

Key Relationship Oriented Indicators of Team Integration in Construction Projects

C. K. I. Ibrahim, S. B. Costello, and S. Wilkinson

Abstract—This paper conducts a review of the literature to identify key practice indicators of team integration in construction projects. The review identified eight key relationship indicators which can be considered vital to team integration within construction projects. These indicators can be used for measuring team relationship practice in construction projects and, hence, assist in improving a team's competitiveness and effectiveness.

Index Terms—Construction projects, Key practice indicators, Relationship, Team integration.

I. INTRODUCTION

Project delivery performance within the construction industry has, in the past, been criticised due to its fragmented approach to project delivery [1], [2]. The traditional procurement approach does not encourage integration, coordination and communication between project teams needed to overcome this fragmentation [1], [3], as the teams in the project itself are not able to collaborate and work together as expected to deliver projects effectively [2], [4]. It is also acknowledged that the fragmented transactional agreements in the traditional approach have a negative impact on team dynamics and channel various team efforts to meet contractual deliverables instead of defining optimal solutions [5]. Moore and Dainty [6] indicated that successful project delivery and the performance of the construction industry depend, to a large extent, on the mechanism of how the knowledge and experience of many people can be integrated together as a team. Teams and individuals who may not have previously worked together, but need to be well integrated, as well as substantial diversity in skills, knowledge and expertise, have made the integration more difficult to achieve within the construction period [7]. In addition, the process of integration in a team does not happen automatically, since it may be challenged by lack of collaboration, inconsistent shared vision, poor communication and inadequate participation from team members [8]. Thus, in order to ensure teams successfully complete their projects, it is necessary for firms to promote, measure, and assess their team integration practices.

This research presents a review of team integration practice indicators included in the literature. The objective of the review was to identify the specific key relationship oriented indicators of team integration in construction

projects which could form a framework for measuring team relationships and, hence, assist in improving team integration.

II. INTEGRATION OF PROJECT TEAMS

From the construction perspective, integration normally refers to collaborative working practices, methods and behaviours that promote an environment where information is freely exchanged among the construction parties [9]. Integration also has been known to improve project delivery team performance [2], [8], [10], [11].

Forques & Koskela [5] and Baiden *et al.* [7] state that the construction industry is composed of several types of organisations and groups of individuals with different characteristics, different cultures and styles of management, but with complementary skills and expertise needed for the delivery of a project. Alshawi and Faraj [12] added that a typical construction project involves the collaboration of a number of organizations, which are brought together for the duration of the project to form the 'project team'.

The nature of the competitive environment within the construction industry has led to the increasing need for the integration of all key players in any construction project in a multi-disciplinary team at both project management and design implementation levels [4]. Cicmil and Marshall [13], described that project team integration is an ongoing concern in the construction industry due to the cultural inconsistencies, distrustful relationships, and paradoxes associated with the 'design-construction divide' that have been recognised as major problems to successful and efficient completion of construction projects.

Baiden *et al.* [7] have suggested that integration can be described as the introduction of "working practices, methods and behaviours that create a culture of efficient and effective collaboration by individuals and organisations". They also defined the term "integrated construction project team" to characterise "a highly effective and efficient collaborative team responsible for the design and construction of a project". Rahman & Kumaraswamy [14] added that true "integration" in construction projects implies mobilization of collaborative efforts from project team members and continuity of their harmonious relationships to eliminate any friction between them during project execution to ensure value for money and improved project delivery.

III. REVIEW OF KEY RELATIONSHIP ORIENTED INDICATORS OF TEAM INTEGRATION

The review of relationship orientated indicators of team integration practice in construction projects identified eight

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key indicators. The following sections discuss each of these indicators in turn.

A. Seamless operation with no organisational defined boundaries

The majority of the authors viewed seamless operation with no organisational defined boundaries as a vital indicator of team integration practice in which the boundaries between individuals are diminished and team members work collaboratively towards mutually beneficial outcomes for the project. This presents a climate where organisations in the construction industry have to collaborate and share knowledge, skills and expertise in order to survive in a competitive market [15]. Dainty *et al.* [16] stated that companies must agree to share the benefits of greater integration with their partners if integration between project teams is to be improved. The existence of professionally oriented boundaries within the project team has contributed to the main issue of impaired project team integration within construction projects [17]. The purpose of an integrated project team (IPT) is to bring together diverse groups of people and combine them into a seamless team for the pursuit of common goals [11]. Forques and Koskela [5] explained that the IPT consists of a coalition of representatives from different organisational and business cultures, and that all aspects of the project must be discussed with the various disciplines within the team, in order to overcome operational differences in public and private sector organisations [18]. To work as a team efficiently and collaboratively, it is essential to have some degree of cohesion of team culture [19]. The Office of Government Commence [10] further added that it is vital for integrated project teams to organise and integrate their roles and responsibilities to act collaboratively between multi-disciplinary teams. Cicmil & Marshall [13] mentioned that collaborative interaction in multi-party coalitions is the key to integrating the project team and understanding the complexity of construction projects.

B. Communication

Many authors, [see for instance 3, 11, 17, 19, 20, 21, 22] identified communication as one of the core indicators in enhancing the practice of team integration in construction projects. As described by Love *et al.* [3], communication has been linked to team effectiveness, the integration of work units across organisational levels, characteristics of effective supervision, job satisfaction, and overall organisational effectiveness. By establishing communication flows, involvement patterns and other behavioural responses to unexpected change events, the nature of any professional and cultural interfaces can be established [17]. Evbuomwan and Anumba [4] found that lack of communication between all key players in any construction project in a multi-disciplinary team has led to difficulty in the development process for both project management and design implementation levels. In order to reduce the complexity of the design implementation process, high quality communication between the main project offices and on-site must be established [19]. Moore and Dainty [17] added that communication barriers between project teams had left the construction team almost peripheral to the design development, despite the importance of their responsibilities in managing the implementation of design

changes. They further added that by having a multi-disciplinary project team, communication systems can be improved as they will encourage face-to-face relationships and interaction between team members. Developing effective communication systems throughout the construction supply chain will ensure good and reliable flows of information; establishing mechanisms for problem resolution and for generating added-value into projects [20]. This can be implemented by using numerous techniques and tools that could assist the project team to encourage open communication and minimise the barriers to information flow. For example, El-Gohary & El Diraby [22] suggested that using ICT systems, such as a portal based system, will promote enhanced communication, coordination, and collaboration among various disciplines and stakeholders. Jorgenson & Emmitt [23] further added that facilitation and leadership appeared to be a vital technique for achieving effective communication between the construction professionals and other stakeholders.

C. Sharing Information

Sharing information is also seen as a key indicator of team integration practice [4], [15], [24]. According to Baiden *et al.* [7], project information should be available, open and accessible to all project team members as an input for efficient decision making and in order to create effective integrated project teams. The challenge is to ensure that the right information gets to the appropriate person at the right time [9]. The lack of information or a response from project stakeholders becomes critical for progressing with project decisions [23]. The integrated project team should be an environment for openness, where shared information is essential for mutual respect and effective collaboration [11]. Each team member should meet regularly to share information, discuss the project plans, any issues raised and generate ideas in order to achieve the objectives of the project. Integration between all key construction players could be successful if there was a compatibility of management and information systems that can enhance the information flow between project teams [25]. For instance, e-commerce and other electronic systems for exchange of information across the supply chain should be adopted to enhance integration. Information can be transmitted to all project parties by the centralized system via a centrally accessible location established to store the electronic information, or a network for transferring the electronic information to all parties [26]. Such strategies to develop IT tools in order to support multi-disciplinary team interaction will contribute to smooth and effective information and knowledge sharing [25]. The speed of communications, standardization, and accessibility of information coupled with specific techniques can cause significant changes in organizations and over a short period of time [12]. It seems clear as Evbuomwan and Anumba [4] mentioned that there is a need to have total information about a project integrated in one common format and environment. This will ensure that the information about the project is consistent, with each participant in the project having access to the same information.

D. Trust & Respect

Another important key indicator of team integration

practice is building trust and respect amongst the team members [5], [16] When lack of trust and the persistence of the 'old' ways of doing things prevail, attitudes and suspicions perceived by the project participants can cause tensions and problems among the team members [13]. Lack of trust and commitment are important factors that can deter the development of integrated teams [14], [24]. One of the most fundamental differences in the collaborative approach is the requirement to trust other team members and recognise that they are trying to achieve the very best results of which they are capable [11]. Dainty *et al.* [16] further stated that it is vital for construction companies to develop trust and understanding with their working partners as it can necessitate some cultural changes or attitudinal shift within organisations in the long-term. Mutual understanding and respect for the entire project team must be combined in order to achieve the successful completion of modern construction projects [17]. Baiden *et al.* [7] added that the early formation of the project team and continuous shared information can contribute significantly to equal respect for all the team member involved in the project. Sharing of information and integration of systems within the project team requires trust and coordination [21]. Briscoe and Dainty [20] explained that one of the main reasons why information flow between project teams fails was due to a lack of desire to engender trust between the parties involved in the construction process.

E. Collective Understanding

Collective understanding is another important indicator of practice in team integration because, as described by Love *et al.* [3], the formulation and collective agreement of project goals within a multi-disciplinary team environment at an early stage can contribute to teamwork success and develop a creative, innovative and functional design that fulfills the clients' requirements. The OGC [10] stated that team integration at an early phase can contribute to the collective responsibility and decision making of the cost of constructing and maintaining the facility, health and safety implications, sustainability, design quality, speed of delivery and the operational efficiency of the completed facility. It is important to ensure that collective and transparent decision making is achieved from the perspective of the client, users and other stakeholders directly involved with the project as this can minimize the cost of waste in construction projects [23]. As stated by Forques and Koskela [5] in achieving collective decision making, it is expected that all team members have their "voice" heard and that all ideas are open to discussion. Baiden *et al.* [27] further explained that collective understanding involves the continuous alignment of the diverse disciplines towards the common goal through the thorough sharing of needed information by any discipline at any given stage in the process. Kajewski *et al.* [15] in their study identified collaborative decision making at the lowest level, and consensus management using experts for their specialist skills, as styles of management that can contribute to the development of effective leadership. On the other hand, Moore and Dainty [17] suggest that professionals need to see themselves as a member of a project team rather than as members of their individual disciplines. Thus, multi-disciplinary teams need to realign themselves by considering each member as an equal stakeholder and an

important player in the project team. These are significant ways in which individual contributions both at the personal and organisational level can be exploited [7].

F. Commitment from Top Management

Ochieng & Price [19] identified commitment from senior / top management as a key indicator of team integration practice, as it is critical to success in multicultural team environments. The issue of commitment is of central importance to integration, as construction projects involve complex organisational and technically challenging design / construction systems. A high degree of leadership from senior management is needed in order to enhance the integration process and determination of transparent and mutually beneficial processes for all team members in the supply chain [16]. Moore and Antill [18] added that the commitment of senior management is vital in changing the process of coordination and empowerment in integrated project teams. Forques and Koskela [5] further explained that senior management should support cultural change, training for collaborative working, and the creation of a no blame environment in multi-disciplinary teams. Senior management should act as exemplars of good practice and behaviour, and show commitment to collaboration and cooperation throughout the project in order to establish a good team working ethic. Senior managers from each organisation should be involved in the initial workshop to ensure visible high level commitment [10]. Their full support and commitment are critical in initiating, leading, and maintaining the spirit to cooperate [24]. High level corporate commitment will also help in establishing the functional support, organisation and procedures for the construction project [15].

G. 'No blame' Culture

Baiden *et al.* [7] agreed that a 'no blame' culture is a key indicator of team integration practice in construction projects. It's been suggested that it's vital to have an equitable relationship and no blame culture as well as to encourage initiative to work towards the joint resolution of problems as this can influence team members to minimise their level of exposure to poor performance and working together in a spirit of trust, cooperation and collaboration. Hall [28] mentioned the needs of an environment where people were not frightened to admit fault on the basis that fault was to be learned from, so that collective responsibility in decision making can be achieved for the best of the project. Dulaimi *et al.* [25] outlined the importance of the creation of a 'no blame' culture as it could encourage project teams to develop and experiment with new ideas. It is important for the team environment to be supported by an effective no blame culture as this will help integrate people who may otherwise feel exposed by their mistakes [11].

H. Team Flexibility and Responsiveness to Change

The need to have team flexibility and the ability to respond to change has been recognised as an important indicator of team integration in construction projects. Baiden *et al.* [7] described flexible team member composition as the ability to respond to any changes over the duration of the project which leads to successful project performance. Ochieng and Price

[19] added that multicultural teamwork requires greater fluidity and flexibility in responding to cultural issues on projects. The focus on team reaction to change is vital according to Moore and Dainty [17], as construction projects consistently face a large number of uncertainties, team changes, design amendments and confrontation throughout their project lifecycle. For example, in the context of the degree of flexibility in response to changes in personnel requirements on the project, Baiden *et al.* [7] found in their study that, as the project progressed, managers were able to bring in additional members to the existing project team. Members whose roles and functions had been completed were relocated and new members brought in to maintain both productivity and progress. This leads to the organisational structure requirements outlined by Evbuomwan and Anumba [4] who agreed that for a team to be fully integrated, the various expertise that is available, and its composition, should be such that new members with requisite knowledge can be brought in and redundant ones leave. As supported by the Strategic Forum for Construction [11], there must be sufficient flexibility and adaptability in the way the project is managed to recognise that when someone new joins or leaves, or a new activity begins, that it may have an effect on the way the team is organised and on the dynamics that are necessary. Moore and Dainty [17] added that for larger organisations in the construction business, it is normal to have a functional matrix structure where employees need to have both project and functional organisational responsibilities, where some of the team members are moved to other projects during the course of the project, or divide their time amongst several contracts.

IV. FRAMEWORK OF KEY RELATIONSHIP ORIENTED INDICATORS OF TEAM INTEGRATION

The review of the literature highlights the key role that relationships play in influencing team integration in construction projects. It is therefore important to classify the nature of indicators to help gain a better understanding of the factors that influence team integration. To that end, the authors have classified the above identified indicators as ‘*Relationship Oriented Indicators*’ and proposed a basic framework to assist in analysing team integration. Other non-relationship oriented indicators are also identified in the literature, but are outside the scope of this paper.

The framework is a result of a combination of eight indicators; seamless operation with no organisational defined boundaries, communication, sharing information, trust and respect, collective understanding, commitment from top management, ‘no blame; culture and team flexibility and responsiveness to change. Figure 1 shows the proposed framework of key relationship oriented indicators of team integration.

The above classification aims to help generate a better understanding of the nature of team integration indicators, for example whether they are under the direct influence of relationships or not, in order to justify the practice. Some mechanism should be introduced to help practitioners develop relationships, work out which strategies are the best for maintaining those relationships, and which indicators

obtain the greatest payback. The utilisation of the proposed framework will not instantly solve the challenge of transforming disparate project teams into a highly integrated team; however, it does classify those identified key relationship indicators of team integration practice. Such a classification needs to be considered, especially in establishing an understanding of how those relationship indicators might work in improving the practice of integration between project teams.

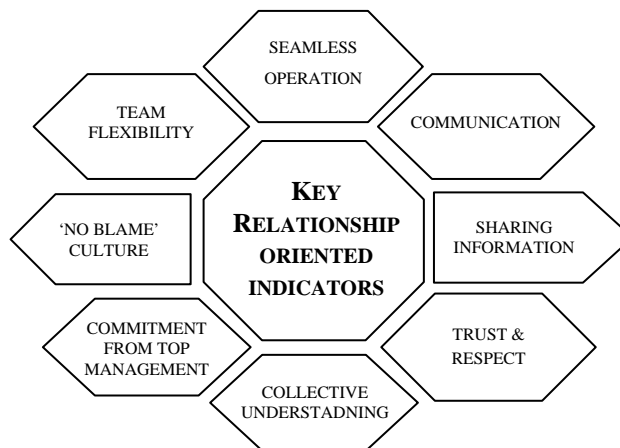


Fig. 1. Framework of key relationship oriented indicators of team integration.

The challenges in using the proposed framework include defining and specifying the types of variables which influence each indicator. Where there are many variables, with different characteristics influencing the indicator, it will be more difficult and complicated to establish the preference of scale structure needed to measure their influence. In such a scenario, each variable may have different attributes which dictate how they should be analysed and evaluated. Fundamentally, the definition of each indicator should be defined from insight of real construction practice, obtained from practitioners, on what is the best way to define it. Therefore, the selection of the most appropriate key relationship indicators for team integration is a crucial challenge faced by every project manager to derive the best outcomes from project teams.

Although past studies focused on various way of improving project performance through the implementation of integrated project delivery, integrated processes and product delivery processes, limited research has focused on establishing the key practice indicators and measuring team integration practice in construction projects, especially in relational contracting. As stated by OGC [10] in their guideline in achieving excellence in construction procurement, one of the criteria for successful projects is to be able to measure the performance, and subsequently benchmark, both the client and supply team members' performance to promote continuous improvement, resolve problems and to share best practice.

V. CONCLUSIONS

This research presents an in-depth review of relationship oriented indicators, from papers published in several construction management journals. From the review, it is

clear that team integration is essential for successful project delivery, resulting in visible, practical and effective collaboration between project teams.

The research also proposes a basic framework, to assist in analysing team integration practice in construction projects. To date, however, this research has focused on the academic literature. To ensure that the framework meets the needs of the construction industry, the research findings should be confirmed through interviews and/or surveys with relevant practitioners.

VI. FUTURE RESEARCH

Although efforts have been made to explore team integration practice in construction projects, the authors believe that much work is yet to be done in this area. This includes identifying a range of team integration practice indicators, classifying those indicators, expanding the proposed framework, and the development of an effective assessment tool for team integration in construction projects. In addition, the majority of the literature refers to non-relational contracting arrangements with little mention of team integration in relational contracting, such as alliancing.

Consequently, the next phase of this research aims to expand this framework further, resulting in the development of an assessment tool for measuring, as well as improving, team integration practice in relational contracting, such as alliancing. However, it is necessary to adopt a fairly cautious approach in developing such a tool, as human relationships are extremely complex. Consequently, emphasis will be placed on developing a range of indicators embedded in a practical assessment tool to facilitate team integration practice in construction projects under alliance contracting. This will require the exploration of industry-wide opinions on the specific key indicators of team integration, identification of specific measures for each key indicator in alliance projects, including recommendations for improving team integration, and, finally, an appropriate scale for each measure ranging from poor to excellent practice. The final output of this research will provide a platform for practitioners to set a benchmark for monitoring, measuring and improving team integration within their projects.

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