

Key Practice Indicators of Team Integration in Construction Projects: A Review

Che Khairil Che Ibrahim ¹⁺, Seosamh Benedict Costello ¹ and Suzanne Wilkinson ¹

¹ Department of Civil and Environmental Engineering, The University of Auckland, New Zealand

Abstract. This paper conducts a review of the literature to identify key practice indicators of team integration in construction projects. The review identified six key practice indicators which are considered vital to team integration within construction projects. These indicators can be used in setting a benchmark for measuring team integration practice in construction projects and hence enhance a team's competitiveness and effectiveness.

Keywords: Key Practice Indicators, Team Integration, Construction Projects

1. Introduction

Project delivery performance within the construction industry has been criticised due to its fragmented approach to project delivery [1, 2]. The traditional procurement approach does not encourage the integration, coordination and communication between project teams needed to overcome this fragmentation [1, 5]. This is because the various teams in the project are not able to collaborate and work together as expected to deliver projects effectively [2, 3]. 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 [15]. Moore and Dainty [20] 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 [9]. Thus, in order to ensure teams successfully complete their projects, it is necessary for the firms to promote, measure, and assess their team integration practices.

This research presents a critical review on team integration practice indicators in construction projects. The objective of this review is to identify the specific key indicators of team integration in construction projects which could form a basis and framework for measuring team integration and hence improve team integration practices.

2. 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 [8]. Integration also has been known as a means of improving the project delivery team performance and hence influences project performance [2, 9, 25, 26].

Baiden et al. [7] and Forques & Koskela [15] state that the construction industry is composed of several types of organisations and groups of individuals with different characteristics, different cultures and style of

⁺ Corresponding author. Tel.: + 6493737599 ext.31387; fax: +6493737462.
E-mail address: cche365@aucklanduni.ac.nz.

management but with complementary skills and expertise needed for the delivery of a project. Alshawi and Faraj [4] 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 [3]. 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 [17] 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.

2.1. Review of Key Practice Indicators of Team Integration

A review on indicators of team integration practice in construction projects identified six key practice indicators for measuring team integration. The following sections briefly discuss these practice indicators for successful team integration in construction projects.

1) Focusing on goals and objectives

Moore and Dainty [20, 23] and Baiden et al. [6-8] agreed that focusing on goals and objectives is one of the key indicators of team integration practice in construction projects. The creation of a single focused project culture has previously been suggested by Moore and Dainty [20] as a way of bringing the various professionals together. Love et al. [5] stated that overall project effectiveness and efficiency will depend on the integrated efforts of the construction team’s ability to focus and work together toward common goals within a project’s organisational system. The goals and objectives will only be achieved if the team members work together in a mature environment for the benefit of every single person involved in the process, helping each other, sharing information and experience [26]. Forques and Koskela [15] added that focusing on goals and objectives is about how each member builds together a shared view of the project purpose; agree the best way to achieve it, and how they will stay on target. Ochieng & Price [22] suggested that the project manager should have the ability to understand and clearly verify and articulate the project goals and objectives with the project team as this can influence the effectiveness of team performance on projects. It is also necessary that the project delivery team, in addition to knowing what has been specified as “value”, understands the underlying factors and preconditions of individual stakeholder value, needs, interests, etc. in order to achieve the goals and objectives of the project [16].

2) 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 the competitive market [14]. Dainty et al. [21] 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 the construction projects [23]. 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 [26]. Forques and Koskela [15] 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 [19]. To work as a team efficiently and collaboratively, it is essential to have some degree of cohesion of team culture [22]. The Office of Government Commerce [25] 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 [27] mentioned

that collaborative interaction in multi-party coalitions is the key to integrating the project team and understanding the complexity of construction projects.

3) Trust & Respect

Another important key indicator of team integration practice is building trust and respect amongst the team members [15, 21]. 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 [27]. Lack of trust and commitment are important factors that can deter the development of integrated teams [17, 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 [26]. Dainty et al. [21] 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 [23]. 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 teams involved in the project. Sharing of information and integration of systems within the project team requires trust and coordination [11]. Briscoe and Dainty [10] 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.

4) Communication

Many authors, [see for instance 5, 6-8, 10, 11, 13, 22, 23, 26] identified communication as one of the core indicators in enhancing the practice of team integration in construction projects. As described by Love et al. [5], 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 [23]. Ebvuumwan and Anumba [3] 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 [22]. Moore and Dainty [23] 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 [10]. 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 [13] 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 [16] further added that facilitation and leadership appeared to be a vital technique for achieving effective communication between the construction professionals and other stakeholders.

5) Sharing information

Sharing information is also seen as a key indicator of team integration practice [3, 14, 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 [8]. The lack of information or a response from project stakeholders becomes critical for progressing with project decisions [16]. The integrated project team should be an environment for openness, where shared information is essential for mutual respect and effective collaboration [26]. 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 [12]. 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 [18]. Such strategies to develop IT tools in order to support multi-disciplinary team interaction will contribute to smooth and effective information and knowledge sharing [12]. 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 [4]. It seems clear as Ebuomwan and Anumba [3] 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.

6) Integrated ICT systems

Love et al. [5] viewed one of the key indicators of team integration practice, as the ability of the project team to utilise ICT systems to enhance the delivery process and to drive the project to achieve the aligned goals. In principal, the integration of ICT systems will act as a common system and open information channels to provide better understanding of the client's requirements as well as improve communication between project teams [26]. Application of ICT systems as a tool in construction projects is considered an important element in developing integrated construction environments between construction teams [4]. As stated by Karlsson et al. [18], the use of the internet, e-mail, and other technologies has been steadily filtering into the process of creating a concurrent engineering (CE) environment, and enabling more integrated and collaborative efforts between project teams. Moore and Antill [19] briefly explained that it is possible to overcome the lack of communication and information flow due to geographic separation. This can be achieved through the ability to bring all stakeholders together within a common electronic network. For instance, it can be done by holding online conferences using the internet as a medium of exchanging information. Cheng et al. [11] added that companies can create virtual channels where people can communicate and collaborate with each other. The utilization of the internet as a communication network has emerged as a way to integrate project teams by distributing information in a flexible, scalable, and reusable manner. Kajewski et al. [14] further elaborated that ICT could be seen as a means in improving the nature of project team performance by reducing more daily tasks (e.g. record-keeping, improving communication, etc.) to allow team members to concentrate energies on being more creative and innovative.

3. Conclusions and Future Research

Team integration is essential for successful project delivery. Although research on integrating project teams from a non-relational contracting perspective is well understood, there are still barriers to be overcome to enable teams to perform to their full potential [6]. A framework for project teams on how to understand and improve team integration practice in relational contracting would benefit the construction industry. Future research will identify the key indicators that contribute to the successful integration of a team in relationship contracting, such as alliancing. The indicators will be investigated to determine which ones best improve team integration. Finally, an assessment tool for measuring team integration will allow organizations to benchmark their team integration practices.

4. References

- [1] Latham, M. *Constructing the Team, Joint Review of Procurement and Contractual Arrangements in the United Kingdom Construction Industry: Final Report*. HMSO, London, 1994. viewed 10 February 2011, <<http://nec-discussion.web.officelive.com/Documents/constructing%20the%20team.pdf>>.
- [2] Egan J. *Accelerating change*. London: Department of the Environment, Transport and the Regions, 2002. viewed 15 February 2011, <http://www.strategicforum.org.uk/pdf/report_sept02.pdf>.
- [3] Ebuomwana, N.F.O. & Anumbab, C. J. An integrated framework for concurrent life-cycle design and construction. *Advances in Engineering Software*, 1998, 29 (7–9), 587–597.

- [4] Alshawi, M. & Faraj, I. Integrated construction environments: technology and implementation. *Construction Innovation*, 2002, 2 (1), 33 – 51.
- [5] Love, P.E.D., Gunasekaran, A. & Li, H. Concurrent engineering: a strategy for procuring construction projects. *International Journal of Project Management*, 1998, 16 (6), 375 – 383.
- [6] Baiden, B.K., Price, A.D.F. & Dainty, A.R.J. Looking beyond processes: human factors in team integration. In: Greenwood, D J (Ed.), *19th Annual ARCOM Conference*, 3-5 September 2003, University of Brighton. Association of Researchers in Construction Management, 2003, Vol. 1, 233 – 242.
- [7] Baiden, B.K., Price, A.D.F. & Dainty, A.R.J. The extent of team integration within construction projects. *International Journal of Project Management*, 2006, 24 (2), 13 – 23.
- [8] Baiden, B.K. & Price, A.D.F. The effect of integration on project delivery team effectiveness. *International Journal of Project Management*, 2011, 29 (2), 129 – 136.
- [9] Constructing Excellence. *Effective Teamwork: A Best Practice Guide for the Construction Industry*, Constructing Excellence, London, 2004. viewed 3 March 2011, <http://www.constructingexcellence.org.uk/pdf/document/Teamwork_Guide.pdf>.
- [10] Briscoe, G. & Dainty, A. Construction supply chain integration: an elusive goal?. *Supply Chain Management: An International Journal*, 2005, 10 (4), 319 – 326.
- [11] Cheng, J.C.P., Law, K.H., Bjornsson, H., Jones, A. & Sriram, R. A service oriented framework for construction supply chain integration. *Automation in Construction*, 2010, 19 (2), 245 – 260.
- [12] Dulaimi, M.F., Ling, F.Y.Y., Ofori, G. & De Silva, N. Enhancing integration and innovation in construction. *Building Research & Information*, 2002, 30 (4), 237 – 247.
- [13] El-Gohary, N.M. & El-Diraby, T.E. Dynamic knowledge-based process integration portal for collaborative construction. *Journal of Construction Engineering and Management*, 2010. 136 (3), 316 – 328.
- [14] Kajewski, S., Chen, S.E., Brewer, G., Gameson, R., Gajendran, T., Kolomy, R., Lenard, D., MacKee, J., Martins, R., Sher, W., McCabe, K. & McCann, J. *Project Team Integration: Communication, Coordination and Decision Support. Part A: Scoping Studies*. Technical Report 2001-008-C-04, CRC-CI, Queensland University of Technology, 2003. viewed 5 April 2011, <<http://eprints.qut.edu.au/17874/1/17874.pdf>>.
- [15] Forgues, D. & Koskela, L. The influence of a collaborative procurement approach using integrated design in construction on project team performance. *International Journal of Managing Projects in Business*, 2009, 2 (3), 370 – 385.
- [16] Jørgensen, Bo. & Emmitt, S. Investigating the integration of design and construction from a “lean” perspective. *Construction Innovation*, 2009, 9 (2), 225 – 240.
- [17] Rahman, M.M., & Kumaraswamy, M.M. Relational contracting and teambuilding: assessing potential contractual and no contractual incentives. *Journal of Management in Engineering*, 2008, 24 (1), 48 – 63.
- [18] Karlsson, M., Lakka, A., Sulankivi, K., Hanna, A.S. & Thompson, B.P. Best Practices for Integrating the Concurrent Engineering Environment into Multipartner Project Management. *Journal of Construction Engineering and Management*, 2008, 134 (4), 289 – 299.
- [19] Moore, D.M. & Antill, P.D. Integrated Project Teams: the way forward for UK defence procurement. *European Journal of Purchasing & Supply Management*, 2001, 7, 179 – 185.
- [20] Moore, D.R. & Dainty, A.R.J. Integrated project teams’ performance in managing unexpected change events. *Team Performance Management*, 1999, 5 (7), 212 – 222.
- [21] Dainty, A.R., Briscoe, G.H. & Millet S.J. New perspectives on construction supply chain integration. *Supply Chain Management: An International Journal*, 6 (4), 163 – 173. Ciemil, S. & Marshall, D. (2005) Insights into collaboration at the project level: complexity, social interaction and procurement mechanisms. *Building Research & Information*, 2001, 33 (6), 523 – 535.
- [22] Ochieng, E.G. & Price, A.D. Framework for managing multicultural project teams. *Engineering, Construction and Architectural Management*, 2009, 16 (6), 527 – 543.

- [23] Moore, D.R. & Dainty, A.R.J. Intra-team boundaries as inhibitors of performance improvement in UK design and build projects: a call for change. *Construction Management and Economics*, 2001, 19 (6), 559 – 562.
- [24] Rahman, M.M., Kumaraswamy, M.M. & Ling, F.Y.Y. Building a relational contracting culture and integrated teams. *Canadian Journal of Civil Engineering*, 2007, 34, 75 – 88.
- [25] Office of Government Commerce (OGC). *Achieving Excellence in Construction. Procurement Guide 05: The integrated project team: team working and partnering*. London, UK, 2003. viewed 12 April 2011, <<http://www.ocg.gov.uk/documents/cp0065.pdf>>.
- [26] Strategic Forum for Construction. *The integration toolkit guide: integrated project team*. London: Strategic Forum for Construction, 2003. viewed 29 March 2011, <http://www.strategicforum.org.uk/sfctoolkit2/ipt_workbooks/00.html>.
- [27] Cicmil, S. & Marshall, D. Insights into collaboration at the project level: complexity, social interaction and procurement mechanisms. *Buil3ding Research & Information*, 2005, 33 (6), 523 – 535.