

Team Resilience and Project Performance in Construction Projects: A Capability Perspective

Ida Bagus Putu Somantara¹, Ignatius Heruwasto¹

¹Graduate Program in Management Science, Faculty of Economics and Business, Universitas Indonesia, Depok, Indonesia.

*Corresponding Author: Ida Bagus Putu Somantara

Email: novi.mahwiyanto30@gmail.com

Article Info

Article History:

Received August 21, 2026
Revised September 15, 2026
Accepted: October 5, 2026

Keywords:

Team Resilience, Project Management, Uncertainty, Servant Leadership, Construction

Abstract

The rapid change in the business environment, triggered by uncertainty and complexity, forces organizations/projects to be able to identify, assess and mitigate challenges and opportunities immediately. Therefore, team resilience is relevant, namely the ability to adapt quickly to the dynamics of environmental changes to remain able to perform well. This research shows how team resilience plays a role, in influencing project performance. The research uses several factors at the organizational level, team, and individual levels on team resilience, then the influence of team resilience on project performance. The research method used is a quantitative method to test the 6 hypotheses that are constructed. Online survey instruments were used for data collection using purposive sampling and snowball techniques. Data analysis using the PLS SEM method in the SmartPLS v.4.1.1.8 application. The results of the analysis using 100 respondents in the construction industry in Indonesia showed that organizational practices, team confidence, teamwork, servant leadership, and individual resilience had a positive influence on team resilience, but only teamwork and individual resilience had a significant effect. Furthermore, the team's resilience affects the success/performance of the project. Research implications and suggestions for further research are also presented.

Introduction

The construction industry is a sector that operates in a dynamic, complex, and uncertain environment. Changing economic conditions, increasing project complexity, technological developments, and high demands from various stakeholders require construction organizations to be able to respond quickly to changes without neglecting the achievement of project goals. In Indonesia, these challenges are increasingly real. Based on the Construction Indicators for the Fourth Quarter of 2024 published by the Central Statistics Agency (BPS), construction service providers face three main problems, namely, the high level of market competition, the declining demand for construction services, and the increasing price of building materials. In addition to these external pressures, national infrastructure development still faces various internal obstacles, such as weak project leadership, low team ability to deal with changes, weak project control, and limited organizational resources that contribute to project delays and failures (Indonesian Construction, 2024; Khattak & Mustafa, 2019; Damoah & Kumi, 2018; Sikhupelo & Amoah, 2026; Mwamvuni et al., 2022). This condition increases the work pressure that the project team must face to maintain work effectiveness and achieve project goals in the midst of an ever-changing environment (Hamsal et al., 2022; Prica & Bjelic, 2025).

Under these conditions, project performance achievement becomes increasingly challenging. So far, the success of projects has often been measured through an iron triangle approach: cost, time, and quality. However, the development of the project management literature that these measures are not yet able to represent the overall success of the project. The Seventh Edition of the PMBOK® Guide emphasizes that project performance reflects the project's ability to

create value through effective work management, stakeholder expectations, and the achievement of organizational goals (Project Management Institute, 2021; Moghaddasi et al., 2025; Muneer et al., 2022; Ika & Pinto, 2022; Barcaui & Monat, 2023). In line with that, various studies show that project performance is a multidimensional construct that includes cost and time efficiency, quality of work, operational effectiveness, innovation, value creation, and stakeholder satisfaction (Alaloul et al., 2020; Anantatmula & Iyyunni, 2023; Dasi et al., 2021; Delise et al., 2023; Floricel et al., 2016). Therefore, the success of projects in an environment of uncertainty increasingly depends on the organization's ability to sustainably maintain performance, rather than simply meeting operational targets.

A capability that is getting more attention in explaining the success of the project is team resilience. A construction project is a temporary organization that relies heavily on the team's ability to deal with pressures, disruptions, and changes that occur during the project cycle (Turner & Müller, 2003; Ebekozién et al., 2024; Nachbagauer, 2022). In this context, team resilience is the collective ability to anticipate, absorb, recover, and adapt to various challenges so that the team remains able to maintain work effectiveness and achieve project goals (He et al., 2018; Hilu & Hiyassat, 2023; Sharma & Sharma, 2016). Studies have also shown that teams with high levels of resilience tend to be better able to maintain coordination, accelerate problem-solving, maintain collective learning, and improve project success than less resilient teams (Hamsal et al., 2022; Pavez et al., 2021). The findings suggest that resilience is no longer seen as the ability to recover after a disruption but as a strategic capability that supports project sustainability and performance.

The importance of team resilience can be explained through dynamic capability theory, which states that an organization's excellence in a dynamic environment is determined not only by the ownership of resources but also by the ability to integrate, develop, and reconfigure those resources to respond effectively to change (Teece, 2007). In the context of construction projects, this perspective provides the basis that team resilience is a dynamic capability formed through the integrated management of various organizational, team, and individual resources. Thus, the team's ability to deal with uncertainty depends not only on individual characteristics or the effectiveness of teamwork, but also on how the organization manages these resources to maintain and improve project performance.

In line with the perspective of dynamic capabilities theory, an organization's ability to sustain performance in a dynamic environment depends on its ability to integrate various resources into adaptive capabilities (Teece, 2007). In the context of construction projects, team resilience is not only influenced by a single resource but is also the result of the interaction of various resources available at the organizational, team, and individual levels. Therefore, an understanding of team resilience needs to be placed in a multilevel perspective that explains how these resources complement each other in supporting the team's ability to cope with project changes and uncertainties.

At the organizational level, various studies show that organizational practices are an important foundation in building team resilience. These practices include formalization mechanisms, orientation to employee development, and innovation practices that support coordination, learning, and organizational flexibility despite changes (Fischer et al., 2014). In a dynamic project environment, organizational practices provide a work system and resource support that allows teams to maintain effective project execution.

Meanwhile, at the team level, *resiliensi tim* is defined by the quality of interaction among members through collective efficacy, teamwork, and leadership. Collective efficacy strengthens the team's collective confidence to complete tasks (Vera et al., 2017), teamwork

improves coordination, communication, and collaboration between members (Dasi et al., 2021), while (servant) leadership builds a work environment that is oriented toward empowerment, trust, and development of team members to support team resilience (Sendjaya et al., 2017; Siddique, 2025).

In addition to organizational and team resources, previous research also recognised the importance of individual resilience. Employee resilience describes an individual's ability to survive, recover, and adapt to the pressures and changes that occur during the execution of a project (Tonkin, 2016). Resilient individuals are better able to manage stress, learn from experience, and maintain performance when faced with uncertain situations. On a broader level, the adaptive capacity of individuals also contributes to team and organizational resilience through interaction amongs members in completing project tasks (Wang & Wang, 2023).

This study views that organizational practices, collective efficacy, teamwork, servant leadership, and employee resilience are representations of strategic resources influence team resilience. Furthermore, team resilience is positioned as a dynamic capability that allows project teams to maintain work effectiveness, adapt to change, and ultimately improve project performance. This framework is the basis for developing a research model that connects cross-level resources to team resilience and its implications to project performance.

While research on team resilience in project management continues to grow, there are some gaps that need attention. From the theoretical side, most of the research on resilience through conservation of resources theory (COR), psychological resilience, and social exchange theory, while the application of dynamic capability (DC) theory to explain team resilience in construction projects is limited (Naderpajouh et al., 2020; Teece, 2007). From the empirical side, previous research generally examined factors such as organizational practices, collective efficacy, teamwork, servant leadership, and employee resilience separately, so it has no comprehensive understanding of how resources interact each other and influence team resilience. In addition, empirical evidence integrating these resources into the construction industry in developing countries, especially Indonesia is limited, even though the sector faces a high level of uncertainty and project complexity (Hamsal et al., 2022). On the other hand, most studies focus more on the factors related to team resilience, while studies on the implications of team resilience on project performance still need strengthening. Based on these gaps, there is a need for a model that integrates resources at the organizational, team, and individual levels from the perspective of dynamic capability theory to explain team resilience and its implications for project performance in the construction industry.

Based on these problems, this study seeks to answer the main questions about how organizational practices, team resources, and employee resilience as a representation of resources contribute to team resilience, then its impact to project performance in the construction industry in Indonesia. To answer this question, this study aims to analyze the influence of organizational practices, collective efficacy, teamwork, servant leadership, and employee resilience on team resilience, as well as to examine the influence of team resilience on project performance.

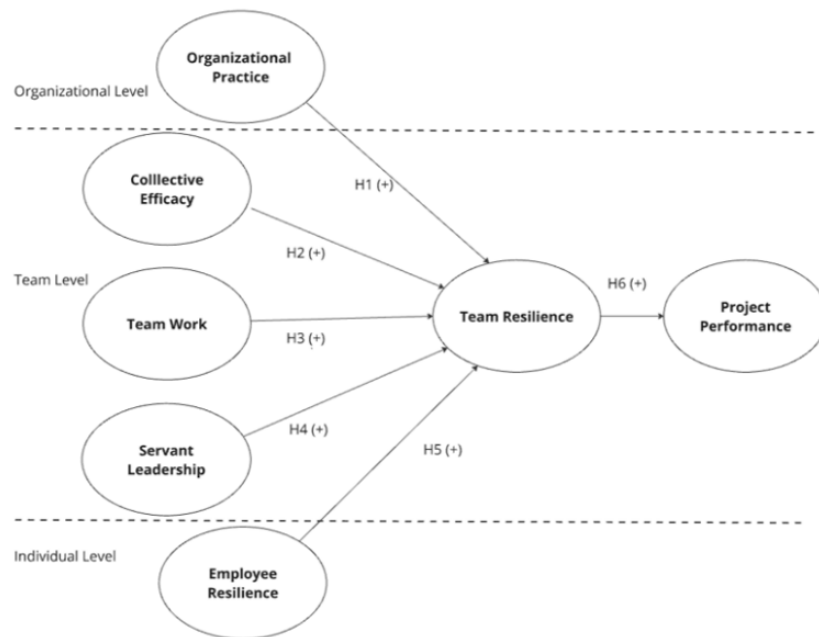


Figure 1. Research Model

This research has made several contributions to the development of literature and project management practices. From the theoretical side, this study expands the study of team resilience through the lens of dynamic capability theory. Previous studies explored resilience antecedents separately, this study developed a conceptual model that integrates cross-level resources in one comprehensive analytical framework. From the empirical side, this study provides evidence on the mechanism of team resilience formation in the Indonesian construction industry as a representation of developing countries deal with uncertainty, stakeholder complexity, and acceleration of infrastructure development. Meanwhile, from a practical perspective, the research findings are expected to be input for construction organizations in designing organizational resource management strategies, team capacity building, and strengthening individual resilience to improve project performance in a sustainable manner.

Method

Research design

This study adopted a quantitative research design, with data collected using a structured questionnaire. The questionnaire comprised a series of statements designed to measure the study variables and was administered through online survey platforms, email, and direct channel from November 2025 to July 2026. All questionnaire items were assessed using a six-point Likert scale ranging from 1 (Strongly Disagree) to 6 (Strongly Agree). The use of an even-numbered Likert scale was intended to minimize respondents' tendency to select a neutral midpoint, thereby encouraging more definitive responses. Prior to the main data collection, the draft questionnaire was reviewed by a panel of experts with extensive experience in construction project management to evaluate its content validity, clarity, and relevance. Based on their feedback, the questionnaire was refined before being subjected to a pilot test involving 30 respondents. The pilot study was conducted to assess the reliability and validity of the measurement instrument and to ensure the clarity and comprehensibility of the questionnaire items before the full-scale survey was administered. In addition, demographic information was collected to describe the characteristics of the respondents, including age, gender, educational

background, years of project experience, project location, project type, project team size, and the complexity of the construction projects in which they were involved.

Participants

The respondents were project team consist of project managers, deputies, and functional managers with diverse education/skill backgrounds, experience, gender, age, and number of team members (*size*). Number of samples by power analysis; significant level ($\alpha = 0.05$), statistical power 0.8, minimum sample (*medium effect*, $f^2 = 0.15$), with the number of predictors of 5 latent variables, the number of samples is ≈ 92 . (Hair et al., 2022). In general, the minimum sample number of 100 respondents is considered adequate.

Measurement

The model proposed in this study adopted framework from previous studies. There are 7 latent constructs used. Organizational practices is a construct with 2 dimensions; formal practices and employee-oriented practices adapted from Tonkin (2016) and Vera et al. (2017).

At the team level, this study examined three latent constructs: collective efficacy, teamwork, and servant leadership. Collective efficacy was measured using four indicators adapted from Bandura (1997). Teamwork was measured using five items adapted from Sharma and Sharma (2016) and Vera et al. (2017). Servant leadership was measured using six items adapted from Greenleaf (as cited in Smith, 2005) and Sendjaya et al. (2017). Team resilience was conceptualized as a multidimensional construct comprising four dimensions: preparatory capability, absorptive capability, restorative capability, and adaptive capability. The construct was measured using 23 items adapted from He et al. (2018); Hilu and Hiyassat (2023). Individual resilience was measured using six items adapted from Tonkin (2016). Project performance was measured using 16 items adapted from Floricel et al. (2016), encompassing four dimensions: schedule performance (time), innovation, operational performance, and value creation. All measurement items were assessed using a six-point Likert scale ranging from 1 (Strongly Disagree) to 6 (Strongly Agree).

Table 1. Constructs, dimensions, and research indicators

Construct	Dimensions	Code	Indicator	References
Organizational Practices: All the support provided by an organization to a team includes all the resources needed to achieve goals in a good, healthy way. Vera, et al., (2017).	Formalization practices: managing and controlling of the organization through formal regulations and procedures. (Fisher, R., et. al, 2014).	OR1	Organizational readiness to provide technical/financial/human resources support to the project team, if needed.	Vera et al., (2017)
		OR2	The organization has a list of reliable alternative sub-contractors and suppliers.	
		OR3	Organizations can manage strategic resources well.	
		OR4	The organization values every opinion/opinion from employees.	
		OR5	Organizations apply <i>Knowledge Management</i> (KM) to every organization/project operation.	

	Employee-orientation practices: Organizations manage various interests for employees (e.g. well-being, career, equality) that have a positive impact on the organization. (Fisher, R., et al., 2014).	OR6	The company gives attention/appreciation to outstanding employees.	
		OR7	The company provides employee skill development programs.	
		OR8	The company provides and encourages employee career development.	
		OR9	The company pays attention to the well-being of employees.	
		OR10	The company treats/provides employee rights fairly and reasonable.	
		OR11	The company encourages open communication (related to projects and organizational policies).	
Collective Efficacy: the belief / confidence of a group that tim capacity is able to organize and carry out the activities/actions necessary to obtain certain benefits. (Bandura, 1997; Vera, et al., 2017).	<i>Uni-dimensional:</i> as a whole unit.	CE1	The composition (number) of project team members is designed precisely to complete the work/project.	Sharma & Sharma, (2016); Vera et al., (2017)
		CE2	Each team member has specific skills to work effectively as a team.	
		CE3	The company provides the resources that the project team needs to manage a project.	
		CE4	Sufficient resources to obtain information and get feedback in managing projects.	
3. Teamwork - That is, the extent to which group/team members have clear, specific team goals, and they share information/tasks with each other and depend on each other to achieve common goals. (Vera, et al., (2017).	<i>One-dimensional,</i> as a whole unit.	TW1	Foster relatively close working relationships amongs project team members.	Sharma & Sharma, (2016); Vera et al., (2017)
		TW2	Build effective communication amongs project team members.	
		TW3	Share important information amongs project team members.	
		TW4	Using standard terms/terminology so that there is a common understanding amongs team members in the work environment.	
		TW5	There is agreement on the expected behavior of each project team member.	
Leadership (servant):	SLBS-6 as a <i>unidimensional</i>	SL1	Leadership uses power/authority to serve others (members and other parties),	Sendjaya et al., (2017)

Greenleaf (2003) states that the main characteristic of servant leadership is the desire to 'serve the broader (common) interest, beyond self/personal interests. Leaders with this style are motivated by a commitment to serve, prioritizing the needs of others over personal interests and sharing power. (van Dierendonck, 2011).	representation of SLBS-35*		not for personal interests/ambitions. (<i>Voluntary subordination</i>).	
	*) <i>Servant Leadership Behavioral Scale-SLBS</i>	SL2	Displays the alignment of values, thoughts and actions (<i>Authentic self</i>).	
		SL3	Mutual respect, building/encouraging strong/sincere commitment amongs team members (<i>Covenantal relationship</i>).	
		SL4	Encourage the team to perform activities based on morality/ethics. (<i>Responsible morality</i>).	
		SL5	Help the team to produce something that has value/meaning/meaning from the activity at work. (<i>Transcendental spirituality</i>).	
		SL6	Contributing in the form of benefits to the team personally and professionally. (<i>Transforming Influence</i>).	
Employee Resilience: Windle (2011) defines resilience as an individual's capacity to face, resolve challenges and obstacles effectively without causing negative disruption until they recover/function normally.	One-dimensional, as a whole unit.	ER1	Effective collaboration with relevant parties to manage challenges in the workplace.	
		ER2	Manage high workloads for long periods of time well.	Tonkin, (2016)
		ER3	Solve problems and challenges using skills/competencies in the workplace.	
		ER4	Conduct performance evaluations and continuously make improvements to work methods in the workplace.	
		ER5	Respond effectively to feedback both positively and vice versa.	
		ER6	Seek help/support when you need special/specific resources.	
		ER7	Approach the project leader/manager if they need support.	
		ER8	Use change as an opportunity to grow and develop.	
		ER9	Learn from mistakes and make improvements immediately.	
Team resilience: - Project team resilience as a	Preparation: refers to anticipatory activities and early	TR1	Selection and method of recruitment of workers/partners.	He et al., (2018);

capacity to anticipate, manage/control and recover from difficulties or failures triggered by the uncertainty and complexity of the project environment. (Pavez, I., et al., 2021).	preparedness to face unpredictable events.	TR2	Risk management is well prepared and managed.	Hilu & Hiyassat, (2023)
		TR3	Work safety measures and project monitoring proactively and continuously.	
		TR4	Digitization of the project work site (<i>site works</i>) and project documents.	
		TR5	Carefully designed contracts with suppliers and sub-contractors.	
		TR6	Project Managers/Deputies have similar experience on similar projects before.	
	Absorptive capacity: refers to the capacity to mitigate unfavorable situations. It consists of: knowledge acquisition, assimilation, transformation, and utilization for the improvement of organizational processes and capacity.	TR7	Reserve time and funds for unidentified risks (reserve management).	
		TR8	Insurance on project work and equipment.	
		TR9	Claims management and variation <i>orders</i> .	
		TR10	There is a quick response from the client (<i>owner</i>) and collaboration with sub-contractors.	
		TR11	Project managers have emotional intelligence.	
		TR12	The project team conducts meetings, discussions and collaborations immediately related to events/events that can disrupt project performance.	
	Restorative capacity: refers to the restoration of the system to its desired performance through repairs/rehabilitation.	TR13	The project team has sufficient resources for the implementation of the project.	
		TR14	The team allocates resources and alignment to various planned project activities.	
		TR15	The project team can apply crashing and fast-tracking techniques, if necessary to maintain time and cost targets.	
		TR16	Leadership agility in responding to various issues and problems without causing delays due to slow responses.	
		TR17	The ability of leaders to make innovative decisions correctly and on time helps in project recovery	

		TR18	Effective communication between project team members.	
		TR19	Involve all stakeholders who have an impact on the project target (<i>stakeholders' engagement</i>).	
	Adaptive capacity: That is, making system adjustments based on unexpected events to maintain and stabilize system performance.	TR20	The team made reasonable/appropriate changes to the design and working methods.	
		TR21	Make reasonable/appropriate changes to the initial/ <i>baseline</i> plan (scope, schedule, and budget).	
		TR22	Adjustment through additional precautions.	
		TR23	Training project team members and the team's ability to make changes.	
Project Performance: Demonstrate the extent to which the <i>outputs</i> and project outcomes meet budget, schedule targets, operational, technical specifications, and the client's business needs. (Ali, et al., 2018, p. 457) Consists of -Deadline -Innovation -Operational -Value creation/ <i>Value creation</i>	Completion/ Deadline; Measure whether resource expenditures and deadlines are as planned, the entire planned scope is achieved and all artifacts are functioning as planned.	PP1	We look closely at and work on the entire scope of the planned project and some additional objects.	(Floriciel et al., 2016)
		PP2	The project is proceeding faster than originally planned.	
		PP3	The realization of the final project cost is below the approved budget at the time/date of the start of the project.	
		PP4	All submitted work items are completed and in good working order as required in the contract.	
	innovation; Measure whether a project produces or pioneers outstanding achievements in the materials/components used, its functionality and performance.	PP5	The project team seeks to explore various opportunities such as working methods and more efficient use of materials.	
		PP6	The project team dares to take measurable risks while trying new strategies to improve project performance.	
		PP7	All the set functional and performance goals have been achieved and some have even been exceeded.	
		PP8	Extraordinary technical achievements make this project	

			a reference project in similar projects.	
	Operational: The extent to which the project runs smoothly and reliably, at minimal maintenance and exploitation costs and few repairs.	PP9	The team applies various effective and efficient work/technical methods to the project.	
		PP10	Despite operating under strict regulatory conditions, the project does not experience failures, disruptions or experience disaster.	
		PP11	The operation and maintenance costs of this project are much lower than the original cost plan.	
		PP12	No significant expenditure is required for the cost of project repairs.	
	Value creation: Measure how well a project achieves the expected financial benefits, meet the expectations of <i>users</i> and other stakeholders and boost the reputation of project owners and promoters.	PP13	The benefits of this project exceed the set target.	
		PP14	<i>Users and project stakeholders</i> are satisfied with the value / benefits provided.	
		PP15	The (physical) project can improve the reputation and strategic position of the project owner.	
		PP16	The project team received recognition/appreciation from the owner for the delivery of the work even exceeding the expectations of the agreement on the contract.	

Results and Discussion

The data obtained from the respondents were then analyzed using PLS-SEM on the SmartPLS v.4.1.1.8 application. According to (Hair & Alamer, 2022), there are 2 stages in conducting data analysis, first stage is assesment of the measurement model to determine the validity and reliability of survey instruments. The measured used are loadings, AVE, Cronbach's alpha and composite reliability, HTMT and criteria Fornel-Larcker (discriminant analysis). The next stage is the analysis of the structural model including *Variance Inflation Factor* (VIF) (evaluation of multicollinearity amongs indicators), *Explanatory Power* (R^2 , F^2 , Q^2), fit models and hypothesis tests.

Table 2. Demographic Characteristics of Respondents and Project Characteristics

Category	Characteristic	Frequency (n)	Percentage (%)
Gender	Male	93	93.0
	Female	7	7.0
Age	20–30 years	6	6.0
	30–40 years	18	18.0
	40–50 years	40	40.0
	>50 years	36	36.0
Education	Diploma	7	7.0
	Bachelor's	43	43.0
	Master's	47	47.0
	Doctorate	3	3.0
Experience	1–3 years	10	10.0
	4–6 years	10	10.0
	7–9 years	12	12.0
	>10 years	68	68.0
Financing	Private	28	28.0
	Foreign	7	7.0
	APBN	32	32.0
	BUMN/D	33	33.0
Contract Value	Rp. 10–100 M	29	29.0
	Rp. 100–500 M	29	29.0
	Rp. >500 M	40	40.0
Project Complexity	Complex	65	65.0
	Medium	32	32.0
	Simple	3	3.0
Site Projects	Java	37	37.0
	Outside Java	48	48.0
	Overseas	5	5.0
Team Size	<10 persons	8	8.0
	10–30 persons	28	28.0
	>30 persons	64	64.0
Position	Project Manager	41	41.0
	Deputy	10	10.0
	Engineering	17	17.0
	Finance, SDM	14	14.0
	Procurement	7	7.0
	QSHE	3	3.0

Source: Processed Data.

The respondent and project characteristics indicate that the sample was predominantly male (93.0%), with most respondents aged 40–50 years (40.0%) and above 50 years (36.0%). In terms of educational attainment, the majority held a master's degree (47.0%), followed by a bachelor's degree (43.0%), indicating a relatively high level of academic qualification. Most respondents had more than 10 years of professional experience (68.0%), suggesting that the respondents possessed substantial expertise in project-related activities. Regarding project financing, BUMN/D and APBN were the most common sources, accounting for 33.0% and

32.0%, respectively. In terms of contract value, 40.0% of projects exceeded Rp. 500 billion, indicating that many respondents were involved in large-scale projects. Project complexity was predominantly classified as complex (65.0%), while 32.0% were of medium complexity. Most projects were located outside Java (48.0%), followed by Java (37.0%), while 5.0% were overseas projects. Furthermore, 64.0% of respondents worked in teams of more than 30 persons, reflecting the relatively large organizational scale of the projects. By position, Project Managers represented the largest group (41.0%), followed by Engineering (17.0%) and Finance/SDM (14.0%) personnel. Overall, these characteristics indicate that the study sample largely comprised highly educated and experienced professionals occupying important managerial and technical positions and working on large, complex projects.

Measurement Model Assessment

As listed in Table 1 there are 74 indicators in the structured questionnaire. Several indicators were eliminated due to a loading value of <0.7 , including the elimination of one dimension in the team's resilience due to the issue of multicollinearity. The assessment of the validity and reliability measurement can be seen in Table 2. Validity is seen from the loading value of >0.7 , the correlation of the indicator measures the concept of the construct; and $AVE > 0.5$; showing that more than 50% of the variants in the construct can be explained by their indicators. The reliability in Table 2 shows Cronbach's alpha value of >0.7 which means that all indicators are assumed to be reliable. The composite reliability value is also >0.7 which indicates that the model has higher reliability.

Table 2. Assessment of the measurement model

Construct	Dimension / Indicator	Loading Factor (≥ 0.70)	Average Variance Extracted (AVE ≥ 0.50)	Cronbach's Alpha (≥ 0.70)	Composite Reliability (≥ 0.70)
Organizational Practices			0.919	0.912	0.958
	Formalization practices	0.963			
	Employee orientation	0.955			
Collective Efficacy			0.738	0.824	0.894
	CE1	0.857			
	CE2	0.864			
Teamwork			0.753	0.918	0.935
	TW1	0.856			
	TW2	0.856			
	TW3	0.883			
	TW4	0.884			
	TW5	0.886			
	TW6	0.829			
Servant Leadership			0.709	0.916	0.935
	SL1	0.700			
	SL2	0.767			

	SL3	0.887			
	SL4	0.875			
	SL5	0.908			
	SL6	0.893			
Employee Resilience			0.672	0.902	0.925
	ER1	0.790			
	ER2	0.868			
	ER3	0.861			
	ER4	0.851			
	ER5	0.776			
	ER6	0.766			
Team Resilience			0.847	0.909	0.943
	Preparation	0.915			
	Restoration	0.954			
	Adaptive	0.890			
Project Performance			0.787	0.910	0.937
	Time	0.842			
	Innovation	0.904			
	Operation	0.904			
	Value creation	0.897			

Source: Processed Data.

The measurement model results indicate that all constructs demonstrate acceptable levels of reliability and convergent validity. The factor loadings for the indicators range from 0.700 to 0.963, meeting the recommended threshold of ≥ 0.70 , which indicates that each indicator adequately represents its respective construct. The AVE values range from 0.672 to 0.919, exceeding the minimum criterion of 0.50 and confirming adequate convergent validity. In addition, Cronbach's Alpha values range from 0.824 to 0.918, while Composite Reliability values range from 0.894 to 0.958, all above the recommended threshold of 0.70. These findings confirm that the constructs, including Organizational Practices, Collective Efficacy, Teamwork, Servant Leadership, Employee Resilience, Team Resilience, and Project Performance, possess satisfactory internal consistency and convergent validity. Therefore, the measurement model can be considered reliable and valid for further structural model analysis.

Table 3. Assessment of Heterotrait–Monotrait Ratio (HTMT)

Construct	Collective Efficacy	Employee Resilience	Org. Practices	Performance	Servant Leadership	Team Resilience	Teamwork
Employee Resilience	0.817						
Organizational Practices	0.890	0.815					
Performance	0.764	0.785	0.678				
Servant Leadership	0.842	0.748	0.726	0.665			

Team Resilience	0.885	0.874	0.851	0.895	0.795		
Teamwork	0.788	0.734	0.773	0.793	0.791	0.895	

Source: Processed Data.

The discriminant validity results show that the constructs generally demonstrate acceptable relationships with one another, although several correlations are relatively high. The correlations among the constructs range from 0.665 to 0.895. The highest correlations are observed between Team Resilience and Teamwork (0.895), Team Resilience and Organizational Practices (0.895), and Team Resilience and Employee Resilience (0.885), indicating strong associations among these constructs. Meanwhile, the lowest correlation is between Serving Leadership and Performance (0.665). Overall, the results indicate that the constructs are empirically related but remain distinguishable from one another. However, because several correlations exceed 0.85, particularly those involving Team Resilience, Organizational Practices, and Teamwork, further assessment using the HTMT criterion is recommended to provide stronger evidence of discriminant validity.

Table 4. Assessment of Fornell–Larcker Criterion

Construct	Collective Efficacy	Employee Resilience	Organizational Practices	Performance	Servant Leadership	Team Resilience	Teamwork
Collective Efficacy	0.859	-	-	-	-	-	-
Employee Resilience	0.701	0.820	-	-	-	-	-
Organizational Practices	0.777	0.746	0.959	-	-	-	-
Performance	0.671	0.719	0.622	0.887	-	-	-
Servant Leadership	0.731	0.683	0.662	0.616	0.842	-	-
Team Resilience	0.776	0.796	0.777	0.818	0.731	0.920	-
Teamwork	0.697	0.677	0.710	0.730	0.726	0.819	0.868

Source: Processed Data.

The discriminant validity results show that the constructs are generally distinct, as the square root of AVE values are higher than their correlations with other constructs. However, the relatively high correlations between Team Resilience and Performance (0.818) and Team Resilience and Teamwork (0.819) should be noted. Overall, the measurement model demonstrates acceptable discriminant validity.

Structural Model Assessment

Before further analysis, it is necessary to assess the level of multicollinearity amongs exogenous latent constructs that predict endogenous constructs. The measure used is the variance inflation factor, VIF. A high VIF value causes the estimated coefficient (β) to be

inaccurate and the contribution of each exogenous construct to be biased and difficult to interpret accurately.

Table 5. Collinearity Assessment (VIF)

Structural Path	VIF	Interpretation
Organizational Practices → Team Resilience	3.373	< 5), moderate collinearity
Collective Efficacy → Team Resilience	3.315	< 5), moderate collinearity
Teamwork → Team Resilience	2.743	< 3.3), no collinearity concern
Serving Leadership → Team Resilience	2.813	< 3.3), no collinearity concern
Employee Resilience → Team Resilience	2.740	< 3.3), no collinearity concern
Team Resilience → Project Performance	1.000	< 3.3), no collinearity concern

Source: Processed Data.

The VIF value is in the range of 1,000--3,373 <5, it can be concluded that there is no serious multicollinearity exist.- The PLS-SEM analysis indicates that the structural model demonstrates strong explanatory power. The coefficient of determination (R^2) for team resilience is 0.809, indicating that 80.9% of the variance in team resilience is explained by the five exogenous constructs organizational practices, collective efficacy, teamwork, leadership, and individual resilience. The remaining 19.1% of the variance is attributable to other factors not included in the model. According to the commonly accepted guidelines for PLS-SEM, an R^2 value exceeding 0.75 reflects substantial explanatory power, suggesting that the proposed model provides a strong explanation of the factors influencing team resilience. The model also demonstrates satisfactory predictive relevance. The Q^2 value indicates that the structural model possesses strong predictive capability, as it exceeds the recommended threshold of 0.35, confirming that the model is capable of accurately predicting the endogenous construct.

Furthermore, the model fit assessment supports the adequacy of the proposed model. The Standardized Root Mean Square Residual (SRMR) is 0.077, which is below the recommended cut-off value of 0.08, indicating a good overall model fit. In addition, the Normed Fit Index (NFI) is 0.708, suggesting a moderate level of model fit. Overall, the R^2 , Q^2 , SRMR, and NFI values collectively demonstrate that the proposed PLS-SEM model exhibits substantial explanatory power, strong predictive relevance, and an acceptable overall fit to the empirical data.

Table 6. Coefficient of Determination (R^2) dan (Q^2)

Construct	R^2	Q^2
Team Resilience	0.809	0.728
Project Performance	0.669	0.570

Source: Processed Data.

The next analysis was a significance test with bootstrapping analysis using 5000 sub-sampling resulting in the following path coefficient significance test

Table 7. Hypothesis Testing.

Hypothesis	Structural Path	Original Sample (β)	t-value	p-value	Decision
H1	Organizational Practices $\rightarrow$ Team Resilience	0.120	0.938	0.348	Rejected
H2	Collective Efficacy $\rightarrow$ Team Resilience	0.180	1.732	0.083	Rejected
H3	Teamwork $\rightarrow$ Team Resilience	0.375	3.070	0.002	Supported
H4	Serving Leadership $\rightarrow$ Team Resilience	0.047	0.385	0.700	Rejected
H5	Employee Resilience $\rightarrow$ Team Resilience	0.295	2.300	0.021	Supported
H6	Team Resilience $\rightarrow$ Project Performance	0.818	19.917	<0.001	Supported

Source: Processed Data.

The hypothesis testing results show that three hypotheses are supported and three are rejected. Teamwork has a positive and significant effect on Team Resilience ($\beta = 0.375$, $p = 0.002$), supporting H3, while Employee Resilience also has a positive and significant effect on Team Resilience ($\beta = 0.295$, $p = 0.021$), supporting H5. Furthermore, Team Resilience has a strong positive and significant effect on Project Performance ($\beta = 0.818$, $p < 0.001$), supporting H6. In contrast, Organizational Practices ($p = 0.348$), Collective Efficacy ($p = 0.083$), and Servant Leadership ($p = 0.700$) do not significantly affect Team Resilience; therefore, H1, H2, and H4 are rejected.

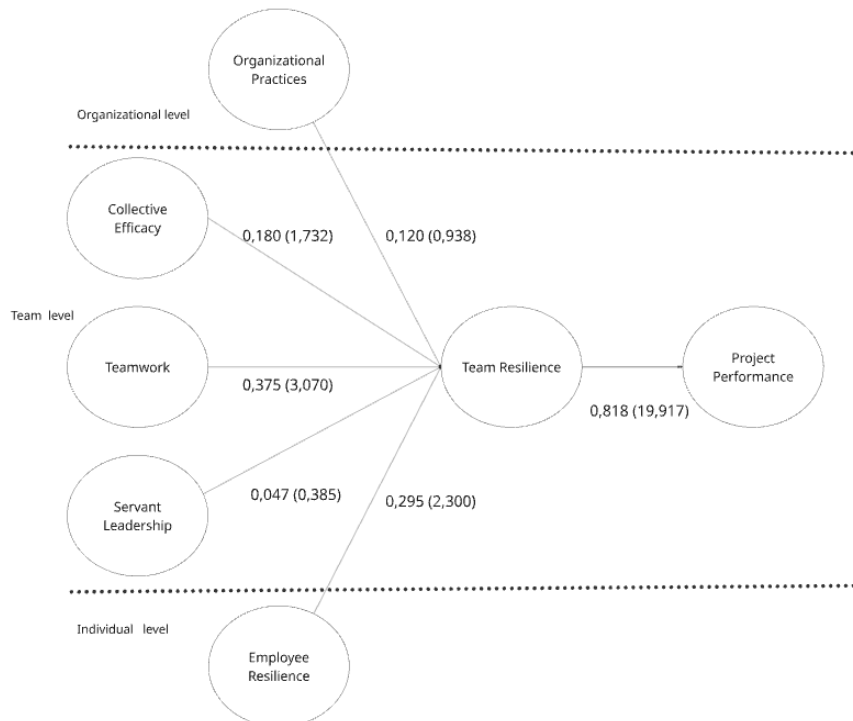


Figure 3. Structural model (bootstrapping using 5000 sub-samples)

*Note: The value indicates the path coefficient and t-value for each construct relationship

The structural model indicates that Team Resilience is the strongest determinant of Project Performance, with a path coefficient of 0.818 ($t = 19.917$), indicating a strong and statistically significant positive effect. At the team level, Teamwork has a positive and significant effect on Team Resilience ($\beta = 0.375$; $t = 3.070$), while Employee Resilience also contributes significantly and positively to Team Resilience ($\beta = 0.295$; $t = 2.300$). In contrast, Collective Efficacy shows a positive but statistically insignificant effect on Team Resilience ($\beta = 0.180$; $t = 1.732$), as does Organizational Practices ($\beta = 0.120$; $t = 0.938$) and Servant Leadership ($\beta = 0.047$; $t = 0.385$). These findings suggest that project performance is primarily driven by the resilience of the team, while teamwork and individual employee resilience are important mechanisms for strengthening that resilience. The nonsignificant effects of collective efficacy, organizational practices, and servant leadership indicate that these factors, although conceptually relevant, may not independently translate into stronger team resilience within the context examined.

Organizational and Leadership Factors in Team Resilience

The insignificance of the influence of organizational practices shows that the existence of formal organizational policies, procedures, and systems is not necessarily a resource that the team really uses when facing project disruptions. In construction projects that have dynamic characteristics, require temporary organization, and involve various disciplines (Turner & Müller, 2003), team members often rely more on direct coordination, field experience, and quick decision-making than adherence to administrative procedures. In other words, organizational practices function more as an enabling resource that provides a framework, but not necessarily as an adaptive resource that directly improves the team's ability to cope with change.

This finding is different from Hamsal et al., (2022) and Vera et al., (2017), who found that organizational practices have a positive effect on team resilience. These differences are likely influenced by the context of the study. In organizations that already have a mature learning culture and knowledge sharing system, organizational practices can be a strategic resource. In contrast, in construction projects that face time pressures, design changes, and field uncertainty, the effectiveness of organizational practices largely depends on the extent to which such policies can be translated into flexible operational support. These findings show that formal procedures alone are not enough to build team resilience if they are not followed by adaptation mechanisms that are responsive to project dynamics.

This study also shows that collective efficacy does not have a significant effect on team resilience. These findings suggest that collective beliefs about team capabilities not necessarily translate into real abilities to deal with pressure, recover from disruptions, and adapt to project changes. In other words, believing that a team is capable is not always synonymous with being able to act resiliently when faced with uncertain conditions.

Collective efficacy reflects shared optimism about the team's ability to achieve goals. Bandura (1997) dan Vera et al., (2017). However, in complex construction projects, these beliefs must be supported by effective coordination, resource availability, experience in dealing with disruptions, and the ability to make decisions quickly. Without these factors, collective confidence tends to be just a psychological perception that has not been able to translate into adaptive behavior. These results show that building team resilience requires more than just collective efficacy, i.e. the team's actual ability to manage project uncertainty.

This study found that servant leadership does not have a significant influence on team resilience. These findings indicate that in construction projects, team resilience seems to be

formed more through horizontal dynamics between team members than the vertical influence of the project leader. Although service behavior, empowerment, and concern for team members are the main characteristics of servant leadership (Sendjaya et al., 2017; Smith, 2005), these characteristics are not necessarily the dominant factor in a project environment that demands quick decisions, cross-functional coordination, and collective problem-solving.

This result is different from that of Siddique (2025), who found that servant leadership could strengthen the resilience of the construction team. These differences can be explained by variations in the organizational context, work culture, and characteristics of the project being studied. As explained (Yukl & Gardner, 2018), the effectiveness of a leadership style is influenced by the characteristics of the task and the organizational environment. Thus, the influence of leadership on team resilience is to be probably indirect, for example through increased collaboration, trust, or a work climate that supports team learning.

Team and Individual Factors in Building Team Resilience

In contrast to the previous two variables, teamwork has proven to be the most powerful factor in increasing team resilience. These findings show that the ability of teams to coordinate, communicate, share information, and help each other is the main foundation for building resilience in construction projects. When team members can work collaboratively, the process of identifying problems, making decisions, and resolving conflicts occurs more quickly, the team's ability to respond to change also increases.

The results of this study are consistent with Hamsal et al., (2022), Pavez et al., (2021), and Vera et al., (2017) which confirms that the quality of relationships between team members, especially communication and interpersonal trust, is an important factor in building collective resilience. From the perspective of dynamic capability theory, teamwork can be seen as a resource integration mechanism that allows teams to sense changes, coordinate responses quickly, and adjust actions according to project conditions (Teece, 2007). Therefore, the ability to work together increases the effectiveness of project implementation and becomes the main mechanism that transforms various resources into team resilience.

In contrast to organizational and leadership factors, employee resilience has been proven to have a positive influence on team resilience. These findings that team resilience is essentially built from the adaptive capacity of each team member. Individuals who can manage pressure, learn from failures, and maintain performance when facing change will more easily contribute to the overall team adaptation process.

These findings support the view (Tonkin, 2016) that individual resilience is a skill that can be developed through experience, learning, and organizational support. In addition, (Wang & Wang, 2023). It shows that the adaptive capacity of individuals is an important foundation in building organizational resilience on construction projects. Therefore, the results of this study strengthen the argument that team resilience development should not only be focused on organizational systems but also on developing the psychological and adaptive capacity of each team member through training, continuous learning, and experience in facing various project challenges.

Team Resilience as a Driver of Project Performance

The relationship between team resilience and project performance is the strongest finding in this study. The large path coefficient indicates that the team's ability to anticipate, absorb, recover, and adapt to various disturbances is a factor that greatly determines the success of a project. These findings indicate that the success of a project is influenced not only by the

adequacy of resources or the quality of planning, but also by the team's ability to maintain work effectiveness in the face of uncertainty.

The results of this study are consistent with (Hamsal et al., 2022; Siddique, 2025) which states that a resilient team can maintain productivity, accelerate recovery after disruptions, and improve the achievement of project goals. In the perspective of dynamic capability theory, team resilience is a manifestation of dynamic capabilities that allow organizations to reconfigure resources when facing changing environments (Teece, 2007). These findings also broaden the understanding that resilience not only functions as a recovery mechanism but also as a strategic capability that supports the achievement of sustainable project performance, both in terms of cost, time, quality, and value creation for stakeholders (Anantatmula & Iyyunni, 2023; Floricel et al., 2016; Project Management Institute, 2021).

Conclusion

This study concludes that team resilience in construction projects is primarily strengthened by teamwork and employee resilience, while organizational practices, collective efficacy, and servant leadership do not have significant direct effects. These findings demonstrate that effective collaboration and individual adaptive capacity are critical capabilities for enabling project teams to anticipate, absorb, recover from, and adapt to disruptions. Team resilience also has a strong positive influence on project performance, highlighting its role as a dynamic capability that transforms organizational, team, and individual resources into improved project outcomes. Practically, construction organizations should therefore prioritize teamwork, cross-functional coordination, team learning, and employee resilience development to strengthen project resilience and performance.

References

- Alaloul, W. S., Qureshi, A. H., Memon, A. H., & Al-Bukhari, A. A. (2020). Structural equation modeling of construction project performance based on coordination factors. *Cogent Engineering*, 7(1). <https://doi.org/10.1080/23311916.2020.1726069>
- Ali, I., Musawir, A. U., & Ali, M. (2018). Impact of knowledge sharing and absorptive capacity on project performance: the moderating role of social processes. *Journal of knowledge management*, 22(2), 453-477.
- Anantatmula, V. S., & Iyyunni, C. (2023). *Research handbook on project performance*. Edward Elgar Publishing.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
- Barcaui, A., & Monat, A. (2023). Who is better in project planning? Generative artificial intelligence or project managers?. *Project Leadership and Society*, 4, 100101. <https://doi.org/10.1016/j.plas.2023.100101>
- Damoah, I. S., & Kumi, D. K. (2018). Causes of government construction projects failure in an emerging economy: Evidence from Ghana. *International Journal of Managing Projects in Business*, 11(3), 558-582.
- Dasi, A., Elvira, M. M., & Pedersen, T. (2021). Team and project performance: Ability, motivation, and opportunity approach. *Project Management Journal*, 52(1), 75–89. <https://doi.org/10.1177/8756972820953958>
- Delise, L. A., Lee, B., & Choi, Y. (2023). Understanding project management performance using a comparative overrun measure. *International Journal of Project Management*, 41(5). <https://doi.org/10.1016/j.ijproman.2023.102450>

- Ebekozien, A., Aigbavboa, C., Samsurijan, M. S., Ahmed, M. A. H., Akinradewo, O., & Omoh-Paul, I. (2024). Managing construction project risks in turbulent times: a stakeholders perspective. *International Journal of Building Pathology and Adaptation*, 42(7), 35-54. <https://doi.org/10.1108/IJBPA-01-2024-0003>
- Fischer, R., Ferreira, M. C., Assmar, E. M., Redford, P., Harb, C., & Glazer, S. (2014). Organizational practices across cultures: An exploration in six cultural contexts. *International Journal of Cross-Cultural Management*, 14(1), 105–125. <https://doi.org/10.1177/1470595813510644>
- Florice, S., Michela, J. L., & Piperca, S. (2016). Complexity, uncertainty-reduction strategies, and project performance. *International Journal of Project Management*, 34(7), 1360–1383. <https://doi.org/10.1016/j.ijproman.2015.11.007>
- Greenleaf, R. K. (2003). *The servant-leader within: A transformative path*. Paulist press.
- Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.
- Hair, J., & Alamer, A. (2022). Partial least squares structural equation modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Research Methods in Applied Linguistics*, 1(3), 100027. <https://doi.org/10.1016/j.rmal.2022.100027>
- Hamsal, M., Sasmoko, & Setiawan, R. (2022). Multi-perspective approach to building team resilience in project management—A case study in Indonesia. *Sustainability*, 14(20). <https://doi.org/10.3390/su142013137>
- He, Q., Dong, Y., Kang, P., & Yuan, J. (2018). *Resilience for construction project-based organizations: Definition, critical factors and improvement strategies*.
- He, Q., Dong, Y., Kang, P., & Yuan, J. (2018). *Resilience for construction project-based organizations: Definition, critical factors and improvement strategies*.
- Hilu, K. A., & Hiyassat, M. A. (2023). Qualitative assessment of resilience in construction projects. *Construction Innovation*, 24(5), 1297–1319. <https://doi.org/10.1108/CI-10-2022-0265>
- Ika, L. A., & Pinto, J. K. (2022). The “re-meaning” of project success: Updating and recalibrating for a modern project management. *International Journal of Project Management*, 40(7), 835-848. <https://doi.org/10.1016/j.ijproman.2022.08.001>
- Khattak, M. S., & Mustafa, U. (2019). Management competencies, complexities and performance in engineering infrastructure projects of Pakistan. *Engineering, Construction and Architectural Management*, 26(7), 1321-1347. <https://doi.org/10.1108/ECAM-05-2017-0079>
- Moghaddasi, S., Kordani, K., Sarvari, H., & Rashidi, A. (2025). Redefining project management: embracing value delivery offices for enhanced organizational performance. *Buildings*, 15(7), 1176. <https://doi.org/10.1108/BEPAM-09-2021-0113>
- Muneer, M., Khan, N., Awais Hussain, M., Shuai, Z., Khan, A. A., Farooq, R., ... & Tariq, M. A. U. R. (2022). A quantitative study of the impact of organizational culture, communication management, and clarity in project scope on constructions’ project success with moderating role of project manager’s competencies to enhance

- constructions management practices. *Buildings*, 12(11), 1856. <https://doi.org/10.3390/buildings12111856>
- Mwamvini, H. D. J., Amoah, C., & Ayesu-Koranteng, E. (2022). Causes of road projects' delays: a case of Blantyre, Malawi. *Built Environment Project and Asset Management*, 12(2), 293-308.
- Nachbagauer, A. (2022). Synchronous and diachronic timing: Insights into managing projects from disaster management and fast-response organizations. *Project Management Journal*, 53(2), 146-160. <https://doi.org/10.1177/87569728221079414>
- Naderpajouh, N., Yu, D. J., Aldrich, D. P., Linkov, I., & Matinheikki, J. (2020). Resilience and projects: An interdisciplinary crossroad. *Project Leadership and Society*, 1. <https://doi.org/10.1016/j.plas.2020.100001>
- Pavez, I., Araya, F., & Gomez, R. (2021). Project team resilience: The effect of group potency and interpersonal trust. *International Journal of Project Management*, 39(6), 697–708.
- Prica, F., & Bjelic, N. (2025). Enhancing Project Efficiency: The Role of Agile Project Management in a Dynamic Corporate Landscape. *Journal of Policy Options*, 8(1), 1-10. <https://doi.org/10.5281/zenodo.17394714>
- Project Management Institute. (2021). *A guide to the project management body of knowledge (PMBOK guide)* (7th ed.). Project Management Institute.
- Sendjaya, S., Eva, N., Butar Butar, I., Robin, M., & Castles, S. (2017). SLBS-6: Validation of a short form of the Servant Leadership Behavior Scale. *Journal of Business Ethics*, 156(4), 941–956. <https://doi.org/10.1007/s10551-017-3594-3>
- Sharma, S., & Sharma, S. K. (2016). Team resilience: Scale development and validation. *Vikalpa: The Journal for Decision Makers*, 20(1), 37–53.
- Siddique, A. (2025). Fostering team resilience with servant leadership: A multi-level study of the construction industry. *Acta Psychologica*, 252.
- Sikhupelo, C., & Amoah, C. (2026). Barriers to the implementation of risk management practices for public infrastructure projects. *Journal of Financial Management of Property and Construction*, 31(1), 123-142. <https://doi.org/10.1108/JFMPC-10-2024-0079>
- Smith, C. (2005). *Servant leadership: The leadership theory of Robert K. Greenleaf*. The Greenleaf Centre for Servant-Leadership UK. <http://www.greenleaf.org.uk/whatissl.html>
- Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350. <https://doi.org/10.1002/smj.640>
- Tonkin, K. (2016). *Building employee resilience through wellbeing in organization*. University of Canterbury.
- Turner, J. R., & Müller, R. (2003). On the nature of the project as a temporary organization. *International Journal of Project Management*, 21(1), 1–8. <https://doi.org/10.1016/j.actpsy.2025.104732>

- Van Dierendonck, D. (2011). Servant leadership: A review and synthesis. *Journal of management*, 37(4), 1228-1261.
- Vera, M., Rodríguez-Sánchez, A. M., & Salanova, M. (2017). May the force be with you: Looking for resources that build team resilience. *Journal of Workplace Behavioral Health*, 32(2), 119–138. <https://doi.org/10.1080/15555240.2017.1329629>
- Wang, D., & Wang, P. (2023). Effect of employee resilience on organizational resilience in construction projects: Considering the role of project tasks. *Engineering, Construction and Architectural Management*, 31(11), 4236–4254. <https://doi.org/10.1108/ECAM-08-2022-0797>
- Windle, G. (2011). What is resilience? A review and concept analysis. *Reviews in clinical gerontology*, 21(2), 152-169.
- Yukl, G. A., & Gardner, W. L. (2018). *Leadership in organizations* (9th ed.). Pearson.