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)
Fidelis Emuze (International Coordinator: CIB TG59)
Mariana Botes (Administration – Mandela Uni.)
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.

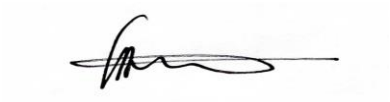
The conference was also hosted on the web through:
http://www.cut.ac.za/cidb-postgrad-conf/

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,



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:

Emmanuel Aboagye-Nimo	University of Brighton, United Kingdom
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HOSTS

Department of Construction Management

NELSON MANDELA UNIVERSITY

Department of Built Environment

Table of Contents

CONCEPTUALIZATION OF COLLABORATION AND LONG-TERM RELATIONSHIPS

Calistus Ayegba[1], Xebiso B. Kamudyariwa[2] and David Root[3]

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There is increasing shift from traditional contracting practices to collaboration and long-term relationships (CLR) contracts in the construction industry. The purpose of this paper is to examine dimensions of CLR practices from a construction perspective. The research methodology employed is based on desk research. This involves the collection of secondary data on CLR practices. Nvivo Pro 2011 software was used to aid analysis of the multiple articles. The result indicates that top management commitment, willingness to learn and support the parties, mutual trust, complete integration of project team members, efficient and open communication are some of the requirements for CLR. Also, the procurement strategies that internalize CLR practices in construction are reported to be framework contracts, partnership and alliance contracting. However, these approaches are shown to be appropriate for specific kind of clients, suppliers, and projects. Consequently, the selection of parties to go into these procurement strategies for CLR becomes very critical to achieve the benefits that CLR have shown to deliver. This will ensure that scarce resources are only dedicated to relationships and processes that will genuinely benefit and support CLR. The knowledge and understanding provided by the study will be useful in encouraging construction stakeholders to appreciate the need for CLR practices and to embrace CLR approaches.

Keywords: alliancing, collaboration, framework contracts, long-term relationships, and partnerships.

INTRODUCTION

The interest in collaboration and long-term relationships (CLR) arrangement has been one of the concerns of the construction industry in recent years. This may be attributed to the industry response to the failings of the traditional contracting practices as a result of its characteristics as shown in table 1. Thus, a shift away from the traditional contracting practices to CLR contracts is advocated for the construction industry. The dominant reference for this change is the Latham (1994) "constructing the team" and Egan (1998) "rethinking construction" construction industry reports. These reports suggested a change in culture and a move towards teamwork, collaboration, and supply chain management of projects. As a result, there has been growing adoption of strategies that forms a fertile opportunity for CLR in construction. Hence, several studies exist on CLR arrangements by researchers in construction and project management studies. Some of these studies used the compound word “long-term collaborative” relationships to imply CLR (Donohoe and Coggins 2016; Kumar et al. 2016; Wang et al. 2016; Chang et al. 2015; Challender et al. 2014; Meng 2013; Ylitalo et al. 2005).

CLR practices are gaining more adoption in the construction industry globally, owing to their success in manufacturing and service sectors in which the strategies are seen as a vehicle to maximize value, levels of quality and service delivery (Khalfan et al. 2014; Meng 2013; Frödell 2011; Naoum 2003; Saad et al. 2002). The approach has shown to be mutually beneficial to both clients and contractors when adopted for project delivery. However, some

clients do not see it as a promising strategy particularly during economic meltdown and recessions (Donohoe and Coggins 2016; Challender et al. 2014; Meng 2013). Also, Sanchez (2012) and Saad et al. (2002) reported that the CLR approaches requires a longer time, more effort, resources and commitment to develop. Also, due to power dynamics resulting from the dominance of some clients in the approach, some contractors do not embrace the approach in contract relationships (Rinkus et al. 2016; Chicksand 2015). Furthermore, issues around contractors becoming complacent, and the inability to prosecute rights under such contracts have been raised (Palaneeswaran et al. 2003; Black, Akintoye, and Fitzgerald 2000). These issues, suggests a limited understanding of the concept of CLR practices and a tendency to view such strategies through the lens of traditional procurement practices. Therefore, this paper will strive to create better understanding on the issue by examining the requirements and practices of CLR in construction, as well as the strategies that harness CLR in the construction industry and suggest that a reconceptualization is required to rebase the premise of these strategies.

Table 1 Characteristics of Traditional contracting practices

Authors	paper title	Source title	Characteristics
Akintan and Morledge 2013	Improving the collaboration between main contractors and subcontractors within traditional construction procurement	Journal of Construction Engineering	Main contractors and subcontractors pursue their self-interests. Mostly preferred by one-off clients. Engenders adversarial attitudes. Prone to conflicts and disputes. Lack of focus on customers' requirements, and failure to satisfy clients' needs are prevalent. Delivery processes are still mostly disconnected. Contract terms are often so strictly and litigiously applied.
Challender et al. 2013	Collaborative Procurement: An Exploration of Practice and Trust in Times of Austerity	ARCOM Conference Proceedings	Short-term contracts. The constant quest for the lowest initial bid price. Open and competitive traditional bidding.
Challender et al. 2014	Partnering in practice: an analysis of collaboration and trust	Proceedings of the Institution of Civil Engineers-Management, Procurement and Law	Competitive procurement methods based on lowest cost. Risk-averse work practices. This is limiting the scope for knowledge sharing across projects. Hampering familiarization and learning from experiences. Reducing innovation and investment within the sector.

Rowlinson and Cheung 2004	A review of the Concepts and Definitions of the Various Forms of Relational Contracting.	International Symposium of CIB	Adversarial in nature. Contractors have being selected mainly by lowest price. Superintendents see their role as gatekeepers, safeguarding the client's interest.
Khalfan et al. 2007	Building trust in construction projects	Supply Chain Management: An International Journal	Rigid flow of communication. Adversarial approach to construction projects.
Lloyd-walker et al. 2014	Enabling construction innovation: the role of a no-blame culture as a collaboration behavioral driver in project alliances	Construction Management and Economics	Tend to be risk averse. Characterized by blame and litigation. Designers have the most power and influence Require each participant to look after their own organization's interest. Involves pursuing a 'claims mentality.
Palaneeswaran et al. 2003	Curing congenital construction industry disorders through relationally integrated supply chains	Building and Environment	Transactional' contracting approach. Fragmented and disjointed transactions and processes. Short-term visions. Adversarial relationships. Unhealthy competition. Purely price-based selections. Incomplete contracts. Numerous change orders and claims. Improper risk-shedding tactics. Disputes and breaches of contract leading to litigation. Client's acts as 'watchdog' with control measures (such as warning letters and penalties).
Spekman 1998	Strategic supplier selection: understanding long-term buyer relationships	Business Horizons	Clients rely on a large number of suppliers to gain price concessions. Clients assume an arms-length posture. Use of only short-term contracts.
Suprapto et al. 2015	Sorting out the essence of	International Journal of Project	Confrontational interactions between owner and contractor.

	owner-contractor collaboration in capital project delivery	Management	Too much emphasis on formal mechanisms (i.e., contracts, tools, and techniques).

RESEARCH METHODOLOGY

The research methodology employed to address the aim of the study is based on desk research of publications on CLR. First, to gather relevant publications to obtain data for the study, a bibliographic survey was conducted via Scopus using the string words "collaboration" and long-term relationship. The choice of Scopus database is because the database is the largest abstract and citation database of peer-reviewed literature, consisting of scientific journals, books, and conference proceedings across various disciplines. Searching within the title, "key-words and abstract" of Scopus database indicates a total of 749 document results on this topic from 69 countries since 1970 across several subject areas with most of the documents (up to 90%) being published after the year 2000. However, papers which are not strongly related to the field of interest of this study and construction such as publications on medical and natural sciences subjects were excluded in the search. Also, on downloading some documents, other close related articles to the topic articles were identified by the search engine and were also downloaded for the study. The final numbers of articles reviewed in the study are 96.

The collected articles were then imported into Nvivo Pro 2011 software, to quickly identify prominent words and phrases, as well as key concepts across the multiple articles. In the Nvivo software, the word frequency query was carried out using 50 most frequent display words, with stemmed words settings, and then the word cloud tab to identify the keywords from all the text. This enables exploration of trends and ideas that are prevalent in the articles and identification of what authors are frequently writing about collaboration and long-term relationships. The result indicates several themes in the research area (collaboration and long-term relationships). However, the theme of interest in this study is the requirements and practices/process of CLR. So from the several themes on the word cloud, a text search query was carried on the requirements and practice themes. This was followed by clicking the reference tab upon which list of articles with a bit of context appears respectively. Nodes were created for these themes, and significant reports from each author were coded and saved into the nodes (A Node is a bucket in which related materials are gathered into one place so that one can easily look for emerging patterns or ideas). Also, nodes were created for other relevant aspects of the study such as framework contracts, partnerships and alliance contracting that was indicated as the practices that internalize collaboration and long-term relationships in construction from the analysis. Within the nodes, other sub-nodes that were established in the study were definitions and description of key concepts, benefits, requirements, and challenges. All relevant text was coded into the nodes and sub-nodes, and aspects that are of interest and essential to the study was then integrated into the study.

COLLABORATION

Collaboration is defined as a mutually beneficial and well-defined relationship between two or more organizations working together to achieve common goals (Mattessich and Monsey 1992). Wilkinson (2005) defines collaboration as a creative process undertaken by two or more interested organizations, sharing their collective skills, expertise, understanding and knowledge in an atmosphere of openness, honesty, trust and mutual respect, to jointly deliver the best solution that meets their common goal. According to Saunders et al. (2012)

Collaboration means building a democratic approach to communication and decision making when constructing, planning, taking and evaluating each action research stage or cycle. The rationale for collaboration is for a party to find more resources, for the other to gain access to new technology domains, and for both parties to learn and enhance their business because of the relationship (Ylitalo et al. 2005). Gadde and Snehota (2000) suggested that collaboration is a function of the volume of business for the buying organization. As it is a more appropriate relationship to adopt when a supplier relationship represents a major volume of business for the buyer, and conversely, if the transaction size or volume of business is low, an arm's length relationship may be suitable (ibid).

The factors that encourage collaboration between two or more organizations when working together are indicated to include: top management commitment, mutual and shared understanding about the goals of cooperation. Others are the willingness to learn from and to support the partner, mutual trust, complete integration, effective communication, risk and reward sharing, clear definition of responsibilities (Cha and Kim 2016; Meng 2013; Anbanandam et al. 2011; Ylitalo et al. 2005). It is found to be a suitable means of nurturing relationships among contracting parties, achieving better project performance and higher end-user satisfaction (Ning and Ling 2013).

Collaboration has been indicated to have the benefit of maximising efficiency, improve profitability, reduce waste, contribute to more valuable relationships and enables benchmarking current levels of practice against the best-in-class performers (Cha and Kim 2016; Shepherd and Gunter 2006; Greenbaum 2004) It creates a free and open environment where the aim is to learn from each other and employees can air their views without hesitation and gives access to unique capabilities and resources to all involved (Soosay et al. 2008; Squire et al. 2006). These benefits may not be available in the traditional practices of arm’s length relationship where parties act in self-interest without any special obligation to the other party. Mattessich and Monsey (1992) submit that with collaboration, individual expenses can be reduced in planning, research, training, and other development activities in the early stage of a new initiative. Also, they suggested that through collaboration, overhead expenses are shared, and duplication of cost and effort is avoided. Glover (2008) submits that such an arrangement is designed to encourage a certain degree of sharing of information; therefore, it is necessary for parties to be open and honest to each other in such relationships. Thus, a collaborative working arrangement is seen as a key to improved efficiency and enhanced innovation in construction (Kadefors et al. 2007). Li et al. (2012) submit that with a collaborative working arrangement, there is a higher chance of buyers achieving greater success with suppliers and it should be the right strategy for major contracts if an element of challenge, competition and value are retained in such relationship. Collaborative working arrangements are also reported to reduce project costs and secure operational efficiencies (Tennant and Fernie, 2010). This is because of the opportunity to share costs collaboratively.

However, Lawson et al. (2006) submit that although collaboration improves performance, it costs money in terms of coordination, communication, adaptation, and commitment to achieve it. This may hinder its adoption in times of austerity. Also, the pursuit of self-interest and element of power dynamics in situations where clients engage for collaboration while retaining authority and responsibility makes collaborative working impossible to achieve (Akintan and Morledge 2013; Sanchez 2012). Therefore, clients must genuinely open up a conversation and empower people to collaborate with one another while retaining the direction and greater effort is required in negotiating the interests of various stakeholders in collaboration (Sanchez 2012). Nevertheless, even though the collaborative arrangement is not without risks, the gain is argued to exceed the potential risks (Spekman 1988).

LONG-TERM RELATIONSHIPS

A long-term relationship also referred to as strategic relationship is a relationship that requires long-term commitment upon which series of projects can be delivered over a specified number of years (Filippetti and D'Ippolito 2016; Jones and Kaluarachchi 2007). Such relationships allow for firms to internalize the value of knowledge generated across organizational boundaries over time (Filippetti and D'Ippolito 2016). This contrasts with the traditional practices of short-termism and discrete contracts where new supply chain arrangements must be established for every project. Long-term relationships are suggested to be suitable for projects involving repeat clients where the continuity of work from the client stabilizes the relationship, when suppliers supply scarce or high-value products and where the complexity of the supply market is high, and where the product is of great importance to the clients (Meng 2013; Spekman et al. 1998 and Kraljic 1983).

Long-term relationships have several reported benefits from previous studies, for example, Cadden et al. (2015) submit that parties in a long-term relationship can review the credibility of one another, reward truth-telling, punish otherwise, and therefore provides the right incentive for truthful information sharing. Other studies indicate the benefits of long-term relationships to include the following: it offers stable business relationships resulting from the continuity of works, allow for aligning specific objectives between parties, it enables the development of a particular way of working that adds value to production, and creates an atmosphere of trust and commitment. Others benefits are: it ensure the provision of technological and managerial assistance and exchange of information during product development and production stages (Filippetti and D'Ippolito 2016; Meng 2013). Also, long-term relationships increase the level of cooperation in terms of coordination, participation and joint problem solving (Mohr and Spekman 1994).

Different industries have adopted the long-term relationship approach in delivering projects. Fujimoto (1999) asserted that in the automotive industry some clients prefer to deal with suppliers on a long-term basis. Khalfan et al. (2007) suggested that the approached can be used for delivering school building and maintenance, social housing stock improvement projects and the likes of local authorities in the UK. Meng (2013) reported a wider acceptance of the approach in the UK for school building projects as 33.3% of school building projects were said to have adopted the long-term relationship approach. However, they reported short-term, project-specific approach as practiced in traditional contracting are initial employed when dealing with a contractor for the first time to establish suitability for a long-term relationship. A similar practice was reported in a study on 'innovative construction procurement at Wits University (Laryea and Watermeyer 2014). This could be an expensive and high-risk selection mechanism to practice, but it indicates that a good performance from the first work by a supplier provides the foundation for going into long-term relationships. Ellram and Martha (1990) argued that paying more attention to supplier's development potential and future plans are an essential consideration for a long-term relationship. Nevertheless, trust and openness between clients and suppliers that enable mutual learning and competency development are the significant factors that have a positive effect on the long-term orientation of the relationships (Filippetti and D'Ippolito 2016; Bäck and Kohtamäki 2015; Anbanandam et al. 2011; Ylitalo et al. 2005).

Table 2 Requirements for Collaboration and Long-term Relationships

Authors	Requirements
Sanchez 2012	Having shared goals. Being involved in the process. Having open lines of communication. Directed engagement.
Saad, Jones, and James 2002	Ability to create, manage and reshape relationships. Continuous learning. Commitment from top management
Babaeian Jelodar, Yiu, and Wilkinson 2016	Attributes such as trust. Commitment. Teamwork. Open communication. Common goals between partners. Fair balance of risks and rewards. Consistent objectives. Mutually. Clear understanding of roles and responsibilities. Clear contract. Clear decision-making mechanism.
Bäck and Kohtamäki 2015	Facilitated by trust. Competence and accumulated experience.
Chang et al. 2015	Social exchange behaviour. Detail information. Respect between Parties. Flexibility. Mutuality. Solidarity.
Ylitalo et al. 2005	Openness. High level of trust.
Meng 2013	Continuity of work. Long-term program.
Mattessich and Monsey 1992	Legislation and funding to promote collaboration. Educating potential collaborators.

	Required resources of its members. Being knowledgeable. Previous experience. Participatory policy development style. Ability to take risks.
Frödell 2011	Willingness and capability for collaboration. Aligned core values. Parties to be approachable, honest and responsive. Total cost focus Knowledge along with delivery precision Trust. Long-term orientation.
Suprapto et al. 2015	Commitment. Cooperation. Connectedness of owner and contractor striving for a common goal. Team-working. Relational attitudes. Capability. Team integration.
Challender, Farrell, and Sherratt 2013	Trust. Change in mind-set. Commitment of participants. Greater coordination. Sufficient time to nurture relationship. Long-term vision.
kadefors, Björlingson, and Karlsson 2007	Trust Commitment Team working
Li, Cheng, and Love 2000	Scheduled meetings Cost control measures Litigation avoidance Satisfaction of all parties Good technical performance
Wang et al. 2016	Mutual trust

	Commitment Solidarity between the buyer and supplier

Table 3 Collaboration and Long-term Relationship Practices

Author(s) & Year	Practices
Sanchez 2012	Interactive meetings to talk about, review, and revise norms and to help each other learn to respect and abide by the norms.
	Practice respect, equality, direct and intentional communication and feedback, and transparency.
	Employees are made responsible for the good of the organization.
	The organization must be respectful of individual needs and diversity.
	Subsidiary corporations must act for the good of the entire organization in mind
	Empowering subsidiary corporations to make decisions in their own best interest
	Involving those affected by a decision or change. involving the subsidiary corporations in planning, problem-solving, and decision-making
	Based in part on the importance people place on belonging to part of a larger community.
	Each subsidiary sees itself as part of the larger organization. This sense of organization-as-community engenders a desire for shared success and unity.
	Sincerely soliciting feedback
	Participants expressed a genuine sense of pride and joy about opportunities to help one another.
Saad, Jones, and James 2002	Involves some stages including the need to innovate, knowledge awareness, evaluation of alternative innovations, planning, and implementation.
	Top management commitment.
	Agreeing on mutual objectives.
	Making decisions openly and resolving problems in a way that was jointly agreed at the beginning of the project.
	Aiming to achieve measurable improvements in performance through incentives.
	Promoting collaboration through leadership, facilitation, training, and incentives.
	Replace short-term contractually driven project-by-project adversarial relationships with long-term, multiple-project

Author(s) & Year	Practices
	relationships based on trust and co-operation.
	Restructuring and integration of project processes and supply networks with fewer strategic supplier partners.
Black, Akintoye, and Fitzgerald 2000	Frequent communication, both formally and informally.
	Co-operative attitudes.
	Trust between the parties.
	A Win-win approach to negotiation.
	Open sharing of information.
	Multi-disciplinary involvement.
	Both the buyer and supplier are highly dependent on each other.
Lavikka, Smeds, and Jaatinen 2015	Co-located working.
	Collaborative decision-making in inter-organizational meetings.
	A liaison role.
	Shared project goals.
Frödell 2011	Importance of sticking to the agreements even if the supplier's competitors are dropping their prices
	Give the service suppliers the right prerequisites when they are involved in a project because they base their pricing on them.
	For the supplier to be able to plan and forecast, the contractor needs to invite the supplier earlier in the design phase of the project and also strive to keep to the predetermined schedule since suppliers use it to plan their work.
	Core values: Personnel are approachable, honest and responsive.
	Treating suppliers fairly, to avoid suppliers getting tired of us and bad reputation.
Palaneeswaran et al. 2003	Certain approaches introduced some incentives (e.g., awards, bonuses) as motivators for good performance.
	Each alliance partner has a higher 'stake' in the project, which leads to stronger commitments and closer bonds.
	Checks are installed to avoid abuse and misuse of such relationships. This may be done through contractual safeguards that need not be dismantled in the 'binding forces'
Lloyd-walker, Mills, and Walker 2014	Inclusive decision-making
	Members jointly work to deliver project outcomes
	Joint member sharing of all project risks in a no-disputes and no-blame environment where unanimous decision-making takes place
	Provides no formal process for legal action except in the case of

Author(s) & Year	Practices
	willful default.
	Signatories work together in good faith, acting with integrity and making best-for-project decisions.
	The incentivization contract ensures that the financial reward and penalty provisions drive motivation.
	Pools its insurances by negotiating an alliance insurance agreement rather than separate insurance requirements, reinforcing unity of purpose.
	The TOC established early in the alliance selection phase of the project, represents fair and reasonable expected end costs.
	The details of budgets and all design and delivery assumptions are openly and transparently discussed for full understanding during initial post-alliance TOC agreement workshops.
	Innovation mainly achieves potential gainsharing from the incentivization contract leg, and so this arrangement encourages and facilitates innovation.
	Encourage a trade-off of the normal rights to sue parties that do not perform to expectation such that they may inhibit parties achieving their KPIs.
	Consensus behaviors turn power and communication imbalances to symmetrical input mechanisms that allow consensus about a solution to emerge,
	Cost control is monitored through adherence to KPIs and an open-book approach to probity and auditing.
	A no-blame culture develops from these features.
	The transparency and open-book approach lower fears that any party can ‘cheat' the system.
	Mutual dependency binds participants closely together because the incentive contract rewards project, not individual party performance.
	All strive for best-for project with an understanding that this involves trying new approaches and recalibrating efforts pragmatically when better understanding of the context requires plans to be changed.
Anbanandam, Banwet, and Shankar 2011	Top management commitment.
	Information sharing.
	Trust among supply chain partners.
	Long-term involvement.
	Risk and reward sharing.
Cadden et al. 2015	Espousing characteristics of trust, cooperation, and information

Author(s) & Year	Practices
	sharing.
	Working closely together through cross-functional teams and joint away-days, both at operational level and strategic management level from the relationship creation.
	Behavioral change about how firms deal with each other in respect of pricing strategies and service level agreements are vital.
Suprapto et al. 2015	Joint working.
	Open and effective communication.
	Clear and fair risk allocation.
	Regular performance measurement.
	No-blame culture.
	Quality defects can be reduced through effective problem-solving mechanisms.
Spekman 1988	Both parties have the power to shape its nature and future direction over time.
	Mutual commitment to the future.
	Balanced power relationship is essential to the process.
	Mutual trust nurtures commitment.
	Open communication.
	Both the buyer and the seller must invest in the relationship.
	Represent a complex web of the less tangible issues of trust, openness, and commitment.

The requirements for CLR as well as the CLR practices from the desk research conducted are shown in Table 2 and Table 3 respectively. From these tables, CLR requirements and practices are indicated to focus on creating the enabling environment that optimizes the ability of project team members to work together efficiently and collaboratively. Thus, building long-term business relationships through which series of projects can be delivered successfully without litigation. This is a fundamentally different situation from what is sought in the traditional contracting practice of one-tender per project approach. In which client enters into a contractual agreement and assembles a separate supply chain for each project with short-term relationships and the subsequent concentration of knowledge within the design team only (Ruparathna and Hewage 2013; Watermeyer 2012; Sinclair 2011). Such practice is said to often result in significant opportunities for claims and inappropriate risk avoidance, and the consequence adversarial relationship and litigation processes (ibid)

The contracting strategies reported to internalize and provide opportunity for collaboration and long-term relationships in construction are partnering, alliance contracting and framework contracts (Babaeian Jelodar et al. 2016; Suprapto et al. 2015; Lloyd-walker et al. 2014; Challender et al. 2014; Mouzas and Blois 2013; Watermeyer 2013; Cheung 2011; Palaneeswaran et al. 2003;). These strategies are further discussed below.

Partnership

A partnership is one of the construction procurement strategies that harness collaboration and long-term relationship practices. Gale (2013) argues that the earliest form of collaboration is through partnering arrangements between parties and several studies described long-term relationships as the bases of partnership (Meng 2013; Ambrose et al. 2010; Naoum 2003). Never the less partnership can also be for a short-term relationship when it is based on a single project (Gadde and Dubois 2010). Lambert et al. (1996) defined partnership as a "tailored business relationship based upon mutual trust, openness, shared risk, and shared rewards that yield a competitive advantage, resulting in business performance greater than would be achieved by the firms individually" The UK National Economic Development Council defines partnership as a long-term commitment between two or more specific organizations for achieving specific business objectives by maximizing the effectiveness of each participant's resources. The Associated General Contractors of America (1991) described partnership as a way of achieving an optimum relationship between a client and a contractor. However, Cheung et al. (2003) described partnership as not a contract but an attempt to establish non-adversarial working relationships among project participants through mutual commitment and open communication.

Several benefits of partnerships are indicated in the literature. Gadde and Dubois (2010) reported the potential benefits of partnership to include increased productivity, reduced costs, reduced project times, improved quality, improved client satisfaction and greater stability. In a study examining the potential of partnering principles for subcontractor selection and improvements in overall project outcomes, by interviewing 20 successful and unsuccessful subcontractors, Kumaraswamy and Matthews (2000) revealed that partnership approach produces at least 10% cost reduction in the tender price and increase in the cost, time and quality performances in the project. Similarly, Bennet and Jayes (1998) examined the financial benefits of partnership and submits that partnership approach can achieve savings up to about 10% of total costs. Other benefits of partnership approach include improved relationships among contracting parties, cost effectiveness, work efficiency, opportunities for innovation, equitable risk sharing, and less confrontation (Cheung et al. 2003; Naoum 2003 Black et al.1999). However, the RICS (2005) argues that most study on partnership focus on success rather than failure is said to pose an unbalanced view and bias impression in terms of the contribution that partnering and collaborative procurement has had within the construction industry, and therefore raised questions around reliability. Also, Morgan (2009) reported that partnering projects are often open to abuse owing to the scale of the commercial interests involved, such that clients may be paying far too much for their products. Cheung et al. (2003) indicate that the non-compromising tendering process, poor perceptions of the partnering process, lack of knowledge and skill to adopt partnering and non-commitment of partnership parties in construction undermines the benefits partnership as shown to deliver.

The reported requirements essential for successful partnerships in the literature are commitment, trust, preparation, understanding, equity, development of mutual goals, inclusion of appropriate parties, continuous joint evaluation, use of project partnering tools and procedures, empowerment of stakeholders, evaluation methodology and willingness to accept mistakes (Ng et al. 2002). Other requirements are mutual objectives, effective communication, continuous improvement, equality, win-win profit-sharing, management commitment, a clear understanding of roles, consistency of objectives, and flexibility to change (Babaeian Jelodar et al. 2016; Chicksand, 2015; Black et al. 1999).

Alliancing

Alliancing together with partnership and framework contracts are the procurement strategies that incorporate collaboration and long-term relationships in construction. Although alliancing is often used interchangeably with the partnership (Ingirige and Sexton 2006), it refers to any arrangement in which the contractual arrangements are designed to stimulate trust by aligning commercial objectives (Broome 2002). In the business literature, alliancing is used to refer to an arrangement between two or more suppliers (not involving buyers or clients) join together to market, manufacture, distribute and sell their product (Ibid). The important difference between alliancing and partnership is that parties shared gains and lost in alliancing while in partnerships, parties may individually gain and suffer lost gains and lost (Challender et al. 2014). Thus, alliancing reflects joint rather than a shared commitment between partners with partner selection based on performance rather than only price (Raisbeck et al. 2010).

Alliancing is argued to have the potentials benefit of providing an environment that maximises collaboration through joint decision making by employing best-for-project and no-blame philosophy (Lloyd-walker et al. 2014).

Although factors that contribute to collaborative working such as trust, mutual understanding, respect, communication, problem solution mechanisms, sharing of the risks and benefits and having a win/win philosophy are attributed to promoting alliancing among parties, a ‘no-blame culture' is indicated to be the key requirement for the success of alliance contracting (Lloyd-walker et al. 2014).

Framework Contracts

A framework contract which may also be referred to as "framework agreement" or "umbrella agreement" (Mouzas and Furmston 2008) is an agreement which is reached between two parties to cover a long-term collaborative arrangement, particularly where clients have a long-term program of work in mind and are looking to set up a process to govern the individual construction or supply packages that may be necessary during the term of the framework (Glover 2008). Mouzas and Blois (2013) describes a framework contract as a manifestation of agreements that defines the fundamental principles upon which companies wish to work together. Framework contracts provide an “umbrella” contract upon which projects are procured at call-off bases contrary to traditional discrete contract practice (Lam and Gale 2014). Watermeyer (2012) remarked that it enables infrastructure clients to procure goods, services and construction works on an instructed basis (call off) over a term without any commitment to the quantum of work instructed and in the absence of a detailed scope of work.

Long-term relationships are submitted as the theoretical basis for the adoption of framework contracts by clients as against the arrangements in discrete contracts (Gale 2013). This is due to the tenure period in framework contracts which provides the opportunity for parties to the project to work together for the period of the framework agreement. Tennant and Fernie, (2010) indicated the period of framework contracts to be for four years with an additional two years' subject to exceptional circumstances. While the ISO 10845-1 (2010) specified a tenure period of three years for a framework agreement after which unsuccessful contractors must wait for the next opportunity to present themselves for selection. It was also indicated that this long-term period of relationship in framework contracts makes the selection of right contractor vital to ensure continuous improvement is achieved within the period.

In describing a framework contract, some authors associated the approach to other construction procurement strategies, for example, Gale (2013) opined that framework

contract approach might have evolved from partnering arrangements. Tennant and Fernie (2010) noted that the approach is analogous to partnering in many ways. However, Tennant and Fernie (2012) describe it as a descendant of the design and build procurement route. This may stem from the characteristics of the approach in providing the opportunity for integration of design and construction through early contractor involvement at the pre-construction stage of projects which has been one of the advantages of the design and build system.

Framework contracts provide the advantage of suppliers reserving capacities for their clients making supplies cheaper and quicker as markup is fixed for the period of the contract (Balcik and Ak, 2014). The approach is also indicated as a tool for improving performance, quality, and long-term relationships (Lam and Gale 2014; MLacoste 2014; Mouzas and Blois 2013). In other words, the framework contract is used to describe an arrangement in which streams of projects can be obtained without the need for a new tendering procedure, under certain agreed conditions. The JCT and Glover (2008) described it to be suitable when clients have a long-term programme of work in mind and are looking to set up a process to govern the individual construction or supply packages. Therefore, Process then must be central to the system as opposed to an ad hoc approach.

Framework contracts are apparently not intended for individual projects. The approach is best suited for repeat clients and may involve several contractors being selected for contracts over an extended period. However, to allow for price competition within a framework agreement, the minimum number of contractors to contract with when it involves more than one contractor is suggested to be three, and there are no maximum number contractors to contract with (Mills and Reeve 2015). However, in practice, it will be difficult to deal with a large number of contractors due to the need to approach each of the contractors for a call-off (ibid). Nevertheless, if framework contracts are not properly implemented, it can be a source of corruption, increases in cost and exclusions (Supply Chain Management 2016).

CONCLUSIONS

This paper creates a better understanding on CLR by examining the requirements and practices of CLR in construction, as well as the strategies that internalize CLR practices in the construction industry based on desk research. CLR was indicated from this review to deliver several benefits to all parties involved. These benefits may not be achievable in the traditional practices of short-termism and arm's length relationships. From the review, the requirements for collaboration are top management commitment, team working spirit, flexibility, solidarity, continuity of work, litigation avoidance, shared understanding about the goals of collaboration, clear definition of responsibilities, willingness to learn from and to support the parties, mutual trust, complete integration of project team members, efficient and open communication, fair risk and reward sharing. While the practices that promote CLR are good performance from the first engagement, potentials for development by parties, future plans of parties to guarantee continuity, interactive and scheduled meetings, respect for one another, a no-blame culture, mutual trust and all parties taking responsibility for the good of the organization. Other practices that promote CLR includes balanced power relationship, parties are approachable, honest and responsive; inclusive decision making and involvement, having a sense of belonging to the larger organization, a win-win approach to negotiation, replacing short-term contractually driven project-by-project adversarial relationships with long-term, multiple-project relationships, and openness between parties.

These requirements are different from what is obtainable in the traditional contracting practices, as traditional approach requires more directive functions, separation of design

activities from construction and the subsequent concentration of knowledge within the design team only, with arms-length relationships. With one-off project practices, relationships are short-term in traditional approaches thereby not accessing the values of long-term relationships. Also from the study, the procurement strategies adopted in the construction industry that internalizes collaboration and long-term relationship practices are framework contracts, partnerships and alliance contracting.

Consequently, the selection of parties to go into these procurement strategies for CLR becomes very critical to achieve the benefits which collaboration and long-term relationships have shown to deliver. Especially as most practitioners on both the contractor and the client sides have been trained and accustomed to the traditional contracting practices. Parties will need to assimilate the requirements and practices that support and promote CLR to ensure that scarce resources are only dedicated to relationships and processes that will genuinely benefit and support CLR.

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