International Journal of Instructional Cases
ISSN: 2399-830x

The Quantitative Study of the Impact of Transformational Leadership and Digital Innovation on Construction Project Performance in DKI Jakarta, Indonesia

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Received Date: 01-11-2024; Accepted Date: 15-12-2024; Publication Date: 30-03-2025

Abstract
Construction activities constitute a crucial element in the advancement of national development, particularly within developing nations. Accordingly, the effective performance of construction project performance (CPP) merits focused academic investigation. This study, serving as a case example, explores the relationship between

How to cite (APA):
Zhenbang, H.P., Prabowo, H., Hamsal, M., & Kuncoro, E.A. (2025). The quantitative study of the impact of transformational leadership and digital innovation on construction project performance in DKI Jakarta, Indonesia. *International Journal of Instructional Cases*, *9*(1), 185-202.
International Journal of Instructional Cases

International Journal of Instructional Cases
ISSN: 2399-830x

transformational leadership (TL), digital innovation (DI), and CPP. Employing a quantitative research design, data were gathered through both online and offline questionnaires from 150 local construction firms, encompassing 368 projects, drawn from a total population of 500 projects. The analysis indicates that TL exerts a positive influence on CPP. Additionally, the effective deployment of DI also contributes to the enhancement of CPP. The study further offers valuable insights into the roles of TL and DI in shaping CPP, with implications for improving project outcomes and addressing challenges within the construction sector in DKI Jakarta, Republic of Indonesia.

Keywords: Transformational Leadership, Digital Innovation, Construction Project Performance, Indonesia, Project Problems.

Introduction

From a functional perspective, construction projects encompass both infrastructure and real estate developments. These two categories are the focus of this study, selected due to the author's professional background in construction project management within the building sector over the past decade in DKI Jakarta, Indonesia. As the core research subjects, construction projects hold significant importance for national progress, a relevance that is even more pronounced in the context of developing countries (Olofsson Hallén et al., 2025). Such projects are integral to societal advancement and economic expansion, as they establish the built environment and critical infrastructure needed for everyday activities and the operations of diverse industries (Vărzaru & Bocean, 2024).

This study examines construction projects with regard to how effectively they achieve their intended goals. Key performance aspects include adherence to scope and safety standards, timely completion, budget control, quality assurance, and efficient financial resource utilisation, all of which contribute to the successful delivery of intended outcomes. As unique undertakings designed to produce a specific product, service, or result, these projects typically have durations ranging from six to thirty months (Powell et al., 2015). Research into such projects is vital for understanding and enhancing their performance. Consequently, this study investigates CPP and aims to identify methods to improve CPP while reducing associated issues within the construction sector of DKI Jakarta, Indonesia. With the rapid pace of urbanisation in DKI Jakarta, the construction sector is increasingly challenged to enhance CPP, reduce costs, and ensure projects are completed within the designated timeframe (Wong & Goldblum, 2016). Typically, construction projects face numerous obstacles that contribute to delays, financial overruns, and disputes.

More specifically, common issues in construction projects include discrepancies between planned and final job scopes (Collard et al., 2019), safety risks (Nyqvist et al., 2024), project delays (Harper et al., 2018), cost overruns (Paraskevopoulou & Diederichs, 2018), quality deficiencies (Taber, 2018), financial instability, and environmental and social concerns (Van Doremalen et al., 2020), as well as legal and contractual conflicts (Cheung, 2013). These problems are well documented in the

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ISSN: 2399-830x

literature. In response, this study seeks to propose approaches for improving CPP while simultaneously mitigating risks and minimising waste within construction activities. Construction projects, by nature, frequently encounter a diverse range of issues, leading to delays, cost increases, and disputes. Table 1 outlines these challenges in greater detail, supported by relevant academic and industry sources.

Table 1: Construction Problems Summary.

S/N	Problems Identification	Description
1	Scope Difference and Safety Concerns	Within construction project management, scope refers to the detailed specification of deliverables or activities necessary for project completion. A scope difference typically denotes a deviation or misinterpretation between planned outcomes and those ultimately delivered (Bjørn et al., 2018). The construction sector is also among the highest risk industries for worker injuries and fatalities, often due to inadequate safety procedures, insufficient training, and lack of personal protective equipment.
2	Project Delays	Delays are common in construction and often arise from ineffective scheduling, unforeseen site challenges, or prolonged approval processes. Research indicates that inadequate planning and improper allocation of resources significantly contribute to such setbacks (Harper et al., 2018).
3	Cost Overruns	Budget overruns frequently occur in construction projects due to unplanned expenses, changes in scope, and inflationary effects. According to Paraskevopoulou and Diederichs (2018), inaccurate cost forecasting is a notable issue, commonly attributed to strategic misrepresentation or optimism bias in the planning phase.
4	Quality Issues	Ensuring consistent construction quality is vital, as deficiencies may lead to structural problems, expensive repairs, and safety hazards. Such issues often stem from substandard materials, poor workmanship, or lack of adequate supervision (Taber, 2018).
5	Financial Issues	Construction undertakings require considerable upfront investment, making proper financial planning essential. This study focuses on liquidity and debt as financial concerns. Liquidity refers to a project's capacity to meet immediate obligations, such as payment for labour, materials, and operational costs. These projects often depend on loans or bonds, which, while necessary, can heighten financial risk (Eschenfelder et al., 2022). These five categories, including this one, constitute the dimensions of CPP in this study.
6	Environmental and Social Impact	Construction projects can produce substantial environmental effects, including land degradation, pollution, and waste. Although sustainable practices are increasingly prioritised, incorporating them into conventional project frameworks remains challenging (Van Doremalen et al., 2020).
7	Legal and Contractual Disputes	Construction contracts are often intricate, leading to conflicts among parties. Disputes may result from variations in interpretation, adjustments in project scope, or delays in payments, potentially escalating to legal action or arbitration (Cheung, 2013).

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The seven identified categories of project-related challenges have been adopted as dimensions and indicators for the operationalisation of the variable CPP. In exploring strategies to enhance CPP, various contributing elements have been evaluated. This study, in particular, focuses on two additional variables: TL and DI. TL plays a critical role in ensuring the effective operation of an organisation or the successful execution of a project as a unified system. It extends beyond decision-making to include the capacity to inspire, motivate, and empower teams to achieve their highest potential. Conversely, DI and technological advancements present considerable opportunities for improving CPP across a range of sectors by modernising conventional processes, increasing operational efficiency, and encouraging stronger stakeholder collaboration. The adoption of advanced technologies such as building information modelling (BIM), artificial intelligence (AI), the Internet of Things (IoT), cloud computing, and automation has allowed construction projects to address enduring issues such as cost overruns, delays, and inefficient resource utilisation (Krishnan et al., 2022). In response to these persistent CPP challenges, this study introduces a set of proposed solutions, along with the formulation of related research questions.

RQ1: Will TL improve CPP?
RQ2: Will Digital Innovation improve CPP?

H1: If it is positively influential, to what extent does TL influence CPP?
H2: If it is positively influential, to what extent does Digital Innovation impact CPP?

Accordingly, this study seeks to investigate the relationship between TL and CPP, along with the extent of its influence. Simultaneously, it aims to examine the association between DI and CPP, and evaluate its impact within the context of DKI Jakarta, Indonesia (Figure 1).

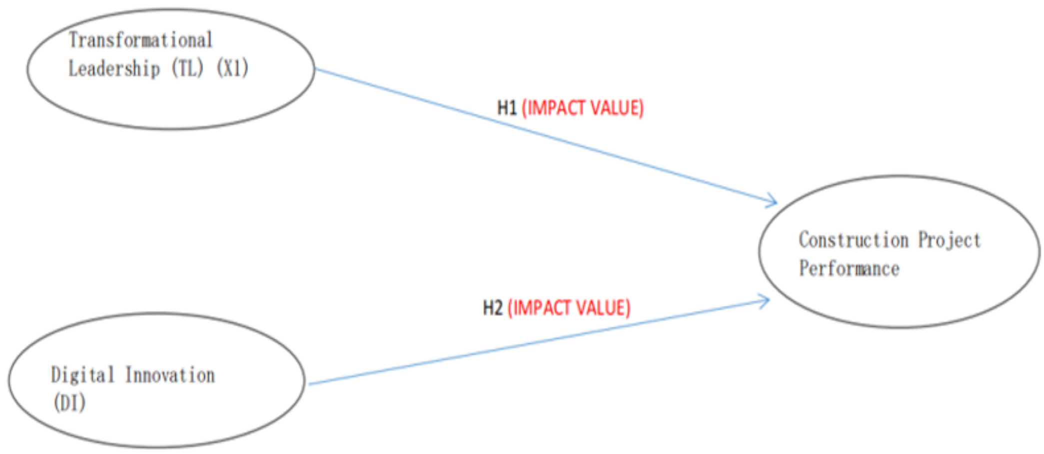

Figure 1: Research Model Conducted for the Construction Industry in Jakarta, Indonesia (Impact Value can be Reflected by Path Coefficient).

The research focuses on construction organisations categorised as local small and medium enterprises (SMEs) within the construction sector. The selected SMEs consist of privately-owned firms, rather than government-affiliated entities, which inherently

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encounter more substantial barriers to access (Corscadden et al., 2018). Through a quantitative case study involving 368 construction projects drawn from 150 companies, this study offers a comprehensive analysis of the influence of TL and DI on CPP, contributing both theoretical understanding and practical implications.

Literature Review

Transformational Leadership (TL)

TL is initially defined by a leader's capacity to inspire and motivate followers, fostering innovation and facilitating organisational change. It comprises several core attributes, namely idealised influence, inspirational motivation, intellectual stimulation, and individualised consideration (Aga et al., 2016; Zhao et al., 2021). Based on this conceptual foundation, the dimensions of TL and their corresponding indicators have been developed as presented in Table 2.

Table 2: Concept of Transformational Leadership (TL) and Its Related Dimensions.

Transformational Leadership (TL) (X1): TL is a leadership style where leaders inspire and motivate followers to achieve extraordinary outcomes by fostering a shared vision, challenging existing norms, and encouraging creativity and innovation. It focuses on transforming both the leader and followers to reach their full potential while prioritizing the needs of the group or organization (Jun & Lee, 2023).				
S/N	**Dimensions**	**Proposed Indicators**	**Likert Scale**	**Questionnaire Statement**
1	Idealized Influence	Charisma		Leaders should behaviour as role models by their Charisma.
		Trust		Leaders should obtain trust and respect from their followers.
2	Inspirational Motivation	Inspiration		Leaders should inspire passion and enthusiasm among team members.
		Motivation		Leaders should motivate good teamwork for project progress.
3	Intellectual Stimulation	Stimulation		Leaders should encourage the followers to be more creative and innovative, which is related with DI.
		Encouragement		Leaders should offer personalized support and encouragement to every follower.
4	Visionary Thinking	Vision		Leaders should illustrate a thorough vision according to the organizational goals in the future.
		Long-term goals		Leaders should look far beyond short-term goals, focusing on where they or their organization/project want to be in the future.
5	Commitment to Development	Keep promise		Leaders should make their valid promises happen.
		Empowerment		Leaders should empower followers to make decisions and as well take initiative.

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Digital Innovation (DI)

DI in the construction sector refers to the integration of digital technologies and tools, including BIM, project management software, and IoT sensors, to improve productivity, safety, and quality outcomes (Ernstsen et al., 2021). More broadly, DI encompasses the use of digital technologies to enhance or create new products, services, processes, or business models. It covers a wide spectrum of innovations that often reshape entire industries by improving operational efficiency, refining user experiences, and enabling novel business practices. The dimensions and indicators of DI applied in this study are detailed in Table 3.

Table 3: Key Areas of Digital Innovation.

S/N	Application area	Descriptions
1	Automation & AI	Leveraging artificial intelligence, machine learning, and automation tools to streamline workflows, reduce human intervention, and improve decision-making (Reisberger et al., 2025).
2	Cloud Computing	Utilizing cloud-based services to increase scalability, flexibility, and reduce costs for data storage, computing power, and application deployment.
3	Data Analytics	Harnessing big data and advanced analytics to derive insights, enhance decision-making, and personalize customer experiences (Chen et al., 2018).
4	Internet of Things (IoT)	Connecting devices and systems to gather real-time data and improve operational efficiency and monitoring in industries like manufacturing, healthcare, and smart cities (Li et al., 2015) .
5	Blockchain	Implementing decentralized ledger technology to improve transparency, security, and trust in industries like finance, supply chain, and healthcare (Zheng et al., 2018).
6	5G & Connectivity	Taking advantage of faster internet speeds and low-latency communications to enable real-time, high-quality digital experiences, such as autonomous vehicles, virtual reality, and more (Agiwal et al., 2016).
7	Digital Platforms & Ecosystems	Building digital platforms that facilitate interactions between users and businesses, such as e-commerce, social media, or financial technology platforms (Gawer, 2021).
8	Cyber Security	Innovating in security technologies to protect data and systems from increasingly sophisticated cyber threats (Tessarini Junior & Saltorato, 2021).

Continuing from the prior discussion, DI involves the utilisation of digital technologies and strategies to develop new or significantly enhanced processes, products, services, business models, or customer experiences. It integrates technology

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with creativity and strategic insight to support transformation, improve operational efficiency, and create value in an increasingly competitive digital environment (Bergram et al., 2022; Kuper, 2017; Webster et al., 2020). Based on a thorough evaluation of these key areas of application, the dimensions of DI and their respective indicators have been formulated as shown in Table 4.

Table 4: The Concept of Digital Innovation (DI) and Its Related Dimensions.

Digital Innovation (DI) (M): DI refers to the process of leveraging digital technologies to develop new or improved business models, processes, products, services, or customer experiences. It involves using digital tools and platforms (such as artificial intelligence, cloud computing, the Internet of Things, and big data analytics) to create value and gain competitive advantages in a rapidly changing business environment (Trenerry et al., 2021).				
S/N	**Dimensions**	**Proposed Indicators**	**Likert Scale**	**Questionnaire Statement**
1	R & D (Research & Development)	Research		It should emphasize the research of AI and its related software.
		Collaboration		It should optimize the state-of-the-art human-AI collaboration.
2	Challenges	Skill		It is difficult for the project team to understand AI and related software.
		Acceptance		It is difficult for the project team to use the latest AI and related software.

Construction Project Performance (CPP)

As previously outlined, this study focuses on CPP, particularly as undertaken by contractors, with the execution of construction projects being carried out by selected SMEs. In a highly competitive environment, CPP emerges as a critical factor determining a construction company's ability to survive and achieve long-term success. The overall performance of a construction firm is intrinsically linked to the outcomes of its individual projects. The performance of a construction company is fundamentally anchored in the success of its projects, which represent the primary operational and value-generating activities within the organisation. Project-level performance has a direct impact on essential performance indicators such as scope adherence, safety standards, schedule compliance, cost control, quality assurance, and financial viability. These factors collectively influence a firm's profitability and strategic sustainability. Successful project delivery demonstrates the firm's competence in resource management, risk mitigation, and strategic alignment between project operations and organisational objectives.

Moreover, consistently achieving strong project outcomes enhances organisational reputation, builds client confidence, and strengthens the potential for securing future contracts. Conversely, project underperformance may result in financial setbacks,

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legal complications, and reputational decline. As such, the cumulative outcomes of a firm's projects provide a reliable metric for assessing its overall efficiency, competitiveness, and long-term prospects. From a strategic management perspective, this highlights the necessity of integrating project-level performance metrics with broader organisational planning and decision-making frameworks. In essence, the success of a construction firm is a reflection of its individual project achievements. Sustained excellence at the project level contributes to financial resilience, business expansion, and reputation building, all of which are foundational to robust organisational performance (Chen et al., 2016).

Table 5: The Construction Project Performance (CCP) and Its Related Dimensions.

Construction Project Performance (CPP) (Y): CPP refers to the effectiveness and efficiency with which a construction project meets its objectives, such as scope, quality, cost, time, safety, and sustainability. It involves evaluating and managing various factors to ensure successful project delivery while aligning with stakeholder expectations.				
S/N	**Dimensions**	**Proposed Indicators**	**Likert Scale**	**Questionnaire Statement**
1	Scope Management	Work List		It needs to check that all the required work list is completed.
		Job Scope		It needs to check that the job scope is the same as the contract or there is additional, or omission works.
2	Time Management	Punctuality		It needs to check projects that are completed in punctuality.
		Information Flows		It needs to check that information flows among project team members and the leaders efficiently.
3	Cost Management	Budget		It involves the planning and controlling the budget.
		Efficiency		It needs to check efficient use of resources, including personnel, materials, and technology.
4	Quality Management	Standard		It needs to check that project deliverables meet defined quality standards (American Standard, Australasia Standard).
		Quality		It needs to check that the quality is over designed or less designed.
5	Finance Management	Liquidity		It needs to maintain the proper Current Ratio and Quick Ratio.
		Debt/Leverage		It needs to maintain a healthy Debt-to-Equity Ratio and Interest Coverage Ratio.

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The final variable to be operationalised in this study is CPP, which constitutes the central focus of the research. As a key evaluative metric, CPP measures the comprehensive success of a construction project through multiple performance dimensions. These indicators are designed to reflect the complex and interdependent aspects of construction outcomes, providing a balanced and systematic assessment of project efficiency, effectiveness, and quality. Drawing on the six categories of project-related issues summarised in Table 5 and the conceptual framework presented in Figure 1, the dimensions and indicators of CPP have been developed accordingly.

Methodology

Research Design

This study adopts a quantitative research approach, utilising survey data gathered from project managers, engineers, and departmental leaders involved in construction projects across Jakarta, Indonesia. A structured questionnaire will be employed to capture data related to the operationalisation of the variables TL, DI, and CPP. The data collection process incorporates a combination of survey techniques, including both online and offline formats, alongside direct face-to-face interviews. These methods are applied in accordance with established research guidelines (Troise et al., 2022), with the objective of identifying and analysing key patterns, trends, and contextual factors relevant to the study. Specifically, three tables—Table 2, Table 4, and Table 5—are used to represent the indicators linked to the operationalised variables. Participants occupying roles such as project managers, engineers, and project department leaders will be asked to respond to questionnaire items derived from these tables. Each respondent is required to assign a ranking to the indicator statements using a five-point Likert scale, where 1 signifies "not at all or very little", 2 indicates "little", 3 represents "moderate", 4 denotes "strong", and 5 corresponds to "very strong".

Sample and Data Collection

The sample comprises respondents engaged in 368 construction projects undertaken by 171 construction firms in DKI Jakarta, Indonesia, during the period from 2022 to 2024. Data were collected through both online and offline questionnaires. The analysis examined the impact of relationships among variables by employing statistical tools to test correlations. The data processing was conducted using SmartPLS 3.0 software (Boenningstedt: SmartPLS GmbH, http://www.smartpls.com).

Measures

The operationalisation of TL is based on a modified version of the Multifactor Leadership Questionnaire (MLQ), which captures key attributes including idealised influence, inspirational motivation, intellectual stimulation, and individualised consideration, as outlined in Table 2. The operationalisation of DI is evaluated through the level of adoption of technologies such as BIM, project management software, and

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familiarity with AI, aligned with its dimensions in Table 4. For CPP, measurement is conducted using performance indicators such as cost efficiency, adherence to project timelines, and quality standards, as detailed in Table 5.

Results

The questionnaire was distributed to 150 construction firms, with each company asked to report on a minimum of three construction projects carried out between 2022 and 2024. This process resulted in a total of 368 valid responses, representing the project-level sample used in this study. The initial findings focus on identifying which indicators yielded the highest mean scores. Feedback from the respondents indicated that the two highest-rated indicators related to the operationalisation of TL were TL10 (empowerment) and TL4 (motivation), as shown in Table 6. These results suggest that when leaders effectively empower their subordinates and motivate them to engage more actively in construction projects, CPP tends to improve in both efficiency and effectiveness.

Regarding DI, the indicator with the highest mean score was DI2, which reflects the optimisation of collaboration between advanced technologies and human input. As presented in Table 7, this finding highlights that the integration of state-of-the-art technology with human expertise contributes positively to enhancing CPP. The top three indicators for CPP, according to mean score rankings, were CCP9 (liquidity), CCP10 (debt/leverage), and CCP3 (punctuality), as illustrated in Table 8. These findings imply that the overall effectiveness of CPP is primarily influenced by financial health—specifically liquidity and debt control—as well as adherence to scheduled timelines. These factors were rated higher in importance compared to other indicators such as work list clarity, scope definition, information flow, budgeting, efficiency, and quality standards. This outcome is consistent with the conceptual foundations of the Balanced Scorecard (Tronvoll et al., 2020) and findings from prior empirical studies (Winge et al., 2019).

Table 6: Mean Score of the Indicators of Transformational Leadership (TL).

S/N	Indicators	Mean Score of the Indicator
1	TL1-Charisma	3.43
2	TL2-Trust	3.42
3	TL3-Inspiration	3.41
4	TL4-Motivation	**3.48**
5	TL5-Stimulation	3.42
6	TL6-Encouragement	3.33
7	TL7-Vision	3.33
8	TL8-Long-Term Goals	3.33
9	TL9-Keep Promise	3.38
10	TL10-Empowerment	**3.45**

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Table 7: Mean Score of the Indicators of Digital Innovation (DI).

S/N	Indicators	Mean Score of the Indicator
1	DI1-Automation & Artificial Intelligence (AI)	3.19
2	DI2-Optimization	**3.28**
3	DI3-Skill	3.19
4	DI4-Acceptance	3.19

Table 8: Mean Score of the Indicators of Construction Project Performance (CPP).

S/N	Indicators	Mean Score of the Indicator
1	CPP1-Work List	3.25
2	CPP2-Job Scope	3.34
3	CPP3-Punctuality	**3.36**
4	CPP4-Information Flows	3.23
5	CPP5-Budget	3.32
6	CPP6-Efficiency	3.32
7	CPP7-Standard	3.24
8	CPP8-Quality	3.34
9	CPP9-Liquidity	**3.41**
10	CPP10-Debt/Leverage	**3.41**

The subsequent findings focus on the impact analysis, where the T-values representing the influence of TL and DI on CPP were 3.491 and 3.121 respectively. The corresponding P-values indicate that both relationships are statistically significant, thereby supporting the acceptance of Hypotheses H1 and H2. These results demonstrate that TL and DI exert a strong positive effect on CPP. The analysis was conducted using SmartPLS 3.0 software (Boenningstedt: SmartPLS GmbH, http://www.smartpls.com), based on data from 368 construction project samples across 171 construction firms. The resulting path coefficients and statistical significance of these relationships are presented in Table 9.

Table 9: Path Coefficient of the Research Result.

Path Coefficient					
Hypothesis	Original Sample (O)	Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Value
Digital Innovation -> Construction Project Performance (H2)	0.139	0.137	0.044	3.121	0.002
Transformational Leadership -> Construction Project Performance (H1)	0.211	0.208	0.060	3.491	0.001

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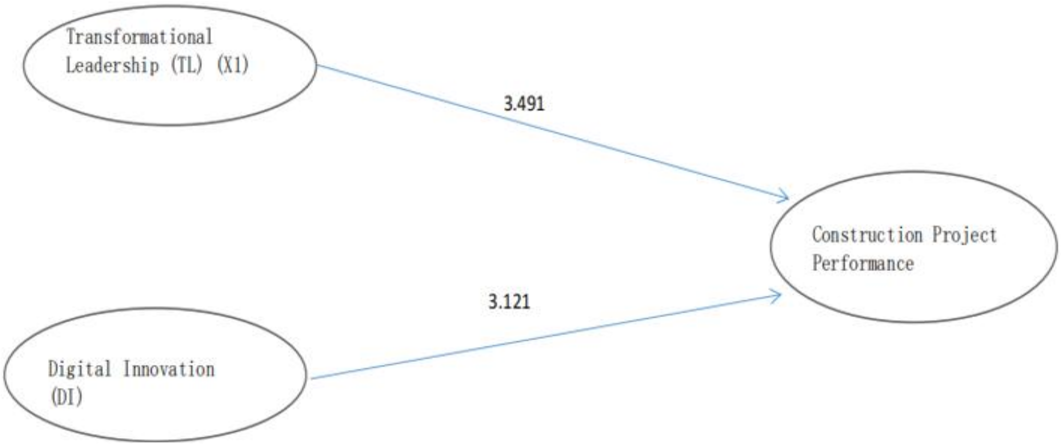
This study also presents the confidence intervals, as shown in Table 10. The interpretation of correlation coefficients, ranging from -1 to +1, offers insight into the strength and direction of the relationships among the variables. A positive and statistically significant correlation ($p < 0.05$) indicates a direct association between the examined variables. These relationships are further illustrated in Figure 2.

Figure 2: Research Result for the Research Model.



The findings summarised in Table 10 reveal that both DI and TL exert statistically significant and positive influences on CPP, both prior to and following adjustment. For DI, the original sample value of 0.139 and a mean of 0.137 lie within a confidence interval of [0.047, 0.220], confirming a significant positive association. After adjustment, the deviation is marginal (-0.002), with the lower bound of the confidence interval remaining above zero (0.053), thereby reinforcing the robustness of the result. In parallel, TL demonstrates an even greater impact, with an original sample value of 0.211 and a mean of 0.208, falling within the confidence interval [0.092, 0.326]. Following adjustment, the deviation is -0.003, and the lower bound remains positive at 0.100, further confirming the consistency and strength of this relationship.

Table 10: Confidence Intervals and Confidence Intervals after Adjustment.

Confidence Intervals				
	Original Sample (O)	Mean (M)	2.5%	97.5%
Digital Innovation -> Construction Project Performance	0.139	0.137	0.047	0.220
Transformational Leadership -> Construction Project Performance	0.211	0.208	0.092	0.326
Confidence Intervals after Adjustment				
	Original Sample (O)	Mean (M)	Deviation	2.5%
Digital Innovation -> Construction Project Performance	0.139	0.137	-0.002	0.053
Transformational Leadership -> Construction Project Performance	0.211	0.208	-0.003	0.100

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These findings suggest that the integration of DI and the presence of strong TL are both essential in enhancing CPP. The continued statistical significance after adjustment substantiates the reliability and validity of the outcomes, underscoring their practical relevance and theoretical contribution to project management research. To enhance the credibility of the results, reliability and validity analyses were performed, including R^2, Cronbach's Alpha, the Fornell-Larcker criterion, and the HTMT ratio, presented in sequential order.

Cronbach's Alpha was employed to evaluate the internal consistency of the measurement scales for TL and DI. Values exceeding 0.70 are generally deemed acceptable, and in this study, the Cronbach's Alpha values for TL and DI were 0.912 and 0.768 respectively, confirming satisfactory internal reliability. Evidence presented in Tables 11 and 12 provides strong validation for both the explanatory capacity of the structural model and the reliability of the instruments utilised. As indicated in Table 11, the R^2 value for CPP stands at 0.614, with an adjusted R^2 of 0.607. This signifies that the model accounts for over 61% of the variance in CPP, representing a substantial level of explanatory power. Likewise, the R^2 value for the implementation of growth strategies is 0.393, which, while more moderate, still reflects a meaningful degree of variance explanation. These values collectively demonstrate that the model effectively captures the primary determinants influencing the outcome variables.

Table 11: R Square in Research Result.

R Square		
	R^2	**Adjusted R2**
Construction Project Performance	0.614	0.607
Growth Strategies Implementation	0.393	0.388

Table 12: Cronbach's Alpha in Research Result.

Cronbach's Alpha				
	Cronbach's Alpha	**rho_A**	**Composite Reliability**	**Average Variance Extracted(AVE)**
Construction Project Performance	0.907	0.908	0.925	0.606
Digital Innovation	0.768	0.778	0.896	0.811
Transformational Leadership	0.912	0.913	0.927	0.559

Table 12 further validates the robustness of the measurement model. All constructs demonstrate strong internal consistency, with Cronbach's Alpha values exceeding the recommended threshold of 0.70—specifically, 0.907 for CPP, 0.768 for DI, and 0.912 for TL. In addition, the composite reliability values all exceed 0.89, indicating robust reliability across constructs. The Average Variance Extracted (AVE) values also meet the minimum benchmark of 0.50, confirming acceptable convergent validity.

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Together, these results affirm the soundness of the measurement model and the predictive strength of the structural framework. Consequently, the reliability, validity, and explanatory accuracy of the study are well supported, thereby strengthening the overall credibility of the research.

The findings detailed in Tables 13 and 14 offer strong support for the discriminant validity of the constructs employed in this research. Based on the Fornell-Larcker criterion presented in Table 13, the square roots of the AVE for each construct—CPP (0.778), DI (0.901), and TL (0.748)—exceed their respective correlations with other constructs. This outcome confirms that each construct shares a greater degree of variance with its own indicators than with those of any other construct, thereby satisfying the Fornell-Larcker condition for discriminant validity. In addition, the HTMT ratios reported in Table 14 further reinforce this conclusion. All HTMT values are well below the conservative threshold of 0.85, with the values between DI and CPP at 0.494, TL and CPP at 0.726, and DI and TL at 0.437. These results clearly demonstrate that the constructs are empirically distinct, with no indication of multicollinearity or conceptual redundancy. Collectively, these findings validate the discriminant properties of the measurement model, affirming the empirical distinctiveness of each construct. As such, the measurement framework is shown to possess strong discriminant validity, thereby enhancing the credibility and structural soundness of the model tested in this study.

Table 13: Fornell-Larcker Criterion in Research Result.

Fornell-Larcker Criterion			
	Construction Project Performance	**Digital Innovation**	**Transformational Leadership**
Construction Project Performance	0.778		
Digital Innovation	0.414	0.901	
Transformational Leadership	0.661	0.368	0.748

Table 14: HTMT Research Result.

HTMT/ Heterotrait-Monotrait Ratio			
	Construction Project Performance	**Digital Innovation**	**Transformational Leadership**
Construction Project Performance			
Digital Innovation	0.494		
Transformational Leadership	0.726	0.437	

Discussion and Conclusion

The findings of this study reveal that TL has a significant and positive influence on CPP. Among the ten indicators presented in Table 2, the most influential were TL10

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(empowerment) and TL4 (motivation), as detailed in Table 6. This suggests that when leaders effectively empower and motivate their subordinates to become actively engaged in projects, CPP tends to improve. Encouraging active participation among team members significantly enhances performance outcomes, as confirmed by the responses in Table 6. These results are consistent with previous research supporting the positive effect of TL on project outcomes (Potter et al., 2018). Within Jakarta's dynamic construction industry, where change is ongoing, TL plays a critical role in addressing project-related challenges. This study thus highlights the central importance of TL in driving improvements in CPP within a developing country context. In addition, the relationship between DI and CPP was also found to be positive. Higher levels of DI were associated with improved efficiency, cost reductions, and enhanced quality. However, barriers remain, including the substantial upfront cost of adopting new technologies and the shortage of skilled labour, which construction firms must address to maximise the benefits of DI.

Table 8 indicates that the indicators with the highest mean scores within CPP are CCP9 (liquidity), CCP10 (debt/leverage), and CCP3 (punctuality). These findings highlight the importance of financial health and strict schedule adherence, both of which are essential for project success, especially in time-sensitive construction environments. Consequently, firms must prioritise financial planning and scheduling controls to optimise performance. This study, however, is subject to several limitations. It focuses exclusively on private sector projects, omitting public projects that often involve added complexity due to political influences. Additionally, the scope is limited to SMEs, excluding larger firms with over 100 employees. Furthermore, while the study is grounded in prior literature and the professional experience of the author, its generalisability would benefit from expanded data and more diverse case references.

Future research could address these limitations in several ways. First, incorporating political dynamics as a variable would enable comparisons between public and private sector projects. Second, including larger construction firms would provide a broader understanding of organisational diversity. Third, expanding the study to other Southeast Asian countries such as Cambodia and Vietnam would allow for comparative regional analysis. Finally, collaborating with researchers possessing more extensive field experience could improve both academic depth and practical applicability. Despite its limitations, the study offers valuable insights for firms aiming to enhance CPP through effective TL and strategic use of DI. The next section presents the implications derived from these findings to support construction organisations in addressing project challenges and boosting overall performance.

References

Aga, D. A., Noorderhaven, N., & Vallejo, B. (2016). Transformational leadership and project success: The mediating role of team-building. *International journal of project management*, *34*(5), 806-818. https://doi.org/10.1016/j.ijproman.2016.02.012

International Journal of Instructional Cases
ISSN: 2399-830x

Agiwal, M., Roy, A., & Saxena, N. (2016). Next generation 5G wireless networks: A comprehensive survey. *IEEE communications surveys & tutorials*, *18*(3), 1617-1655. https://doi.org/10.1109/COMST.2016.2532458

Bergram, K., Djokovic, M., Bezençon, V., & Holzer, A. (2022). The digital landscape of nudging: A systematic literature review of empirical research on digital nudges. Proceedings of the 2022 CHI conference on human factors in computing systems, https://doi.org/10.1145/3491102.3517638

Bjørn, A., Owsianiak, M., Laurent, A., Olsen, S. I., Corona, A., & Hauschild, M. Z. (2018). Scope definition. In *Life cycle assessment: Theory and practice* (pp. 75-116). Springer. https://doi.org/10.1007/978-3-319-56475-3_8

Chen, P.-H., Ong, C.-F., & Hsu, S.-C. (2016). Understanding the relationships between environmental management practices and financial performances of multinational construction firms. *Journal of cleaner production*, *139*, 750-760. https://doi.org/10.1016/j.jclepro.2016.08.109

Chen, Z., Huang, S., Liu, C., Min, M., & Zhou, L. (2018). Fit between organizational culture and innovation strategy: Implications for innovation performance. *Sustainability*, *10*(10), 3378. https://doi.org/10.3390/su10103378

Cheung, M. W.-L. (2013). Multivariate meta-analysis as structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal*, *20*(3), 429-454. https://doi.org/10.1080/10705511.2013.797827

Collard, F., Gasperi, J., Gabrielsen, G. W., & Tassin, B. (2019). Plastic particle ingestion by wild freshwater fish: a critical review. *Environmental Science & Technology*, *53*(22), 12974-12988. https://doi.org/10.1021/acs.est.9b03083

Corscadden, L., Levesque, J., Lewis, V., Strumpf, E., Breton, M., & Russell, G. (2018). Factors associated with multiple barriers to access to primary care: an international analysis. *International journal for equity in health*, *17*(1), 28. https://doi.org/10.1186/s12939-018-0740-1

Ernstsen, S. N., Whyte, J., Thuesen, C., & Maier, A. (2021). How innovation champions frame the future: Three visions for digital transformation of construction. *Journal of construction engineering and management*, *147*(1), 05020022. https://doi.org/10.1061/(ASCE)CO.1943-7862.0001928

Eschenfelder, K. R., Shankar, K., & Downey, G. (2022). The financial maintenance of social science data archives: Four case studies of long-term infrastructure work. *Journal of the Association for Information Science and Technology*, *73*(12), 1723-1740. https://doi.org/10.1002/asi.24691

Gawer, A. (2021). Digital platforms' boundaries: The interplay of firm scope, platform sides, and digital interfaces. *Long range planning*, *54*(5), 102045. https://doi.org/10.1016/j.lrp.2020.102045

Harper, N. J. N., Cook, T. M., Garcez, T., Farmer, L., Floss, K., Marinho, S., Torevell, H., Warner, A., Ferguson, K., Hitchman, J., Egner, W., Kemp, H., Thomas, M., Lucas, D. N., Nasser, S., Karanam, S., Kong, K. L., Farooque, S., Bellamy, M., & McGuire, N. (2018). Anaesthesia, surgery, and life-threatening allergic reactions: epidemiology and clinical features of perioperative anaphylaxis in the 6th National Audit Project (NAP6). *British Journal of Anaesthesia*, *121*(1), 159-171. https://doi.org/10.1016/j.lrp.2020.102045

International Journal of Instructional Cases
ISSN: 2399-830x

Jun, K., & Lee, J. (2023). Transformational leadership and followers' innovative behavior: Roles of commitment to change and organizational support for creativity. *Behavioral Sciences*, *13*(4), 320. https://doi.org/10.3390/bs13040320

Krishnan, S. R., Nallakaruppan, M., Chengoden, R., Koppu, S., Iyapparaja, M., Sadhasivam, J., & Sethuraman, S. (2022). Smart water resource management using Artificial Intelligence—A review. *Sustainability*, *14*(20), 13384. https://doi.org/10.3390/su142013384

Kuper, R. (2017). Evaluations of landscape preference, complexity, and coherence for designed digital landscape models. *Landscape and Urban Planning*, *157*, 407-421. https://doi.org/10.1016/j.landurbplan.2016.09.002

Li, S., Xu, L. D., & Zhao, S. (2015). The internet of things: a survey. *Information systems frontiers*, *17*(2), 243-259. https://doi.org/10.1007/s10796-014-9492-7

Nyqvist, R., Peltokorpi, A., Lavikka, R., & Ainamo, A. (2024). Building the digital age: management of digital transformation in the construction industry. *Construction Management and Economics*, *43*(4), 262-283. https://doi.org/10.1080/01446193.2024.2416033

Olofsson Hallén, K., Forsman, M., & Eriksson, A. (2025). Which aspects of leadership are associated with trustful use of bim and other digital technologies in construction? *Buildings*, *15*(10), 1670. https://doi.org/10.3390/buildings15101670

Paraskevopoulou, C., & Diederichs, M. (2018). Analysis of time-dependent deformation in tunnels using the convergence-confinement method. *Tunnelling and Underground Space Technology*, *71*, 62-80. https://doi.org/10.1016/j.tust.2017.07.001

Potter, E. M., Egbelakin, T., Phipps, R., & Balaei, B. (2018). Emotional intelligence and transformational leadership behaviours of construction project managers. *Journal of financial management of property and construction*, *23*(1), 73-89. https://doi.org/10.1108/JFMPC-01-2017-0004

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., Proctor, E. K., & Kirchner, J. E. (2015). A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation science*, *10*(1), 21. https://doi.org/10.1186/s13012-015-0209-1

Reisberger, T., Reisberger, P., Copuš, L., Madzík, P., & Falát, L. (2025). The linkage between digital transformation and organizational culture: Novel machine learning literature review based on latent dirichlet allocation. *Journal of the Knowledge Economy*, *16*(1), 2082-2118. https://doi.org/10.1007/s13132-024-02027-3

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in science education*, *48*(6), 1273-1296. https://doi.org/10.1007/s11165-016-9602-2

Tessarini Junior, G., & Saltorato, P. (2021). Workforce agility: A systematic literature review and a research agenda proposal. *Innovar*, *31*(81), 155-167. https://doi.org/10.15446/innovar.v31n81.95582

International Journal of Instructional Cases
ISSN: 2399-830x

Trenerry, B., Chng, S., Wang, Y., Suhaila, Z. S., Lim, S. S., Lu, H. Y., & Oh, P. H. (2021). Preparing workplaces for digital transformation: An integrative review and framework of multi-level factors. *Frontiers in psychology*, *12*, 620766. https://doi.org/10.3389/fpsyg.2021.620766

Troise, C., Corvello, V., Ghobadian, A., & O'Regan, N. (2022). How can SMEs successfully navigate VUCA environment: The role of agility in the digital transformation era. *Technological Forecasting and Social Change*, *174*, 121227. https://doi.org/10.1016/j.techfore.2021.121227

Tronvoll, B., Sklyar, A., Sörhammar, D., & Kowalkowski, C. (2020). Transformational shifts through digital servitization. *Industrial Marketing Management*, *89*, 293-305. https://doi.org/10.1016/j.indmarman.2020.02.005

Van Doremalen, N., Bushmaker, T., Morris, D. H., Holbrook, M. G., Gamble, A., Williamson, B. N., Tamin, A., Harcourt, J. L., Thornburg, N. J., Gerber, S. I., Lloyd-Smith, J. O., de Wit, E., & Munster, V. J. (2020). Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *New England journal of medicine*, *382*(16), 1564-1567. https://doi.org/10.1056/NEJMc2004973

Vărzaru, A. A., & Bocean, C. G. (2024). Digital transformation and innovation: The influence of digital technologies on turnover from innovation activities and types of innovation. *Systems*, *12*(9), 359. https://doi.org/10.3390/systems12090359

Webster, A., Svalastog, A. L., & Allgaier, J. (2020). Mapping new digital landscapes. *Information, Communication & Society*, *23*(8), 1100-1105. https://doi.org/10.1080/1369118X.2020.1784507

Winge, S., Albrechtsen, E., & Arnesen, J. (2019). A comparative analysis of safety management and safety performance in twelve construction projects. *Journal of safety research*, *71*, 139-152. https://doi.org/10.1016/j.jsr.2019.09.015

Wong, T.-C., & Goldblum, C. (2016). Social housing in France: A permanent and multifaceted challenge for public policies. *Land Use Policy*, *54*, 95-102. https://doi.org/10.1016/j.landusepol.2016.01.011

Zhao, N., Fan, D., & Chen, Y. (2021). Understanding the impact of transformational leadership on project success: A meta-analysis perspective. *Computational Intelligence and Neuroscience*, *2021*(1), 7517791. https://doi.org/10.1155/2021/7517791

Zheng, Z., Xie, S., Dai, H.-N., Chen, X., & Wang, H. (2018). Blockchain challenges and opportunities: A survey. *International journal of web and grid services*, *14*(4), 352-375. https://doi.org/10.1504/IJWGS.2018.095647