

RESEARCH ARTICLE

Assessing Causal Relationship Amongst Factors Affecting Adoption of the Concept of Learning Organisation by Construction Firms

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ABSTRACT

The concept of a Learning Organisation (LO) has emerged as a strategic approach for enhancing organizational adaptability, innovation, and competitiveness in dynamic business environments. Despite its growing relevance, limited research has examined the factors influencing the adoption of Learning Organisation principles within construction firms and the causal relationships among these factors. This study assessed the causal relationships among factors affecting the adoption of the Learning Organisation concept by construction firms in Nigeria. A quantitative survey design was adopted, targeting medium and large construction firms. Data were collected through a structured questionnaire administered to 163 selected respondents, of which 96 valid responses were analyzed. Relative Mean Score (RMS), Standard Deviation (SD), and Partial Least Squares Structural Equation Modelling (PLS-SEM) were employed for data analysis. The findings revealed that the most critical factors facilitating Learning Organisation adoption were encouraging creativity and innovation (Mean = 4.34), effective team learning (Mean = 4.20), enhancement of technology use (Mean = 4.17), and organizational growth (Mean = 4.06). The study further validated four key constructs influencing Learning Organisation adoption: People, Process, Technology, and External Factors. Structural model results indicated strong positive and significant relationships among all constructs, with path coefficients ranging from 0.939 to 0.987. The measurement model also demonstrated high reliability and validity, with Cronbach's Alpha values ranging from 0.975 to 0.991 and Average Variance Extracted (AVE) values between 0.848 and 0.904. The study concludes that People, Process, Technology, and External Factors are interdependent and collectively play a decisive role in facilitating Learning Organisation adoption in construction.

Keywords: *Causal Relationships; Construction Firms; Learning Organisation; PLS-SEM*

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1. INTRODUCTION

Globalization has hindered many organisations from responding fast and being flexible to the increasing uncertainties of the changing environment. To overcome numerous challenges in today's business environment, Learning

Organisation (LO) is seen as one of the best tools (Moloi, 2010; Ayupp & Perumal, 2008; Senge, 2006). Making employees feel empowered through learning in the organisation has proved to be an important element for organisational success, adaptation to changes, and assisting many business organisations to survive for a longer period than their counterparts (Asadi, Ghorbani, & Naderan, 2009). Many top-echelons of business organisations have adopted the concept of LO as a means of increasing efficiency, improving customer relationships, and providing quality products to their customers (Jamali, Yusuf, Ayupp, & Perumal, 2008; Watkins & Marsick, 2003).

Existing literature indicates that many studies in the past on the concept of LO were done in Business Companies and Manufacturing Firms, but not in relation to the construction industry. Although the concept of LO may be new to Construction Organisations, the concept is well established in the management domain (Chinowsky & Carrillo, 2007). The foundation of the concept is rooted in work conducted by Peter Senge in the organisational systems domain (Senge, 1990). The concept of LO has gained importance over the past years as a source of competitiveness. LO facilitates learning of all its members, and this aim is to continuously transform itself (Pedlar, Burgoyne, & Boydell, 1991) in line with the environment's needs.

Even though the increasing focus on technology provides Construction Organisations with an entry point into the learning domain, it does not meet the requirements of the LO. Specifically, a reactive-based approach to learning does not drive the Organisation forward to continuously gain knowledge and update processes for improvement (CII 2006). Reflecting the need to move in this proactive direction, the writers and the CII research team put forward the following LO definition based on work by others and a focus on the needs of the Construction Industry (CII 2006). A LO is skilled at creating, acquiring, sharing, and applying knowledge, and embracing change and innovation at all levels, resulting in optimum performance and maximum competitive advantage.

The move to an LO is a nontrivial transformation as it depends on a number of drivers and barriers. To achieve the move to LO, studies have (Cho & Pucik 2005, Bell & sanz-valle 2011 and Therrien & chamberlin 2011; Gunu et al., 2016; Chrispen & Mukeredz 2013; Ihsaan et al., 2013; Gospalakrishua et al., 2007; Chinowsky et al., 2007) identified different drivers and Barriers for implementing the concept of LO and to promote the investment. However, the interdependencies/relationship amongst these factors for adopting the concept of LO by construction firms are not known.

Research hypothesis

- H1 Process [P2] has a significant impact on External factors [E], People [P1], and Technology [T]
- H2 People [P1] have a significant impact on External factors [E], Process [P2], and Technology [T]
- H3 External Factors [E] have a significant impact on People [P1], Process [P2], and Technology [T]
- H4 Technology [T] has a significant impact on External Factors [E], People [P1], and Process [P2].

2. LITERATURE REVIEW

The concept of learning organisation

The concept of Learning Organisation comes under two wide categories; the first category treats Learning Organisation as a variable that can be applied to an Organisation and which has a vital impact on the outcome of the Organisation. The second type of category, Learning Organisation, is accounted as a metaphor to explain an Organisation (Garavan, 1997).

Robbins and Coulter (2007) posit that Business Organisations of the present day have to develop the ability to learn and respond fast to environmental challenges. According to the authors, business Organisations will need to imbibe the philosophy of Learning Organisations, that is, a philosophy that will develop the capacity to continuously learn

new things and change things (Robbins & Coulter, 2007). Moilanen (2005) is of the opinion that a Learning Organisation is something that can be consciously managed in an Organisation using learning as an important element in its core values, mission, visions and objectives as well as in its day – to – day operations and their assessment. According to Kinicki and Williams (2003), a Learning Organisation is an Organisation that seeks to actively create knowledge, acquire knowledge, and transfer knowledge within itself and is able to change its behaviour to show new knowledge. A Learning Organisation can learn about, and from its environment and fitting itself into it. Advanced Learning Organisations can change their environments with the aim of achieving the desired objectives (Rzevski & Prasad, 1998). Senge (1990) describes Learning Organisations as Organisations where employees continually seek to expand their capacity and ability to create and produce results they desire, where new and expansive creative thinking is nurtured, where team aspiration is promoted, and where employees are continually learning to see the whole problem of the Organisation together. Three different levels in learning have been identified which could be found in any Organisation. These include: Double loop Learning; Single loop Learning; and Deutero Learning (Argyris & Schön, 1996). Watkins and Marsick (2003) posit that Learning Organisations possess continuous Learning opportunities and team learning as their characteristics.

Learning organisations and the construction industry

Despite a wealth of literature on Learning Organisations and Organizational Learning, a minimal amount of research exists on Learning in the construction industry. In contrast, a significant amount of work has been published on the use of lessons-learned systems within Construction Organisations. This focus reflects the industry's focus on single-loop or adaptive learning. Rather than focus on identifying issues before they arise, the Construction industry is characterized by its focus on reacting to problems and striving to contain problem projects (Chinowsky & Patricia, 2007).

Research efforts by Kululanga *et al.* (1999) show that United Kingdom (U.K.) contractors employ very few learning mechanisms as a means of creating new knowledge, and those that are employed are not developed to their full potential. Fu *et al.* (2002) suggest that the lack of intentional implementation of learning mechanisms or attempts at becoming Learning Organisations may be due to the high level of competitiveness within the construction industry. As the construction industry is highly fragmented, many contractors focus only on short-term survival. This being the case, many companies do not have sufficient resources for developing a Learning Organisation. Rather, the management approach to learning seems to emphasize a technology-based approach. Specifically, organisations that have identified knowledge as a corporate asset are emphasizing the development of database systems, intranets, and other distributed systems that allow individuals to access data when it is required. As highlighted by recent research, this technology approach is now being extended beyond the bounds of the Construction industry to include participants throughout the design-construction interface (Messner, 2003).

Characteristics of a learning organisation

Characteristics of a Learning Organisation are introduced with the following fundamental characteristics: In a Learning Organisation, "information" runs smoothly at all levels of the Organisation; Learning is done simultaneously at four levels of individual, group, intergroup, and Organisational; Staff, due to continuous training and the delegation that is given to them, create numerous teams and do group discussions to improve their information and ability; A learning organisation has bright and consensus visions about the future, growth, and development of the Organisation and the employees; A learning organisation is a type of reflective thinking and insights about people, the organisation, and management.

Sery (2004) Creating a Learning Organisation utilizes human resource management. Human resource management must provide a learning environment for the improvement of human resources by the following factors: Creation of challenge job: Include job enrichment, job development, and job rotation; Change of available perception patterns: Required for the transfer of Knowledge concepts through teaching, sharing, and self-study; Change of thinking habits: Change of mental models through teaching, sharing, and self-study; Allowing the separation in production and its valuing: Provides a shape for a creative culture in which employees would be willing to change their thinking and understanding habits (Hong, 1999); Factors facilitating and hindering LO have been reported by numerous researchers (Table 1). This provides a basis for meeting the first objective of this study, which is the exploration of such factors from the relevant literature. A preliminary questionnaire was designed for validation based on the 49 factors identified through an in-depth literature review of the subject, was then grouped under these broad categories (People, Process, Technology, and External Factors), and 45 were relevant for NCI in Table 1.

Table 1. Factors used for questionnaire survey

S/N	Factors	Sources
1	Encourages Creativity and innovation	Cho & pucik (2005), Bell & sanz-valle (2011) and Therrien & chamberlin (2011)
2	Collaborative and individual lifelong learning	Chrispen & Mukeredz (2013), Ihsaan <i>et al.</i> (2013)
3	Enhances professional autonomy	
4	Shared accountability and collective responsibilities	
5	Provides appropriate incentive schemes	
6	Organisational Capabilities to learn	
7	Continuous learning capabilities	Gunu <i>et al.</i> (2016)
8	Facilitates co-optation	
9	Identifies the customer's power	Mohanty & Deshmukh (1999)
10	Upgrading of information power	
11	Influence of global investors power	
12	Motivate global market power.	
13	Fostering power of simplicity	
14	Transforming the power of organisation	
15	Past experience of customers	Gopalakrishua <i>et al.</i> (2007)
16	Customers personal needs	
17	Implementation of external communication	
18	Word of mouth mode of communication	
19	Define client model	
20	Opportunities for continuous learning	Yang <i>et al.</i> , (1993)
21	Effective team learning	
22	Capabilities of embedded system	
23	Establishment of system connections	
24	Supports empowerment	
25	Supports strategic leadership	
26	Creates vision and strategy	Marsick (2006)
27	Strategic leadership and management	
28	Coordinating the culture and structure	
29	Provide essential communication	
30	Give relevant Information and knowledge mgt.	
31	Development of performance mgt and support	
32	Enhance the use of technology.	
33	Support of knowledge workers in organisation	Chinowsky <i>et al.</i> (2007)
34	Performance of the employees	
35	Considering an aging workforce (Experience)	
36	Distributed workforce- Globalization	
37	"Better" solutions to client problems	
38	Evolution (growth) of the organisation	
39	Promote inquiry and dialogue.	
40	Encourage collaboration and team learning.	
41	Create systems to capture and share learning.	
42	Empower people towards a collective vision.	
43	Connect the organisation to its environment.	
44	Provide strategic leadership for learning.	

Theoretical framework

The factors identified were grouped into four broad categories: people (P1), process (P2), technology (T), and external factors (E), as listed in Table 1. Hence, the latent dimensions (broad categories) provide a basis to establish the theoretical framework of this research, represented in Figures 1, 2, 3, and 4 (the arrows show the direction of influence in the hypothesized model), where 4 research hypotheses are depicted.

3. MATERIALS AND METHODS

The study adopted a quantitative survey research design, using primary data generated through a structured questionnaire. The scope of the study was limited to medium and large construction firms operating in Abuja and Kaduna, Nigeria.

The population of the study comprised construction firms registered with the Federation of Construction Industry (FOCI), numbering 281. The Krejcie and Morgan (1970) formula was used to determine the sample size, which was 163 respondents. Respondents were selected using a purposive sampling technique. Purposive sampling was adopted, rather than random sampling, because the study required respondents with specific expertise and direct involvement in organisational learning and management decisions within their firms (e.g., strategic- and management-level staff able to meaningfully assess Learning Organisation practices). Given that the sampling frame of medium and large construction firms was relatively small, and that the constructs under investigation (People, Process, Technology, and External Factors) required informed and experienced judgement, purposive sampling enabled the researchers to deliberately target knowledgeable respondents capable of providing valid and reliable data, thereby enhancing the credibility of the findings. Ninety-six (96) properly completed questionnaires were retrieved and used for the study, representing a valid response rate of 58.9%.

Data Collection

Data were collected using a structured, close-ended questionnaire administered to respondents drawn from strategic-, management-, and operational-level staff of the sampled construction firms. The questionnaire was designed based on 44 factors identified from the literature review, grouped under the four broad constructs of People, Process, Technology, and External Factors, and rated by respondents on a five-point Likert scale.

Data Analysis

Relative Mean Score (RMS) and Standard Deviation (SD) were used to evaluate the extent to which each factor affects the adoption of the concept of LO, using SPSS software. Partial Least Squares Structural Equation Modelling (PLS-SEM), performed using SmartPLS 3, was subsequently used to examine the causal relationships amongst the factors influencing the adoption of the concept of LO.

4. RESULTS AND DISCUSSION

The respondent profile shows a fairly mature and experienced sample. In terms of firm experience, the largest single group of firms had been operating for over 20 years (32.30%), followed by firms with 11–15 and 16–20 years of experience (19.80% each), while firms with 6–10 years of experience were the least represented (12.50%). Firm size, measured by number of employees, was dominated by firms with 6–10 employees (35.42%) and those with over 20 employees (29.17%), suggesting the sample was weighted toward medium and large firms, consistent with the study's scope. At the individual level, most respondents had 6–10 years of professional experience (30.20%), followed by 0–5 years (25.00%) and 11–15 years (21.90%), with very few respondents (7.30%) having over 20 years of experience,

indicating that the respondents, while professionally established, were not predominantly senior veterans as shown in Table 2.

Table 2. Respondents' Information

Firms' years of Experience			Number of employees		
	Frequency	%		Frequency	%
0 - 5 years	15	15.60	0 - 5	21	21.90
6 - 10 years	12	12.50	6 - 10	34	35.42
11 - 15 years	19	19.80	11 - 20	28	13.54
16 - 20 years	19	19.80	Over 20	13	29.17
Over 20 years	31	32.30	Total	96	100
Total	96	100			

Years of Experience			Education qualification		
0 - 5 years	24	25.00	OND	4	4.20
6 - 10 years	29	30.20	HND	17	17.71
11 - 15 years	21	21.90	BSC	37	38.54
16 - 20 years	15	15.60	PGD	8	8.33
Over 20 years	7	7.30	MSC	23	23.96
Total	96	100	PHD	7	7.29
			Total	96	100

Respondents discipline			Positions in firms		
Architects	20	20.80	Strategic level	18	18.75
Builders	11	11.50	Management level	48	50.00
Engineers	28	29.20	Operational level	30	31.25
Quantity surveyors	37	38.50	Total	96	100
Total	96	100			

In terms of qualifications and roles, the majority of respondents held a Bachelor's degree (38.54%), followed by a Master's degree (23.96%), while holders of OND and PhD qualifications were least represented (4.20% and 7.29% respectively), reflecting a generally well-educated respondent pool capable of providing informed responses. By discipline, Quantity Surveyors formed the largest professional group (38.50%), followed by Engineers (29.20%), Architects (20.80%), and Builders (11.50%). Regarding organisational position, half of the respondents (50.00%) occupied management-level positions, with 31.25% at the operational level and 18.75% at the strategic level. This distribution indicates that the data were drawn predominantly from middle- and senior-level professionals directly involved in decision-making, which strengthens the credibility and reliability of the responses obtained on Learning Organisation adoption.

Table 3. Assessing the critical factors affecting the implementation of the concept of LO

FACTORS	Mean	SD	Group Mean
Effective team learning among workers	4.20	0.59	
Team learning ability of employees	4.17	0.71	
Encouragement of collaboration and team learning	4.16	0.69	
Providing appropriate incentive schemes	4.16	0.67	
Collaborative and individual lifelong learning	4.15	0.75	
"Better" solutions to client problems	4.14	0.73	
Considering the aging workforce (Experience)	4.03	0.73	
Development of performance management and support	3.93	0.79	
Word of mouth mode of communication	3.18	0.94	4.01
PROCESS			
Encouraging creativity and innovation	4.34	0.63	
Creation of vision and strategy	4.02	0.74	
Continuous learning capabilities	4.02	0.79	
Opportunities for continuous learning	4.01	0.64	
Establishment of system connections	3.95	0.69	
Providing strategic leadership for learning	3.94	0.77	
Strategic leadership and management	3.93	0.79	
Collective accountability and responsibility	3.90	0.83	
Organisational capabilities to learn	3.88	0.74	
Coordinating the culture and structure of firms	3.83	0.68	
Performance of the employees	3.82	0.70	
Capabilities of embedded system	3.75	0.78	
Fostering power of simplicity	3.72	0.86	
Transforming the power of organization	3.71	0.86	
Supporting of dialogue and inquiry	3.70	0.73	
Facilitation of co-optation among workers	3.70	0.81	
Empowering people towards a collective vision	3.61	0.81	
Supporting empowerment in organisation	3.61	0.86	
Definition of the client's model	3.57	0.79	
Enhancing professional autonomy	3.54	0.79	3.83
TECHNOLOGY			
Enhance the use of technology	4.17	0.68	
Availability of systems that capture and share learning	4.13	0.65	
Provision of essential communication	4.04	0.61	
Support of knowledge worker in organizations	4.00	0.56	
Giving of relevant Information & knowledge management	3.99	0.64	
Implementation of external communication	3.40	0.76	
Upgrading of information power	3.34	0.79	3.87
EXTERNAL FACTORS			
Evolution (growth) of the organization	4.06	0.65	
Distributed workforce- Globalization	3.86	0.79	
Motivate global market power	3.80	0.76	
Customers personal needs	3.74	0.81	
Identification of the customer's power	3.64	0.98	
Connecting the organisation to its environment	3.50	0.94	
Past experience of customers	3.49	0.89	
Influence of global investors power	3.48	0.86	3.70

Across the four constructs, People recorded the highest group mean (4.01), followed by Technology (3.87), Process (3.83), and External Factors (3.70), indicating that all four categories of factors were rated as significant to the

implementation of the Learning Organisation concept, with people-related factors regarded as most critical overall. Within the People construct, effective team learning within workers (4.20) and team learning ability of employees (4.17) ranked highest, while word-of-mouth communication (3.18) ranked lowest, suggesting that collaborative, team-based learning behaviours matter far more to respondents than informal, unstructured communication channels. Similarly, under Technology, enhancing the use of technology (4.17) and the availability of systems that capture and share learning (4.13) were rated most highly, while upgrading of information power (3.34) and implementation of external communication (3.40) were comparatively lower, as shown in Table 2.

Within the Process construct, encouraging creativity and innovation recorded the highest mean of all 44 factors assessed (4.34), reinforcing its position as the single most critical driver of Learning Organisation adoption identified in the study, while enhancing professional autonomy (3.54) ranked lowest within this group. Other process-related factors such as creation of vision and strategy (4.02) and continuous learning capabilities (4.02) also scored strongly, pointing to the importance of deliberate strategic direction in embedding organisational learning. Under External Factors, evolution (growth) of the organisation (4.06) was the standout factor, while influence of global investors' power (3.48) and past experience of customers (3.49) were rated lowest, indicating that internally driven organisational growth is regarded as more influential to Learning Organisation adoption than externally driven market or investor pressures. Overall, the low standard deviation values across most factors (mostly between 0.56 and 0.94) suggest a reasonable degree of consensus among respondents in their ratings.

The Model Specification

The partial least squares structural model was set up with reflective measurement models and the structural model. The four measurement models include the Process measurement model with twenty (20) indicators, the People measurement model with nine (9) indicators, the Technology measurement model with seven (7) indicators, and the External Factors measurement model with eight (8) indicators. In all, the original model was made up of forty-four (44) reflective indicators associated with the four variables. Figures below respectively capture the consequent model.

Path model

The PLS estimation results for the structural model, path coefficient values as well as the item loadings for the research constructs are shown in Figures 1, 2, 3 and 4 (Table 4). The main data source (questionnaire) is used to collect data from respondents in the territories of Abuja and Kaduna. The Microsoft Excel spreadsheet is used to enter all data and draw conclusions from the data obtained. The Statistical Package for Social Sciences (SPSS) and Smart PLS software for

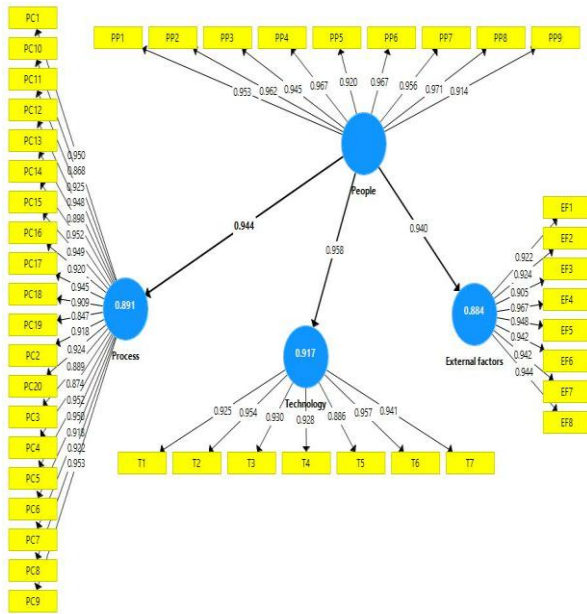


Figure 1. [P1 > P2, T & E]

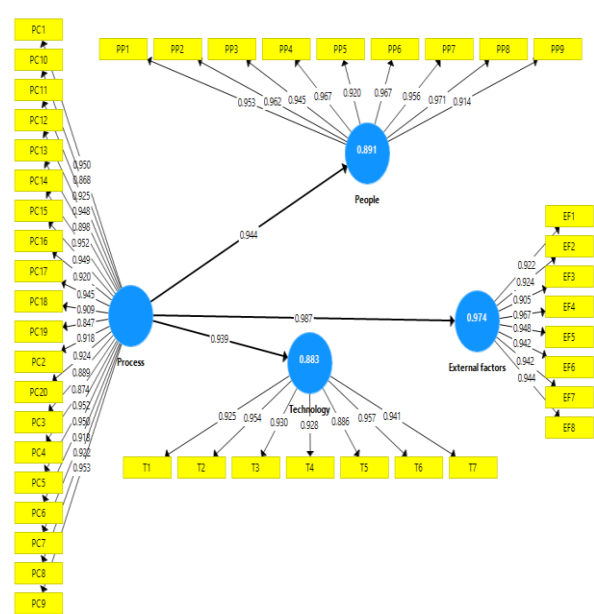


Figure 2. [P2 > P1, T & E]

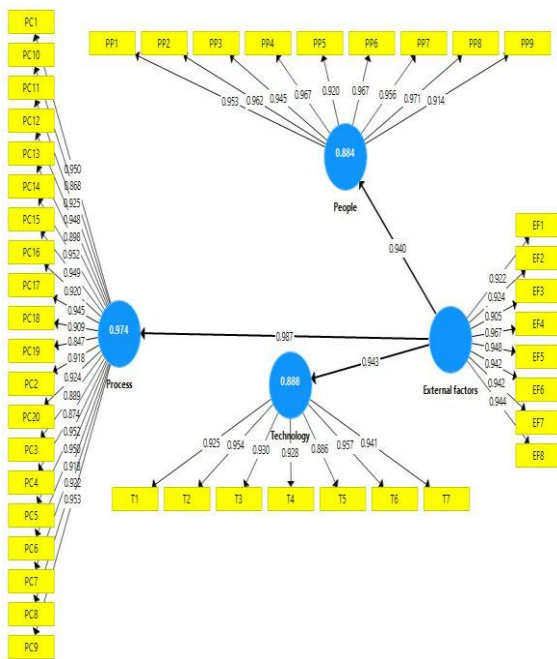


Figure 3. [E > P1, P2 & T]

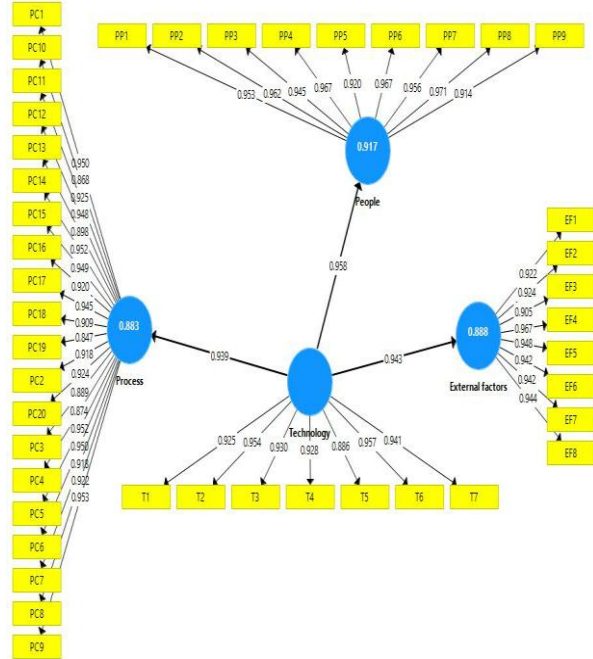


Figure 4. [T > P1, P2 & E]

Structural equation modelling techniques (SEM) are used to record data and carry out the statistical analysis. In addition, Smart PLS supports exploratory and confirmatory research; normal multivariate and good for small sample sizes.

The path coefficients, having standardized values from -1 to +1, represent the hypothesized relationships among the constructs. Estimated path coefficients close to +1 represent strong positive relationships, and estimated path coefficients close to -1 represent strong negative relationships (Hair et al., 2014).

Table 4. Outcomes of structural equation model analysis

Path	Hypothesis	Path coefficient	Decision
People > Process	H1	0.944	Strongly Positive and significant
People > Technology		0.958	Strongly Positive and significant
People > External factors		0.940	Strongly Positive and significant
Process > People	H2	0.944	Strongly Positive and significant
Process > Technology		0.939	Strongly Positive and significant
Process > External factors		0.987	Strongly Positive and significant
Technology > People	H3	0.958	Strongly Positive and significant
Technology > Process		0.939	Strongly Positive and significant
Technology > External factors		0.943	Strongly Positive and significant
External factors > People	H4	0.940	Strongly Positive and significant
External factors > Process		0.987	Strongly Positive and significant
External factors > Technology		0.943	Strongly Positive and significant

The Cronbach's alpha, composite reliability, and Dijkstra-Henseler's Rho_A are measures of internal consistency reliability, and all are expected to be 0.70 or higher. Table 5, the model(s) with the original 44 indicators satisfy these conditions. However, the Average Variance Extracted (AVE) is acceptable at 0.50. The scores of AVE show that convergent validity has been achieved. In other words, the indicators with which the latent variables are measured do converge on their associated constructs.

Table 5. Construct reliability and validity

	Cronbach's Alpha	Rho_A	Composite Reliability	Average Extracted (AVE)	Variance
External factors	0.980	0.980	0.983	0.878	
People	0.987	0.987	0.988	0.904	
Process	0.991	0.991	0.991	0.848	
Technology	0.975	0.975	0.979	0.868	

According to Hair *et al.* (2014), measurement of reflective models is different from that of formative models. Reflective models are measured based on the individual loadings of each indicator, which range from 0 to 1. The threshold for each indicator loading to ascertain its contribution to the model is 0.70. From Table 5 above, it shows that all of the indicators of the reflective models were far above the 0.70 threshold. Hence, there is no need to drop any of the indicators of the reflective models.

Predictive Power of the Model (R²)

How well exogenous variables predict endogenous variables is measured with the coefficient of determination (R²). The coefficient of determination is the statistical yardstick for measuring the predictive power or accuracy of a partial least squares structural equation model. According to Hair *et al.* (2014), how small or big an R² value is depends on the disciplinary purpose of the research. In consumer behaviour studies, R² values of 0.20 are considered high, but in success driver studies (e.g., in studies that aim at explaining customer satisfaction or loyalty), researchers expect much higher values of 0.75 and above. In scholarly research, R² values of 0.75, 0.50, or 0.25 for endogenous latent variables can, as a rough rule of thumb, be respectively described as substantial, moderate, or weak. The R² is the number shown in the circle that represents the endogenous construct.

The predictive power or accuracy of a partial least squares structural equation model is measured by the coefficient of determination (R²). Table 6 below shows the R² values of the three endogenous variables in the model. The values for the endogenous variables are far above 0.3 and were found significant. The R² values are the values in the blue circles of the structural model. The table below shows the R² values.

Table 6. *R² Values of the Endogenous Constructs Across the Four Structural Models (H1–H4)*

R²		R²		R²		R²	
P1 > P2, T & E		E > P1, P2 & T		P2 > P1, T & E		T > P1, P2 & E	
External factors	0.884	People	0.884	External factors	0.974	External factors	0.888
Process	0.891	Process	0.974	People	0.891	People	0.917
Technology	0.917	Technology	0.888	Technology	0.883	Process	0.883

Discussion of findings

The study achieved validation of categorising the different factors into components/groups as People [P1], Process [P2], Technology [T], and External factors [E].

The result, as presented in Table 3, identified the most critical factors through their Means and Group Means that facilitate the adoption of the concept of LO by Construction Firms. Virtually all the factors (drivers) were very significant/critical for adopting the concept.

Also, 44 indicators were established from the Structural Equation Model, and the Measurement model validated four Latent Variables (Process, People, External Factors, and Technology) responsible for facilitating the adoption of the concept of LO by Construction Firms. According to the path coefficients as presented in the above figures, the Structural Equation Model results suggest that Process, People, Technology, and External Factors have a strong positive effect/relationship on one another, which makes them very important to facilitate the adoption of the concept.

5. CONCLUSION

Based on the findings of the study, it is concluded that the measurement model validated the four constructs of People, Process, Technology, and External Factors as key components underlying the adoption of the concept of LO by construction firms. The structural model provided strong empirical support for the interrelationships among these constructs, contributing to the body of knowledge on the factors that facilitate the adoption of the concept of LO. Process, People, Technology, and External Factors are each important to the adoption of the concept of LO, given their strong, positive, and significant relationships with one another. The study offers researchers and practitioners insight into the complex relationships among these causal factors and the adoption of LO.

The study further finds that Process, People, Technology, and External Factors play a decisive role in the adoption of the concept of LO, both through their causal interrelationships and through their individual criticality, as reflected in their mean scores. This research offers a valid and reliable framework of the factors that facilitate the adoption of the concept of LO by construction firms, and provides a basis for future studies in similar contexts.

Based on the findings and conclusions of the study, the following recommendations are made:

- 1) Construction firms should prioritise the factor of encouraging creativity and innovation, which recorded the highest mean score in this study, by creating structures, policies, and incentives that actively reward innovative thinking and creative problem-solving among employees.
- 2) Given the strong interdependence among People, Process, Technology, and External Factors, management should adopt an integrated approach to Learning Organisation adoption, rather than addressing these constructs in isolation, since interventions in one construct produce significant positive effects on the others.
- 3) Firms should invest in continuous team-learning initiatives and effective team-learning platforms, given that effective team learning among workers was identified as one of the most critical individual factors under the People construct.

- 4) Management should strengthen the use of technology, particularly systems that capture and share organisational learning, as this was identified as a highly critical factor under the Technology construct.
- 5) Policymakers and industry bodies, such as professional regulatory councils and contractors' associations, should develop guidelines and capacity-building programmes that support construction firms, especially small and medium-sized firms not covered in this study, in adopting Learning Organisation principles.
- 6) Future studies should consider replicating this research across a wider geographical scope and across firms of varying sizes, using random or stratified sampling where feasible, to enhance the generalisability of the findings.

6. ACKNOWLEDGEMENTS

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7. COMPETING INTEREST

None to declare

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