

COLLABORATIVE PRACTICES IN SOUTH AFRICAN CONSTRUCTION PROJECT DELIVERY

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ABSTRACT

Collaborative practices (CP) in recent times have emerged as a significant requirement and a viable approach to overcome the growing changing business environment and adversarial nature of construction supply chain in construction project delivery globally. This is partly due to the propensity of CP for improving performance and enhancing competitiveness by responding to the changing environment in construction. Even though CP has been rigorously pursued in many advanced areas of the construction industry, its implementation and nature of practices required in the South African construction industry (SACI) are relatively unknown. Additionally, there is a lack of consensus among stakeholders and practitioners on the nature of CP to engender the needed performance towards success in infrastructural delivery in South Africa. By adopting a qualitative design using structured interviews with 31 participants and convergence analysis of multiple case studies, the study revealed on site operational governance and the nature of operational structures and integration strategies adopted for supply chain contributors as the main collaborative practices in the SACI. These findings give empirical credence to the nature of collaborative practices necessary in construction project delivery in South Africa and thus offer practical and theoretical implications for the industry.

KEYWORDS: Collaborative practices, Construction supply chain, Construction industry, South Africa.

INTRODUCTION

Despite the widely acknowledged contribution of the construction industry to the national economies of many countries, the sector is plagued with the issues of its fragmented and dynamic nature, coupled with growing adversarial relationships (Gorgenlner, 2011; Morwood *et al.*, 2008; Li *et al.*, 2005; Egan, 2002). Ying *et al.* (2014) and Pryke *et al.* (2014) further revealed that the construction industry is beleaguered by issues related to project performance that emanate from its highly fragmented approach to business. This has resulted in complex contractual relationships between clients and contractors and breakdown of stakeholder relationships (Xue *et al.*, 2005; Pryke *et al.*, 2014). In the opinion of Li *et al.* (2005) and Morwood *et al.* (2008), these challenges frustrate much of the progress achieved in the

improvement of construction practices, thereby resulting in certain management dilemmas regarding securing projects, procuring resources and executing work efficiently.

Literature rates lack of collaborative working and practices in construction supply chain high among many factors that have a significant impact on project performance and delivery success (Li *et al.*, 2005; Morwood *et al.*, 2008; Rahman & Kumaraswamy, 2005; Loosemore, 2014).

The South African construction industry (SACI) has not been spared these developments of project performance and delivery success emanating from a lack of collaborative working and practices among the players in the construction supply chain in project delivery (Emuze & Smallwood, 2012, 2014). However, anecdotal evidence suggests that pursuing collaborative practices, procurement and contracting have remained significant items engaging key stakeholders and professionals in the SACI. In spite of this recognition and evidence of some level of implementation of collaborative practices in the SACI, the stakeholders still do not clearly understand the type and nature of collaborative practices and contracting that are critical to engender the necessary improvement in the delivery of infrastructural projects in South Africa. Additionally, even though CP has been rigorously pursued in many advanced construction industries, its implementation and the nature of practices required in the South African construction industry (SACI) are relatively unknown. Likewise, there is a lack of consensus among stakeholders and practitioners on the nature of CP to engender the necessary performance towards success in infrastructural delivery in South Africa.

It must be reinforced that knowledge and understanding of the type and nature of collaborative practices in the SACI could be considered as a vital resource that can be used to pursue an agenda to stimulate the needed impetus towards significant improvement in collaborative construction supply chain in South Africa. Prompted by the seeming lack of previous studies on collaborative working and practices in construction supply chain focusing on the South African industry, the primary focus of this paper is to delineate the nature and type of collaborative practices and working in the SACI. The significance of the study is underpinned by the theoretical understanding that the findings will offer practical implications for ameliorating emerging social issues which hinder effective team and managerial effectiveness in construction project delivery in South Africa, as espoused by Erdogan *et al.* (2012).

LITERATURE REVIEW

The Concept of Collaborative Working and Practices

Collaborative working (CW) is a term that is often associated with supply chain (see Chunyu, 2013; Davis & Walker, 2009; Pryke, 2012; Davies & Love, 2010; Kvan, 2000). The term CW has succinctly been defined as "...working jointly together of project stakeholders from different organizations to effectively and efficiently accomplish a product..." (Ke *et al.*, 2013; Hauck *et al.*, 2004; Pryke, 2004; Kvan, 2000). From the definition, it can be explained that stakeholders and team participants work jointly with others on project tasks in providing solutions that are satisfying to all parties with shared goals. Being efficient and effective as espoused in the definition, on the other hand, implies that team participants and stakeholders achieve project goals to the maximum satisfaction and the acceptance of all. Kvan (2000) and Rahman and Kumaraswamy (2004) posited that the primary underpinning principle of

collaborative working and practices is collaboration and cooperation, but cooperation is perceived as a simpler concept than cooperation. It can further be argued that the theoretical underpinning of collaborative working and practices lies within the field of interpersonal and organisational behaviour and social dynamics. It can thus further be argued that CW is context driven and that the universality of practices is rarely possible owing to the influence of varying socio-cultural environments (Hauck *et al.*, 2004; Pryke, 2004; Sillars & Kangari, 2004; Beach *et al.*, 2005; Fong & Lung, 2007). Conceptually, CW has been perceived as a sine qua non to team integration and team effectiveness and thus critical towards enhanced project delivery performance, high project benefits and enhanced lasting relationships (Rahman & Kumaraswamy, 2005; Hartmann & Bresnen, 2011; Davis & Love, 2011; Kumar & Banerjee, 2014; Fu *et al.*, 2015).

The Global Perspective of Collaborative Working and Practices in Construction Contracting

Collaborative working and collaborative practice models have gained increasing popularity and acceptance in many developed countries with notable ones being Australia, United Kingdom (UK), Japan, Norway, China, and the United States of America (USA) (Hauck *et al.*, 2004; Hartmann & Bresnen, 2011; Love *et al.*, 2010; Davis & Love, 2011; Ke *et al.*, 2013). The increasing acceptance of CW&P has primarily been attributed to its propensity to deliver superior performance in comparison to traditional models (Song *et al.*, 2009; Bresnen, 2010; Chan *et al.*, 2010; Hartmann & Bresnen, 2011). They are continually evolving in response to changing market conditions (Ke *et al.*, 2015a & b; Chen & Manley, 2014; Davis & Walker, 2009; Kelly, 2011; Mignot, 2012). It is also seen as the response to the expanding business environment in construction due to the emerging trends of economic globalisation and the rapid development of technology (Xue *et al.*, 2010; Hauck *et al.*, 2004; Hartmann & Bresnen, 2011; Love *et al.*, 2010; Song *et al.*, 2009). For the past two decades, there has been an accelerating trend toward major initiatives to improve the performance of the construction industry by focusing on re-engineering construction, lean construction, supply chain management (SCM), constructing the team and rethinking construction, and technological innovations (Egan, 1998; Leiringer, 2006; Xue *et al.*, 2010).

Prompted by the focus on increasing performance and client satisfaction in construction supply chain, there has been increasing acknowledgement of collaborative working and practices as a core of new management paradigms in the construction community. From a critique of extant literature, it can be seen that two primary viewpoints are said to underpin the development of CW&P, namely a working relationship (working model) and delivery systems (operational model) (Kumar & Banerjee, 2014; Chen & Manley, 2014; Xue *et al.*, 2010; Rahman & Kumaraswamy, 2004; Pryke, 2005). From the perspective of working relationships, CW&P takes the form of teamwork, partnerships, project alliances, coalitions, strategic alliances and joint ventures (Xue *et al.*, 2010; Bell, 2003; Pryke, 2005). The primary focus enshrined in these CW&P is towards developing a more integrated team and delivery process with a shared common goal (Chan *et al.*, 2010; Xue *et al.*, 2010; Rahman & Kumaraswamy, 2004; Pryke, 2005). These are expressed in the form of governance structures and practices towards performing effective project management (Xue *et al.*, 2010).

In the dimension of delivery systems, the focus was to enhance reduced interest of everyone involved through the implementation of shared practices that motivate team cohesion, mutual trust, respect, timeliness of shared information and understanding of shared goals (Ke *et al.*, 2015a; Pryke & Pearson, 2006; Hartmann & Bresnen, 2011; Ibbs *et al.*, 2003; Wong *et al.*, 2005).

Collaborative Working and Practice in Construction

According to Emuze and Smallwood (2014) and Kumar and Banerjee (2014), collaborative practice in construction refers to the ability of firms or entities, project teams, and individuals to agree upon mutual goals, decision-making processes and troubleshooting systems while focusing on specific improvements to their normal performance objectives in a project undertaking. Eyaa *et al.* (2010) highlight the key dimensions of collaborative practice as including information sharing, incentive alignment and decision coordination. Anumba *et al.* (2002) outlined four models of collaborative practices that focus on sharing of information and the manner of participation in the project process. These were face-to-face collaboration, asynchronous collaboration, synchronous distributed collaboration and asynchronous distributed collaboration (Anumba *et al.*, 2002).

From this perspective, it is argued that collaborative practices require trust between partners, clearly defined processes and efficient communication infrastructures supported by appropriate technologies (Shelbourn *et al.*, 2012; Wong *et al.*, 2005; Rahman & Kumaraswamy, 2005). However, because of the socio-cultural, political, structural and systemic variabilities and the contextual nature of collaborative working and practices, the direct adoption and integration of these CW&P into the SACI are unlikely to yield the required results. Hence it is important for countries to adapt their CW&P to suit their project environment. From extant literature, the terms collaborative working and collaborative practices have been used interchangeably suggesting no differences (see Kumar & Banerjee, 2014; Chen & Manley, 2014; Xue *et al.*, 2010; Rahman & Kumaraswamy, 2004; Pryke, 2005; Emuze and Smallwood, 2014). Likewise, from the definitions provided in this study, it can further be affirmed that, CP and CW is almost same and thus there is no striking difference. Thus in this study, collaborative practice (CP) was used.

The South African Construction Industry and Collaborative Practices

Even though the South African construction industry has remained an important and significant contributor to the development of the country's economy (Othman, 2014), the sector has witnessed several structural changes over the past three decades (Emuze & Smallwood, 2014; Martin & Root, 2010). These structural changes have been attributed to the increase of contracting activities funded by both private and public sectors of the economy and accompanied, however, by several issues (Othman, 2014; Emuze & Smallwood, 2014). The Construction Industry Development Board (CIDB) (2011) and Ambe and Badenhorst-Weiss (2011) identified structural issues that are evident in the transient nature of work and the resulting temporary organisations, the sensitivity of the industry to the economic environment, and the emergence of adversarial relationships in supply chain and teams as among the several critical issues affecting the construction industry. There are also issues of poor performance, high rate of enterprise failure, low levels of delivery capacity and team performance and mismatches between available skills and required skills (Windapo & Cattell, 2012).

Over and above these challenges, Emuze and Smallwood (2014) highlight fragmentation and lack of collaboration as dominant features of the industry which are common to the global construction community. While CW&P is not an emergent concept in construction, in the SACI researchers have only recently explored and promoted this concept through supply chain management as a means to improve project performance and other related issues in the sector (Emuze & Smallwood, 2014). Theoretically, contractors and stakeholders in a construction supply chain are perceived as enablers of productivity and performance in construction product delivery and thus oversee the coordination and collaboration of the supply chain (Towey, 2012; Emuze & Smallwood, 2014). Emuze and Smallwood (2014) affirm the participation of contractors in collaborative arrangements in the South African construction industry within the last ten years. However, they indicate that contractors in South Africa face numerous challenges that hinder their ability to ensure effective collaboration. Emuze and Smallwood (2014) further propose a rigorous pursuit of effective collaborative working and practices as a solution to the numerous challenges in the supply chain of construction delivery. In this regard, they suggest:

'early involvement of key knowledgeable project team members', 'establish(-ing) stable subcontractor and supplier relationships, harmonious management of project parameters', 'working together as a team to agree on mutual goals and devis(-ing) dispute resolution mechanisms', 'developing) and monitoring continuous improvement programmes', 'developing and implementing sound risk management processes', 'using non-adversarial forms of contract', 'ensuring employee satisfaction through integrated teams' and 'embracing the Latham (1994) and Egan (1998) collaborative working principles'.

However, from a critical perspective of the suggestions made by Emuze & Smallwood (2014), it can be argued that there is an apparent paucity which implies that these suggestions lack empirical rigour and may not be congruent with reality. Arguably, it is more insightful knowing and understanding the specific collaborative practices than merely knowing generic ones that are culled from other countries and this is because collaborative working and practices are context induced and significantly influenced by the systemic structures, cultural orientations, and socio-economic dynamics. Therefore it would be sound practice to gain practical and theoretical understanding of the reality of the practices in the SACI through an empirical study. This is further augmented by the fact that there is a seeming lack of awareness and consensus on the nature and types of collaborative practices among industry professionals and stakeholders that can trigger the needed improvement in construction project delivery and ameliorate the growing adversarial tensions associated with traditional supply chain systems in the SACI. These limitations constitute an apparent gap in collaborative practices which requires addressing. Despite these limitations, the insight provided by Emuze and Smallwood (2014) can be instrumental in facilitating further empirical studies to augment the current understanding and knowledge of the collaborative practices that are best suited to the South African context.

In the context of South Africa, the CIDB template provides the essential and desired framework and guidelines for contractual and procurement arrangements in the construction industry. It ensures that the CIDB being a regulatory body in South Africa, there on unreasonable provisions which could, unfairly, prejudice the interests of any party, provide for an interrelated management system, which clearly defines the roles and duties of all persons involved. The template also serve to guide contractual relationships among parties in construction project delivery by enhancing the legal and governance structures, operational

structures, functional composition and effective building blocks to relational coordination (CIDB, 2011). Comparatively, it can be said that the CIDB (2011) template and guidelines offers both the working and operational models espoused by Kumar & Banerjee (2014), Chen & Manley (2014) and Xue *et al.* (2010). It thus underscores the development of collaborative practices in the SACI towards a developing a more integrated team and delivery process with a shared common goal in engineering and construction projects delivery.

METHODOLOGY

It is affirmed that collaborative practices (CP) are context induced and also lie in the behavioural domain, meaning they are dynamic and continuously changing/evolving? (Rahman & Kumaraswamy, 2012; Pryke & Pearson, 2006; Xue *et al.*, 2005; Pryke, 2005). Additionally, there seem to be a limited number of studies on collaborative working and practices in the South African construction industry. This makes exploratory study a more appropriate approach (Creswell, 2009). Against this background, the study adopted a qualitative design using multiple case studies as the main data collection instrument and convergent analysis as the analytical approach. The choice of multiple case study research design as the main data collection strategy was influenced by its ability to pragmatically investigate a modern-day phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Creswell, 2009; Yin, 2013; Bryman, 2008) as is the case of CW&P in the South African construction industry. Additionally, case method allows the questions of ‘Why?’ and ‘How?’ to be answered with relatively full understanding of the nature and complexity of the complete phenomenon in respect of practices, managerial processes and organisational and group behaviour (Farquhar, 2012; Yin, 2013).

The collection of the data consisted of a convergence of two data sources, namely semi-structured interviews and archival documents with interviews being the primary data source (Klenke, 2015). In spite of the numerous criticisms levelled against qualitative research notwithstanding its usefulness in providing in-depth meaning of phenomena, ensuring reliability and validity are crucial in offering credence to the findings of a study and achieving triangulation based on a principle of seeking ways of verifying and corroborating a practice or finding (Yin, 2013; Creswell, 2009; Gibbs, 2007). From the use of the multiple case studies as stated, the process involved the checking of transcripts to ensure they do not contain mistakes, coding, and transcribing the data adapted from the content analysis flowchart of an inductive qualitative design (Hesse-Biber & Leavy, 2010; Yin, 2013; Gibb, 2007). This was followed by a procedure of establishing themes based on combining several sources of data or perspectives from participants, and allowing participants to comment on the findings (Creswell, 2009). The two processes contributed to ensuring the reliability and validity of the findings (Yin, 2013; Creswell, 2009; Gibb, 2007).

The primary data for the study was collected in five provinces of South Africa, namely Free State, Gauteng, North West, Limpopo and Mpumalanga. A total of eight (8) construction projects were investigated out of which three (3) construction sites (case studies) were explored more extensively. The provinces were selected for the study because of the willingness of the respondents to participate in the study as well as the construction projects selected being flagship projects of high value and requiring strict adherence to client requirements, project scope and specifications. Adopting a purposive sampling owing to its suitability allows a researcher to make a selection of participants based on the unique purpose

of their involvement with a given profile that suits the required data in a given study (Guest *et al.*, 2012; Bryman, 2008; Yin, 2013). A total of 31 semi-structured face-to-face interviews were conducted with various construction project participants from the selected three (3) construction sites from the provinces. The interview protocol was designed to be conducted in 20 minutes, but owing to the participants' schedules involving their daily site activities and engagements, the interviews took 30 minutes each. The overall data collection took approximately three and half months owing to logistical considerations and the infrequent availability of participants. The roles of the interviewed professionals ranged from project managers from both contractors' companies and consulting firms, contracts managers, construction managers, suppliers, site agents, foremen, wet trades' subcontractors and specialist subcontractors. The various roles covered reflect the usual project team participants in the construction supply chain in the South African construction industry, depicting an all-inclusive approach.

The data collection instrument used for the case study comprised archival documentation and interview protocol following suggestions by Simons (2009) and Yin (2013) to ensure theoretical validity. The archival documentation consisted of a contract evaluation template developed by the CIDB (2011 & 2008), encompassing criteria of acceptable forms of engineering and construction works contracts considered to comprise collaboration enablers and practices which would flourish under legal circumstances. The template for evaluating consisted of two parts, namely essential criteria which contained eleven checklist items, and desirable criteria made up of nine checklist items. The archival document evaluation was followed by in-depth interviews which consisted of a structured outline to guide the interview in respect of the collaborative practices experienced and practised in the delivery of their projects. Figure 1.0 illustrates the merging of data instruments adopted for the case study. These instruments are displayed in successive sequence to depict the process followed in every stage. The interview protocol served as the chief data instrument with the archival document providing a rounded view of the theoretical individual perspective by interpreting the 'real life' context of collaborative practices in construction contracting.

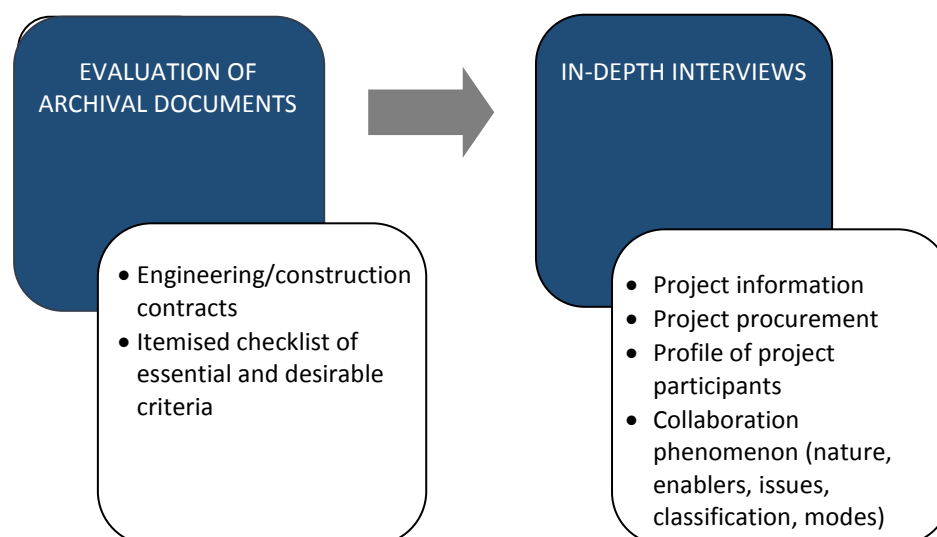


Figure 1: Merging of data sources for the data collection instrument

The primary data from the interview was analysed using thematic analysis which included transcribing and coding the interviews, thereby establishing the basis for evolving the themes, interpretation and representation (Taylor-Powell & Renner, 2003). The themes were colour coded to facilitate ease of allocating similar themes across every participant's response. In order to assist in identifying the emergent patterns and themes, participants' responses were colour-coded across the subgroups of professionals and tradesmen from the three cases. The themes were further categorised into primary themes and sub-themes supported by participant quotations.

ANALYSIS OF DATA, RESULTS AND FINDINGS

Analysis of Background Information

The results of the descriptive statistics are presented in Table 1.0. This depicts the professions as well as the average years of experience of the various respondents acting in their various professional roles in collaborative practices. A total of 31 project professionals in various roles in the supply chain team at the three construction sites responded to the invitation to an interview.

Table 1. Background information on interview respondents

Professional Role	Frequency	Average years of experience in CP
Project Manager	2	13
Contract Manager	6	6
Construction Manager	1	26
Supplier	1	8
Site Agent	2	19
Foreman	7	14
Wet trades subcontractor	8	4
Specialist subcontractor	4	10
TOTAL	31	

Source: Field Data

The respondents' professional background and roles as project team participants were project managers (2) from both contractors' companies and consulting firms; contracts managers (6); construction manager (1); supplier (1); site agents (2); foremen (7); wet trades subcontractors (8); and specialist subcontractors (4). From this, it can be affirmed that there is a fair representation of almost all the various participants in a typical onsite construction supply chain. In addition, one of the project managers was an architect and two contract managers were structural engineers. This enhances the representation and offers credence to the findings. Additionally, from the average number of years of experience indicated in Table 1.0, it can be deduced that over 90 per cent of the respondents have had over five (5) years' experience. Practically, in mainstream human resource management practice, a minimum of five (5) years' experience is adequate for a senior management position and over ten (10) years for a chief executive position. It can therefore be said that the fact that the majority of respondents have accumulated over five (5) years' experience in their roles suggests that they

have had adequate exposure and are thus suitable and more likely to offer accurate responses to the questions.

Thematic Analysis of Interview data: Nature of Collaborative Practice

The analysis of the interviews was conducted through thematic analysis which was triangulated with existing literature on the subject area. The results obtained revealed three dominant themes with various sub-themes as presented in Table 2.0. The themes identified that suggest the nature of collaborative practices on the various projects in which the participants have been involved, including the current one, were: '*on site operational governance*', '*nature of operational structure*' and '*integration strategies adopted for supply chain contributors*'. The criteria for accepting these themes and sub-themes was that each should have more than a 50 per cent score in counting from the interview and this is supported by the works of Creswell (2009), Yin (2013) and Bryman (200). The figures in parenthesis represent their respective frequencies.

Table 2. Primary and sub-themes recorded from participants' interviews

PRIMARY THEMES	SUB-THEMES RELATED TO PRIMARY THEME	
On Site Operational Governance (24)	Familiarity of team leaders (19) Mode of communication (28) Transparency (28)	Frequency of communication (30) Information sharing (29) Transference of repetitive work (18)
Nature Of Operational Structure (18)	Mutual dependency (22) Acting in 'good faith-trust' (20) Freedom of expression (24)	Established relationships (22) Open-door policy (18)
Integration Strategies Adopted For Supply Chain Contributors (21)	Appointment process (17) Superiority structures (21) Designated roles (19)	On-site team leadership (18) Working environment orientation (28) Job scheduling and allocation (18)

Source: Summary of Field Data

From a critical assessment of the taxonomy of collaborative practices revealed in Table 2.0, it can be said that '*on site operational governance*' by consensus emerged as the dominant collaborative practice in the industry among construction supply chain team participants. Under this broad theme, participants further indicated '*familiarity of team leaders*', '*mode of communication*', '*frequency of communication*', '*information sharing*', '*transparency*' and '*transference of repetitive work*' as the tenets of this practice. In respect of 'integration strategies adopted for supply chain contributors' as the second collaborative practice in the industry, an integrative assessment of the sub-theme revealed '*appointment process*', '*superiority structures*', '*designated roles*', '*project-tailored responsibilities*', '*on-site team leadership*', '*working environment*' and '*job scheduling and allocation*' as the defining practices. Lastly, '*nature of operational structure*' emerged as the third dominant collaborative practice. This was defined by '*mutual dependency*', '*trust*', '*open door policy*', '*freedom of expression*' and '*established relationships*'.

DISCUSSION OF FINDINGS

The significance of effective ‘*on site operational governance*’ practices is well acknowledged in existing literature. The emergence of this as a dominant collaborative practice in the South African construction industry is not surprising. Morwood *et al.* (2008) and Rahman & Kumaraswamy (2005) revealed that establishing an efficient on-site operational structure that entails efficient sharing of project-related information, transparency in operations and activities, and sound interdependence of tasks is critical to success in most non-traditional contracting such as partnership and alliancing in the construction industry. They further mentioned that these practices have a high propensity to curb adversarial tensions among team participants which is a common feature of the well-known traditional contracting (Morwood *et al.*, 2008; Rahman & Kumaraswamy, 2005). The majority of participants felt that the environment they worked in afforded them a measure of transparency and gave them the freedom to express themselves. They also intimated that the frequent sharing of information and openness to activities, decisions and plans promote confidence and thus they were able to approach their leaders for clarification and further discussions. However, one project manager (main contractor representative) cautioned against being too transparent and preferred sharing information on a need-to-know basis. The frequency of communication, however, was determined by two factors, namely familiarity with the team leaders (foremen and subcontractor relationship) and duration of participant in the current project collaboration.

From the finding above, the significance of communication in construction supply chain is reaffirmed. Against this background, it can be said that communication which encompasses the mode and medium, frequency and protocols is a central collaborative practice that cannot be overlooked. Further to this, Sullivan and Skelcher (2002), Sullivan *et al.* (2002) and Pryke (2005) indicated that the success of operational governance structure is heavily dependent on certain key behavioural attributes and practices that are either adopted as core practices or owing to leaders’ intuitive innovation. This affirmed that ‘*familiarity of team leaders*’ and ‘*establishment of transparent structures*’ are crucial effective operational governance practices that can engender effective collaborations in construction supply chain in South Africa. This is because these practices motivate free-will participation, commitment, ownership of actions, and belongingness (Pryke, 2005; Sullivan *et al.*, 2002; Sullivan & Skelcher, 2002). In reality, it can be said that the results of ‘*familiarity of team leaders*’ and ‘*establishment of transparent structures*’ are conditions for the effectiveness of the project team (Kwofie *et al.*, 2015; Sullivan *et al.*, 2002).

‘*Trust*’, ‘*mutual dependency*’, ‘*freedom of expression*’, ‘*established relationships*’ and ‘*free access to participants*’ are key indicators of the maturity level of an organisation, team or establishment and thus are crucial for strategic partnerships (Sullivan *et al.*, 2002; Xue *et al.*, 2005; Wong *et al.*, 2005). In this regard, their emergence here is in congruence with reality in the global construction industry. Against this it can be affirmed that the nature of operational structures adopted in construction project delivery is very significant to the success of the project. Experiences of trust failure, excessive fragmentation, and lack of interdependences are widely acknowledged in construction supply chain in construction management research (Pryke, 2004; Xue *et al.*, 2005; Li & Lai, 2005; Hartmann & Bresnen, 2011). In the findings, the participants were unanimous in acknowledging the nature of their relationship as one of mutual dependency as well as adversarial when challenges arose. Main contractor representatives complied with an open-door policy that encouraged subcontractors to propose

innovative solutions as well as raising problems they encountered on site. Some supply and install subcontractors also indicated a measure of independence. This, however, did not reassure them of trust on the main contractor's part but was perceived as a nonchalant attitude towards their presence on site. Additionally, most participants intimated that having previously worked with subcontractors and suppliers on other projects created familiarity and that enhanced trust and therefore did not require constant communication or supervision as both sides were familiar with the required standards of quality and efficiency. This proved successful as some of the subcontractors were given additional tasks to complete on behalf of the main contractor. In respect of relationships, most participants indicated that the frequent sharing of information brought about understanding, respect and cordiality on the project site.

The third dimension of collaborative practices related to the '*integration strategies adopted for supply chain contributors*'. It is said that integration strategies are born out of team dynamics and their success depends on dynamics of control, shared and designated roles, superiority structures in teams, leadership, and appointment processes (Fu *et al.*, 2015; Davis & Love, 2011; Fong & Lung, 2007; Kumaraswamy *et al.*, 2005). Against this, the emergence of '*appointment process*', '*superiority structures*', '*designated roles*', '*on-site team leadership*' and '*working environment orientation*' as the tenets of the '*integration strategies adopted for supply chain contributors*' is in convergence with the plethora of existing knowledge and practice in collaborative practices towards team integration (see Kumar & Banerjee, 2014; Chen & Manley, 2014; Xue *et al.*, 2010; Pryke, 2005; Emuze and Smallwood, 2014). However, the revelation of '*working environment orientation*' as a key collaborative practice can be seen as typifying the uniqueness of the construction industry in many African countries. According to Kumar and Banerjee (2014) and Chen and Manley (2014), an understanding of and familiarity with the working environment are necessary factors for integration strategies and this is born out of a person's ability to adapt and assume control. But this phenomenon insignificantly influences a person's ability to control and wield authority in a working environment, especially in developed countries. The result in this study revealed that participants who had joined the construction site at a later period struggled to establish a working system. This was true on both sides of the collaboration (main contractor representatives and subcontractors). A late entrant of a contractors' representative on one project site displaying an authoritative presence of which most of the subcontractors did not approve subsequently led to a troubled relationship of a hostile and unforgiving nature. Against this, a primary collaborative practice as suggested by the teams on the project is to conduct an orientation at the start of the project and during the course of the project for people to gain understanding of the cultural, leadership and structure of the site authority. This is geared to give a clear understanding of the working environment in order to promote cooperation and integration.

CONCLUSION AND IMPLICATION OF FINDINGS

There is no denying the evidence of the impact of effective collaborative working in design and construction teams on managerial efficiency, team performance and delivery success in construction project delivery. Central to this is the influence of the adoption of effective collaborative practices in the construction supply chain. This study has sought to delineate the collaborative practices that are evident in the South African construction industry (SACI). The results have provided empirical evidence of three main thematic collaborative practices in the SACI. It is clear that the significance of collaborative practices to the construction supply chain cannot be underestimated as indicated in the real-life experiences augmenting

the findings from the interview. The study has provided empirical evidence inherent in the results (sub-themes in Table 2.0) that corroborates existing knowledge of the primary significance of communication, mutual dependency, trust, and leadership as vital to the construction supply chain, especially in the South African context. Against this, it can be highlighted that these findings then offer both practical and theoretical implications to the industry.

From extant related literature, it is stressed that construction industry faces numerous collaborative challenges which are hinged around the exceedingly fragmented nature of the sector. These challenges that plague the industry could be ameliorated by understanding and implementing effective collaborative practices. In the light of this, if industry practitioners implement these practices in order to improve '*on site operational governance*', '*nature of operational structure*' and '*integration strategies adopted for supply chain contributors*' there is evidence that effective collaboration in the construction project delivery in South Africa would be engendered.

In this regard, practitioners can pursue bespoke communication tools, strategies, media, leadership patterns, and team control practices, among others, that can offer a comparative advantage to maximize their benefits to the construction industry. It is worth acknowledging that this study merely identified the collaborative practices in the SACI without correlating the nature and extent of the contribution of these practices to the collaborative effectiveness and integration of the team. It should be noted that the understanding of the extent and nature of the influence of these practices is significant in underlining and offering rigour to the choice and decisions in respect of effective collaboration in construction supply chain.

Given that understanding and knowledge of effective collaborative practices is crucial in construction project delivery (Xue *et al.*, 2010; Chen & Manley, 2014), the identification of the collaborative practices herein given by this study could offer practical and theoretical implications to practitioners and stakeholders in the South African construction industry. The insights given by this study could be useful to adopting that can enhance effective collaboration in construction project delivery. The collaborative practice which translate in 'Trust', 'mutual dependency', 'freedom of expression', 'established relationships' and 'free access to participants' are frequently cited as critical indicators of the maturity level of an organisation, team or establishment and thus are crucial for strategic partnerships (Sullivan *et al.*, 2002; Xue *et al.*, 2005; Wong *et al.*, 2005). Against this background, stakeholders could be encouraged to pursue these practices to enhance a more matured project environment that will foster team integration towards effective collaboration. The findings on the On-site operational governance, Nature of operational structure and Integration strategies adopted for supply chain contributors occurrence could also provide the necessary stimulus for the industry as a whole to place greater emphasis on addressing collaborative practices challenges in non-traditional procurement in the SACI.

The main objective if this study was to delineate the nature and type of collaborative practices in the South African construction Industry. However, it is well perceived that, collaborative practices have contributed to performance of construction delivery. It is thus acknowledged that the study and the findings here do not give insights into the extent and nature of influence of the collaborative practices on construction project performance in the South African construction industry.

Hence a further objective inquiry is required to assess the nature and extent of ‘onsite operational governance’, ‘nature of operational structures’ and ‘integration strategies adopted for supply chain’ in engendering needed performance towards success in infrastructure delivery in South Africa.

REFERENCES

- Ambe, I. & Badenhorst-Weiss, J. (2011). An exploration of public sector supply chains with specific reference to the South African situation. *Journal of Public Administration*, 46(3), 1100-1115.
- Anumba, C. Baugh, C. & Khalfan, M. (2002). Organisational structures to support concurrent engineering in construction. *Industrial Management & Data Systems*, 102(5), 260 -270. <https://doi.org/10.1108/02635570210428294>
- Beach, R., Webster, M. & Campbell, K. M. (2005). An evaluation of partnership development in the construction industry. *International Journal of Project Management*, 23(8), 611-621. <https://doi.org/10.1016/j.ijproman.2005.04.001>
- Bell, S. (2003). Economic governance and institutional dynamics. Melbourne, Australia: Oxford University Press.
- Bryman, A. (2008). Social research methods (3rd edition). Oxford: Oxford University Press.
- Chan, A. P. C., Chan, D.W. & Yeung, J.F. (2010). Relational contracting for construction excellence: Principles, practices and case studies. Abingdon: Spon Press.
- Chen, L. & Manley, K. (2014). Validation of an instrument to measure governance and performance on collaborative infrastructure projects. *Journal of Construction Engineering and Management*, 140(5), 04014006. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000834](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000834)
- Chunyu, H. (2013). A study of the application of supply chain management in construction Industry. WHICED 2013 Proceedings: Wuhan International Conference on e-Business Paper 37 (pp. 583-589). Wuhan: AIS Electronic Library.
- Construction Industry Development Board (CIDB). (2008). Documents: A basic guide to general conditions of contract for construction works. Retrieved from Construction Industry Development Board: [www.cidb.org.za/publications/Documents/ A Basic Guide to General Conditions of Contract for Construction Works.pdf](http://www.cidb.org.za/publications/Documents/A%20Basic%20Guide%20to%20General%20Conditions%20of%20Contract%20for%20Construction%20Works.pdf) [Accessed on 11 May 2016].
- Construction Industry Development Board (CIDB). (2011). Baseline study of provincial contractor development programmes: Review of the contractor development programmes - Towards an NCDP monitoring and evaluation system. Pretoria: CIDB.
- Creswell, J.W. (2009). Research design: Qualitative, quantitative, and mixed method approaches (3rd edn.) Thousand Oaks, CA: Sage Publications.
- Davis, P. & Love, P. (2011). Alliance contracting: Adding value through relationship development. *Engineering, Construction and Architectural Management*, 18(5), 444-61. <https://doi.org/10.1108/09699981111165167>
- Davis, P. & Walker, D. (2009). Building capability in construction projects: A relationship-based approach. *Engineering, Construction and Architectural Management*, 16(5), 475-489. <https://doi.org/10.1108/09699980910988375>
- Egan, S.J. (1998). Rethinking construction - The report for the construction for RCE. London: Crown.

- Emuze, F. & Smallwood, J. (2012). Infrastructure project performance in the South African construction sector: Perceptions from two provinces. *Research articles. Acta Structilia*, 19(2), 1-22.
- Emuze, F. & Smallwood, J. (2014). Collaborative working in South African construction: Contractors' perspectives. *Journal of Engineering, Design and Technology*, 12(3), 294 - 306.
<https://doi.org/10.1108/JEDT-08-2010-0057>
- Erdogan, B., Koseoglu, O., Bouchlaghem, D. & Nielsen, Y. (2012). Chapter 9: Collaboration implementation in construction - Case studies. In: D. Bouchlaghem (Ed.). *Collaborative working in construction* (pp. 171-200). Abingdon: Spon Press.
- Eyaa, S., Ntayi, J.M. & Namagembe, S. (2010). Collaborative relationships and SME supply chain performance. *World Journal of Entrepreneurship, Management and Sustainable Development* 6, 233-245. <https://doi.org/10.1108/20425961201000018>
- Farquhar, J. (2012). *Case study research for business*. London: Sage Publications.
<https://doi.org/10.4135/9781446287910>
- Fong, P. S. W. & Lung, B. W. C. (2007). Inter-organizational teamwork in the construction industry. *Journal of Construction Engineering and Management*, 133(2), 157-168.
[https://doi.org/10.1061/\(ASCE\)0733-9364\(2007\)133:2\(157\)](https://doi.org/10.1061/(ASCE)0733-9364(2007)133:2(157))
- Fu, Y., Chen, Y., Zhang, S. & Wang, W. (2015). Promoting cooperation in construction projects: An integrated approach of contractual incentive and trust. *Construction Management and Economics*, 33(8), 653-70. <https://doi.org/10.1080/01446193.2015.1087646>
- Gibbs, G. (2007). Analyzing qualitative data. In: Flick, U. (Ed.) *Sage qualitative research kit*. London: Sage Publications. <https://doi.org/10.4135/9781849208574>
- Gorgenlner, V. (2011). *A strategic analysis of the construction industry in the United Arab Emirates: Opportunities and threats in the construction business*. Hamburg: Diplomica Verlag.
- Guest, G., Maney, E. & Mitchell, M. (2012). *Collecting qualitative data: A field manual for applied research*. London: Sage Publications.
- Hartmann, A. & Bresnen, M. (2011). The emergence of partnering in construction practice: An activity theory perspective. *Engineering Project Organization Journal*, 1(1), 41-52.
<https://doi.org/10.1080/21573727.2010.549609>
- Hauck, A. J., Walker, D. H. T., Hampson, K. D. & Peters, R. J. (2004). Project alliancing at national museum of Australia - Collaborative process. *Journal of Construction Engineering and Management*, 130(1), 143-152. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2004\)130:1\(143\)](https://doi.org/10.1061/(ASCE)0733-9364(2004)130:1(143))
- Hesse-Biber, S. & Leavy, P. (2010). *The practice of qualitative research*. London: Sage Publications.
- Ibbs, C. W., Kwak, Y. H., Ng, T. & Odabasi, A. M. (2003). Project delivery systems and project change: Quantitative analysis. *Journal of Construction Engineering and Management*, 129(4), 382-387. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2003\)129:4\(382\)](https://doi.org/10.1061/(ASCE)0733-9364(2003)129:4(382))
- Ke, Y., Gajendran, T. & Davis, P. (2015a). Relational contracting in the construction industry: Mapping practice to theory. AEI Conference: Birth and Life of Integrated Building, 24 - 27 March (pp. 175-184). Milwaukee: Milwaukee School of Engineering.
<https://doi.org/10.1061/9780784479070.016>

- Ke, Y., Ling, F. & Zou, P. (2015b). Effects of contract strategy on interpersonal relations and project outcomes of public-sector construction contracts in Australia. *Journal of Management in Engineering*, 31(4), 1-10. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000273](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000273)
- Ke, Y., Ling, F., Wang, S., Zou, P., Kumaraswamy, M. & Ning, Y. (2013). Relationships among contracting parties and their effects on outcomes of public construction projects in China. AEI Conference: Building solutions for Architectural Engineering (pp. 74 - 83). Pennsylvania: State College. <https://doi.org/10.1061/9780784412909.008>
- Kelly, J. (2011). Cracking the VFM code: How to identify & deliver genuine value for money in collaborative contracting. Sydney, Australia: Big Fig Publishing.
- Klenke, K. (2015). Qualitative research in the study of leadership. Bingley, UK.: Emerald Group Publishing.
- Kwofie, T. E., Alhassan, A., Botchway, E. & Afranie, I. (2015) Factors contributing towards the effectiveness of construction project teams. *International Journal of Construction Management*, 15(2), 170-178. <https://doi.org/10.1080/15623599.2015.1033818>
- Kumar, G. & Banerjee, R. (2014). Supply chain collaboration index: An instrument to measure the depth of collaboration. *Benchmarking: An International Journal*, 21(2), 184-204. <https://doi.org/10.1108/BIJ-02-2012-0008>
- Kumaraswamy, M. M., Rahman, M. M., Ling, F. Y. Y. & Phng, S. T. (2005). Reconstructing cultures for relational contracting. *Journal of Construction Engineering and Management*, 131(10), 1065-1075. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2005\)131:10\(1065\)](https://doi.org/10.1061/(ASCE)0733-9364(2005)131:10(1065))
- Kvan, T. (2000). Collaborative design: What is it? *Automation in Construction*, 9, 409-415. [https://doi.org/10.1016/S0926-5805\(99\)00025-4](https://doi.org/10.1016/S0926-5805(99)00025-4)
- Latham, M. (1994). Constructing the team. London: D. O. T. Environment, HMSO
- Leiringer, R. (2006). Technological innovation in PPPs: Incentives, opportunities and actions. *Construction Management Economics*, 24(3), 301-308. <https://doi.org/10.1080/01446190500435028>
- Li, E. Y. & Lai, H. (2005). Collaborative work and knowledge management in electronic business. *Decision Support System*, 39(4), 545-547. <https://doi.org/10.1016/j.dss.2004.03.001>
- Loosemore, M. (2014). Improving construction productivity: A subcontractor's perspective. *Engineering Construction & Architectural Management*, 21(3), 245-60. <https://doi.org/10.1108/ECAM-05-2013-0043>
- Love, P. E. D., Mistry, D. & Davis, P.R. (2010). Price competitive alliance projects: Identification of success factors for public clients. *Journal of Construction Engineering and Management*, 136(9), 947-956. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000208](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000208)
- Martin, L. & Root, D. (2010). Emerging contractors in South Africa: Interactions and learning. *Journal of Engineering, Design and Technology*, 8(7), 64-79. <https://doi.org/10.1108/17260531011034655>
- Mignot, A. (2012). Who moved my cheese? Adapting to the changing nature of collaboration in infrastructure. Brisbane: Alliancing Association of Australasia.
- Morwood, R., Scott, D. & Pitcher, I. (2008). Alliancing a participant's guide: Real life experiences for constructors, designers, facilitators and clients. Los Angeles: AECOM.

- Othman, A. (2014). A study of the competency requirements of property development graduates to meet the qualifications of the South African construction industry. *Journal of Engineering, Design and Technology*, 12(1), 2-28. <https://doi.org/10.1108/JEDT-04-2012-0019>
- Pryke, S. & Pearson, S. (2006). Project governance: Case studies on financial incentives. *Building Research and Information*, 34(6), 534-545. <https://doi.org/10.1080/09613210600675933>
- Pryke, S. D. (2004). Analysing construction project coalitions: Exploring the application of social network analysis. *Construction Management and Economics*, 228, 787-797. <https://doi.org/10.1080/0144619042000206533>
- Pryke, S. D. (2005). Towards a social network theory of project governance. *Construction Management and Economics*, 23(9), 927-939. <https://doi.org/10.1080/01446190500184196>
- Pryke, S. (2012). Social network analysis in construction. Hoboken, NJ: John Wiley & Sons. <https://doi.org/10.1002/9781118443132>
- Pryke, S., Broft, R. & Badi, S. (2014). SCM and extended integration at the lower tiers of the construction supply chain: An explorative study in the Dutch construction industry. CIB 2014 International Conference on Construction in a Changing World (pp. 1-12). Sri Lanka: UCL
- Rahman, M. M. & Kumaraswamy, M. M. (2004). Contracting relationship trends and transitions. *Journal of Management in Engineering*, 20(4), 147-161. [https://doi.org/10.1061/\(ASCE\)0742-597X\(2004\)20:4\(147\)](https://doi.org/10.1061/(ASCE)0742-597X(2004)20:4(147))
- Rahman, M. M. & Kumaraswamy, M. M. (2005). Relational selection for collaborative working arrangements. *Journal of Construction Engineering and Management*, 131(10), 1087-1098. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2005\)131:10\(1087\)](https://doi.org/10.1061/(ASCE)0733-9364(2005)131:10(1087))
- Rahman, M.M. & Kumaraswamy, M.M. (2012). Multi-country perspectives of relational contracting and integrated project teams. *Journal of Construction Engineering and Management*, 138(4), 469-80. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000463](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000463)
- Shelbourn, M., Bouchlaghem, D. & Carrillo, P. (2012). Chapter 10: Industry perspective and conclusions. In: D. Bouchlaghem (Ed.). Collaborative working in construction (pp. 201-212). Abingdon: Spon Press.
- Sillars, D. N. & Kangari, R. (2004). Predicting organizational success within a project-based joint venture alliance. *Journal of Construction Engineering and Management*, 130(4), 500-508. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2004\)130:4\(500\)](https://doi.org/10.1061/(ASCE)0733-9364(2004)130:4(500))
- Simons, H. (2009). Case study research in practice. London: Sage Publications. <https://doi.org/10.4135/9781446268322>
- Song, L., Mohamed, Y. & Abou-Rizk, S.M. (2009). Early contractor involvement in design and its impact on construction schedule performance. *Journal of Management in Engineering*, 25(1), 12-20. [https://doi.org/10.1061/\(ASCE\)0742-597X\(2009\)25:1\(12\)](https://doi.org/10.1061/(ASCE)0742-597X(2009)25:1(12))
- Sullivan, H. & Skelcher, C. (2002). Working across boundaries. Collaboration in public services. Basingstoke: Palgrave. <https://doi.org/10.1007/978-1-4039-4010-0>
- Sullivan, H., Barnes, M. & Matka, E. (2002). Building collaborative capacity through "theories of change": Early lessons from the evaluation of Health Action Zones in England. *Evaluation*, 8(2) 205-226. <https://doi.org/10.1177/1358902002008002514>

- Taylor-Powell, E. & Renner, M. (2003). Analyzing qualitative data. University of Wisconsin, Madison, Wisconsin, USA.
- Towey, D. (2012). Construction quantity surveying: A practical guide for the contractor's QS. Hoboken, NJ: John Wiley & Sons.
- Windapo, A. & Cattell, K. (2013). The South African construction industry: Perceptions of key challenges facing its performance, development and growth. *Journal of Construction in Developing Countries*, 18(2), 65-79.
- Wong, P. S. P., Cheung, S. O. & Ho, P. K. M. (2005). Contractor as trust initiator in construction partnering - Prisoner's dilemma perspective. *Journal of Construction Engineering and Management*, 131(10), 1045-1053. [https://doi.org/10.1061/\(ASCE\)0733-9364\(2005\)131:10\(1045\)](https://doi.org/10.1061/(ASCE)0733-9364(2005)131:10(1045))
- Xue, X. L., Li, X. D., Shen, Q. P. & Wang, Y. W. (2005). An agent-based framework for supply chain coordination in construction. *Automation in Construction*, 14(3), 413-430. <https://doi.org/10.1016/j.autcon.2004.08.010>
- Yin, R. (2013). Case study research: Design and methods. Thousand Oaks, CA: Sage Publications.
- Ying, F., Tookey, J. & Roberti, H. (2014). Development of SCM competencies in construction: Lessons learned from New Zealand. 19th International CIB World Building Congress, Brisbane 2013: Construction and Society (pp. 1-14). Auckland: Queensland University of Technology.