



CONFERENCE PROCEEDINGS

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10th cidb Postgraduate Conference
**Towards a better route to enhanced productivity, performance, and
transformation of construction**
25-27 February 2018
Port Elizabeth, South Africa

Editor
Fidelis Emuze

10TH CIDB POSTGRADUATE CONFERENCE

Edited by
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PREFACE BY THE CEO OF cidb

The cidb postgraduate conference was initiated to bring together academics, researchers, practitioners and students from the different construction industry disciplines to debate issues of interest. This conference provides a platform to discuss research of interest to the construction industry including the status of the industry and its developmental trajectory as an industry that contributes to national infrastructure, and promotes youth skills development, and empowerment.

Since 2003 the conference has provided a platform for active postgraduate researchers to exchange experiences and observations about the state of the industry and to also provide a knowledge base for the future development of the industry. The focus of the papers presented at the conference have covered areas of construction industry performance, such as health and safety and people in construction; competitiveness of the industry including the development of small and medium contractors; the industry's contribution to socio-economic development and its contribution to employment creation as well as long-term sustainability in the industry.

The cidb postgraduate conference has always focussed on supporting a research agenda that results in the development and transformation of the South African construction industry.

The conference is now recognised as an important event amongst the academic community for facilitating debate, partnerships and knowledge dissemination amongst students and academics across different institutions. It has also made significant contributions to knowledge creation on developmental issues in infrastructure development such as the debates on health and safety, growth of the emerging sector, and impact on government procurement, among others.

Significantly, the cidb postgraduate conference has contributed to the growth of junior academics in our country. From the initial intension of providing a place for potential and up and coming researchers, the conference has grown to become a knowledge partner where industry needs are researched and solved in a collaborative manner with academic institutions.

To date we have professors who first participated in the conference as honours and masters students and have through the years been given a platform to grow to full professors. It is further encouraging seeing that these professors are using the same platform to support the growth and development of their students. This we hope will lead to the continued growth and prestige of the cidb postgraduate conference.

Further growth of the conference is shown by the expansion of its geographic and academic reach. From its humble beginnings as a local conference targeting students and researchers in South Africa, the conference has now grown a global footprint that attracts participants from across the world. It is now recognised as a platform to share research findings by students and academics in countries across the globe and has, over the years, attracted participants from the following countries Botswana, Egypt, Ghana, Kenya, Nigeria, Swaziland and Zambia in Africa; Hong Kong in Asia; England and the Netherlands in Europe, New Zealand and the

Unites States of America. It is our strong belief that the cidb Postgraduate Conference will continue to grow and attain the status of a fully international meeting.

Recognition for the quality of work presented at the conference has come from our professional councils with the South African Construction Project and Construction Management Professional and the Association of Quantity Surveyors awarding continuing development points (CPD) to their professionals for participating in the conference. This is indeed as sign that the humble cidb Postgraduate Conference is making a significant contribution to professional development in the construction industry.

As we celebrate the 10th occurrence of this prestigious event it is our wish as the cidb to see it grow from and strength to strength and to continue making significant contributions to the transformation of our academic institution. The cidb also wishes to congratulate the academics and students who have and continue to deliver outstanding papers, as well as the heads of academic departments in the various universities who have partnered with us through the years to deliver conference.

I would also like to thank the conference organisers, a partnership between Nelson Mandela University and the Central University of Technology, Free State for the hard work and dedication that went into preparing for this celebration. I also wish to acknowledge the conference participants who have been very loyal to the cidb postgraduate conference and wish you all a good meeting.

Mfezeko Gwazube
Acting CEO: cidb
February, 2018

FOREWORD

The organizing committee of the 10th Construction Industry Development Board (cidb) Postgraduate Conference is happy to welcome you to Port Elizabeth, South Africa. The 10th edition of the cidb conference series provides an international forum for researchers and practitioners to put forward progressive ideas on how to advance the performance of the construction industry through the contributions of early career academics. The meeting is a platform where recognized best practices are shared between researchers and practitioners. The conference aims to strengthen industry performance and transformation through a purposive engagement with contemporary discourses. The broad objectives of the conference are to:

- Provide a forum for multi-disciplinary interaction between academics and practitioners;
- Provide an internationally recognised, and accredited conference;
- Disseminate ground-breaking and cutting-edge practices, and
- Contribute to the built environment body of knowledge.

The conference theme is

“Towards a better route to enhanced productivity, performance, and transformation of construction.”

The peer reviewed papers in this edited proceedings thus aligns with the theme by addressing various ways in which productivity, performance and transformation could be engendered in the construction industry.

Fidelis Emuze
Academic Programme Chair
Bloemfontein, South Africa
February, 2018

ACKNOWLEDGEMENTS

The preparation and hosting of the 10th cidb Postgraduate Conference is based on the kindness and sponsorship of the Construction Industry Development Board. The contributions of the cidb is supported by the goodwill from the Nelson Mandela University (Mandela Uni.), the Central University of Technology, Free State (CUT), and other helpful individuals. The organising team is grateful to Iruka Anugwo, Clinton Aigbavboa, Ayodeji Aiyetan, Brink Botha, Lance Wentzel, and Olalekan Oshodi for serving as a Session Chair in the conference. The team also recognize the support of keynote speakers in the persons of Dr Rodney Milford, Prof. Theo Haupt, Prof. Gaye Le Roux, Mr. Eric Manchidi, Prof. PD Rwelamila, and Ms Lisa Parkes.

The effort of the International Scientific Committee (ISC), who diligently reviewed both abstracts and papers that were afterward edited by Fidelis Emuze is affectionately appreciated. The voluntary assistance of the ISC led to the published proceedings that satisfy the subsidy criteria of the Department of Higher Education and Training (DHET) in South Africa. I must mentioned the immense support from colleagues at the cidb, starting from Ms Ntebo Ngozwana who spearheaded the organisation of the event. The role of Rodney Milford is also notable, especially in relation to the strategy support required by the conference. At the academic institutional level, the support of Winston Shakantu (Mandela Uni.), and Alfred Ngowi (CUT) are notable. Through voluntary supports, Mariana Botes, Chris Allen, and Katharina Crafford in Port Elizabeth; and Dillip Das, Bankole Awuzie, Benny Ramafalo, Thabiso Monyane, George Mollo, Michael Oladokun, Evelyn Allu, Portia Atoro and Chikerizim Okorafor in Bloemfontein are much-appreciated. It is also important to mention the web support from Leandra Jordaan.

ORGANISING COMMITTEE

John Smallwood (Technical Programme Chair)
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Portia Atoro (Administration – CUT)
George Mollo (Editorial – CUT)

DECLARATION

The papers in this conference proceedings have been double-blind reviewed at abstract and full paper stages by members of the International Scientific Committee. This process involved comprehensive reading of the abstracts and papers, reporting of comments to authors, modification of articles by authors whose papers were not rejected by the reviewers, and re-evaluation of revised papers to ensure the quality of content. The conference proceedings are made up of papers that have been reviewed by experts in specific fields of construction research. It is declared that multiple institutions contributed majority of the papers in the proceedings.

THE PEER REVIEW PROCESS

To ensure the quality of the conference proceedings is not compromised regarding the need to comply with the criteria for the Department of Higher Education and Training (DHET) subsidy in South Africa, a rigorous two-tier peer review process by no less than two recognized experts was followed. In certain instances, three reviewers were used to assess the quality of a paper. In fact, four papers were subjected to three reviews before a decision was made. The process was implemented by making sure that each abstract was twice blind reviewed with reference to applicability to the conference theme, scientism, originality of research ideas (and data) and extent of contributions to knowledge. Authors, whose abstracts were accepted, after the stage one review, were provided with anonymous reviewers' reports and requested to submit their full papers for the second round of peer review. The review of the full papers followed the two-tier blind review process again. Authors whose papers were accepted after this second review were provided with second anonymous reviewers' comments and requested to submit their revised full papers (camera ready versions of each paper). These final papers were included in the conference programme and the conference proceedings after evidence was provided that all comments were appropriately addressed by the concerned authors. The Easy Chair online system was fully utilized for the peer review of all submissions for the conference.

The submissions were made to:

<https://easychair.org/conferences/?conf=cidb2018>.

The conference was also hosted on the web through:

<http://www.cut.ac.za/cidb-postgrad-conf/>

The statistics shown below indicate that full papers originated from eight countries:

| Country | Authors | Submitted | Accepted | Acceptance rate |
|----------------|---------|-----------|----------|-----------------|
| Ghana | 6 | 2 | 2 | 1 |
| Israel | 1 | 1 | 1 | 1 |
| Kenya | 1 | 0.33 | 0.33 | 1 |
| Nigeria | 7 | 4.83 | 3.83 | 0.79 |
| South Africa | 89 | 52.7 | 48.7 | 0.92 |
| Swaziland | 1 | 1 | 0 | 0 |
| United Kingdom | 7 | 1.63 | 1.63 | 1 |
| Zimbabwe | 1 | 0.5 | 0.5 | 1 |

The members of the International Scientific Committee (ISC) were not involved in the review related to their own authored or co-authored papers. The role of the editor was to ensure that the final papers integrated the reviewers' comments and position the papers into the final order as captured on the Table of Contents. A total number of 92 submission were received through the abstract and paper submission stages. However, only 55 papers were accepted for inclusion in the proceedings. This statistic results in an acceptance rate of 59.8% / rejection rate of 40.2%. The total reviews conducted by scholars at the paper review stage stand at 132 with four papers. The inclusion a paper in the proceedings is predicated on acceptance consensus from the reviewers. All rejected papers failed the acceptance litmus test.

Best wishes,

A handwritten signature in black ink, appearing to be 'F. Emuze', written over a horizontal line.

Fidelis Emuze
Academic Programme Chair
Bloemfontein, South Africa
February, 2018

INTERNATIONAL SCIENTIFIC COMMITTEE

The peer review exercise for the 10th cidb Postgraduate Conference was expedited through the voluntary contributions of scholars from various international institutions. The editor sincerely appreciate the contributions of all reviewers listed below:

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HOSTS

Department of Construction Management

NELSON MANDELA
UNIVERSITY

Department of Built Environment



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IMPLEMENTING EFFECTIVE COLLABORATION IN CONSTRUCTION THROUGH A BOTTOM UP APPROACH

Xebiso B. Kamudyariwa¹, Calistus Ayegba² and David Root³

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Change has been a byword of the construction industry over the last two decades. In most cases procurement strategy change has been spearheaded by government on public projects. This type of change focuses on practices without a corresponding change in culture. Using desktop research this review examines clients as agents of change as they are in a position to positively influence the construction industry through the manner in which they procure. A shift from procurement practices modelled after Principal Agent Theory to those modelled after Stewardship Theory would help enable this change. The findings provide insight into why client change is effective and highlight the importance of collaborative procurement. Practically this review encourages clients to be at the fore of change to encourage an industry culture with a focus on value and shared interests. Since the review provides a theoretical perspective, further empirical research could be conducted to delve into actual expert client inspired change.

Keywords: change, collaboration, culture, procurement

INTRODUCTION

The Construction Industry is an integral part of most global economies. Unfortunately it is regarded as a hostile environment that tends to create stakeholders who prioritise their interests above all else (Babic and Rebolj, 2016; Holley and Ben Farrow, 2012; Memon et al., 2015; Osipova, 2015; Van Marrewijk et al., 2014). This is exacerbated by industry characteristics such as the separation of the design phases from construction phase, the organisation of the construction process and the methods used for price determination (Ankrah et al., 2009; Stephen Barthorpe et al., 2000). These characteristics created a need for change within the industry

Detailed research has been conducted by various countries into ways of improving the industry. Most common is the United Kingdom (UK) report by Latham that emphasised the need for client involvement, partnering in projects and the use of relational contracts such as the NEC which emphasised working more collaboratively within the industry (Latham, 1994). Egan's report that was conducted a few years later also reiterated the concept of working together with a focus on government and major clients working to completely overhaul the industry (Egan, 1998). All in all, research has resonated with the theme of changing procurement in order to improve the industry.

The problem identified in literature is that successful change of the industry is at risk because in some instances it has been found that organisations are reverting back to the traditional procurement they know (Bowles and Morgan, 2016). This implies that change though implemented can be superficial (Gardiner, 2014) and driven by a need

to qualify for tenders. The aim of this research was thus to determine how change can be implemented such that it has a more permanent impact in both organisations and industry.

RESEARCH METHODOLOGY

Desktop research was conducted using Web of Science (WOS). This choice was made based on the fact that WOS has a wide range of indexed scholastic journals from which good representations of metadata lists can be drawn. WOS also provides details of the Impact Factor meaning one can determine the strengths of chosen journals.

Using a list of approximately 525 articles that were downloaded into Zotero, the research keyed in on problems in the industry. Latent analysis determined these to include cost and time overruns, fragmentation and adversarial relationships. Most major problems were related to procurement and suggested solutions intimated that collaboration was a means of improving the industry. Focusing on procurement problems reduced the articles to 53. Collaboration thus became the content area and content analysis determined that two categories were present in terms of collaboration.

In these articles, collaboration was a content area and content analysis determined the presence of two categories. These were reluctance to change and changing of procurement practices. The theme that evolved from the latter category was that a different type of change needed to occur as changing only practices was not producing the desired change within the industry. From this theme latent analysis further produced the themes of attitude, values, beliefs and behaviour. These in a nutshell pointed to the fact that beyond practices, culture also needed to change to ensure a permanent type of change. This discovery then brought to the fore the fact that culture change is an undertaking best suited to clients who are also starting to have a wide influence within the construction industry.

EVOLUTION OF THE CONSTRUCTION INDUSTRY

Procurement is the process that creates, manages and terminates contracts making it in essence a process concerned with activities preceding and following the signing of a contract (Govender and Watermeyer, 2000). The inadequacy of traditional procurement methods has been a driving factor in the need for change in various construction industries globally (Stephen Barthorpe et al., 2000).

Traditionally, procurement in the construction industry is characterised by lack of trust and goal alignment between the client and vendor (Snippert et al., 2015). It is also through an extremely fragmented supply chain which is driven by lowest cost instead of maximum value (Thomas et al., 2002). Since the industry is also adversarial, tensions occur in the supply chain limiting the cohesion necessary for both efficiency and innovation (ibid).

Relationships among the stakeholders are at arms-length with self-interest being the norm in interactions (Sinclair, 2011). In a manner reflecting the principal-agent model, the client (principal) hands over responsibility for the project to a specialist (agent) who is supposed to create value for the client (Bosse and Phillips, 2016). While the agent should be trusted to act in the client's best interest they are considered opportunistic (Davis et al., 1997) and likely to act in self-interest. This results in a control oriented management style in projects (Giritli et al., 2006) which does not help in improving relationships.

History of the Construction Industry

The history of the UK's construction industry as depicted in Figure 1 is reflective of the process of change within construction industries. The industry shifted from the craft guilds of the middle ages that worked as a sharing collective (Epstein, 1998) with cultural cohesion (Thomas et al., 2002) to more fragmented relationships with a myopic focus on cost and short term goal attainment (Thomas et al., 2002) by the 19th century. This resulted in a loss of openness, trust, respect and the development of long term relationships all of which are essential for the strong cultures necessary for successful projects (ibid).

While change tends to be inevitable, the construction industry has managed to remain steeped century old practices (Babic and Rebolj, 2016). By the late 1980's, Design & Build which was originally intended for simple procurement matured into various design, build and management systems (Constructing Excellence, 2009). The lack of cohesion in the industry, preoccupation with lowest price (Babic and Rebolj, 2016; Osipova, 2015) and increase in levels of claim culture are what eventually led to the commission of the Latham and Egan reports which iterated the need for change in the industry.

The Collaboration angle

With the evolution of roles, clients are conscientious of the need for more collaborative attitudes and values (Eriksson and Westerberg, 2011; Phua and Rowlinson, 2003). This need has been driven by the lack of cooperation found among project stakeholders (Phua and Rowlinson, 2003).

“Collaboration has been defined as a process in which autonomous or semi-autonomous actors interact through formal and informal negotiation jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; it is a process involving shared norms and mutually beneficial interactions” (Thomson et al., 2009).

Collaboration engenders greater involvement of clients in projects and encourages them to procure in a manner that does not alienate stakeholders (Boughzala and De Vreede, 2015; Osipova, 2015). These Obligational Contractual Relations (also known as Bridging) involve forming of strategic partnerships with stakeholders (Sinclair, 2011) by establishing common ground and action (Austen et al., 2008).

In contrast to the traditional antagonism, conflict and disputes, a culture of collaboration, open interaction, trust, commitment, mutual advantage, learning, innovation and productivity is developed with expertise transmitted from project to project (Ankrah et al., 2009).

Collaborative procurement is thus modeled after Stewardship Theory which is a polar opposite of Principal Agent Theory. Collectivist behaviour is the priority and higher value is placed on cooperation of stakeholders (Davis et al., 1997). Relationships are expected to create value, improvement, alignment and implement the most cost effective solution (Constructing Excellence, 2009). Focuses on goal convergence between agent and principal instead of self-interest while using responsibility and autonomy to limit opportunistic behaviour (Snippert et al., 2015).

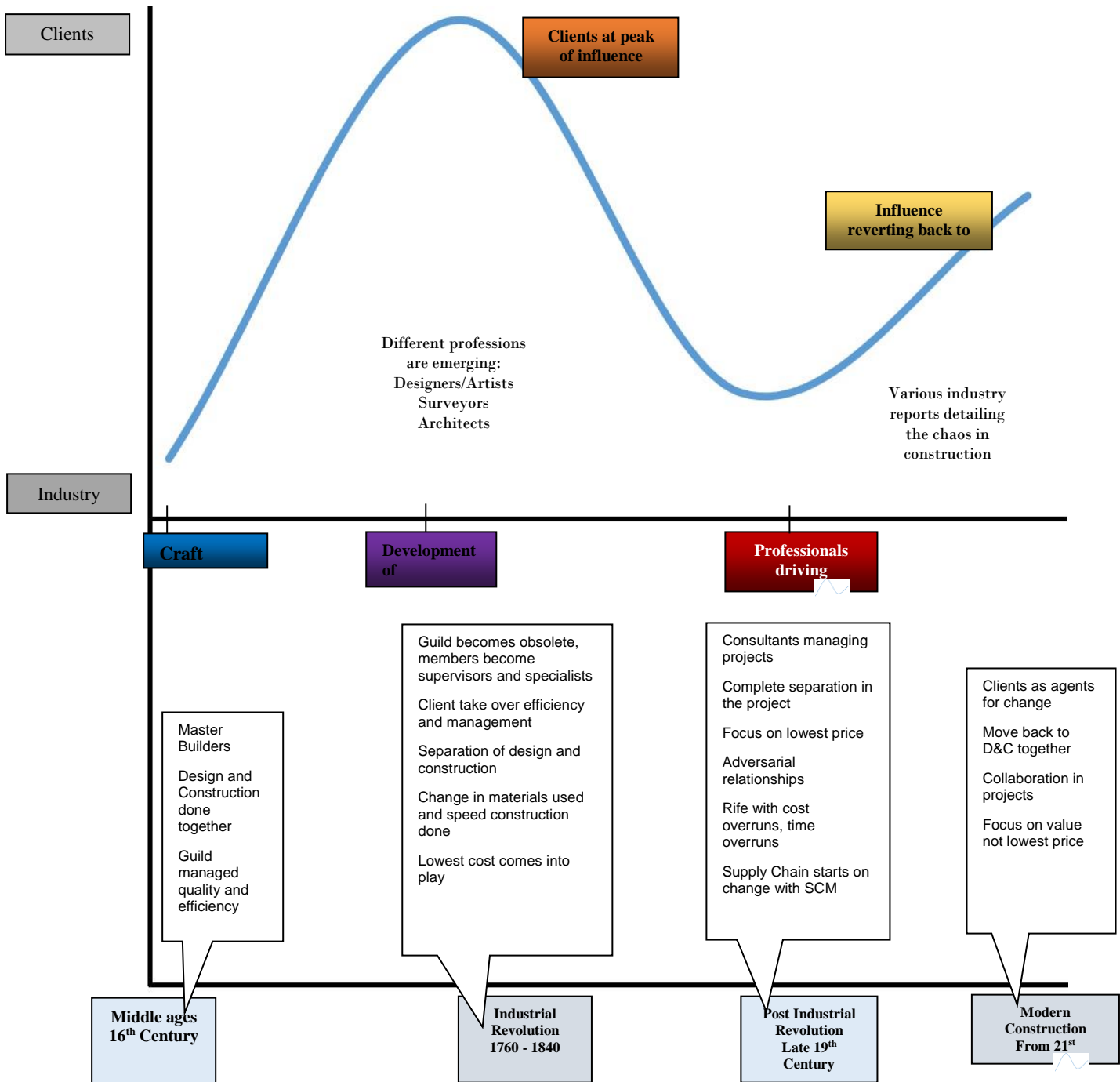


Figure 1: A timeline of construction

While stewardship has its advantages, most principals who want to reduce their risk prefer set governance measures which allow them more control over what the agent is doing (Davis et al., 1997).

This is in contrast to global construction industries that have woken up to the fact that new procurement and risk management procedures when aligned with modern partnering arrangements and integrated delivery schemes can improve project success (Snippert et al., 2015). This emphasises the need for adaptation to the changing landscape in construction (Cheng and Liu, 2007). Some countries have taken specific adaptive steps. From April 2016 the UK has mandated the use of BIM Level 2 for all centrally procured construction projects (NBS, 2016), the USA has mandated use of

ECI for all its highway projects (Pearman, 2006), while Singapore is urging the adoption of progressive procurement methods that integrate the activities of various industry players to achieve synergy and attain productivity breakthrough (Kwan and Ofori, 2001). The previous preoccupation with lowest price is also being replaced with a focus on maximum value (Aapaoja et al., 2013).

IMPLEMENTING CHANGE

Advocacy is widespread for partnering arrangements and integrated delivery systems which include designing and construction especially for high risk projects (Bowles and Morgan, 2016; Holley and Ben Farrow, 2012). They encourage the sharing of risk and create opportunities for shared gains (Bowles and Morgan, 2016; Memon et al., 2015; Nukic and Huemann, 2016; Osipova, 2015).

Lag and resistance to change

In spite of advocacy and the fact that use of collaboration is not new to construction (Bowles and Morgan, 2016; Holley and Ben Farrow, 2012; Memon et al., 2015) change has not been easy in the industry (Thomas et al., 2002). It has a conservative and sometimes laggard approach to new ideas mainly due to its fragmented nature and lack of ability to invest time and money into innovation, research and development (Stephen Barthorpe et al., 2000). Change has historically been met with scepticism, resistance and a reluctance to move away from well-established work practices and procedures (Babic and Rebolj, 2016; Van Marrewijk et al., 2014).

It has been suggested that the industry is subject to historical, industrial and market forces that perpetuate its existing culture and management style (Kwan and Ofori, 2001). These inhibit the industry's ability to initiate change and makes it especially unwilling to invest in technology (ibid).

While some construction professionals may appreciate the changes that have occurred in other industries, they have difficulty envisioning how to harness these advantages to benefit the construction industry (Thomas et al., 2002). The types of relationships in the industry also imply that some professionals could be happy with the current status quo and not willing to lose out on their advantage in the industry.

Need for in-depth change

Where change has been accomplished it has focused on the use of various tools and techniques. While these are great to utilise they do not produce a change in attitudes from industry stakeholders; they simply enable stakeholders to change practices.

Nummelin asserts that change should not merely encompass adoption of new systems and methods; it should include changing underlying assumptions and values which in essence implies a change in organisational culture (Nummelin, 2006). Höök and Stehn refer to this as a focus on the mind (Höök and Stehn, 2008). In their study on knowledge management, Fong and Kwok found that besides utilising new technologies, there is a need for understanding and integration of human aspects as well as determination of the right culture to operate (Patrick S. W. Fong and Kwok, 2009). The clear implications are that transformation has to go deeper than using particular tools and techniques. Instead of changing only practices, behaviour, attitudes and values also need reassessment (Ankrah et al., 2009). Changing culture is a means of internalising and entrenching change (Babic and Rebolj, 2016). A more robust conception of culture is necessary for change in the industry to be understood and responded to appropriately (Stephen Barthorpe et al., 2000)

The issue of culture

Culture has no single definition (Stephen Barthorpe et al., 2000). In Stuart Hall's simplistic terms it is the practices which characterise a particular society (Billington et al., 1991, p. 28). There is consensus though on culture being the shared values and basic assumptions of an organisation that are manifested in organisational practices (Ankrah et al., 2009). Culture is so powerful it can actually prove to be a barrier to productivity if it is not adaptive and congruent with organisational structures and the prevailing environment (Zhang and Liu, 2006).

According to Abeysekera, within construction, culture is considered to be about the characteristics of the industry, approaches to construction, competencies of those working in the industry and the strategies, goals and values of the organisations in which they work (Ankrah et al., 2009). The issue of culture has gained importance because of internationalization of construction markets and the fragmented nature of the industry (Ela Oney-Yazıcı et al., 2007)

Industries tend to have a dominant culture. This dominant culture implies that there is a driving force behind it (Billington et al., 1991). T.S. Eliot and Althusser recognised the existence of an elite class in every culture who have special knowledge and skills within a class society (ibid).

Figure 1 points to the presence of an elite class that has evolved over time within the construction industry. Just as the craft guild eventually gave way to industry specialists, in this modern age clients are taking on a dominant, expert role by becoming better informed and involved in construction projects.

CHANGING PRACTICE VS. CULTURE

When conceptualising change, the focus has been on changing practices. Though practices are a part of culture, a synergy exists between them such that changing one without the other short changes the change process.

Drivers of Practice and Culture

It is important to note that an organisation's norms and values play a critical role in the strategy of the firm meaning a match is needed between culture and strategy (Hartmann, 2006). While culture is manifested in practices (Cheung et al., 2012), practices too can influence culture (Ankrah et al., 2009). This is emphasised by the fact that success in an organisation is a result of the successful translation of values and beliefs into policies and practices (Cheung et al., 2012).

Culture dictates the way an organisation responds to environmental stimuli (Yong and Pheng, 2008). While it is influenced by working practices (Höök and Stehn, 2008) it is also a reflection of practices and basic values (Yong and Pheng, 2008).

As shown by Figure 2 below, the practices influence the working culture, which in turn determines the practices in the organisation. As a culture becomes entrenched, the organisation uses practices that are consistent with the existing culture (Yong and Pheng, 2008). Problems occur when after practices change, the culture is so ingrained it fails to adequately respond to the change (Babic and Rebolj, 2016; Brinkman et al., 2015). The end result is an ineffective change.



Figure 2: Synergy between Culture and Practices

The need for both Practice and Culture change

Trying to solve all problems using new tools and techniques is unlikely to address the underlying culture issues. It has been established that when practices change, the underlying behaviour behind those practices also needs to change; in essence there needs to be a corresponding culture change (Cheung et al., 2012). It is not that a particular cultural orientation is inherently wrong, it may simply not be conducive for overall implementation of collaborative practices (Yong and Pheng, 2008). Strategies for facilitating more rapid improvements can also be developed by consciously attempting to simultaneously shape the cultural profile (Riley and Clare-Brown, 2001). The practiced organisational culture may need to be changed so that attitudes and expectations within the organisation are in line with new philosophies (ibid).

Culture modification takes time so it may be prudent to implement practices in line with emergent culture (Yong and Pheng, 2008) so as not to rush the process and allow enough time for the necessary changes in both behaviour and culture to occur (Baiden et al., 2006).

CLIENTS AS AGENTS OF CHANGE

Latham's report back in 1994 stressed the need for change with clients being in the best position to implement it (Latham, 1994). The client's pivotal position is shown by the fact that motivation for quality improvement in construction has come from two sources; client dissatisfaction and government action (Thomas et al., 2002). This implies that the client has always potentially been a driving force of change.

Clients are essential because the manner in which they procure affects the degree of integration and cooperation among project participants (ibid). Where industry professionals are depicted as being at the helm of procurement separation, clients have been hailed as bridging the divide between various stakeholders by advocating cordial and long term relationships (Brinkman et al., 2015; Ling et al., 2015; Memon et al., 2015). Their emphasis on teamwork and cooperation has also brought the design and construction back together.

Client motivated change has occurred in two ways. In most scenarios, government as a client has imposed change on the industry such that there are particular credentials necessary in order to qualify for public projects (Babic and Rebolj, 2016). In other scenarios, clients in the private sector take it on themselves to insist on a particular manner of behaviour and procurement and impose it for their projects (Memon et al., 2015; Osipova, 2015; Van Marrewijk et al., 2014). These are referred to as the top down approach and the bottom up approach respectively.

Public Sector for change (The Top-Down approach)

Change in construction has traditionally focused on a top-down tool approach (Höök and Stehn, 2008) which is reflective of government intervention.

Various studies have been commissioned to determine how to improve the state of the construction industry. These reports suggested the implementation of procurement practices that are more collaborative with an emphasis on team integration, long term relationships and a move away from lowest price tendering in order to improve the industry's success statistics (Bowles and Morgan, 2016; Van Marrewijk et al., 2014).

Table 1 – Various industry reports

| Country | Report | Focus |
|-------------|----------------------------------------------------|----------------------------------------------------------------------------|
| UK | Constructing the Team Rethinking Construction | Value procurement, partnering, NEC, better relationships |
| Hong Kong | Tang Report | Focus on partnering, alliancing and NEC |
| New Zealand | Valuing the Role of Construction in the NZ Economy | Value procurement, PPPs and Alliancing |
| Singapore | Construction 21 | Value procurement, skills enhancement, integrated approach to construction |

Source: C21 Committee, 1999; CIRC, 2001; Egan, 1998; Latham, 1994; PWC, 2016

This practice/tool driven approach has imposed change on the industry such that they take on particular practices in order to win public contracts but ultimately values and attitudes remain the same. Given a choice it is likely some stakeholders would work the way they have always worked and given the opportunity they revert back to what they know best (Babic and Rebolj, 2016; Van Marrewijk et al., 2014). It cannot be emphasised enough how a corresponding change in culture is necessary for practices to change effectively (Challender et al., 2013) especially since strategy and culture are symbiotic (Undercurrent, 2012).

Private Sector for Change (The Bottom-Up approach)

When private, expert clients impose their collaborative culture on the industry they can influence all stakeholders to work in a different way. This can produce a ripple effect especially when multiple projects are worked on by the same stakeholders.

To enable this shift to collaborative behaviour, a conducive culture has to be in place (Cheung et al., 2011). Collaboration needs to be considered an important part of each project with emphasis placed on team culture and fostering right attitudes (Bresnen and Marshall, 2000). The stronger the collaborative climate the better any cooperative procedures will be performed (Eriksson and Westerberg, 2011). An examination of most organisational values is likely to have a collaborative tone. Relying on industry specialists has eroded these values to an extent as they have had to adapt to the construction industry environment in order to allow them to get work done in the industry. Reverting back to original values and culture fosters the collaborative climate necessary for change.

Culture is said to gain from the process of friction with other cultures and by class conflicts (Billington et al., 1991, p. 11). As expert clients find their cultures at odds with the culture displayed by the industry they are clamouring for change and distancing themselves from the rampant traditional practices in industry. Clients while

changing practices also have the added advantage of addressing individual behaviours, attitudes and values which are critical for the success of change (ACRCCI, 2001; Challender et al., 2013).

Envisioned change needs to pervade the entire organisation with senior management leading (Bresnen and Marshall, 2000). Where change focuses simply on individual projects, problems come up when project culture clashes with the wider organisational values and norms thus diffusion of appropriate norms and values is required organisation wide (ibid).

When change has been accomplished culture needs to be progressive, adaptive and enduring so it can be a foundation for efficiency (Cheung et al., 2011). A strong culture is able to adapt to any changes in the environment. With progress, changes are inevitable and as the construction climate evolves, the culture needs to be able to change accordingly so that organisations and the industry can run at maximum efficiency. Effective collaboration is then realised through implemented changes that are enduring and continually improved on (ibid).

CONCLUSIONS

Change in any organisation or industry runs the risk of not being effective or even permanent. The construction industry is lagging several decades behind other industries in terms of change and there is a need to rectify the situation. With a change in the elite class in construction, clients mainly in the form of governments are spearheading change. Their focus has been top down with a focus on tools and techniques which limits the effectiveness of change. A move to an approach that encapsulates government involvement but brings into focus the internalising of change would be more beneficial as culture change would also be incorporated.

Change in the industry has focused on moving to more collaborative working. A conducive environment is necessary to accomplish this and only a simultaneous change in attitudes and values can promote the necessary climate. To effectively change the construction industry especially to a more collaborative environment, a corresponding change in culture is required.

Future studies which would delve into how private clients actually implement their bottom up change are recommended. It would also be prudent to determine how government mandated change can provide a more holistic approach by also incorporating culture change within their organisations that has the ability to further influence the construction industry.

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