Effect of project team integration on the performance of Indian construction project: SMART PLS Structural Equation Approach

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ABSTRACT

Due to competition and high expectations of customers, the construction sector is faced with several challenges while pursuing project outcomes. Generally, construction firms consist of various project teams with multipurpose, which necessitates participation and involvement of team members in an organised manner to complete the project effectively. The current research aimed to understand the essential factors that contribute to Effective Teamwork in the construction industry. The study is based on primary data via a questionnaire-based survey method. The data collected from 72 respondents comprises various construction team members like Engineers, Contractors, Owners, Architects from various parts of Tamil Nadu. The data collected were processed using the Structural Equation Model (SEM), which was employed in this research to understand the relationship among the successful outcomes and the factors determining the team's success. The analysis of the results and the model show that the integration between the project team brings about a uniquely positive effect on construction project outcomes at a R^2 value of 0.733. This study provides empirical evidence that a successful construction project team will positively influence the outcome of construction projects.

KEYWORDS: Project team; Construction industry; Project performance; SMART PLS, Structural Equation Model.

INTRODUCTION

Teamwork is a situation where a group of people with various skills and knowledge work together in a mutually supportive and coordinated way to attain the common goal or objectives of firms. Generally, construction is a collaborative process that includes Engineers, Contractors, Owners, Architects, working together in teams to complete projects. Merely bringing people to work together may not result in the active function of the team. Effective teamwork does not form automatically, firms or projects have to promote it to overcome problems. The various problems which may occur are poor communication, inadequate participation, misunderstanding, and lack of organisation**.** The essential elements of productive teamwork are outlined in the following paragraphs.

Spatz (2005) studied the improvement of the organisation's performance, competence, productivity are based on collaborative teamwork learning and proper communication among the people in the firm. It promotes corporate efforts today by replacing hierarchical structures based on team-oriented organisations. It is an essential one for the construction industry. Because in the construction process the teamwork is an integral part of completing the project successfully. It has been identified that to sustain competitive challenges, and construction companies implement hierarchical management approaches through open communication, trust, Collaboration, and quick responses to the required changes. It has been revealed from this research that the key factors which induce team building are Commitment, Mutual trust, Communication, and Leadership.

Mitropoulos and Memarian (2012) examine the various factors that enhance the efficient teamwork process in the construction industry, promoting the worker's safety. The first step is to analyse team performance based on the focus of construction workgroups. These reviews have identified the behavioral, cognitive, and affective modules that affect the teamwork process construction industry, which influences the construction worker's safety. In this, the framework formed by teamwork constructs practitioners has been formulated for teamwork development. It has been concluded from this study that critical issues that influence the teamwork process for the construction worker's safety are Prevent and manage errors Reduce and Mitigate task demands directly, increase in compliance with safety rules (Payne, 2021). Chan *et al.* (2001) examine the possessions of Project outcomes based on the concert of the intern organisational teamwork. This research mainly focuses on determining the relationship between project contestants' work fulfillment and the entire project performance of inter-organisational teamwork. The questionnaire survey was conducted to obtain the bivariate analysis data collected from participants in public sector projects. Findings show that inter-organisational teamwork influences Successful project performance, project participants develop a favorable view of projects, and job satisfaction. Patrick *et al.* (2007) describe inter-organisational teamwork as one of the essential aspects of construction firms. This research determines the aspects which affect the individual's perception of the team. It has been identified by creating the modified model that includes the effects of cultural factors on employee attitudes on team orientation. By the questionnaire, survey data has been collected from the inter-organisational team members. It is confirmed from the previous studies' findings that there has been a positive relationship between the competency test, task interdependence, and team alignment. However, there is a negative relationship between team orientation and speculation. (Franz *et al.,* 2017).

Tennant *et al.* (2011) examined the relationship between task performance and team efficiency. The study also analysed a distinct aspect of the team performance based on project performance and construction site management. In this, the data has collected by the attitude statement questionnaire survey. Findings from the results show that team and performance are inseparable. It has been concluded that better-performing teams always better performance projects. Sinem, Korkmaz and Aditya (2012) describe the construction industry, and its existing techniques are split in nature depends upon that team member works separately in the whole thinking. Due to the multifaceted collaboration among different prospects, producing a sustainable building with system optimization is not easy. This research investigates the teamwork approach to provide feasible built environment practices. Results show leadership, teamwork, communication, mutual trust among team members where team members from different disciplines may lead to the project success. Albanese (1994) describes the significant

improvements in the project results based on the efficient team constructing process with the inter-organisational team. This study represents the data obtained by personal interviews and questionnaire surveys from the construction industry. It includes both public and private sector projects. It is identified that the entire project has team building in various degrees. The results determine the substantial improvement in project results obtained by inter-organisational teams paired with the team-building process.

Yuan and Jing (2014) study the relationship between team conflict, climate, and team effectiveness. Data has been collected from the team members by the questionnaire survey. It is determined that a constructive confrontation approach is managing team conflict and provides practical implications for stimulating team effectiveness. While taking part in task conflict and overcoming conflict, team leaders and negotiators may reduce the intensity of their emotional reactions. Every team member is incorporated into the cooperative environment by risk-taking; feeling free to share opinions may lead to productivity. It has been concluded that team members have mutual trust and mutual understanding in creating a harmonious team climate.

Ibrahim *et al.* (2011) investigated the specific and critical relationship-oriented pointers of team assimilation in construction. In the construction industry, integration typically prefers collaborative working. It has been determined that seamless operation, communication, mutual trust and understanding, involvement, avoiding criticism and flexibility, influence team relationship practice in construction projects and improve team effectiveness and competitiveness.

Sulaiman *et al*. (2012) analysed the efficient function of team building based on the sheer spirit, job motivation, and high level of employees. The research findings show that essential elements of effective team building include behavioral skills, the capability to resolve crises and conflict in the workplace, and inspiration. Leung *et al.* (2005) describe the traditional practice towards dispersed teams, thereby creating the need to understand the leadership attributes that lead to successful project outcomes.

METHOD

The essential factors that affect teamwork effectiveness in construction firms have been identified from several literature reviews, and the questionnaire has been prepared based on the reviews. The questionnaire consists of two parts. The first part contains general information about the respondents, whereas the second part contains the factors influencing teamwork effectiveness (Table 1). The research findings from this study and literature reviews determined that effective teamwork be an essential determinant for overall project success in construction projects, which is a vital aspect in the competitive contemporary global construction sector

The descriptive research design is selected as it is the best suited for studying various behaviours and their associations with other variables. (Malhotra, 2009). The Smart PLS is a renowned software developed by Ringle *et al.* (2005). The software gains lots of acceptance because it was user-friendly and free software available to academicians and researchers. The Structural Equation Modeling (SEM) used in the current study is a second-generation multivariate analysis often used in management research because of its three unique applications (Chin, 1998; Statsoft, 2013) viz: a) it can test a theoretically supported linear

model; b) it can also test casual additive models; and c) it can visually examine the relationship of the variables through the model. Smart PLS is a soft modeling approach, and it does not take into any assumptions for distribution of data, and it is a good alternative for Covariance based SEM for the following situations when: the sample size is small, the study application has little availability of theory, predictive accuracy is supreme, and when correct model specification cannot be confirmed.

Partial Least Square (PLS) facilitates two models to measure the different variables, an outer model called the measurement model and the inner model, which determine the relationship between variables called the structural model. As a result, the outcome Smart PLS consists of two sets of equations stating:

- the outer model called the measurement model encompass the equation, which signifies the associations between the variables used as a measure.

- the inner model called the structural model which comprises the equations that indicate the path (i.e.) the strength of the relationship between variables.

To estimate the results based on the model, it is essential to simultaneously consider both the measurement and structural models (Hair, 2006; Rolph, 2011). So, the researchers have used Partial Least Square (PLS) path modeling technique (Ringle, 2005), commonly used in behaviour-related research.

Research Tool

The current study is based on a descriptive research design. Furthermore, the current study aims to pinpoint the factors promoting the success of construction projects through team integration. For that, the questionnaire survey was used as the research instrument and had two categories. Each explains the demographic profile of the respondents and their perspective towards the success of construction projects through team integration. A variety of constructs were created initially based on the past literature (Chan *et al.*, 2001; Spatz. 2000). After checking the validity and reliability, the final questionnaire was designed after removing specific insignificant items. The final questionnaire consists of 40 questions, and that has been used for the survey. These 40 items have been categorized into seven critical spheres of influence involved in understanding the accomplishment and success of construction projects through team integration had; a Cronbach's Alpha value was 0.818, which is higher than the standard cut-off value of 0.7. It is concluded that reliability is accurate and suitable for further data analysis. The conceptual research framework is shown in Figure 1.

Research Framework

A team is a group of people who work together (Spector, 2000; Varvel *et al.,* 2004), and a work team is where a group of individuals is working interdependently towards a common goal (Kirkman, 2000). The work team shares the responsibility in common for specific outcomes (Henkin & Wanat, 1994) and works systematically (Sulon,1997). A strong inclination and development in management strategy in recent years is the team-related work. In the competitive and global environment, jobs are created as projects or teams for a successful outcome (Weiss, 2002). Messmer (2003) the increase in using project teams have

resulted in effective project outcome due to the pooling of talents. The current study analysed the critical factor that determines the outcome of the construction project. Based on the past literature, team skills, team structure, team climate, atmosphere, team identity, team leadership, situation monitoring, communication, and mutual support are the factors chosen for the study. Spector (2000) says team success depends on individual skills, roles, and a common goal.

Team Skills

Activities in the industry are characterised by teamwork-based for the delivery of projects (Assaf *et al.,* 2014; Khoshtale & Adeli, 2016). Bennett (2003) also views the construction project as an enterprise involving many people with diverse interests, talents, and backgrounds to achieve a common goal. Each project needs different people by their professionalism, knowledge, and experiences. The participants must work and collaborate with others from different organizations (Khoshtale & Adeli, 2016). Therefore, teamwork is considered the central part or core foundation of the success of construction projects. (Khoshtale & Adeli, 2016). Assaf *et al.* (2014) showed a positive and high correlation between team effectiveness and project success. Based on the above, we hypothesize:

H1: There is a significant association between the team skills of the construction project team and construction project outcome.

Team Structure and Situation Monitoring

The external factors of the organization also influence the organisational strategy, authority structures, formal policies/regulations, the resource used, and the organisation's culture (Robbins, 2000). The organisational structures of contemporary construction firms are too complex, formal, and rigid. They have many challenges due to centralisation and decentralisation (Robbins,1998; Robbins, 2000). Based on the above, we hypothesize:

H2: There is a significant bonding between the team Structure of the construction project team and the construction project outcome.

Team Climate, Identity and Atmosphere

Team identity is the initial step to form effective teamwork (Warner *et al.*, 2005). It manages the teamwork with clarity, commitment, contribution, and concerns which are essential elements of the team identity. Team clarity emphasis the vision and mission of the team, and it also formulates strategies for team collaboration. The team identity also ensures timelines for all activities and the team member. It also provides a suitable level of authority and helps fix the needed commitment level to the projects. Commitment leads to the fixation of each team member's responsibility level and helps to prop up an assured level of effectiveness to their action. It improves the level of team member's effective involvement to enhance productivity. Team contribution (Bjørn & Ngwenyama,2009) describes the team's strength and weaknesses, specific skills and knowledge levels, individual team member's roles in the team, and the resultant outcome. The role of the team leader is an essential stimulator for the performance of team members (Ali *et al*., 2020). Based on the above, we hypothesize:

H3: There is a significant correlation between team climate and construction project team identity and construction project outcome.

Team Leadership

A team leader identifies each team member's perception and opinions and rejuvenate strategies to improve member participation towards the team (Seers,1989). The essential aspects of effective teamwork are clear goals and role clarity, which facilitates attaining the firms' objectives (Khoshtale & Adeli, 2016). Effective teamwork can be developed through shared goals, mutual goal setting, and collaborative work in regular patterns. The goals and clear objectives have to be developed for the team and the individual team members. The goals should be specific and measurable (Yang *et al.,* 2011). The whole team has to work on predetermined common objectives. Team members individually and collectively contribute to the achievement of the common objectives.

In the team function, the communication factor is an important facet in the communication function to understand and develop the ideas. Through transparent communication, team members can actively and openly share their ideas and knowledge. The project team members need to collaborate successfully for the attainment of the objectives.

In a team, conflict is inevitable when the peoples work together. It is due to differing views, opinions, disagreements, and misunderstandings among team members (Ochieng & Price, 2010). The conflict may arise due to the various objectives, priorities, expectations from the team's direction goals, and team leader decision. Conflict can be resolved by adopting transparent policies, communicating the decisions, negotiating, encouraging collaboration among team members, and developing mutual trust and understanding (Chow *et al.,* 2005).

The efficient team leader forms an effective team. The team leader has to assign the task so the team members are mutually coordinated to achieve the common goal. The effective team leader should have the following capabilities- problem-solving, decision making, resolution of conflict, and communication. They have to ensure that the team members know the necessary for the completion of the task. The team leaders should encourage and motivate the team members for successful outcomes and productivity (Baidenet *et al.,* 2006). Based on the above, we hypothesise that:

H4: There is a significant relationship between team leadership of the construction project team and construction project outcome.

Team Communication

Effective communication and interaction between team leaders and members would enhance team performance (Yu *et al.,* 2018). In teamwork, collaboration and communication is the essential component. Generally, in a team, a single member cannot complete the project or attain the objectives. By effective collaborating, the teams (Nawi *et al.,* 2012) can communicate well and share their ideas, knowledge, and expertise to complete the project in an enhanced manner. For implementing better collaboration, every member of the team their involvement and participation is an essential aspect of the team's success. When the team is assigned a task, every team member should identify their jobs and complete the task successively.

Effective teamwork will be achieved by the active participation of the team members (Eskerod & Blichfeldt, 2005). It is accomplished by the binding and commitment of the members towards the job, goals, and objectives. Each team members have different roles and responsibilities while working as a team for the effective functioning of a team; the team members must be aware of their duties and responsibilities and execute them effectively (Gupta *et al.,* 2010). When the team takes a task to complete it, then the duties and responsibilities must be fairly distributed to their team members. Based on the knowledge, skills, and level of expertise the role has adopted, each team member can contribute to the task and complete it efficiently (Pramlal, 2004; Wu *et al.,* 2019). Based on the above, we hypothesise that:

H5: There is a significant association between team communication of construction project team and construction project outcome.

H6: There is a significant association between situation monitoring of construction project team and construction project outcome.

Team Performance Outcome

In the construction project, the performance and effective outcome of the project is based on the performance and task skills of the team members (Londino, 2002). The high-performance outcome in the construction project depends on high-quality teamwork, productivity, and cost-effective, timely decisions (Sartzetaki, 2011; Wu *et al.,* 2019). Each team has a unique culture due to the members, leader(s), resources, demands, and team experiences.

Owens and Hekman (2016) regarded team leaders as an essential factor in team performance; combining leadership skills and team learning could effectively enhance team performance. Lisak *et al.* (2016) indicated that leadership skills affected team performance through enhanced team communication reduced internal contradiction and promoted team members moving towards the team objectives (Bhakta & Baiden, 2021; Pollack & Matous, 2019).

Table 1: Elements determining the success of a project team based on literature

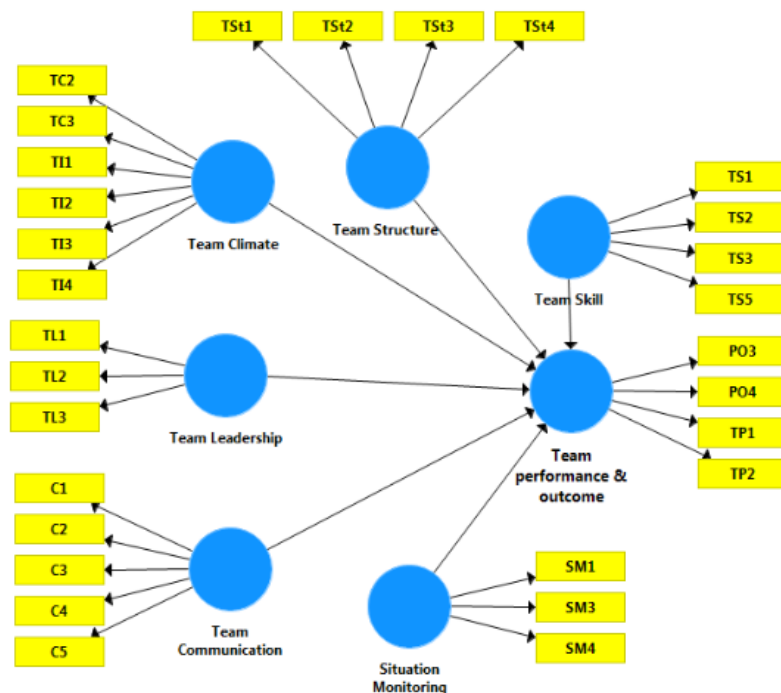| No.	Factors	Authors	Cronbach Alpha
1	Team Skills, Team leadership,	Londino, 2002	0.717
2	Team structure, Situation monitoring,	Robbins, 2000	0.671
3	Team climate, identity and atmosphere	Blanchard,1993 Hellriegel *et al.*, 2001	0.811
4	Team Communication,	Phillips, 2001	0.775
5	Team performance & outcome	Blanchard,1993 Hellriegel *et al.,* 2001	0.708

Figure 1: Conceptual research model

The above factors in Table 1 were taken for analysis based on the past literature, and the conceptual research model is shown in the Figure 1.

A questionnaire survey has collected data from different professions in the construction industry. It has been identified that twelve collaborative leadership traits drawn from the emotional managerial competencies were tested against team performance and team spirit stimulants. The study's findings show that team leadership attributes and project team members' satisfaction and mutual objectives lead to project success. The various essential factors that affect teamwork effectiveness in construction firms have been identified and listed out based on the several literature reviews from the identified factors the questionnaire has been prepared. The questionnaire consists of two sets. The first set contains general information about the respondents, whereas the second set contains the factors influencing teamwork effectiveness. In this Likert scale of 1-5, ratings are used for measuring the degree of importance. The selected respondents are Site Engineers, Quantity surveyors, Architects, Contractors, and Owners.

The questionnaire survey data has been collected from entirely over 72 respondents. To check the accuracy, the data were subjected to reliability analysis. The data collected were processed using Structural Equation Model (SEM), the second-generation statistical method - Partial Least Square (Falk & Miller, 1992). This research was adopted to understand the relationship between the successful outcomes and the factors determining the team's success. This PLS method encompasses two sets of equations, which are the assessment model and structural model. The assessment model is also known as the external model, which consists of equations characterizing the relationships among indicators and the constructs they measure. The internal model or structural model is the model that develops paths among the constructs, and the equations epitomize it. This tool gives a better solution by considering both dependent

and independent variables with multi-collinearity. Also, it replaces the multiple regression analysis, which is the key feature of using this tool. From Figure 1, it is evident that seven variables focus on success outcomes of construction Projects through Team integration. The present study has the following objectives:

- To identify the factors that influence teamwork effectiveness and integration in construction projects.

- To study the need for active teamwork and integration to complete the construction project.

ANALYSIS

Respondents Profile

Table 2 gives a summary of the respondents' profile.

Table 2 Respondent's profile

DETAILS OF THE RESPONDENTS		RESPONSE (%)
Age	Less than 25 Years	23.6%
	26-35 Years	51.4%
	36-45 Years	20.8%
	Above 45 Years	4.2%
Gender	Male	93%
	Female	7%
Educational Qualification	Graduates	66.2%
	Postgraduates	19.3%
	Diploma	14.5%
No. of Projects Handled	6-10 Projects	33.3%
	11-15 Projects	27.8%
Location	Rural	55.6%
	Urban	33.3%
Project Budget	51-75 Lakhs	31.9%
	31-50 Lakhs	30.6%

Reliability analysis leads to the accuracy or precision measurement to determine the internal consistency of the research instrument. Cronbach's Alpha value was 0.818. Therefore, it is higher than the standard cut-off value of 0.7. Then the reliability is accurate and suitable for the data analysis.

In the current study, PLS-SEM has been considered the best method to examine the relationship between factors influencing teamwork efficacy and integration in construction projects. The PLS-SEM model was considered superior to multiple regression methods because it considers multi-collinearity (Falk & Miller, 1992) based on dependent and independent factors. The PLS-SEM model is a multivariate tool that combines linear regression and factor reduction methods to estimate a set of interrelated dependent relationships simultaneously. All the dependent and independent interrelated factors determining the relationship in the path diagram can be estimated using the Structural model (Hair *et al.,* 2013). It is a regression analysis with a path analysis called causal modeling. Under the PLS approach, the Equation Model has three specific advantages over other approaches (Bontis, Booker & Serenko, 2007; Eskildsen, Kristensen & Westlund, 2004). They are:

- PLS approach measures even a single construct, but covariance-based approaches measure at least four constructs
- Survey-based data, which tend to be nonnormal, the PLS approach handles very well, and it is well suited for analysing such data.
- PLS accounts for measurement errors with high accuracy and also provides interaction effects.

Assessment of the Measurement Model

The estimation of the measurement model was made using both convergent and discriminant validity through SEM analysis. In the first stage, the measurement model was scrutinized for determining the convergent validity. Convergent validity is defined as the amount to which various items come together to measure the construct's conception (Bagozzi *et al.,* 1991; Hair *et al.,* 2010). This is measured by the Average Variance extracted (AVE), Composite Reliability (CR), and factor loadings (Hair *et al.,* 2010).

Convergent validity identifies that the team instrument indicators of the construct the teamwork integration efficacy in construction projects should have a higher amount of variance Hair *et al.* (2006), and the following three criteria need to be assessed.

i. Factor loadings (Table 3 and Figure 2) should be higher than 0.5 (Hair *et al.,* 2007).

ii. Composite Reliability (CR) should be higher than 0.7 for each construct

iii. Average Variance Extracted (AVE) should be 0.5 for each construct (Fornell & Larker, 1981).

The evaluation criteria of the Measurement Model included evaluating the internal consistencies of the construct used in the current study are Cronbach Alpha, Average Variance Extracted (AVE), and Composite Reliability (CR). Internal consistency confirms how far the set of indicators used in the current study factors to determine the teamwork integration of construction projects are internally consistent in providing identical results in repetitive trials (Chin, 1998; Hair *et al.,* 2007). In the current study, factors determining teamwork and its integration efficacy in construction projects have been analysed. The Smart PLS statistical tool and the Graph (diagram) the team efficiency factors have a loading value

of more than 0.5, a threshold considered for general acceptance and ensures the instrument's content validity in the current study (Fornell & Larcker, 1981

Table 3: Accuracy Analysis Statistics- Composite Reliability and Average Extracted Variance (AVE)

Team Factors Determining Construction Project Outcome	Factor Loadings		Cronbach Alpha	Composite Reliability	Average Variance Extracted (Ave)	Rho_A	R Square	R Square Adjusted
Situation Monitoring	SM1	0.764	0.652	0.811	0.588			
	SM2	0.745						
	SM3	0.791						
Team Climate and identity	TC2	0.655	0.811	0.864	0.516	0.657		
	TC3	0.687						
	TI1	0.803						
	TI2	0.748						
	TI3	0.707						
	TI4	0.701						
Team Communication	TC1	0.630	0.775	0.847	0.527	0.819		
	TC2	0.705						
	TC3	0.738						
	TC4	0.775						
	TC5	0.771						
Team Leadership	TL1	0.802	0.721	0.843	0.641	0.785		
	TL2	0.835						
	TL3	0.764						
Team Skill	TS1	0.776	0.709	0.822	0.543	0.731		
	TS2	0.764						
	TS3	0.838						
	TS5	0.533						
Team Structure	TSt1	0.783	0.680	0.806	0.511	0.738		
	TSt2	0.664						
	TSt3	0.764						
	TSt4	0.638						
Team performance and outcome	TP1	0.795	0.708	0.820	0.534	0.690	0.733	0.717
	TP2	0.658						
	PO3	0.684						
	PO4	0.775						

All the loadings for the factors (Figure 2) that determine team integration are higher than 0.5. So, it is concluded that the convergent validity (Lin & Ding, 2006) is good, and all the items measuring team integration are significantly imperative (Hair *et al.,* 2010). Another vital reliability measure is the Average Extracted Variance (AVE). It confirms the total amount of Variance amounted to the latent variables, which are very important and conservative (Yonggi *et al.,* 2004) measure. The recommended threshold level of AVE is 0.50. When the Average Variance Extracted (AVE) is at least 0.5 and (CR) Composite Reliability is more excellent than 0.7, then the convergent validity level is highly acceptable (Bagozzi *et al.,* 1991; Hair *et al.,* 2010). It is confirmed from Table 1, that the loadings of all the items are higher than 0.5 as per the recommended threshold, and the CR and AVE are also equivalent to the threshold.

So it is confirmed that convergent validity is good for the current study. Cronbach's Alpha estimates the internal reliability and consistency of the instrument used for the study in determining team integration. It also confirms the level of correlation between each factor (Hulland, 1999). It is evident from the higher level of intercorrelation that the instrument used to measure the outcome of construction through team integration is internally consistent. It is also concluded that there is a strong association between a manifest variable and a latent variable. The intercorrelation matrix results are given in Table 2.
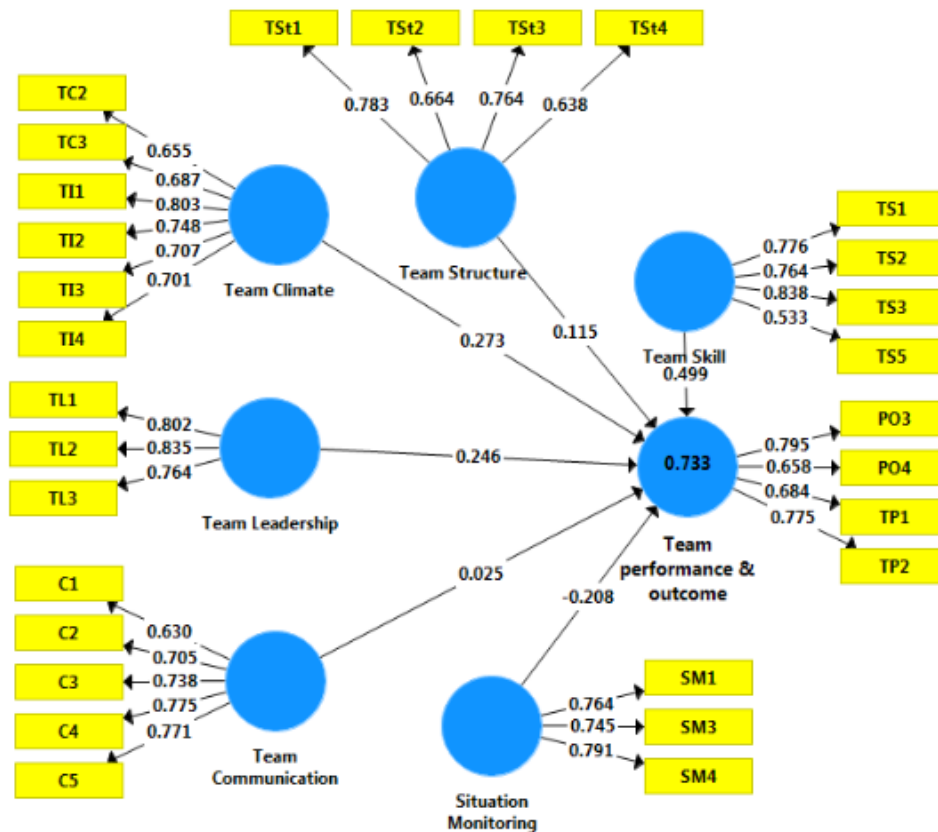

Figure: 2 Evaluation of Structural Model Through PLS Algorithm

The AVE is a test measure of discriminant validity obtained in PLS. The square root of AVE of each Team Factors determining construction project should be higher than the correlation of the specific construct (Gefen & Straub, 2005). Discriminant validity explains how the measurement tool is used to evaluate the Team performance & outcome due to team integration & efficiency factors. Though several methods are available to calculate Discriminant validity, the process calculated by using Average Variance Extracted (AVE) is the most well-known method (Gerbing & Anderson, 1988). Table 4 confirms that the discriminant validity exists and the degree to which each indicator of the construct measuring the Team Factors determines the construction project's success and the correlation of the latent variable constructs. The validation of the PLS model globally is also computed for the current study using the geometric mean of the AVE for the factors determining team integration and its upshoot on the successful performance of the construction project. It is calculated using the formula given as Equation 1.

$$Gof = \sqrt{(R^2 \times \overline{AVE})}$$ ….. Equation 1

It is concluded based on the Wetzels *et al.* (2009) baseline values of GoF as highly substantial (small = 0.1, medium = 0.25, large = 0.36). Moreover, the study construct has good and large global Goodness of Fit. So, the calculated value of GoF is = 0.592, which exceeds the recommended threshold value of 0.36, as suggested by (Wetzels, Odekerken-Schröder & Van Oppen, 2009). Thus, it concluded that the study model of Team Factors determining the success of construction projects is different, and it has an overall Goodness of Fit.

Table 4: Fornell-Larcker Criterion – Inter Construct Correlation

Team Factors Determining Construction Project Outcome	Situation Monitoring	Team Climate	Team Communication	Team Leadership	Team Skill	Team Structure	Team Performance & Outcome
Situation Monitoring	**0.767***						
Team Climate	0.718	**0.718***					
Team Communication	0.691	0.715	**0.726***				
Team Leadership	0.748	0.616	0.595	**0.801***			
Team Skill	0.674	0.676	0.654	0.682	**0.737 ***		
Team Structure	0.667	0.712	0.713	0.602	0.729	**0.715***	
Team performance & outcome	0.630	0.693	0.653	0.684	0.715	0.718	**0.730***

*Discriminant Validity

Assessment of the Structural Model

The assessment of the structural model (Figure 2) was made to evaluate the formulated hypothesis. Having established the reliability and validity through the PLS algorithm, the Bootstrapping algorithm was used to assess the hypothetical relationship of construction performance outcome and the factors affecting project team integration. The Structural model developed based on the hypothesis paths can be assessed based on the R^2 value, demonstrating the Variance in the endogenous variable described and explicated by the exogenous variable. The results are shown in Table 4. The structural model can indicate the relationship pattern among the endogenous construct. The model developed by PLS is evolving in several research areas, including psychology studies.

The structural model in Smart PLS need to be passed by the following three criteria:

i.   Path coefficient, which is the Beta Value (β)

ii.   The significance of Path coefficient (p-Value)

iii.   The Variance Explained by R^2

The Bootstrap model of resampling with five hundred iterations has been used to test the significance level of path coefficient of the hypothesized relationship between Team integration factors determining the success of construction projects.

The R^2 value of the independent variables (Factors determining team) – designated that the PLS model was able to account for the performance and outcome of the team by 73.3% variance.

Table 5: Results of Structural Equation Model Analysis

Team factors determining construction project outcome	Hypothesis	Path coefficient	T statistics	Result
Team Skill -> Team performance & outcome	H1	0.499	4.223	Supported
Team Structure -> Team performance & outcome	H2	0.115	0.970	Not Supported
Team Climate and identity -> Team performance & outcome	H3	0.273	2.044	Supported
Team Leadership -> Team performance & outcome	H4	0.246	2.550	Supported
Team Communication -> Team performance & outcome	H5	0.025	0.216	Not Supported
Situation Monitoring -> Team performance & outcome	H6	-0.208	1.368	Not Supported

Hypothesis 1 (H1) infers and confirms the degree to which Team Skill influences Team performance & outcome of a construction project, and it has an influential and significant positive consequence (β = 0.499, p < 0.001). Similarly, Hypothesis 3 (H3) concludes the degree to which Team Climate and identity have an influential and significant positive consequence towards Team performance & outcome (β = 0.273, p < 0.001). In the same way, Hypothesis 4 (H4) infer the degree to which Team Leadership has an influential and significant positive consequence towards Team performance & outcome (β = 0.246, p < 0.001). The model is evaluated based on the critical t value, and if it is 1.96, the P-value is less (0.05), and if it is 2.58, the P-value is less (0.01) (Gefen & Straub, 2005). The results are shown in Table 5.

Table 6: MV Prediction Summary

Factors	MV Prediction Summary				LM Prediction Summary			
	RMSE	MAE	MAPE	Q^2	RMSE	MAE	MAPE	Q^2
TP1	0.659	0.519	15.719	0.322	0.615	0.464	12.194	0.408
TP2	0.559	0.478	12.123	0.390	0.588	0.444	11.103	0.326
PO3	0.697	0.543	17.061	0.468	0.783	0.587	18.125	0.328
PO4	0.781	0.617	18.856	0.235	0.776	0.571	16.861	0.244
Team performance & outcome (Latent -Variable LV Prediction Summary)	0.546	0.413	-	0.685				

The prediction model accuracy can be confirmed with Q^2 value, RMSE, MAE, MAPE (Becker *et al.,* 2013; Hair *et al.,* 2017). Q^2 value must be higher than zero that is, it will be predicted as less than 0.25 as small, 0.25 to 0.49 as medium and 0.50 and above as high. Here in the current, the Q^2 value in LV Prediction Summary is 0.686, and it is concluded that the prediction accuracy is high.

DISCUSSION

The current study has used the structured questionnaire for analysing the Project Team Integration on the Performance of the Indian Construction Project based on the factors chosen from the past literature. It was found that the questionnaire tool has good validity, reliability, and global fit. The validity of the instrument used was verified by the second generation SMART PLS-SEM model and utilizing various tests (Hair *et al.,* 2007) like convergent validity, Composite Reliability (CR) & Average Variance Extracted (AVE). The results also concluded that there was good discriminant validity (Fornell & Lacker, 1981) and confirm that the factors of the research tool are not closely related. The internal consistency confirms how far the indicators used in the current study factors to determine the teamwork integration of construction projects are related to the project outcome. It is also concluded that the study model has overall global Goodness of Fit for the team factors towards the success of construction projects. Each of the factors impacted outcomes differently and also influenced the overall outcome of construction projects. The R Square value of the PLS model confirms that the outcome of the construction projects has been varying with 0.733 variances. The factors Team Skill (Hypothesis 1), Team Climate and identity (Hypothesis 3), Team Leadership (Hypothesis 4) are significant with the overall outcome of a construction project. The prediction model accuracy can be confirmed with Q^2 value, RMSE, MAE, MAPE, LV Prediction Summary, and ensured the study model has greater accuracy and fit.

CONCLUSION

This paper argues that the theoretical base lies in industrial and organisational psychology, which assists understanding by providing the behavior-performance-outcome cycle and, more specifically, the significant distinction between success and satisfaction and their relationship. The identification of factors of influence such as team skills, team climate and identity, team structure and situation monitoring, team communication, team leadership is fundamental in understanding a team's performance and the merit of the outcome of a project. Thus, this study intends to scrutinise the association between the factors determining the construction project team integration and the project's outcome. Five confirmed that the structural model has a good fit from the eight hypotheses taken from the current study. This concludes that the proposed study model developed based on the past literature to understand the project performance and outcome due to team integration has an adequate fit, represented by the R^2 value 0.733.

The analysis results and the model ensure the relationship between the project team integration features and the outcome of the construction project. It brings to a close that there is a uniquely positive effect on construction project outcome due to the successful team, and the R^2 value is 0.733. This study also provided empirical evidence that a successful construction project team will positively influence the outcome of the construction project. Therefore, in the construction sector, the project manager should handle different project teams lightly or provide room for complaints, influencing the project outcome. The results of this study support the findings in the literature (Baiden *et al.,* 2006; Ibrahim, Costello, & Wilkinson, 2013; Nawi *et al.*, 2017) that positive team features of the construction project will influence the project outcome positively. Further studies can also examine project performance indicators with other variables and traits of team behaviors and psychology.

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