

Overview of Key Indicators of Team Integration in Construction Projects: New Zealand Practitioners' Point of View

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Abstract

The purpose of this paper is to provide an overview of the key indicators of team integration in construction projects, based on an online survey of a construction peer group in New Zealand. A literature review was initially conducted to review the concept of team integration in construction projects and, from this, 15 key indicators were identified. A set of questions designed to confirm and rank the indicators was included in an online questionnaire survey. Analysis of the survey results revealed that all 15 indicators have a strong influence towards determining the success of team integration in construction projects. The top-ranked factors that contribute towards successful team integration are free flowing communication, single team focus and objectives, commitment from top management, trust & respect, and encouraging initiative. In addition, suggestions on how to improve team integration were identified as part of the survey.

Keywords: Construction Projects, Key Indicators, Team Integration, New Zealand

1. Introduction

Project delivery performance within the construction industry has, in the past, been criticised due to its fragmented approach to project delivery (Latham, 1994; Egan, 2002). The traditional procurement approach does not encourage the integration, coordination and communication between project teams needed to overcome this fragmentation (Latham, 1994; Love et al., 1998). Indeed, the characteristics of the contract can hinder effective collaboration and cooperation (Love et al., 1998; Walker et al., 2002), resulting in various teams being unable to collaborate and work together as expected to deliver projects effectively (Egan 2002; Evbuomwan and Anumba 1998). It is also acknowledged that the fragmented transactional

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agreements in the traditional approach have a negative impact on team dynamics, and channel various team efforts to meet contractual deliverables instead of defining best solutions (Forques and Koskela, 2009).

Teams from different types of organisations must be able to coordinate and cooperate to fully utilise their knowledge and experience to ensure that the information can be shared and transferred effectively throughout the project life cycle. Moore and Dainty (1999) indicated that successful project delivery and the performance of the construction industry depend, to a large extent, on how the knowledge and experience of many people can be integrated together as a team. Teams and individuals possessing substantial diversity in skills, knowledge and expertise, but who may not have previously worked together, make integration more difficult to achieve (Baiden et al., 2006). In addition, the process of integration in a team does not happen automatically, as it may be hindered by various issues, such as lack of collaboration, inconsistent shared vision, poor communication and inadequate participation from team members (Constructing Excellence, 2004).

This study was designed to validate, through an online survey of practitioners in New Zealand, key indicators of team integration in construction projects identified from a previous review of the literature (Ibrahim et al., 2011a; 2011b). The indicators were assessed based on their level of significance. Finally, suggestions on how to improve team integration were identified based on practitioners' experience in the construction industry.

2. Key Indicators of Team Integration

A previous review of literature was conducted by Ibrahim et al. (2011a; 2011b; 2012) to understand team concepts and integration approaches in construction projects. This resulted in a set of 15 indicators that contribute to team integration as identified in Figure 1. This study aims to validate these 15 indicators from a practitioners' point of view.

Through observation of the existing literature, relationship based attributes are seen as key as they have a direct influence on the relationship between project teams. Indicators such as trust & respect, no-blame culture, commitment from top management, and communication, among others, are identified as the main behavioural factors influencing the development of team integration practice.

The literature also indicates that the use of systems or processes in influencing human behaviour is important, for example having an integrated ICT system. The importance of having systems and processes actively promote desired behaviours among project teams in delivering projects is often underestimated, or overlooked altogether (Boedker et al., 2011). Although project teams normally aspire to a culture of collaboration and efficiency, the existence of "red tape" restricting the capacity of teams to demonstrate initiative and get things done, and a lack of processes in place to promote, or even allow, members of different functions to collaborate have contributed to the disintegration of team integration practice (Lawrence & Scanlan, 2007).

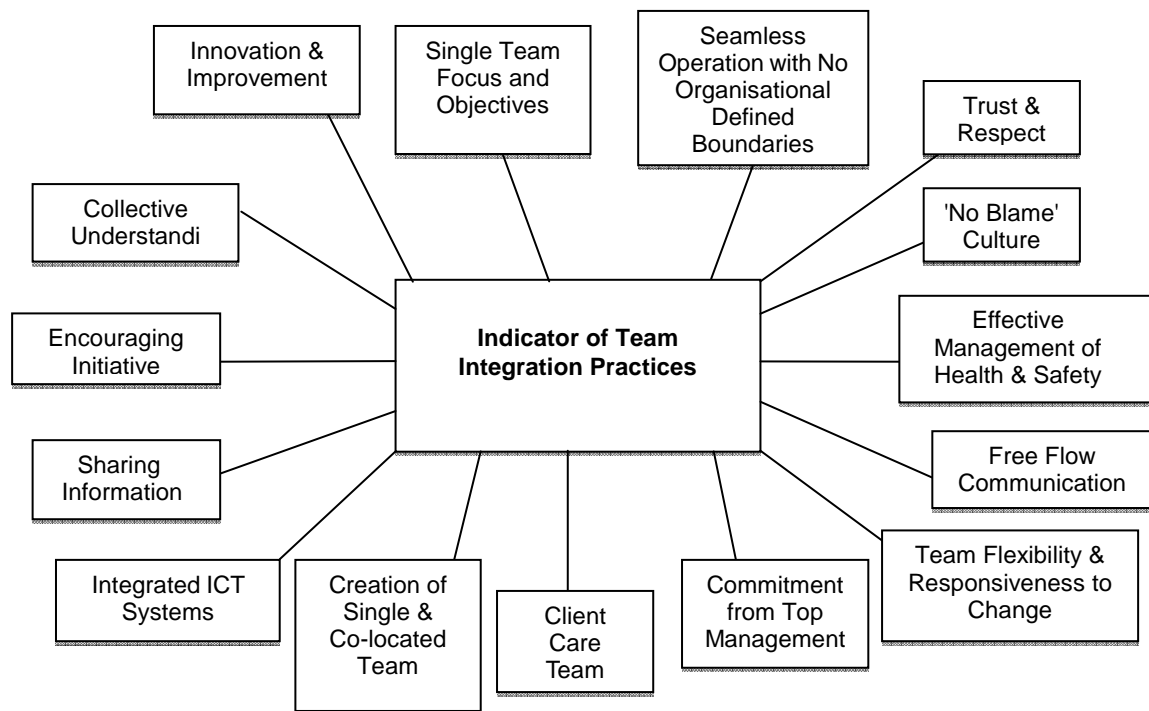


Figure 1: Summary of 15 indicators identified from existing literature (Adapted from Ibrahim et al., 2011a; 2011b).

3. Research Methodology

The research methodology for this study included the development and distribution of a questionnaire survey for data collection purposes. A construction peer group from New Zealand, the Construction Clients' Group (CCG), was selected to participate in this study. The CCG is an established peer group for public & private sector clients of construction in New Zealand. Its members typically hold top and senior management positions in the industry. Consequently, it was considered extremely useful to draw on the CCG members' experience, knowledge and expertise regarding the subject of team integration. This survey had the following objectives:

- To validate the key practice indicators of team integration identified from the construction management literature.
- To rank the key practice indicators in terms of their importance in assessing team integration in construction projects.
- To elicit feedback and suggestions on how to ensure team integration practice.

The questionnaire comprised of both closed-ended and open-ended questions and was divided into two parts. The first part of the questionnaire (SECTION A) sought background

information on each participant's level of experience, how many years they have been in the industry and the type of contracting arrangements that they have been involved in over the years. The second part (SECTION B) focused on what key practice indicators they considered important for assessing the success of team integration in construction projects, as well as their views on methods to ensure team integration in construction projects.

The survey was administered online. An email with a brief introduction about the survey was sent to the participants between 13 September 2011 and 15 October 2011 with the help of CCG, along with the survey hyperlink, and an attachment of the survey summary for their reference. According to CCG, the survey was sent to 588 individual members' email accounts. From the invitation, 38 responded, which is equivalent to 6.5% as the response rate. However, from the 38 responses received, only 35 respondents (6% response rate) could be used for analysis purposes as the other 3 respondents did not complete SECTION B of the questionnaire.

4. Survey Results and Discussions

4.1 Section A: Profile of Respondents

The various designations and varying years of experience of respondents to this survey are included in Table 1. Eighteen of the respondents (52%) identified themselves as managers, five respondents (14%) were directors, six respondents (17%) held other positions such as senior consultant, project engineer or technical advisor, and the remaining six respondents (17%) did not reveal their current positions. It is clear that the majority of respondents belong to senior and top management decision makers, with the balance predominately senior engineers and advisors.

Overall, there was a fairly good mixture of designations of respondents with 66 per cent of the respondents holding upper level management positions in their organisations. On average, respondents had about twenty six (26) years of experience in the construction industry. The survey results are discussed in the following sections.

Table 1: Summary of respondents

	Respondent characteristics	No. of respondents (Total = 35)	(%)
Designation	Directors	5	14.3
	Managers	18	51.4
	Others	6	17.1
	Unknown	6	17.1
Years of experience	0-10	5	14.3
	11-20	5	14.3
	21-30	12	34.3
	31 and above	8	22.8
	Unknown	5	14.3

4.1.1 Respondents' Involvement in the Construction Industry

Respondents were asked for their involvement in the construction industry in terms of type of sector and project delivery systems. Referring to Table 2, the majority (89 per cent) of the respondents were involved (at some stage of their career) in the infrastructure sector. The commercial and maintenance sectors follow with 60 per cent and 51 per cent, respectively. The residential sector comes fourth with 40 per cent, followed by other sectors with 17 per cent. Based on the survey, responses on the other sectors included aeronautical, macro planning and public / civil building. Overall, it reflects the fact that in New Zealand, infrastructure has become a political priority and the government is committing billions of dollars to infrastructure projects as one means of fighting the recession (McCormick, 2010).

Table 2: Respondents involvement in industry by sectors and delivery systems

		No. of respondents (Total = 35)	(%)
Sectors in Industry	Infrastructure	31	89
	Residential	14	40
	Commercial	21	60
	Maintenance	18	51
	Others	6	17
Type of Delivery Systems	Traditional	33	94.3
	Design & Build	32	91.4
	Joint Venture	22	62.9
	Partnering	23	65.7
	Alliancing	15	42.9
	Others	4	11.4

As expected, the most prevalent project delivery system that the respondents had been involved in throughout their career was the traditional system with 94.3 per cent. Design and Build follows behind with 91.4 per cent. The respondents were also involved with more advanced project delivery approaches, notably partnering and joint ventures, with 65.7 per cent and 62.9 per cent respectively. Alliancing comes fifth with 42.9 per cent and the least percentage was for other types of project delivery with 11.4 per cent. Based on the responses, the other types of project delivery included early contractor involvement (ECI), construction management and private finance initiative (PFI) / public private partnership (PPP).

Overall, Zuo et al. (2006) describe procurement systems such as traditional, and design and build as well established and developed in the New Zealand construction industry. Although these still dominate the New Zealand construction industry, this study has shown that approximately 40% and 60% of the respondents had been involved in alliancing and partnering, respectively, which suggest an increasing understanding and use of new procurement forms. According to McCormick (2010), in New Zealand, alliances and other forms of collaborative contracting are now a major procurement force and the trend is growing.

4.2 Section B: Ranking of Team Integration Indicators

4.2.1 Significance of Key Indicators of Team Integration

Respondents were asked to rate the 15 indicators of team integration on how significant they thought each was for determining the success of team integration in construction projects. They were asked to rate the indicator based on the selection of a score according to the 5-point Likert scale, ranging from 1 = Not Significant, 2 = Least Significant, 3 = Neutral, 4 = Significant, to 5 = Highly Significant. Results are shown in Table 3.

Overall, the indicators “Single Team Focus and Objectives” and “Free Flowing Communication” received the highest mean ranking of the team integration indicators with a 4.7 mean rating. This is followed by “Trust & Respect” and “Commitment from Top Management” which both received a 4.5 mean rating. These four highest rated indicators can be classified as “Highly Significant” in determining the success of team integration in construction projects.

Indicators such as “Encourage Initiative” with a mean rating of 4.4, “No Blame Culture”, “Sharing Information” and “Innovation and Improvement” which shared the same mean rating value of 4.2 and “Team flexibility & Responsiveness to Change” which received a mean rating of 4.1, can be classified as “Significant” in terms of influencing team integration. The remaining choices among the 15 indicators were “Integrated ICT system” with a mean rating of 3.9, “Seamless Operation with No Organisational Defined Boundaries” with a 3.8 mean rating, while “Client Care Team”, “Collective Understanding” and “Creation of Single & Co-located Team Location” received the same mean rating value of 3.7. The least important indicator according to the ranking is “Effective Management of Health & Safety”, with a mean rating of 3.6.

Table 3: Mean rating of key indicators of team integration

Indicators	Significance (Mean Rating)	Ranking
Free Flowing Communication	4.7	1
Single Team Focus and Objectives	4.7	1
Commitment from Top Management	4.5	3
Trust & Respect	4.5	3
Encourage Initiative	4.4	5
Innovation & Improvement	4.2	6
Sharing Information	4.2	6
No Blame Culture	4.2	6
Team Flexibility & Responsiveness to Change	4.1	9
Integrated ICT system	3.9	10
Seamless Operation	3.8	11
Creation of Single & Co-located Team Location	3.7	12
Collective Understanding	3.7	12
Client Care Team	3.7	12
Effective Management of Health & Safety	3.6	15

Even though indicators such as integrated ICT system and single team location received a lower mean rating compared to others, their value should not be underestimated. As described by Alshawi and Faraj (2002), the application of ICT systems as a tool in construction projects is considered an important element in developing integrated construction

environments between construction teams. While, Baiden et al. (2006) suggested that the establishment of co-located design and construction teams will increase the integrated culture between teams.

In addition, it should also be noted that these types of indicators, for example, single team location, are only practiced under certain types of contract that utilise an integrated approach such as project alliancing. As mentioned by Baiden et al. (2006), some procurement approaches do not necessarily call for the creation of a single co-located team although collective working was encouraged on the project. Thus, the lower mean rating might be caused by the fact that approximately half of the respondents were not familiar with collaborative contracting such as partnering and alliancing.

The top 5 indicators which appear to have the greatest effect on team integration success based on the ranking were; (1) Free Flowing Communication; (2) Single Team Focus and Objectives; (3) Commitment from Top Management; (4) Trust & Respect and (5) Encourage Initiative. Overall, the survey results confirm that all the 15 indicators which received an average of towards “significant and highly significant” responses are needed to ensure the success of team integration practice.

In determining the consistency and consensus of the experts' ranking on team integration indicators, the intraclass correlation coefficient ICC(k) (combination of Interrater Agreement (IRA) + Interrater Reliability (IRR)) method was adopted. Interrater reliability coefficients (IRR) indicate the consistency of the pattern of ratings by two or more raters and interrater agreement coefficients (IRA) indicate the degree of similarity in the level or magnitude of ratings by two or more raters (Kumaraswamy and Anvuur, 2008). The ICC is estimated when attempting to understand the IRR + IRA among multiple targets rated by a different set of judges on an interval measurement scale. ICC values range from 0 (total lack of agreement) to 1 (perfect agreement) and a value of 0.7 has been used as the traditional cut-off point signifying an acceptable ICC value (LeBreton and Senter 2008). In this study, values of 0.807 (IRR) and 0.768 (IRA) were scored, both of which exceed the 0.70 threshold. The high IRR value indicates a high level of consistency among the experts in assessing the team integration indicators. The high value of IRA indicates strong consensus of experts on the ranking of team integration indicators.

4.2.2 Approach to ensuring team integration

In the last question of the survey, respondents were asked for their advice and suggestions on approaches to ensure team integration in construction projects. The results from these open-ended comments indicated that there is a difference of opinion amongst the respondents towards ensuring team integration in construction projects. Given the wide experience of CCG members, it has perhaps been the case that respondents had different dimensions of experience (e.g. different background, contracts, procurement systems), thus the open-ended comments are vital and essential input for this study as they reflect the reality in construction projects. From the comments, a number of suggestions on how to ensure team integration are related to the previously mentioned top 5 indicators. The related comments are shown in Table 4 below;

Table 4: Comments related to ensuring the top 5 key indicators of team integration

Rank	Indicator	Comments
1	Free Flowing Communication	<ul style="list-style-type: none"> • Encouraging the "culture of team" through organising off-site and on-site events to assist with <i>relationship</i> building and understanding individual styles of <i>communication</i>. • Ensure <i>mix</i> of capabilities and experience, foster an <i>open collegial</i> working environment, <i>co-locate</i> and <i>communicate</i> clearly.
2	Single Team Focus and Objectives	<ul style="list-style-type: none"> • <i>Co-location</i>, if possible, has proven to be essential. This goes a long way to creating the atmosphere of <i>One Team One Goal</i>. • Every member needs to feel they have an <i>important contribution</i>. Project <i>objectives</i> need to be strictly adhered to (no side tracking) and deadlines constantly reviewed.
3	Commitment from Top Management	<ul style="list-style-type: none"> • <i>Strong leadership</i> from key managers seeks to have early alignment, and keep pursuing the goal of team integration. Try different methods, until one works, and if it stops working, try something else. It's a relentless pursuit. • <i>High management</i> need to buy in early, nothing will short circuit a project team effort more than a contrary unilateral high level decision based on a left field parameter like politics etc.
4	Trust & Respect	<ul style="list-style-type: none"> • Early team interaction. Involve everyone; seek opinions and advice from all. Be <i>open</i> and <i>honest</i>. <i>Trust</i> exists from day 1, it can only be lost. • <i>Communicate</i> freely to build up <i>trust</i> and ensure all are aware of the <i>objectives</i>.
5	Encourage Initiative	<ul style="list-style-type: none"> • Acting as a <i>role model</i> all the time to encourage the "feeling of team". • <i>Lead by example</i>, someone will show the way and this makes others (if it is contractually embedded) fall into the collective line. • <i>Frequent gatherings</i> of team personnel in order to establish a more collective understanding that could lead towards <i>initiatives</i> and <i>innovation</i> in solving problems.

The majority of respondents indicate that relationship attributes such as leadership, openness, honesty, trust, shared vision and collective understanding are essential in ensuring team integration. However, approaches such as having a co-located team are also mentioned as helping create a good team work atmosphere with a more collaborative working approach. It is therefore evident that there is an element of interdependence between some of the indicators, for example co-location is seen as promoting Free Flowing Communication and Single Team Focus and Objectives. Similarly, communicating freely is required to build up Trust & Respect.

Overall, based on the comments provided, it can be summarised that team integration practice can be improved by using specific mechanisms, as follows;

- Establishing or enhancing a culture of acknowledgment (and appreciation) of a team;
- Implementing a rigorous selection of individuals for a team on a "best for project" basis;
- Contract based model that emphasizes the concept of early involvement and shares pain and gain in order to ensure that all parties are playing to the same rules;
- Having a regular team meeting / workshop / social event in order to update and resolve any key issues, and at the same time try to get an understanding of, and improve, team bonding and relationships;

- Team building to strengthen relationships, build trust and better social relations and remove all interpersonal past barriers; and
- Contract management plan and performance drivers can be used to monitor the responsibilities (performance) of the teams involved.

5. Conclusions

This study has provided an overview of the key indicators of team integration in construction projects from a New Zealand practitioners' point of view. This study also assessed the significance of the key indicators and provided insight into methods for ensuring team integration in general. The findings suggest that all 15 indicators are important and the results of the analysis also revealed that they have a strong influence towards determining the success of team integration in construction projects.

This study has ranked the key indicators based on the significance of the indicator towards ensuring team integration practice. The top-ranked factors that contribute towards successful team integration are free flowing communication, single team focus and objectives, commitment from top management, trust & respect, and encourage initiative. In addition, various dimensions of approach in ensuring team integration practice have been identified. Based on these, continuous improvement guidelines can be established which will be beneficial to practitioners in need of advice on how to ensure team integration practice.

Overall, the variability in the responses suggest that different experience in the construction industry may have an impact on assessing the significance of the team integration indicators and approaches in ensuring team integration in construction projects. The difficulty lies in assessing the extent of the impact. In addition, the degree and type of interdependence of these indicators may also present a challenge in any future research. Finally, this study was limited to the views and opinions of respondents from the New Zealand construction industry that are registered with CCG. As such, the findings of this study may not represent the views of the entire New Zealand construction industry.

Future research should therefore focus more on enhancing our understanding of how the procurement approach influences a team's ability to perform. In addition, further research is needed to understand the degree and type of interdependence of the proposed indicators. Finally, since the key indicators were assessed from a New Zealand practitioners' perspective, it is suggested that further research should be conducted in other countries for comparative purposes.

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