of construction, professionalism, development, trust.

INTRODUCTION

Many studies have highlighted the need for trust within the construction industry. The seminal work, *Interdependence and Uncertainty* (Crichton, 1966), outlined how the output of one group in a project becomes the input for the tasks of the next group, and thus, how important it is for this subsequent group to be sure of the efficacy of the input. Research also highlights the need for greater collaboration among, and integration of, the project team and the need for the client and the whole project value chain to be involved in it, suggesting appropriate delivery methods such as partnering which have *trust* as a major factor (Latham, 1994, Egan, 1998). The lack of integration, exacerbated by the high extent of adversarialism, is blamed for many of the ills of the UK construction industry. The *Construction 2025* strategy (HM Government, 2013) sees team integration to be key to the industry being able to deliver on the vision and targets for 2025. The strategy has these targets: 33 percent reduction in the cost of construction and whole life cost of assets; 50 percent reduction in the time taken from inception to completion of new building work; 50 percent reduction in greenhouse gas emissions in the built environment; and 50 percent reduction in the trade gap in construction products and materials. The industry will have to improve its professionalism and *trust* to attain these ambitious targets.

The UK government and industry have recently outlined even more demanding aspirations of performance. The ambition of the *Construction Sector Deal* (which builds on the *Construction 2025* strategy) is to deliver: better-performing buildings built more quickly and at lower cost; lower energy use in homes and workplaces; better

jobs, including apprenticeships; better value from the construction pipeline; and a globally competitive sector that exports more (HM Government, 2018).

Trust is a valuable currency in construction. There should also be trust between the client and the industry; between construction firms and the rest of the value chain; and between the construction industry and its stakeholders, including the users/occupants and beneficiaries of its products who should trust the construction project team about their physical safety in the built items. The members of the community should have trust that the activities of the industry will not have an adverse impact on their health, safety, livelihoods or wellbeing.

OBJECTIVES OF THE STUDY

The aim of this study is to investigate the need for incorporating trust among the features and manifestations of professionalism. The objectives are to: (1) consider the issues of professionalism and trust and explore their importance in construction; (2) determine what builds trust in the construction industry; and (3) propose possible courses of action to enhance the level of trust in construction.

A PROFESSION AND PROFESSIONALISM

What is a profession? What is professionalism?

The professions have been studied in the social sciences since the early 20th century. Over time, the definition and conceptualisation have changed. To Freidson (1994), a ‘profession’ is an occupation that controls its own work, organised by a special set of institutions sustained in part by a particular ideology of expertise and service. Evans (2008) considered this to be an example of old, traditional conceptions of a profession, and suggested that the concept is going through major changes; in many fields, new ‘professionalisms’ have emerged, sweeping clear conceptions based on professionals’ autonomy and control. There is also a shift of power; accountability has replaced autonomy in an era of greater management and market orientation; thus, some refer to a process of ‘de-professionalisation’.

Reviewing works on professionalism, Evans (2008) notes a lack of consensus on its meaning; it changes and is redefined, often to serve different interests. Hoyle (1975, p. 315) explained it as “those strategies and rhetorics employed by members of an occupation in seeking to improve status, salary and conditions”. Recent works perceive professionalism, even in a particular field, not as absolute, but as “a socially constructed, contextually variable and contested concept” (Troman, 1996, p. 476).

Evans (2008) notes that, while many authors focus on professionalism as being an externally imposed, articulated perception of what constitutes a profession’s functions and responsibilities, Boyt *et al.*, (2001, p. 322) emphasise the importance of the professional; they note: “Professionalism consists of the attitudes and behavior one possesses toward one’s profession”. Professionalism goes beyond professional culture (shared ideologies, values, and ways of and attitudes to working) by mapping out the content of the work done by the profession, as reflected in roles, responsibilities, key functions, required skills and knowledge, work practices and procedures, ways of perceiving problems and solutions, and of dealing with clients (Evans, 2008). Concluding the review, Evans (2008) defines professionalism as: professionalism-influenced practice consistent with consensual delineations of a specific profession and that both contributes to and reflects perceptions of the profession’s purpose and status and the specific nature, range and levels of service provided by, and expertise prevalent within, the profession, and the ethical code underpinning this practice.

HISTORICAL DEVELOPMENT

Professionalism and socio-political structure

Early studies highlighted the role of the professions in the social structure, in influencing the stability and civility of social systems. For example, to Tawney (1921), professionalism could subject individualism to the needs of the community. Carr-Saunders and Wilson (1933) considered it as a force for stability and freedom against the threat of bureaucracies. Marshall (1950) highlighted altruism or the 'service' orientation of professionalism. Parsons (1951) made the best known effort to set out the features of professionalism and its normative values. He showed how the capitalist economy, rational-legal social order, and the professions were inter-related, acting together to maintain and stabilise the social order. For Hughes (1958), professions and occupations presume to tell the rest of society what is good for it.

Traits of the professional, including trust

In the 1950s and 1960s, Parsons's work held sway, and analyses focused on a profession as a kind of occupation, with special characteristics. For example, Greenwood (1957) and Wilensky (1964) argued that professional work required a long education and training to acquire the necessary knowledge and expertise; professionals were autonomous and performed a public service; were guided in decision-making by a professional ethic or code of conduct; they were in special relations of trust with clients, were altruistic and motivated by universalistic values. The work of Parsons, in particular on features of professionalism, is criticised because of its links with functionalism (the 'trait' approach) (Dingwall and Lewis, 1983).

In the 1970s and 1980s the concept of professionalism as value system was discredited; attempts to define special features of professions were largely abandoned. The focus moved to analysis of professionalisation or "the professional project" (Larson, 1977), the processes through which an occupation closed the market (to the untrained and unqualified) thereby promoting a privileged income level and status to practitioners. The successful professional project would result in a "monopoly of competence legitimised by official sanctioned 'expertise', and a monopoly of credibility with the public" (Larson, 1977, p. 38). This resulted in scepticism about professions and the idea of professionalism as a normative value. They were seen as elite conspiracies of occupations; privileged, self-interested monopolies competing for status, upward social mobility and income (Johnson, 1972). Abbott (1988) examined the carving out and maintenance of a jurisdiction through competition and the work needed to establish the legitimacy of the monopoly practice. They could 'capture' states and negotiate "regulative bargains" (Cooper *et al.*, 1988). Larson's work is still often cited (MacDonald, 1995) but her interpretation is challenged. Freidson (1982) preferred market 'shelters' to monopolies in provision of professions' services.

In the 1990s, researchers partly returned to the concept of professionalism as a normative value system but with new directions. They began to reassess the significance of professionalism and its contributions for customers, clients and social systems. To Freidson (1994, 2001), professionalism is a unique form of occupational control of work which has advantages over market or organisational and bureaucratic forms of control. The new paradigm examines professionalism as a discourse of occupational change and control. 'Professionalism' is now used in many occupations and workplaces; in organisations' mission statements, aims and objectives to motivate employees and in policy procedures and manuals. 'Professionalism' is also claimed by both sides in disputes and political and policy arguments (Crompton, 1990).

STUDIES ON PROFESSIONS AND PROFESSIONALISM IN CONSTRUCTION

Works on the professions in construction usually mention the typology of Lord Benson (1992) which uses the old model of a profession. The relevant criteria in this study are: (a) The profession must be controlled by a governing body, which sets standards of education and training as a condition of entry and continued membership; (b) The governing body must set the ethical rules and professional standards to be observed by members; (c) The rules and standards should be designed for the benefit of the public and not for the advantage of the members; (d) The governing body must take disciplinary action, should the rules and standards not be observed; (e) Work is often reserved to a profession by statute because of the protection of the public; (f) The governing body must satisfy itself that there is fair and open competition in the practice so that the public are not at risk of being exploited; (g) The profession's members must be independent in thought and outlook; and (h) In its field, a profession must give leadership to the public it serves. It is worth noting that most of the criteria relate to the public's interest. The "leadership to the public" criterion is enlightening.

Spada (2008) suggests that the professions have played a big role in the development of meritocracy in the UK because of their emphasis on knowledge-based skills rather than social class; the professions are a potential source of ethical role models.

Professionalism and trust, and the built environment

Evetts (2003) suggests that professionalism in occupations and professions implies the importance of trust in economic relations in societies with an advanced division of labour; lay people must place their trust in professional workers. Professionalism requires professionals to be merit the trust, to maintain confidentiality and conceal any guilty knowledge they have developed by not exploiting it for evil purposes. In return, professionals receive authority, rewards and higher status; later analyses attributed higher rewards to occupational powers rather than professionalism in some fields.

On the built environment, Spada (2008) notes that people rely on the ethical integrity of professionals because a professional provides intangible services which purchasers have to take on trust. Individuals and society as a whole have become increasingly dependent on professionals. Thus, trust, measured by how it fits the socially accepted standards of repute and respectability, is also important (MacDonald, 1995).

Professionalism and the public interest

Morrell (2015) outlines how Lord Benson's criteria are operationalised by noting that, in the UK, for every professional institution to obtain a charter, it needs to convince the Privy Council that it passes a public interest test as it seeks; and it can highlight provisions including: (a) setting educational, training and other entry requirements, and obligations for continuing professional development, so that the public can be sure of a level of competence of members; (b) regulating members' conduct to ensure compliance with codes of conduct; (c) advising (or speaking out) on matters of public interest where the profession's expertise should be regarded as authoritative.

Morrell (2015) notes that some professional institutions require members to consider the rights of others, including: (a) Respecting the relevant rights and interests of others (RIBA); (b) Having full regard for the public interest, particularly the well-being of future generations (ICE); (c) Having regard to the interests of those who may

be reasonably expected to use the products of their work (LI); (d) Having regard to the public interest in fulfilling professional responsibilities and duties (CIOB); and (e) Promoting the usefulness of the profession for public advantage (RICS).

The “fundamental principles” of the code of ethics of the American Society of Civil Engineers’ (ASCE) (2017) include: Engineers uphold and advance the integrity, honour and dignity of the profession by: (1) using their knowledge and skill for the enhancement of human welfare and the environment; (2) being honest and impartial and serving with fidelity the public, their employers and clients; and (3) striving to increase the profession’s competence and prestige. The relevant canons in the code of ethics include: (1) Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development; (2) Engineers shall perform services only in areas of their competence; (3) Engineers shall issue public statements only in an objective and truthful manner; (4) Engineers shall build their professional reputation on the merit of their services; and (7) Engineers shall, in all matters related to their profession, treat all persons fairly.

Call for change

Morell (2015) noted that built environment professions face a threat; their standing and perceived value is challenged; observers note a trend towards protectionism, resistance to change, existence of silos and hierarchies. The institutions are perceived as losing control of quality and oversight of educational standards, a code of ethics, a duty to serve the public interest, and leadership on key issues of the built environment. Spada (2008) notes that professions have gained societal importance in the information age, but have experienced a decline in public esteem. The perceived self-interest of the professions has brought about changes in regulations. Spada (2008) notes that the professions are under attack from government, which often fails to consider professional expertise in relevant policy areas; and the public, which view professionals with suspicion in an era of falling deference to authority.

Morrell (2015) considered these drivers for change: (a) Loss of trust by the public (leading to loss of automatic authority by professionals); (b) A prevailing mood against regulation and protectionism of a knowledgeable and aware citizenry armed with a right and ability to choose; (c) Client impatience with poor delivery and lack of accountability; (d) The impact of new technologies and applications; (e) Pressure on the ‘business model’ of the institutions (potentially leading to reduction in entry qualifications and standards, reduced investment in developing knowledge and so on); (f) The need to serve many members prevents setting of one view on matters of great public interest such as climate change and housing supply. Morrell (2015) notes that occupations considered outside the traditional professions have developed codes of conduct and claim the qualities possessed by the professions with a longer history.

TRUST IN CONSTRUCTION

Cerić (2016) notes that *trust* between parties to contracts and their agents is a major factor in assessing and managing risk. There is an asymmetry of communication and understanding among project participants. This leads to an imbalance of knowledge which results in inequalities of understanding and a possible increase in risk for one or more of the parties involved. Construction projects have become larger, more technically and managerially complex, involving more organisations and practitioners. Participants fulfil inter-dependent tasks, connected by a web of relationships. They should also relate to many other stakeholders external to the project. Cerić (2016) used the Principal-agent Theory to analyse the relationships

among the project owner, contractor, and their project managers; this is shown in Figure 1.

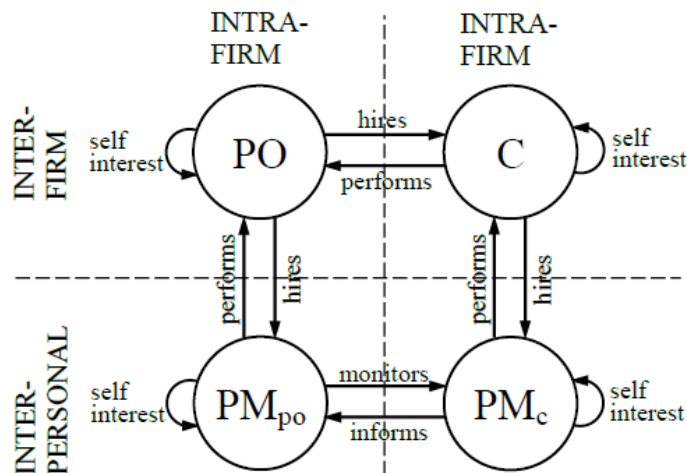


Figure 1 Principal-agent theory framework for construction projects showing key relationships between project parties, where PO: Project owner, C: Contractor, PM_{po}: Project owner's project manager, PM_c: Contractor's project manager (Cerić, 2016:102)

In typical construction projects, the inter-firm relationship applies to the project owner and contractor; the intra-firm relationship to both project owner and contractor and their project managers; and the inter-personal relationship applies to the two project managers. Communication risk differs across these relationships. One can appreciate the importance of trust in the context of these relationships. Each type of trust can increase, decrease, or vary in complex ways from project initiation to completion.

Cerić (2016) notes that, in English, trust is associated with veracity, integrity, and other virtues including fidelity, faithfulness, and belief. Also, *trost* in German stands for comfort or consolation. In Latin, *fides* stands for trust, as well as faith, belief, confidence, loyalty, and promise of protection. She notes that in communication in Latin, risk or *periculum* also means danger, peril, trial, insecurity, jeopardy, attempt, and hazard. The Latin words for trust and risk are often opposites of each other. Cerić (2016) notes that the central epistemological question about trust is whether or not to trust someone or something. An important criterion for trust is the acceptance of risk or vulnerability (Becker, 1996); this risk can be reduced through communication. Thus, trust enhances co-operation (Cook *et al.*, 2005). Co-operation involving trust becomes less cumbersome and less costly once the incentive to check up on other parties declines. As Williams (2001) notes, inter-personal trust is an important social resource that facilitates co-operation and enables co-ordinated social interaction.

All projects requiring persons to associate in various activities over a period contain seeds of social dilemmas. It is each individual's responsibility to build relationships on the basis of trust and reciprocity (Ostrom, 2003:62). Cerić (2016) shows that trust has become one of an important subject, because it is increasingly clear that external authority is insufficient to guarantee successful completion of construction projects. So far, the mainstream research encompasses trust between persons, within firms or other organisations, and between firms or other organisations. Project managers in Cerić's (2016) study agreed that it is not easy to develop trust between project parties, but that it can easily come apart, after which it is even more difficult to build it again.

Much of the research on trust in Construction Management is concerned with inter-firm relationships (as in partnerships and alliances); intra-firm and inter-personal trust are neglected in the literature. Research on trust in the relationships among parties in construction projects needs to develop in three inter-related directions outlined by the Principal-Agent Theory framework: on inter-firm, intra-firm, and inter-personal trust.

FEATURES OF CONSTRUCTION AND IMPLICATIONS FOR PROFESSIONALISM AND TRUST

Features of construction, professionalism and trust

The features of the construction industry, construction process and construction product are highlighted by various authors; construction is considered to be unique. Hillebrandt (2000) presented these features: high cost; long period of gestation; many participants; large sector of the economy, with complex linkage effects; and role of the government. World Economic Forum and Boston Consulting Group (2015) traced the construction industry's practices to what clients desire from the industry (Table 1).

Table 1 Relationship between construction industry's features and clients' practices

Construction industry's features	Practices of construction clients
Many stakeholders with diverse interests and needs	Immature project definition and technical assessment
Project business and on-site construction	Over-preference for the lowest price bid
High industry fragmentation – the US has 710,000 engineering and construction firms, only 2% have over 100 workers, 80% have 10 or fewer	Insufficient or incremental funding – delays in payments of contractors for work done
Low profitability and capitalization	Conservative clients
Highly cyclical and volatile business	Increased risk transfer to contractors
Unstable workforce	Complexity of contracts and dispute resolution

The UK construction industry exhibits the features in Table 1. Department for Business, Innovation and Skills (2013) found that the UK construction and construction products sector is highly fragmented (of its 280,000 businesses, which employ 2.9 million people, less than 300 firms employ over 250 people). Construction firms are considered to be of higher risk due to low levels of fixed capital, smaller firm size and low profit. Late payment or partial payment is the most important issue affecting construction firms (only 5 percent of specialist contractors are paid in full within 30 days). Tier 2 firms are net providers of trade credit, while Tier 1 firms are net receivers of credit (from suppliers including Tier 2 firms) than they offer to clients. Profit margins in the largest 10 construction companies (excluding house builders) are less than 1 percent of turnover. It described the UK construction industry as: Fragmented – 99 percent are small and medium-sized firms; and (ii) Highly disaggregated - supply chains average 70 packages over four to five tiers.

It is evident from Table 1 and the UK industry that the client-industry relationship is generally based on mutual suspicion and “risk-passing”. Construction Leadership Council (2018) notes that the UK government has introduced many measures over the last ten years to improve the situation for construction firms but, as shown in the same report, the measures have not made any dent in the industry's problems and features. Figure 1 shows the features of the construction industry, construction process and constructed product, and implications for professionalism and the importance of trust.

<i>Feature of construction</i>	<i>Implications for professionals</i>	<i>Importance of trust</i>
Location specificity * Each constructed item is fixed in its location. Thus, the required resources should be deployed in that location. * Local construction businesses can be competitive against ‘outsiders’, owing to the bulkiness of the material inputs. * Many construction workers might live in the local community during the project.	* The requirements of each profession in the regions might differ owing to differences in climate, resources, culture and regulations. * The community must be safeguarded but the industry’s health and safety practices have an internal orientation only.	* A range of construction skills should be available throughout the country. * Local capability in development and building control is required. * The community are project stakeholders; they must have trust in the team.
Implications of health and safety * Construction involves possible danger to the workers owing to bulkiness of material inputs, work done at a height, and frequent need for work to be expedited. * Construction work can also pose danger, and noise, dust and visual pollution to persons in the locality. * Constructed items can pose danger to the health and safety of occupants, from poor indoor environmental quality to possible collapse of the building.	* In many countries, construction has a poor safety and health record. This has a negative impact on its social image. * Governments, in many countries have increasingly stringent health and safety regulations, and demanding targets for safety performance.	* Continuous awareness building and sensitisation of workers, and education, training and professional development are necessary. * Community relationships should be a key component of stakeholder management.
Role of government * Government is a major client of the construction industry. * Government is a regulator of construction, given its health, safety, and environmental implications. * Government is responsible for managing the development of the industry.	* Government can use investment in construction to stimulate the economy. * With its bargaining power, government can influence how projects are designed and built. * Government can determine quality of professionals by registering them.	* Professionals should include in their activities, a role of sound relationships with government to contribute to policy development.
High cost and indivisibility * Constructed items are expensive in their own rights and when compared with the turnover of the firms involved in it; and the income of the end purchasers. * The uncompleted building or infrastructure item cannot be used well, or often, not at all. * The construction industry mostly responds to demand; it has little control over its market, in terms of what it will build, the inputs and technologies which will be involved, and the location of the items.	* The low-bid focus in the industry leads to low profit margins. * An appropriate definition of ‘cost’. “Value for money” is a topical issue in many countries. UK Construction Leadership Council’s (2018) report. proposes a whole-life approach. * Other cost-related project parameters such as ‘affordability’ should be considered.	* The industry should be able to develop the capability to respond to changes in its operational requirements. * An industry with trust as a feature of its professionals would have a more favourable pricing approach.

Long period of gestation * Constructed items take a long period to complete. During this period, workers on the project relate to the community.	* Each construction project is a temporary task; it can provide jobs for reasonably long periods.	* Training to enhance skills helps increase productivity of the workers and minimise possible delays to projects.
Involvement of many participants * Each construction project involves several companies and individuals with different expertise and specialisations, undertaking specific tasks at its various stages.	* Professionalism at both corporate and individual levels is of paramount importance.	* Trust among the companies and practitioners is key, as their tasks are interdependent.
Environmental implications * Construction has potential negative implications for the environment. They include: taking of the land on which the built item stands; extraction, processing and transportation of materials; construction work on site including energy use and waste production; operating built items including use of energy and water; and demolition of the built item; and disposal of the waste.	* The effort to make the built item sustainable can also result in the creation of additional jobs.	* Education and training programmes should cover the sustainability impacts of construction and how they are to be avoided or addressed. * New skills necessary for sustainable construction needs to be created.

Figure 1 Features of the construction industry, construction process and constructed product and implications for professionalism and trust

Features of construction as the basis for a new professionalism: Further work

Whereas there have been changes relating to the professions and professionalism in construction, the features of construction, which make trust necessary, have remained the same. Trust is an important aspect of professionalism; it should be evident in the relationships. More work is needed on criteria for a profession and professionalism, especially in the built environment, to explore how the importance of trust within the profession, and between its members and those outside it can be reflected. There should also be more work on trust, and its many levels in the built environment. Stakeholder Management on projects should be further developed, using trust.

CONCLUDING REMARKS AND RECOMMENDATIONS

‘Professional’ should not be what one calls oneself; it must be merited, and accorded by one’s technical and business partners, and society. This should be part of the criteria for a profession, especially in the built environment. Each ‘professional’ should feel a responsibility to ensure the relationships of the person are based on trust. Trust has relevance in all the functions on the project: between the project team and the client, between these two groups and the end purchaser and users of the built item, between the project team and the companies’ business partners, and between all involved in the project and the government and society should also be highlighted.

A new concept of professionalism is required which is based on the features of construction, and considers the element of trust. In this era, if the construction industry is to be able to meet the high aspirations set for it in terms of the nature and quality of its output and its performance, the professionals should be technologically sophisticated, autonomous, self-regulating, and sensitive to local needs and cultures. Trust should be their watchword; they should exhibit it to, and merit it from, all partners and stakeholders. The industry can regain the lost trust if it takes deliberate,

systematic action by providing a service and products, and demonstrating attitudes worthy of such trust. On each project, team-building effort should be given attention on all projects; emphasis should be on intra-team trust. Good corporate citizenship and individual responsibility are necessary.

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INDUSTRY CASE STUDIES

CASE STUDIES DEMONSTRATING INNOVATION, REGULATION CONTROL AND SUSTAINABLE DEVELOPMENT THROUGH EFFECTIVE PROJECT MANAGEMENT AND BEST PRACTICE PROFESSIONALISM.

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Details on projects that WPS Compliance Consulting Ltd has consulted on over the last two to three years are discussed in this paper. Each case study demonstrates that it is crucial to understand the relevant regulations and control for each construction project and that without leadership, clear communication, stakeholder engagement and management, the success of the implementation of the project is affected. Across the entire project management process, effective communication is essential. Without a robust communication plan, implemented at the commencement of the project, delivery of innovation, regulation control and sustainable development may pose a challenge. Implementation must be monitored at established project gates and change managed accordingly. The case studies range across commercial and residential developments.

The paper highlights key considerations:

Adopting sustainable development and innovation assists in addressing current issues and ensures professionalism within the industry

Communication is essential amongst both internal and external stakeholders, to successfully adopt sustainable development and innovation, the entire project team including operatives on site must be duly engaged to allow understanding and rationale for sustainable development and innovation and possible impact on the project outcomes.

Regulation control requires professionalism.

Education, training and awareness are essential for ensuring effective project management and professionalism.

Adopting a lateral methodology including regulations, standards, best practice and professionalism.

The use of software can be instrumental in achieving sustainability and transparency in developments and regulation control.

Professionalism and institutional membership can be useful for adhering to codes of ethics and the impact this can have on an individual.

Keywords: innovation, management, professionalism, regulation, sustainability, communication

INTRODUCTION

This case study analysis investigates eight case studies from the construction industry that represent how the use of project management and best practice professionalism can lead to innovation, regulation control, and sustainable development.

The literature review demonstrates the importance of communication and how communication underpins the successful delivery of construction and infrastructure projects, and initiatives that are closely aligned to such projects including sustainable development and innovation.

This research was completed using a desk-based study of the projects of the clients WPS Compliance Consulting Ltd have worked with over the past two to three years. This includes projects from both commercial and residential developments across the UK.

Aims and Objectives

The aim of this study is to use industry case studies to demonstrate how innovation, regulation control and sustainable development can be achieved through effective project management and best practice professionalism.

This aim will be achieved through the following specific objectives:

1. To investigate the economic impact of waste minimisation application in construction projects.
2. To investigate how best practice, training and communication at site level can contribute to; sustainable development, regulation control and professionalism.

Project Background

Historically the construction industry has always been a high producer of waste. In the UK, this was the reason that the “Site Waste Management Plan” (SWMP) regulations were introduced in 2008.

WPS’s online software tool SitePlan was originally called WastePlan because in its original form it was a Site Waste Management Plan (SWMP) software tool. It was and still is (as SitePlan), however, the only software tool to satisfy both the SWMP and Waste Duty of Care regulations. WastePlan used new and innovative data base structures by using a Sequel database and linking it to a PHP development platform in order to achieve the solution.

To maintain regulation control, the Waste Contractor database within the system is maintained inhouse by WPS and ensures compliance via the Environment Agency Public Registers website, ensuring that all Waste Carrier Licences (WCLs) and Waste Site Permits are valid at time of use.

WastePlan was upgraded to SitePlan in 2017 to include the management of other sustainability elements relating to construction projects and the tool now even goes as far as calculating the carbon footprint of a project. Regardless of this further development, however, the software is still unique in its analysis of waste disposal cost savings at a project level.

LITERATURE REVIEW

Introduction to Sustainable Development

Sustainable Development is defined by the Brundtland Commission as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and

Development, WCED, 1987). This definition has been expanded to include the triple bottom-line, or three pillars of sustainability: economic, social, and environmental sustainability (Silvius and Schipper, 2014). Sinakou et al. (2018) found that academics in the field of education of sustainable development tend to lean towards the economic and social aspect of sustainable development, not the integration of all three. However, Urbaniec et al. (2018) state that the focus should rest on the environmental pillar, especially in relation to energy and water.

This paper uses case studies to demonstrate how all areas of sustainable development can be addressed through effective project management and best practice professionalism.

Project Management and Communication

Sommerville et al. (2004) confirmed that the efforts to deal with the problems with communication in the construction industry were not leading to improvement, and the problem might be regarded as chronic. They highlighted how the nature of construction projects typically required complex networks of stakeholders including managers, employees, colleagues and clients who must consistently communicate to work together towards achieving the objectives of the project (Sommerville et al., 2004; Thomas & Thomas, 2008). These highlight how good and timely communication is an essential component of successful project management.

A review of the literature provides a wealth of examples of authors providing definitions for communication. For example, Weaver (1949) considers communication as the spoken word either direct, by telephone or radio; the written or printed word, transmitted by hand, by post, by telegraph or in any other way are obvious forms of communication. Weaver's definition of communication is broad and extends to music, pictures and what he refers to as a variety of other methods of conveying information. However, more recently, authors have moved towards defining communication in less broad terms. For example, Katz & Khan (1978) describe communication as information transmission significant for what it implies, triggers or controls.

Dainty et al. (2006) reiterate that construction project managers and teams need to communicate both up and down the supply chain, transcending team and organisational boundaries while overcoming barriers created by the project and team complexities. Ziek & Anderson (2015) observed, during their research on project teams, that the amount of communication among team members is a strong indicator of project outcomes and success.

The definition put forward in a project management context is that communication is the means by which information or instructions are exchanged; successful communication occurs when the received meaning is the same as the transmitted meaning (APM, xxxx Body of Knowledge 6th Edition).

The literature review highlights the significance of communication in project delivery; Communication is an important ingredient that needs to be embedded as part of the foundation of any construction or infrastructure project. There is significant onus on leadership and the project manager to achieve this.

Project Management and Sustainability

Sustainability is becoming an increasing priority in relation to project management. Sustainable project management must include consideration of the life cycle of the project (Labuschagne and Brent, 2005) while also focusing on the three pillars of sustainability (Silviu and Schipper, 2014).

Kivilä et al. (2017) discussed how focusing on sustainable project management within just the design and planning phases is inadequate, it must also be carried across to the execution phase. The case studies mentioned within this report work using this theory of sustainable development being at the forefront of each stage of the construction process, not just the planning phase.

Other Case Studies

Kivilä et al. (2017) analysed a case study of a road tunnel construction project. They found that through regulatory requirements, sustainability became a higher concern of both the project team and the project partners, boosting innovation and integration in terms of project control and the three pillars of sustainability.

Another case study, completed by Simionescu and Silviu (2016), can be used as a comparison to Kivilä et al. (2017). This project did not implement sustainability within all aspects of the project management, sustainability was only considered relative to the deliverability of the project. This resulted in the observation of sustainability being only recognised in terms of economics, not all three aspects of the triple bottom line (Silviu and Schipper, 2014).

Mavi and Standing (2018) analysed sustainable project management within the construction industry in Australia. This case study found that senior management support is important in relation to project management and achieving sustainable development. This is because support results in resources and activities to help achieve the goals of the project. They also analyse how the government in Australia should enforce stricter standards within the construction industry to emphasize the value placed on sustainability in the sector. This, alongside future research and innovation, was found to help with integrating project management and sustainable development.

METHODOLOGY

Research Approach

This paper was prepared through desk-based analysis of case studies from projects that WPS Compliance Consulting Ltd have consulted on over the last two to three years. Each of these companies received training on regulation requirements, best practice techniques and site communication support.

Methods

Information on the projects was culled from the relevant project documentation. Data was collected from WPS Compliance Consulting Ltd's online software SitePlan regarding the amount of money saved by the implementation of different waste minimisation techniques in the last two to three years.

RESULTS

Medium Size Principal Contractor Company, 7 Star Hotel site

The first project commenced on 1st December 2015 and finished on 31st May 2018; a project spanning 2 years and six months. The project had a floor area of 3,106m² and was completed in Hertfordshire, UK.

The client estimated to have saved over £25,000 through using the following waste minimisation techniques:

- Using returnable pallets where possible
- Segregating timber waste on site
- Storing reusable bricks and roof tiles from demolition phase, for use in later phases
- Segregating metal waste on site
- Segregating paper and cardboard waste and bale on site prior to disposal
- Testing clean soil from excavation by 'CL:aire' and then dealing with it as Material Transfers to be reused on another site
- Retaining timber and metal waste where it is possible to re-use these materials

The client stated that "the SWMP was successfully implemented on the site" and they were "particularly pleased that [they] kept an excellent record of Duty of Care for this project and managed to use CL:aire, which was the first time [they] had done that".

The client said they learnt to segregate waste during future projects and ensure that CL:aire is considered when working on future sites.

Medium Size Property Developer Company, Block of Flats

The second project spanned one year and six months, from May 2015 to September 2016. The site was 600m² and was located in Camden, London, UK.

The client has estimated to have saved £700 through the following waste minimisation techniques:

- Segregating Gypsum waste on site
- Segregating timber waste on site
- Using returnable pallets where possible
- Retaining materials in packaging until required.

The client commented that "the SWMP was successfully implemented". They also commented that the £700 savings came from £200 saved by the segregation of timber on site and £500 through returning pallets on site. They claimed that they learnt to segregate waste and return packaging on future projects as well.

Medium Size Principal Contractor Company, New School development

The third case study project spanned one year, from May 2015 to May 2016. The site was 620m² and was located in Biggleswade, UK.

The clients saved over £10,000 by using the following waste minimisation techniques:

- Retaining excavated arisings on site
- Segregating waste on site where possible
- Ensuring all sub-contractors agree to order efficiently, and only order what is required for the project
- Retaining the original paving slabs for reuse on site.

The clients commented that they were “unable to segregate canteen waste on the project and other segregation, i.e. packaging/timber was not as feasible as [they] had thought”. They did, however, retain 1,000m³ of excavated material on site which resulted in the saving of £10,000 they made.

Medium Size Principal Contractor Company, Factory Site

The fourth case study project occurred between April 2015 and March 2016, spanning 11 months. The site was 1,726m² in Suffolk, UK.

The client estimated that they saved £15,000 by using the following waste minimisation techniques:

- Using ground remediation to mitigate the need to remove 2000m³ of non-hazardous waste to landfill – the waste was screened and processed to a usable material
- Further treating any unusable material and stabilising it with lime/cement to allow this material to be used in external car park areas
- Using controlled ordering and storage of materials
- Segregating waste on site where possible.

The client stated that they have learnt for future projects to remediate where it is possible to do so, and to continue ordering materials without allowing for excess.

Medium Size Principal Contractor Company, Civil Engineering

The fifth case study is a 7,400m² site in Peterborough, UK. This project occurred between February 2016 and August 2016, spanning six months.

The client estimated that they saved £5,200 by using the following waste minimisation techniques:

- Utilising cut and fill opportunities where possible
- Adopting the method of removing trees involving chipping on site with the chippings then being spread for mulch.

The project involved the removal of 141 trees. By chipping on site, they saved £4,700 on skip hire. They also found that the small amount of cut and filling they completed on site saved about £500. They said that for future projects they learnt that “chipping wood waste on site is an excellent waste minimisation technique”.

Medium Size Principal Contractor Company, Civil Engineering

The sixth case study project was on an 8,000m² site in Bretton, UK. The project lasted between April 2016 and September 2016; a 5-month project.

The clients estimated to have saved £2,005 by using the following waste minimisation techniques:

- Alteration of pathways to minimise wastage on cutting
- Shredding and chipping of tree surgery arisings for recycling.

The clients commented on how £500 was saved through the act of chipping wood on site, stating that they learnt for future projects that “chipping wood waste on site helps to reduce [their] timber waste arisings”.

Medium Size Principal Contractor Company, Industrial Warehousing and offices

The seventh case study started in November 2016 and was completed in September 2017, spanning 10 months. The site was 4,371m² in area, and was located in Peterborough, UK.

The clients estimated that they saved over £16,400 by using the following waste minimisation techniques:

- Ensuring that the design was completed before build started to ensure abortive works were minimised
- Crushing inert demolition material on site and reusing it on site
- Segregation of waste on site where possible

The clients stated that “the SWMP was successfully implemented on site and some cost savings were made”. The revealed that “1,300m³ of crushed material was reused on site” which led to the monetary savings observed.

Medium Size Principal Contractor Company, Commercial offices

The final case study project started in April 2017 and was completed in May 2018, spanning 13 months. The site was located in Kettering, UK, and was 4,000m² in area.

The client estimated that they saved over £3,000 by using the following waste minimisation techniques:

- Segregating waste on site where possible
- Retaining materials in packaging until required
- Using returnable pallets where possible
- Segregating timber waste on site
- Segregating metal waste on site
- Segregating inert waste on site.

The client said that “the SWMP was successfully implemented” and they learnt to “continue to segregate waste where it is possible to do so and utilise a local community wood recycling project for our timber waste”.

INTERPRETATION AND DISCUSSION

There are three key examples of effective project management that are the most common across the case studies in helping to achieve economic and environmental savings. These three waste management techniques are shown in Table 1. Using returnable pallets where possible and storing reusable items from the demolition phase were applied as waste minimisation techniques on three out of the eight case study projects. The segregation of different waste streams on site was used on 75% of the case study projects; this emerged as the most popular waste minimisation strategy across all the eight case studies.

Table 1: Popularity of Main Waste Minimisation Techniques

Waste Minimisation Technique	Number of Case Studies Implemented In	Percentage Use (%)
Segregating waste on site	6	75
Using returnable pallets where possible	3	37.5
Storing reusable items from demolition phase	3	37.5
Chipping of tree waste on site	2	25
Retaining materials in packaging until required	2	25
Ensuring sub-contractor participation	1	12.5
Using ground remediation	1	12.5
Controlled ordering and storage of materials	1	12.5
Utilising cut and fill opportunities	1	12.5
Alteration of pathways to minimise cutting of trees	1	12.5

Table 2 shows a cost saving comparison among the case studies. As each case study site is different in size, the savings per m² has been calculated to allow comparisons to be drawn. It can be seen that some of the larger sites, such as the Warehousing project, have high economic savings due to the larger scale of their sites meaning that it would be possible to make more savings. When calculated at savings per m², the savings from the Warehousing project (£3.75/m²) are lower than the average across all the case studies (£4.94/m²).

The highest savings per m² was found at the New School Development project, which managed to make a saving of £16.13 per m² of their site. This site utilised four different waste minimisation techniques. Most of the techniques used were popular on the other case studies, as shown in Table 1. These included segregating waste on site (used on 75% of the case studies), and the storage of reusable items during demolition (used on 37.5% of the case study projects). This was the only site which claimed that they ensured that all subcontractors were ordering correctly and consciously to avoid wasted materials.

Table 2: Cost Analysis of the Case Studies

Case Study	Economic Saving (£)	Floor Area (m²)	Savings (£ per m²)
Medium Size PC –7 Star Hote	25,000	3,106	8.05
Medium Size Dev. - Flats	700	600	1.17
Medium Size PC –New School	10,000	620	16.13
Medium Size PC – Factory	15,000	1,726	8.69
Medium Size PC – Civil Eng.	5,200	7,400	0.70
Medium Size PC – Civil Eng	2,005	8,000	0.25
Medium Size PC- Warehousing	16,400	4,371	3.75
Medium Size PC - Offices	3,000	4,000	0.75

The results demonstrate that sustainable practices and innovation assist in professionalism within the industry as well as leading to significant cost savings and minimising environmental impact. It is pertinent to note that all the companies received training on regulations and were given the tools to control regulation in-house. This was supported by further awareness training on expectations and knowledge across the levels of management and site labour.

These results would not have been measurable without adopting a lateral process for monitoring regulation control, best practice and professionalism in the methodology including regulations, standards, best practice and professionalism. The SitePlan.online software was instrumental in helping the clients of WPS to achieve sustainability and provided transparency in the project development and regulation control

The adoption of waste minimisation techniques is also tentatively linked to the question of ethics and although this was not measured during this research, the impact these decisions had on individuals who were part of the projects would have been positive; further research on this area is required.

CONCLUSION

The eight case studies detailed above highlight that communication underpins the successful management and delivery of construction and infrastructure projects irrespective of the size or nature of the project. Robust communication enables sustainability of any best practice adopted and embraced over the entire duration of a project. In addition, it is demonstrated that there is a strong link between sustainable development and professionalism within the industry and regulation control is part of this and software can be a useful ‘assistant’ in helping to monitor, record and measure objectives on a project and within a company.

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ETHICS IN CONSTRUCTION: KEY ISSUES

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This is a paper for the Royal Institution of Chartered Surveyors (RICS). It discusses the following topics which relate to professionalism and ethics: international standards and ethics, conflicts of interest, anti-money laundering, bribery and corruption, modern slavery. It outlines what the institution is doing in each of these areas. It concludes by stating the RICS to provide thought leadership to guide its members to act with integrity and professionalism while competing for work in a challenging market in a complex and fast changing environment.

Key words: Professionalism, Conflict of interest, Money laundering, Modern Slavery, Thought leadership, Commercial pressure

INTERNATIONAL STANDARDS AND ETHICS

Ethics is a current ‘hot topic’ within the property and construction sectors – the proper behaviour of Chartered Surveyors as they undertake their services and the need for them to ‘do the right thing’ every time. Client expect a quality service from the professionals that they employ – and acting ethically at the same time - this was typically not questioned in the past as it was just to be expected – and on many occasions business was conducted and successfully concluded with merely the good and true word of both parties. Regrettably, the modern world with extremely complex business structures does not necessarily approach business of an entirely ethical basis.

This is why the Royal Institution of Chartered Surveyors (RICS) was one of the key coalition members who have written and published the International Ethics Standard (IES), a set of high level principles which seek to ensure that professionalism is delivered consistently and transparently throughout the world. The group, of now around 130 independent, not-for-profit global organisations came together to write and publish (for the first time) a set of high-level ethical principles intended for use across the whole of the property and related professions, be they connected with land, property, construction, infrastructure or valuation.

A coalition formed towards the end of 2014 and they started by signing a charter which committed them all to promote and subsequently make use of the Standards. An independent Standards Setting Committee was formed with a group of nineteen experts from around the world who drafted and then consulted upon the text, resulting in publication at the end of 2016.

Copies of the IES are freely available to download at www.ies-coalition.org

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The Standards note that their vision is to, ‘promote and strengthen the ethical conduct of professional practice for the benefit of clients, third parties, current and future stakeholders, and the public’. (*IES, December 2016*).

The high-level principles (listed in alphabetical order) are:

- Accountability
- Confidentiality
- Conflict of interest
- Financial responsibility
- Integrity
- Lawfulness
- Reflection
- Standard of Service
- Transparency
- Trust

The RICS, along with many other global organisations in the fields of property, land and construction seeks to bring clarity and leadership in this important area.

The IES has now offered a ‘supporter’ category of membership for firms, government and academia and interest continues to grow around the world.

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CONFLICTS OF INTEREST

This is one of the ethical principles noted above and it requires that professionals make any and all appropriate disclosures in a timely manner. Having made the disclosure, if it transpires that the conflict cannot be mitigated or removed all together, then the professional shall withdraw from the situation. It could be, of course, that all parties concerned may agree that matters can continue after the disclosure, but surveyors (and others) are always advised to err on the side of caution.

Given that this is such an important matter of practice for professionals, the RICS has recently published a Professional Statement, entitled, 'Conflicts of interest' (*RICS, March 2017*) which seeks to build upon the high-level principle as set out in the IES and set out detailed and specific requirements and directions to professionals. Up to now, the *RICS Rules of Conduct* merely state that, 'members and firms at all times must act with integrity and avoid conflicts of interest and avoid any actions or situations that are inconsistent with their professional obligations'. All very well, but there was then no specific material as to how that was to be worked out in practice, and this Professional Statement seeks to correct that imbalance.

The Professional Statement places into categories three types of conflict, namely:

- Party conflict (*conflicting duties owed to two different parties within the same assignment*)
- Own interest conflict (*conflict within the firm over seeking to act in conflict with the interests of the same firm*)
- Confidential information conflict (*disclosure of information known to the surveyor from one client being shared with another client*)

In all cases, there is the Opportunity to obtain 'Informed Consent' from the Client, but the Professional Statement makes it clear that this should never be sought merely to serve the interests of the firm or individual. RICS are bringing this important subject to the forefront of the practice of professionals and the publication has been welcomed by all.

ANTI-MONEY LAUNDERING

The global property world now sees a huge volume of cross-border transactions with the constant flow of funds between countries being commonplace. We will all be too aware with our own personal banking transactions of the measures that the banks have put in place to guard against this practice and the Government equally takes international money laundering very seriously having set up a new watchdog (in January 2018) to seek to strengthen the UK's defences against it.

In the property sector, London remains a very attractive location for international investment in high end residential property and professionals in this and related fields of practice need to be aware of the risk of 'dirty money' being the vehicle for the purchase. Accordingly, the RICS continues to develop specific guidance for professionals working with other stakeholders to spot the signs.

BRIBERY AND CORRUPTION

A recent Court case on the Crossrail infrastructure project showed the extent of corruption that can take place even on a high-profile scheme like that – the claiming of a greater quantum of time and men than was actually used, and with the help and assistance of someone on the 'inside' merely 'signing off' the claims in return for a cut of the winnings.

However, much of the activity in this field is 'low level' and includes the offering of hospitality and gifts as inducements for the placing of business and giving favour. The Bribery Act was introduced by Government to bring clear direction in this area and it is considered that this legislation is amongst the toughest in the world in this area of law.

Many ethical issues arise within construction over the status of interim payments – the Contractor over-claiming for the extent of work undertaken in the previous period, in the hope that it is just 'waved through' by the professional QS. In many cases, the response is to merely 'strike it out' noting the sharp commercial practice by the Contractor. But is it attempted fraud, or is that too strong a label to apply to that action?

These, and other construction related ethical issues are considered in the latest edition of the RICS Construction Journal (RICS, November/December 2018) where several professionals were asked to consider how they would react to the issue put to them – the answers given are very interesting and it is hoped that a healthy debate will result.

Given that this is also a very important area for consideration by professionals, the RICS is developing specific guidance.

MODERN SLAVERY

The Modern Slavery Act 2015 sought to bring the growing issue of modern slavery (MS) to the public mind and to seek to address the problem which has been present for several years within such areas of the UK economy as agriculture, retail, car washes and nail bars.

More recently, construction has increasingly been an industry where it is present and the Home Office report that it is now the fourth most common expression of MS. Many RICS professionals working within construction will have historically not

considered it not to be in their industry and if it is in construction, it is not within the UK market.

The reality of MS within the construction industry has been a painful voyage of discovery for many surveyors within the UK market and the RICS is seeking to educate its members, by being trained to watch out for the key signs of MS on a construction site.

PROFESSIONALISM AND COMMERCIAL PRESSURE - RICS THOUGHT LEADERSHIP

All the foregoing issues within the professional world are being ‘played out’ in a world where Clients expectations of the service to be provided by surveyors must be of the highest quality, but at a price which is considered fair and reasonable – and RICS research has found that ‘the biggest challenge to professionalism is commercial pressure’.

Surveyors, and indeed all professionals, should continue to resist Client pressure to reduce fees and to report against even increasing deadlines. This is particularly relevant where the advent of technology provides the Opportunity to undertake (for example) survey work by machine – which on the surface is a threat to the future work of surveyors – what should the response be to this threat?

All professionals seek to work by reference to a set of Rules of Conduct and Professional Statements particular to that profession but to act at all times with integrity when there is the need for an element of interpretation over the Rules and Statements. The area of conflict of interest is very relevant in this debate and so how can professionals manage this ever-present tension and not always ‘lose out’ on appointments from Clients where other firms might take a different and more relaxed interpretation of the Rules?

Chartered Quantity Surveyors working within the construction industry are responsible for the management of considerable values of Client funds and there is always the Opportunity for other players in the industry to offer low-level inducements to the professional to be invited to tender for a construction project, to be the successful bidder or to look favourably upon the claimed amounts put forward – how does the surveyor distinguish between sharp commercial practice by others (‘trying it on’) and outright bribery and how do they avoid over-reacting?

The RICS continues to guide and direct members of the profession to act with integrity and in a professional manner at all times, for the public benefit. We celebrate our 150th anniversary this year and even after this considerable period of time we continue to seek to lead the profession to ensure quality outcomes for their Clients in a complex and fast-moving world, hardly recognisable from the world when the RICS was founded.

ETHICS AND CONSTRUCTION: THE FINAL FRONTIER

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This paper presents what Balfour Beatty plc is doing to contribute to the efforts being made to bring about change in the construction industry. It outlines the company's ethics and compliance programme, how it ensures that its business partners in its supply chain also show integrity, how it influences clients, and how it is working with other construction firms to change the industry.

Keywords: Balfour Beatty, collaboration, contractors, construction, ethics

BIDDING IN THE CONSTRUCTION INDUSTRY

In 2009, the then Office of Fair Trading (OFT) investigated, and subsequently fined, 103 firms in the construction industry. The OFT investigated collusion between competitors in the UK between 2000 and 2006 and concluded that the firms engaged in anti-competitive bid rigging activities on 199 tenders, mostly in the form of cover pricing. Cover pricing is where one or more bidders in a tender process agree in advance the prices at which bids will be submitted and therefore who will win the tender. One or more bids submitted contain prices which are artificially high resulting in the 'cheapest' bid winning. The client is unaware of the cover pricing and believes that a competitive process has taken place and the best value bid has won. As the winner faced no real competition, the client may have unknowingly paid a higher price than it would have done if there had been genuine competition. The OFT named the companies involved and fined them a combined £129m.

In addition to fining and naming and shaming these companies, the OFT also issued guidance in conjunction with the Office of Government Commerce cautioning procurers against excluding the infringing firms from future tenders. This guidance was issued on the basis that the practice of cover pricing was widespread in the industry; it was the way that the whole industry operated and had done so for many years.

The Government therefore recognised that the competition law issues arose from the operation of the entire industry, not just the behaviour of a small number of organisations within it. Changing the industry begins with an individual organisation but collaboration is needed to effect long lasting change.

AN INDIVIDUAL APPROACH - BALFOUR BEATTY'S ETHICS AND COMPLIANCE PROGRAMME (BUSINESS INTEGRITY)

Balfour Beatty's programme was launched in 2009 and is underpinned by a Code of Conduct (www.balfourbeattycodeofconduct.com). The Code covers what is expected of everyone who works for or with Balfour Beatty. It was originally launched as a hard copy book and subsequently redesigned and relaunched as a website in 2016. There is also a Supplier Code of Conduct which distils those parts of the Code which are relevant to suppliers (www.balfourbeatty.com/how-we-work/supply-chain/supplier-code-of-conduct/). The Code covers anti-trust and bribery & corruption, and also health and safety, human resources and legal areas. The requirement to comply with the Code is included in each employment agreement and supplier contract.

There is a dedicated team (Business Integrity) responsible for embedding the Code of Conduct into the business and a wider network of 'champions' who, in addition to their day job, provide support to the Business Integrity team and act as a conduit for information and best practice. All elements of the Business Integrity programme link back into the Code of Conduct.

Following a redesign and relaunch of the programme in 2016, the focus has been on shifting responsibility for business integrity from the dedicated central team and onto each business, and moving away from a tick box approach, into a genuine compliance culture. A number of different approaches have been used to further this goal. In order to ensure that compliance is an individual responsibility which is encouraged and monitored by each business a "comply and explain" approach has been taken. This involves the senior leadership of each business not only providing an annual declaration of compliance but evidence of how they have shown leadership in this area. They are also required to highlight areas where they require additional support from the Business Integrity team (thereby reinforcing that the team is supporting the business to fulfil its responsibility). In addition, the businesses are required to agree the high level agenda of the Business Integrity team every six months, again requiring them to understand what is happening within their own businesses and highlight areas where additional support is required. Data which is collected centrally on different aspects of the programme, including the number of whistleblower reports, registrations and training statistics, are shared with each senior management team and benchmarked against UK averages. This enables each senior team to understand how well embedded the programme is within their business and ensure resource is deployed in those areas where it is required.

Key announcements and training requirements are cascaded through the businesses by the senior leaders within the business. The importance of the Business Integrity programme is reinforced by the senior leaders communicating directly with their employees, rather than the central team. If the boss believes something is important, it is likely that others in the business will too.

In order to ensure that compliance is the easy option, the 2016 programme review also removed or streamlined processes which had not reflected the changes in governance in the organisation more generally. As controls around a number of businesses procedures had improved, many of the areas which were included under the programme were being covered elsewhere. If complying with a process is anything

other than easy, people will devote a surprising amount of time and effort to circumventing it. This is particularly true if they cannot see any value in the process itself because it is not necessary or repetitive. The most effective change has been to tweak processes which were already operational and working well. This meant that separate processes were not required and complying with the programme has become part of how the business operates; not an additional requirement of the Business Integrity team.

Another key focus was to understand why people behaved in the way they did. To understand what were the biggest influencers on them whilst at work. This involved understanding the culture within the different businesses and designing the programme to have the maximum impact. The programme's vision is to ensure that Balfour Beatty's culture enables people to make the right choices and empowers them to Speak Up where others have not. This means using different means of communications and training to change the way people behave. To put people in the situations where we normally experience a risk of non-compliance and train them on how we expect them to behave. This new approach is more thought provoking and engaging, and therefore persuasive.

The redesigned and relaunched programme is having an impact – the latest employee engagement survey (which had a response rate in excess of 70%) showed 95% of respondents know what is expected of them under the code of conduct, 82% feel encouraged to do the right thing in everything they do at work and 84% feel they can raise issues and challenge unethical, dishonest or unacceptable behaviour. In addition, the number of cases reported through the whistleblowing hotline has increased from 7.2 cases per 1,000 employees to 11.6 cases per 1,000 employees between 2015 and 2017.

COLLABORATION – WORKING TOGETHER TO CHANGE THE INDUSTRY

The programme at Balfour Beatty has changed considerably and is working well but there are still issues. For example, the culture on a project or an individual site is influenced by many different people. Given the structure of the construction industry and its reliance on subcontracting, a project or site will include employees from a number of different organisations. Whilst some will have their own ethics and compliance programmes, many do not. In order to effect a true change in the behaviours which are promoted or tolerated, a more coordinated approach is required. The industry needs to work closer together and we need clients to support this approach.

As the OFT concluded, practices by construction companies are not usually isolated. If behaviours are taking place in one company, they will almost certainly be more widespread than that, “just the way the industry operates” or the way “things have always been done”. Particularly as people don't tend to leave the industry, they simply move from one organisation to another. In some cases this means taking inappropriate behaviour with them. This behaviour must be addressed by the whole industry in order to stamp out these behaviours.

TONE FROM THE TOP (CLIENTS)

The construction industry is one of the few where a highly technical, complex and bespoke product is delivered for very slim margins. Construction News' CN100 puts the average industry margin at -0.9% for the top 10 UK contractors (by revenue) over the previous 12 months. A large infrastructure project brings considerable risk into an organisation, but the reward doesn't reflect this. Nor does it reflect the complexity involved in delivering a project on time and on budget.

The slim pickings for those working in the industry drive behaviours which make it challenging to have a positive impact from an ethics and compliance perspective.

Firstly, a number of organisations simply do not have the resources to devote sufficient time, energy and money to understand the legislative requirements and implement programmes to ensure compliance. With margins so tight, the focus for most businesses is understandably on getting the job done, particularly if delay brings further cost. This doesn't just have an impact on behaviours which are troublesome from an ethics and compliance perspective but also potentially from a safety and quality perspective too. With pressure to get jobs finished and little or no positive programmes to reinforce the right behaviours, there is a greater risk that corrupt activity will take place. Paying to get the job signed off or to release payments or retentions may seem like a good solution.

In addition, where there is little to be made legitimately, the temptation of making some money "on the side" becomes more attractive and perhaps more morally acceptable. If someone is making extra money on a project because they are not following the right process it is tempting to join them. Particularly if the culture makes it feel like this is acceptable and the risk of getting caught is low.

Just paying more for construction and infrastructure projects isn't the answer. Paying more and expecting more in the area of ethics and compliance is. Clients, like others in the construction industry, have obligations to comply with the law. Unfortunately sometimes this just involves passing the responsibility down the supply chain. Questions are asked about what policies, procedures and training is provided but not checked in detail or questions asked about whether these are operating in practice. Contractual obligations contain onerous requirements about ensuring no bribery or corruption exists within the business, supply chain or on the project, but how this actually works in practice isn't explored. Rights of audit are included within contracts but how often are they actually used? The responsible client doesn't just "pass the buck" but makes ethics and compliance important by asking the right questions and checking what actually happens. It also awards work to those who are genuinely trying to ensure that their employees behave in the right way. Lastly, the responsible client must accept that every organisation is made up of a cross section of the population. However good the ethics and compliance programme is, there will always be someone who will not comply. It is simply not possible for a company to guarantee that no bribery or corruption will occur. It is possible however to provide evidence of how they are ensuring that everyone knows what is expected, how people can raise concerns and the approach taken when someone falls below what is expected.

The price of a project and the way it is tendered, managed and delivered should fairly share the responsibility of ensuring people behave in the right way. Arguably, this

should save money in the long term when less is lost to theft, fraud and bribery (the cost of which ultimately needs to be met by someone).

TONE FROM THE TEAM (CONTRACTORS)

The industry also needs to work together to make a lasting change. Competing in the area of ethics and compliance means we are all simply spending money trying to achieve the same thing. Worse still, we are making the industry more complex for the supply chain where the larger contractors have different requirements which must be met in order to work. One organisation working in isolation will not succeed in changing the way the industry operates. Cultural change can be difficult, time consuming, expensive and fail. It also differs from organisation to organisation. So what can we do as an industry to start to make a change?

There are some relatively small and inexpensive practical steps that members of the industry can take to start to make a change.

One which is easy and free; join an organisation which promotes the ethics and compliance agenda in the construction and infrastructure sector. Balfour Beatty is a member of the Anti-Corruption Forum (<http://anticorruptionforum.org/>). The Forum is an alliance of UK business associations, professional institutions, civil society organisations and companies with interests in the domestic and international infrastructure, construction and engineering sectors. The Forum needs additional representatives from industry to join the conversation.

After the bid rigging scandal, the construction industry is rightly sensitive to sharing information with competitors. However, it is possible to share information on those who have committed criminal offences. The financial services industry had issues with people committing fraud or other financial crime and then applying to work in the industry. The financial services industry worked together to create Cifas (<https://www.cifas.org.uk/>). Cifas is a not-for-profit fraud prevention membership organisation and the UK's leading fraud prevention service, managing the largest confirmed fraud database in the country. The 400 members of Cifas are made up of organisations from the public and private sector and include the Home Office. If a number of organisations in the construction and infrastructure sector joined Cifas, it would be possible to create a database of crimes which have been committed in or against construction companies.

Lastly, the industry and government could work together to educate and train small and medium sized enterprises (SMEs) on bribery and corruption. There already exists a vehicle which is capable of facilitating this process – the Supply Chain Sustainability School (<https://www.supplychainschool.co.uk/uk/default-home-main.aspx>). The school is paid for by a collaboration of contractors, clients and 1st tier suppliers and is free at the point of use for SMEs. The School provides eLearning, face to face workshops, supplier days and policies, procedures and check lists to nearly 30,000 registered users. The School has expressed an interest in working with the industry and government to create content covering anti-bribery and corruption. Balfour Beatty and members of the Anti-Corruption Forum are willing to assist in this process.

All of the above are small but meaningful steps to start to work together to change the industry. Let's start now.

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