Harnessing the Supply Chain Attributes in the Contractor Evaluation Matrix: Empirical Analysis of the Influence of Supply Chain Attributes

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Abstract
Through a systematic review of the literature, this study identifies a gap in the current evaluation criteria for contractor competence that often overlooks the critical supply chain attributes that influence project success. This study investigated the mediating roles of supply chain commitment, collaboration, and resilience in the relationship between contractor competence and the success of public projects. It posits that successful public projects necessitate not only proficient contractors but also a resilient and cooperative supply chain, especially in the context of disruptions such as those caused by the COVID-19 pandemic. Utilising a quantitative research methodology and data from project stakeholders in Tanzania, this study reveals that while contractor competence is linked to public project success, it is insufficient without the mediating effects of supply chain collaboration and resilience. The findings indicate that supply chain resilience significantly enhances the positive relationship between contractor competence and public project success, whereas supply chain commitment does not exhibit a mediating effect. This study underscores the necessity for public procurement entities to incorporate supply chain dynamics into contractor evaluation criteria to mitigate project delays, cost overruns, and quality issues, thereby fostering improved project outcomes. This study contributes to the discourse on public project management by emphasising the interdependence of contractor competence and supply chain attributes in achieving project success.

Keywords: *Contractor Evaluation Matrix, Supply Chain Attributes, Public Project Success, Contractor Competence, Supply Chain Commitment, Supply Chain Collaboration, Supply Chain Resilience*

1.0 INTRODUCTION

A successful public project meets stakeholders' expectations regarding design quality, cost, usefulness, and sustainability (Silva et al. 2019; Meredith and Zwikael 2019). Public project success depends on several factors, including contractor competence (Ahmadabadi & Heravi, 2019a; Mathar et al., 2020), client commitment (Radhakrishnan et al., 2022), project management team competence (Radhakrishnan et al., 2022; Sampaio et al., 2022), and supplier credibility (Luo & Lu, 2021). Therefore, contract evaluation criteria for public procuring entities in developing countries are designed to scrutinise competent contractors (El-khalek et al., 2019). However, after the COVID 19 pandemic where most supply chains were disrupted, competent contractors alone cannot guarantee public project success but a resilient, committed, and collaborative supply chain for project inputs (Habibi et al., 2023; Lahyani et al., 2021). This supply chain quality leads to public project success by ensuring an uninterrupted flow of project input events during business hardships (Zainal Abidin & Ingirige, 2018). Therefore, a competent contractor should not only be defined by his/her expertise, equipment, experience, and financial soundness, but also by the quality of the supply chain with which the contractor is connected.

Unfortunately, most evaluation matrices applied to determine a competent contractor for a project do not consider the supply chain attributes of commitment, collaboration, and resilience (El-khalek et al., 2019; Hatush & Skitmore, 1997). This could be due to a lack of understanding of the role of supply chain attributes in the relationship between contractors' competence and public project success. The evaluation criteria defining a contractor's competence in the procurement of work include experience, financial soundness, construction facilities or equipment, and engineers' profiles in terms of their qualifications, experience, and registration (Hatush & Skitmore, 1997; T.-K. Wang et al., 2017). All of these criteria consider only contractors as if they do not outsource any of their requirements.

However, these evaluation criteria lead procuring entities to sign a contractor without vital knowledge about the competence of their supply chain. For this reason, most procuring entities and public project stakeholders complain about the delayed completion of the project, low-quality construction, high project costs, lack of project usability, and lack of value for money (Olanipekun et al., 2018; Rwakarehe & Mfinanga, 2014; Sambasivan et al., 2017). Contractors who react to complaints argue that suppliers of project inputs are one of the main reasons for unsuccessful projects (Rwakarehe & Mfinanga, 2014; Sambasivan et al., 2017). This shows the dependence of contractors on their respective supply chains for project inputs.

A typical supply chain for project inputs has several features including commitment (Olanipekun et al., 2018), collaboration (Radhakrishnan et al., 2022), and resilience (Zainal Abidin & Ingirige, 2018). These features are considered vital for dealing with likely disruptions in the supply chain (Chen et al., 2024; Lahyani et al., 2021). For example, commitment in the supply chain is said to embed the practices of each chain member towards supply chain stability (Kwon & Suh, 2004; Olanipekun et al., 2018). It also attracts resource sharing (Olanipekun et al., 2018) because of trust among members of the chain, thereby assuring the uninterrupted flow of materials through the chain, and hence, public project success (Jiang et al., 2016). Collaboration among members resolves any conflicts (Bond-Barnard et al., 2018), thereby ensuring the stability of the relationship in the chain and the continued flow of inputs for public project success (Jiang et al., 2016). On the other hand, supply chain resilience restores the chain to its original position immediately after it has been affected by socio-political and economic factors such as the pandemic, regional war, regional economic recession, and civil unrest (Chen et al., 2024; Habibi et al., 2023; Singh et al., 2019). It also causes supply chain preparedness for unforeseen contingencies and ensures the flow of project inputs (Chen et al., 2024; Munoz & Dunbar, 2015).

However, a systematic literature review using qualitative content analysis (Mayring, 2000) revealed that the relationships between contractors' competence, supply chain commitment, collaboration, resilience, and public project success have not been adequately explained empirically. Nevertheless, studies have examined the effect of each herein-identified factor individually on public project success. Examples include supply chain commitment (Ahmadabadi and Heravi, 2019b; Bond-Barnard et al., 2018; Mathar et al., 2020), collaboration (Bond-Barnard et al., 2018; Chang et al., 2010), and resilience (Abidin, n.d.); Habibi et al., 2023; Lahyani et al., 2021). However, their findings did not provide clear insights into the collective effects of these factors on public project success.

The need to assess these variables together is crucial to reveal both the combined and individual influences of the variables in the presence of others. This approach reflects the industrial reality that a competent contractor is one whose supply chain is committed, collaborative, and resilient. Therefore, this study was designed to address this concern by examining the mediating effect of supply chain commitment, collaboration, and resilience on the relationship between contractor competence and public project success.

2.0 THEORETICAL PERSPECTIVE: INDUSTRIAL MARKETING AND PURCHASING (IMP)

This study uses Industrial Market and Purchasing (IMP) theory to examine the impact of supply chain attributes on public project success (Agarwal & Narayana, 2020; Anderson et al., 1994; Gadde & Snehota, 2000; Håkansson & Shenota, 1995). According to the IMP theory, businesses typically operate within networks composed of various participants (Aslam et al., 2022). These networks can be as straightforward as a buyer-supplier relationship, which generally exhibits both structural and functional attributes, including commitment, collaboration, and resilience (Bond-Barnard et al., 2018; Olanipekun et al., 2018; Saglam et al., 2022). This theory suggests that these relational attributes contribute to relationship stability, thereby enhancing the performance of the involved parties (Ostrovsky, 2017; Wu et al., 2017, 2018). This further indicates that within a stable relationship, buyers are more inclined to source directly from similar suppliers within their network rather than engage in competitive bidding to identify new suppliers (Anwar et al., 2018; Artto et al., 2017). This perspective is grounded in the advantages of participating in business relationships, such as improved access to resources, increased market competitiveness, and enhanced performance of individual companies (Anwar et al., 2018; Moroni-Cutovoi, 2021). Therefore, this study adopts this perspective and posits that a committed, collaborative, and resilient supply chain will facilitate a competent contractor in realising public project success.

2.1 Empirical Literature Review and Hypotheses Development

2.1.1 Contractor’s Competence and the Public Project Success

Several studies have found that contractor competence has a significantly positive relationship with public project success in the construction industry (Geoghegan & Dulewicz, 2008; Jiang et al., 2016; Sampaio et al., 2022). However, this is not always the case, as audit reports show that most public projects in developing countries are unsuccessful because they are not completed in time, are constructed at a high cost, and have low construction quality, despite being constructed by certified competent contractors (Ahmadabadi & Heravi, 2019b; Álvarez et al., 2021; Gunduz & Yahya, 2015; Sambasivan et al., 2017). This indicates that other factors also determine the success of public projects. Most studies exploring the causes of unsuccessful projects found a lack of contractor commitment, poor collaboration among project management teams, delayed funding, and corruption among causatives (Ahmadabadi and Heravi 2019b; Gunduz and Yahya 2015; Mathar et al. 2020; Sambasivan et al. 2017). However, these studies were confined to the client-contractor interaction scope. Because of business interconnectedness across the globe, when assessing the determinants of public project success, it is important to explore the attributes of the supply chain through which project inputs flow (Abidin, n.d.); Habibi et al., 2023; Lahyani et al., 2021). Some studies explored the effect of supply chain attributes on public project success and found that resilience is crucial among other supply chain attributes for public project success (Chen et al., 2024; Zainal Abidin & Ingirige, 2018). This is due to the effect of socioeconomic and political factors, such as pandemics, bilateral wars, and bandits, on the global supply chain (Chen et al., 2024; Lahyani et al., 2021). However, the effects of socioeconomic and political factors on global supply chain performance depend on levels of commitment (Chang et al., 2010; Chen et al., 2024), collaboration (Bond-Barnard et al., 2018, 2018), and resilience (Habibi et al., 2023; Lahyani et al., 2021; T.-K. Wang et al., 2017; Zainal Abidin & Ingirige, 2018). Other studies have found that supply chain collaboration and resilience play vital roles in ensuring the success of public projects (Bond-Barnard et al., 2018; Chang et al., 2010; Hudnurkar et al., 2014). However, most of these studies examined commitment, collaboration, and resilience as exogenous constructs together with contractor competence. This analysis style may not reveal the distinctive role of supply chain attributes which are normally hidden within a contractor's competence. Based on this, it is obvious that public project success depends not only on contractor competence but also on the attributes of the supply chain through which the contractor acquires auxiliary and primary inputs for the completion of public projects. Therefore, this study hypothesizes that; -

H_1: - In the absence of supply chain commitment, collaboration and resilience, contractor competence has no significant relationship with a public project success

2.1.2 Supply Chain Commitment and Public Project Success

Commitment is the result of trust among supply chain members (Kwon & Suh, 2016; Kwon & Suh, 2004). It helps with long-term orientation, particularly when dealing with unanticipated problems (Chang et al., 2010; Olanipekun et al., 2018; Paluri & Mishal, 2020). Commitment makes it difficult for a supply chain partner to act in ways that adversely affect the performance of the supply chain, thus warding off risks (Paluri & Mishal, 2020). Commitment refers to trading partners' willingness to exert effort on behalf of their relationship (Olanipekun et al., 2018). This suggests a future orientation in which firms attempt to build a relationship that can be sustained in the face of unanticipated problems and the likelihood that the action or outcomes of another will be satisfactory (Paluri & Mishal, 2020). Studies have shown that a contractor's competence has a direct relationship with public project success (Sampaio et al., 2008; Sampaio et al., 2022). However, in this study, it was thought that this relationship may be strengthened by the inclusion of supply chain commitment. This is because supply chain commitment attracts working together for project accomplishment within a given time frame (Chang et al., 2010; Paluri & Mishal, 2020). In addition, supply chain commitment embeds the practices of supply chain members towards supply chain stability, which can favour the project in question (Olanipekun et al., 2018). However, when there is no supply chain commitment, a project depends solely on the contractor's competence (Mathar et al., 2020; Scholten & Schilder, 2015). Similarly, when there is no mutual relationship between the buyer and supplier in the supply chain, there may be no commitment to the project (Ahmadabadi & Heravi, 2019b). However, most studies differ in terms of the mediating role of supply chain commitment in the relationship between contractor competence and public project success. This study therefore hypothesises that;

H2: - Supply chain commitment mediates the relationship between contractor competence and public project success

2.1.3 Supply Chain Collaboration and Public Project Success

Collaboration is an upper-level relationship determined by the degree of information-sharing among supply chain members (Bond-Barnard et al., 2018). It is viewed as the formation of inter-firm linkages or partnerships, in which the parties involved work together and share information, resources, and certain degrees of risk to accomplish mutual objectives (Radhakrishnan et al., 2022). The fundamental rationale behind collaboration is that a single company cannot successfully compete (Bond-Barnard et al. 2018; Scholten and Schilder 2015). Customers are more demanding, and competition escalates (MINAMI et al., 2023; Scholten & Schilder, 2015). Thus, many firms seek to coordinate cross-firm activities and work reciprocally over time to achieve superior performance (Afroze and Abidin, 2018; Saglam et al., 2022). The objective is to achieve higher performance than can be achieved by operating individually (Association et al., 2022; Chang et al., 2010). In this study, it is expected that collaboration among contractors and clients, consultants, suppliers, and service providers will strengthen the relationship between contractor competence and public project success despite the inconsistency in the empirical findings. Therefore, in this study, it was hypothesized that; -

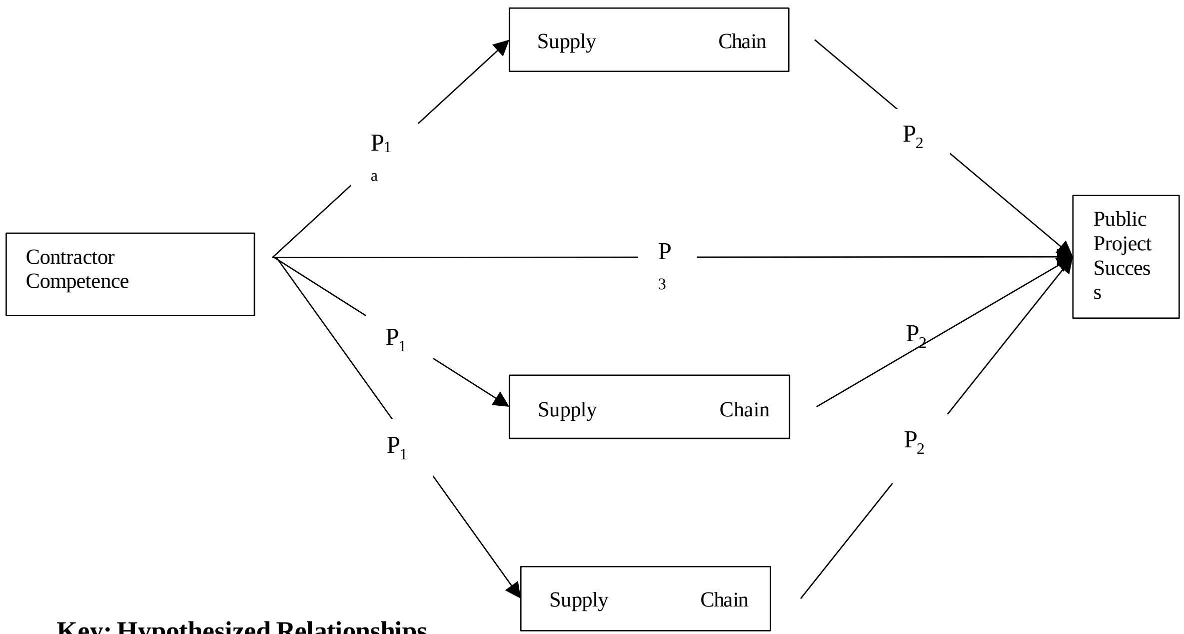
H_3: - Supply chain collaboration mediates the relationship between contractor competence and public project success

2.1.4 Supply Chain Resilience and Public Project Success

Resilience is the ability of a supply chain member to return to its original state or move to a new, more desirable state after a disturbance (Ahmadabadi & Heravi, 2019b; Saglam et al., 2022). The supply chain can absorb disruptions or enable the supply chain network to return to state conditions faster, and thus, has a positive impact on individual members' performance (Habibi et al., 2023; Zainal Abidin & Ingirige, 2018). This attribute is important for ensuring public project success because of the effect of socioeconomic and political factors on the global supply chain (Abidin, n.d.); Chen et al., 2024). Contractor competence without supply chain resilience alone cannot ensure the success of public projects (Afroze & Abidin, 2018). However, empirical findings on the effect of supply chain resilience on public project success are divergent. Other studies have found that supply chain resilience has a significantly positive effect on public project success (Ahmadabadi & Heravi, 2019b; Chen et al., 2024). Other studies found that supply chain resilience has no significant effect on public project success when there is no evident disruption in the supply chain (Chang et al., 2010; Sampaio et al., 2022). Supply chain resilience is measured by the absorptive capacity corresponding to the preparation for emergencies/disasters, adaptive capacity denoting the response to emergencies/disasters, restorative capacity determining the recovery from emergencies/disasters, and competitive advantage gained thereafter (T.-K. Wang et al., 2017). Based on the feature of supply chain resilience, it was hypothesized that; -

H_4: - Supply chain resilience mediates the relationship between contractor competence and public project success

Figure 1: Conceptual Framework and Hypothesized Relationships



Key: Hypothesized Relationships
H_1: -P_3 is not significant
H_2: -P_{1a}, P_{2a} is significant
H_3: -P_{1b}, P_{2b} is significant
H_4: -P_{1c}, P_{2c} is significant

3.0 METHODOLOGY

3.1 Research Design, Type of Data and Study Population

This study was designed to determine whether supply chain attributes of commitment (COMT), collaboration (COLAB), and resilience (RESIL) mediate the relationship between contractor competence (COMP) and public project success (PPS). In this study, supply chain is defined as the interconnectedness of various consultants, suppliers, and service providers for the success of selected public projects (Appendix 1). This study was based on the researcher's perception that contractor competence alone is insufficient to ensure public project success. This perception was based on previous studies (Alashwal et al., 2017; Mathar et al., 2020) which argued that the whole supply chain has to demonstrate effective commitment, collaboration, and resilience towards public project success. Therefore, to attain its objectives, the study needed various perceptions from project consultants, suppliers, and service providers about the perceived contractor competence, commitment, and collaboration among various project consultants, suppliers, and service providers, as well as their perceived resilience of the respective project supply chain and perceived public project success, as shown in Table 1.

Table 2: Respondents' Descriptive Statistics

Variables	Descriptions	Frequency	Per cent
Age	18 – 32	43	38.4
	33 – 47	46	41.1
	48 – 60	23	20.5
Gender	Male	90	80.4
	Female	22	19.6
Education Level	Ordinary Diploma	24	21.4
	Bachelor Degree	16	14.3
	Master Degree	14	12.5
	Others -Full Technician Certificate	58	51.8
Project Stakeholder Category	Contractor	20	17.9
	Client	20	17.9
	Project Consultant	20	17.9
	Materials Suppliers for the Project	32	28.6
	Service Provider for the Project	20	17.9
Work Division	Operations/Construction	60	53.6
	Finance & Accounting	7	6.3
	Business Development & Marketing	7	6.3
	Human Resources	7	6.3
	Information Technology	12	10.5
	Others - Quantity Surveyor	19	17.0
Working Experience	01 - 15 Years	42	37.5
	16 - 30 Years	36	32.1
	31 - 42 Years	34	30.4
N		112	100.0

3.2 Construct Measurements, Sampling and Data Collection Methods

The measurements for the constructs were adapted from other studies, as shown in Table 2, and validated through expert review techniques (Christensen et al., 2020; Kumari et al., 2021), in which three area experts were used to ensure content validity. Construct validity was tested using construct factor analysis (Schreiber, 2021; X. Wang et al., 2021). Responses were grouped into a 5-Likert Scale (Jebb et al., 2021) from 1 Strongly Disagree, 2-Disagree, 3-Undecided, 4-Agree and 5 Strongly Agree; each construct was measured using 5 to 10 items in line with recommendation for survey study (Building, 2018; Presser, S., & Schuman, 1980). The measurements for the constructs are shown in Table 2. Snowball sampling was used to identify contractors, consultants, suppliers, and service providers of the cited projects. This method was used because of its ability to help the research to access hidden project stakeholders and, therefore, to obtain the required data for the study (Wohlin et al., 2022). The method also establishes trust, as the researcher is connected to hidden participants through their familiar stakeholders (Ghojogh et al., 2020; Wohlin et al., 2022). However, this approach collects biased information, which limits the generalisability of the findings (Ghojogh et al., 2020). Therefore, the researcher diversified the initial participants while using multiple entry points and limiting referral chains (Building, 2018; Kusmaryono et al., 2022). In addition, a bias-corrected and accelerated (BCa) bootstrap was conducted at every stage of the data analysis to ensure that a randomised sample was obtained (Kusmaryono et al., 2022; Wohlin et al., 2022). A standard questionnaire was used, and data collection covered seven months between early August 2022 and early March 2024. This was due to the difficulty in reaching project consultants, suppliers, and service providers, especially when the project was completed. The selected projects include the construction of public schools, colleges, classrooms, libraries and laboratories, hospitals and dispensaries, and other public offices, including ministries and district councils in Tanzania's mainland. A total of twenty (20) projects were identified for data collection in the following breakdown: two projects in Arusha, four in Dar es Salaam, seven in Dodoma, three in Kilimanjaro, two in Morogoro, and two in Mwanza (Matto, 2023; Mwaiseje et al., 2024). The client was the first contact person in each identified project and the respective contractor for the project was identified along with other consultants, suppliers, and service providers.

Table 3: Construct Measurements

Constructs	Measurements	References
Public project success (PPS)	Perceived Quality of the Project Perceived Usability of the Project Timely Completed Project Cost Effective Project Regulatory Compliant Project Environmentally Friendly Project Sustainable Project	(Álvarez et al., 2021; Beleiu et al., n.d.; Mathar et al., 2020; Silva et al., 2019)
Contractor Competence (COMP)	Trust among Contractor Team Members Effective Communication in the CMT Mutual respect in the team Contractor Learning The contractor's ability to deal with different Interests	(Alashwal et al., 2017; El-khalek et al., 2019; Flores & Ismael, n.d.; Hatush & Skitmore, 1997; Mathar et al., 2020; Sampaio et al., 2022)
Supply Chain Attributes Commitment (COMT)	Age of Relationship Mutual Understanding among the CMT Trust among the CMT Strategic Agreement Interdependence among the CMT	(Ayodeji, n.d.; Chang et al., 2010; Olanipekun et al., 2018; Paluri & Mishal, 2020)
Collaboration (COLAB)	Trust Information Sharing Regular Communication among the CMT Resource Sharing Conflict Resolution Forums	(Bond-Barnard et al., 2018; Chang et al., 2010; Suprapto et al., 2015)
Resilience (RESIL)	Collaboration Agility Sustainability Redundancy Flexibility Visibility Information Sharing Robustness Risk Management Culture Adaptability Supply Chain Design	(Chen et al., 2024; Habibi et al., 2023; Hosseini et al., 2022; Lahyani et al., 2021; Zainal Abidin & Ingirige, 2018)

3.3 Data Analysis

3.3.1 Factor Analysis

The collected data were examined for missing values, and a factor analysis was performed to establish construct reliability and validity (Dash & Paul, 2021; Jr, n.d.). Outer factor loadings were analysed, whereby only items with loading values ≥ 0.6 were retained, as shown in Table 3. SMART PLS 4 was used and the consistent PLS-SEM algorithm was run at its default. Outer factor loadings of the graphical output were examined, whereby all items whose factor loadings were ≤ 0.5, were deleted, and the algorithm was run again. Then the consistent PLS-SEM algorithms bootstrapping was run at its default except for the "amount of results" where the complete (slower) option was checked to generate all bootstraps for the model (Tibbe & Montoya, 2022). Measurement model reliability and convergent validity were established through factor analysis in which outer loadings were examined (Schreiber, 2021; Tavakol & Wetzel, 2020). All items with values below or above the acceptable range were removed from the dataset (Cho et al., 2020; Hu & Bentler, 1999). After all outer loadings were within this range, Cronbach's alpha, composite reliability (rho_c), and average variance extracted (AVE) statistics were generated to examine the consistency and convergence of the measurements (Tavakol & Wetzel, 2020). Additionally, Variance Inflation Factor (VIF) statistics were generated to measure multicollinearity in the construct measurements (Christensen et al. 2020; Hu and Bentler 1999). All the statistics were within the acceptable range, as shown in Table 3.

Table 4: Outer Loadings, VIF, Cronbach Alpha, Composite Reliability and AVE

	COMP	COMT	COLAB	RESIL	PPS	VIF
CONLEN	0.768					1.946
CONTRU	0.905					3.459
DIFINT	0.692					3.293
MUTRES	0.878					2.606
INTERD		0.759				2.294
MUTUALT		0.928				2.622
RELAGE		0.808				2.141
FRECOM			0.838			2.765
INTERUC			0.887			1.639
SHARESO			0.680			2.836
ADAPT				0.798		2.155
RECOV				0.907		2.905
ROBUST				0.673		1.745
PRODUS					0.921	3.473
PROQUA					0.848	2.961
PROSCH					0.813	2.800
PROSUS					0.834	2.647
Cronbach's alpha (α)	0.888	0.871	0.851	0.831	0.915	
Composite R (rho_c)	0.887	0.872	0.847	0.839	0.916	
AVE	0.665	0.697	0.651	0.637	0.731	

Discriminant validity was analysed using the Fornell-Larcker criterion and Heterotrait-Monotrait ratio (HTMT) to observe whether the constructs truly differed from each other (Fornell & F. Larcke, 1981; Hu & Bentler, 1999). To establish these results, the square root values of the average variance extracted (AVE) in the diagonal were compared against the respective correlations in the columns and rows (Henseler et al., 2015; Schreiber, 2021). All cases (see Table 4) show values on the diagonal that are higher than the corresponding correlations. In addition, the HTMT statistics (italicised scores on the upper-right side of the diagonal of Table 4) are all lower than 0.85, indicating discriminant validity (Cho et al., 2020).

Table 4: Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio Matrix

	COMP	COMT	COLAB	RESIL	PPS
COMP	**0.815**	*0.569*	*0.499*	*0.379*	*0.277*
COMT	0.575	**0.835**	*0.342*	*0.162*	*0.128*
COLAB	0.501	0.339	**0.807**	*0.315*	*0.468*
RESIL	0.382	0.084	0.313	**0.798**	*0.757*
PPS	0.272	0.093	0.474	0.752	**0.855**

NOTE: *The italicised are the statistics for HTMT, while the bold diagonal is the square root of the AVE statistics.*

3.3.2 Model Fit Indices Analysis

Despite the caution that when using SMART PLS researchers should not report the model fit indices to conclude anything (Hair et al., 2017) and that of Marsh (2004) that rule of thumb should not be taken too seriously, in this study, the predictive model fit was analysed. The standardised root mean squared residual (SRMR), d_ULS, and d_G were used. The SRMR value of the estimated model was 0.08 (see Table 5) which is within an acceptable fit (Cho et al., 2020; Henseler & Sarstedt, 2013; Iacobacci, 2010). Studies recommend that the SRMR value should be close to 0.09, but should not exceed 1 (Hair et al., 2017). On the other hand, Chin (2015) recommended SRMR≤.08 as a model fit, while Hu and Bentler (1999) suggested an SRMR value of 0.09 or lower to reduce type I and II errors. However, other measures, such as d_ULS and d_G, confirm the estimated model fit because the confidence interval values generated are higher than their original values (Hu & Bentler, 1999; Sarstedt et al., 2023). NFI values above 0.9 usually represent acceptable fit (Henseler & Sarstedt, 2013), but it is not recommended because it underestimates fit in small samples and is therefore not reliable as it is difficult to compare it across data sets (Ding et al., 1995; Marsh et al., 2004).

Table 5: SRMR, d_ULS and d_G Model Fit Statistics

Metrics	Saturated Model				Estimated Model			
	O	M	95% CI	99% CI	O	M	95% CI	99%CI
SRMR	0.075	0.050	0.062	0.069	0.084	0.061	0.081	0.092
d_ULS	0.849	0.386	0.594	0.719	1.089	0.592	1.002	1.283
d_G	0.489	n/a	0.604	0.868	0.508	n/a	0.688	n/a
Chi-square	263.913				269.849			
NFI	0.81				0.806			

However, the predictive ability of the theoretical structural model is based on the R^2 value (Babin & Anderson, 2014; Kwong & Wong, 2015). Wang et al., 2023) which suggests that R^2 values of 0.75, 0.50, or 0.25 for endogenous latent variables can, as a rough rule of thumb, be described as substantial, moderate, or weak, respectively (Babin & Anderson, 2014). In this study, the endogenous construct was PPS, where the value of R^2 of the original sample was 0.635 (see Table 6), implying that the model's predictive ability is more than moderate.

Table 6: Model Quality Criteria: R-Square and Adjusted R-Square Statistics

DESCRIPTIONS	COMTM		COOPR		RESILSC		SUCCESPRO	
	R-Sq	Adj. R-Sq	R-Sq	Adj. R-Sq	R-Sq	Adj. R-Sq	R-Sq	Adj. R-Sq
O	0.248	0.242	0.186	0.179	0.105	0.097	0.505	0.488
M	0.256	0.249	0.193	0.186	0.110	0.102	0.517	0.499
STDEV	0.071	0.072	0.061	0.062	0.051	0.052	0.079	0.082
|O/STDEV|	3.474	3.352	3.029	2.888	2.043	1.874	6.360	5.923
P values	0.001	0.001	0.002	0.004	0.041	0.061	0.000	0.000
LCI	0.119	0.111	0.078	0.070	0.024	0.015	0.321	0.297
HCI	0.392	0.387	0.309	0.303	0.218	0.212	0.636	0.623

NOTE: *STDEV, standard deviation; O/STDEV = T Statistics, LCI = Lowest Confidence Interval, HCI = Highest Confidence Interval, R-Sq. = R-Square, Adj. R-Sq. = Adjusted R-Square*

4.0 STUDY FINDINGS

Mediation analysis was performed to assess the multiple mediating roles of COMT, COLAB, and RESIL in the relationship between COMP and PPS. The results (Table 7) revealed a significant total indirect effect of CC on PPS through COMT, COLAB, and RESIL (H1: $\beta = 0.455$, $t = 4.207$, $p < 0.05$). The total effect of CC on PPS before the inclusion of mediators was significant ($\beta = 0.272$, $t = 3.234$, $p < .05$). Even with the inclusion of the mediator, the total indirect effect of CC on PPS remained significant. This shows the complementary partial mediation of COMT, COLAB, and RESIL in the relationship between COMP and PPS. However, the specific indirect effect reveals that only RESIL and

COLAB have complementary partial mediating roles in the relationship between COMP and PPS, with β = 0.278, t = 3.261, p < 0.05, and β = 0.167, t = 3.133, p < 0.05, respectively, whereas COMT does not mediate this relationship. This is because the results show that the specific indirect effect of CC on PPS through COMT is not significant (β = 0.014, t = 0.222, p > 0.05). Furthermore, the results show that the total effect of COMP on COMT was significant (β = 0.575, t = 7.103, p < 0.05); however, the total effect of COMT on PPS was not significant (β = 0.025, t = 0.235, p > 0.05).

Table 7: Total Indirect Effect, Specific Indirect Effect and Total Effect

MODEL PATH	O	M	STDEV	t value	p-value	LCI	HCI
Total Indirect Effect							
COMP -> PPS	0.455	0.463	0.108	4.207	0.000	0.212	0.515
Specific Indirect Effect							
COMP -> RESIL -> PPS	0.273	0.278	0.084	3.261	0.001	0.146	0.422
COMP -> COLAB -> PPS	0.167	0.167	0.053	3.133	0.002	0.087	0.261
COMP -> COMT-> PPS	0.014	0.018	0.064	0.222	0.824	-0.082	0.125
Total Effect							
COMP -> COMT	0.575	0.577	0.081	7.103	0.000	0.436	0.706
COMP -> COLAB	0.501	0.509	0.079	6.356	0.000	0.375	0.634
COMP -> RESIL	0.382	0.382	0.096	3.973	0.000	0.215	0.531
COMP -> PPS	0.272	0.272	0.084	3.234	0.001	0.130	0.404
COMT-> PPS	0.025	0.028	0.106	0.235	0.407	-0.143	0.205
COLAB -> PPS	0.334	0.329	0.089	3.754	0.000	0.183	0.474
RESIL -> PPS	0.715	0.723	0.085	8.431	0.000	0.579	0.859

NOTE: *The Lowest and Highest Confidence Intervals (LCI & HCI) are for 95% where p < 0.05*

5.0 DISCUSSIONS

This study had four hypotheses about the relationship between COMP and PPS, with and without the mediation of COMT, COLAB, and RESIL. The empirical findings supported two hypotheses, while the other two were not (see Table 8). At first, it was thought that COMP alone could not ensure PPS based on the fact that contractor performance depends on the COMT, COLAB and RESIL of the supply chain for the project. However, the empirical findings in this study do not support this hypothesis, probably because there is no peril causing negative effects on the project (Zainal Abidin & Ingirige, 2018), or a situation where contractor dependency on other members of the supply chain for the project, such as consultants, suppliers, and service providers, is low (Alashwal et al., 2017; El-khalek et al., 2019). For example, when the market is fairly competitive, free from a pandemic that may hinder the flow of resources and the availability of project inputs is assured, or the situation where the contractor is large in the sense that he/she has the capital to complete the project and then claim the payment (Lahyani et al., 2021); this can also be the case with donor-funded and community-based projects, where the financier is independent of the government (Alashwal et al., 2017). These findings are consistent with other studies but also contrary to other studies.

These findings suggest that the nature of project-based relationships, in which parties come together for a specific project and may not have a long-term commitment to each other, makes collaboration a key factor in achieving successful project outcomes (Bond-Barnard et al., 2018). Furthermore, the finding that COMT does not mediate the relationship between COMP and PPS aligns with the idea that commitment alone may not be sufficient to ensure public project success (Ahmadabadi & Heravi, 2019; Mathar et al., 2020). While commitment is important for fostering trust and cooperation among project stakeholders, effective collaboration and coordination are essential for managing the complexities and uncertainties inherent in public projects (Chang et al., 2018; Chang et al., 2010). Overall, this finding highlights the need to consider context-specific factors when examining the relationships among collaboration, commitment, and public project success. This suggests that, in project-based settings, where relationships are temporary and collaboration is crucial, the traditional notion of commitment as a mediator may not hold. Future research could further investigate the specific mechanisms through which collaboration influences public project success in various contexts and industries.

On the other hand, consider potential factors that may hinder a project's progress. Supply chain resilience is essential in these situations (Abidin, n.d.); Chen et al., 2024; Lahyani et al., 2021). This study examined whether supply chain resilience can mediate the relationship between contractor competence and public project success. The findings indicate that in the presence of contractor competence, supply chain resilience plays a crucial role in ensuring public project success. This is justified by the lengthy duration of most public projects, which can take three to five years to complete (Ayodeji, n.d.). Therefore, supply chain resilience is important in these cases. These findings align with prior research emphasising the significance of resilience in achieving public project success (Chen et al., 2024; Habibi et al., 2023).

Table 8: Summary of Hypotheses and Findings

S/N	Hypothesis	Findings	Remark
H_1	There is no significant relationship between COMP and PPS	β = 0.272, t = 3.234, $p < .05$	Not Supported
H_2	COMT mediate the relationship between COMP and PPS	β = 0.014, t = 0.222, $p > 0.05$	Not Supported
H_3	COLAB mediate the relationship between COMP and PPS	β = 0.167, t = 3.133, $p < 0.05$	Supported
H_4	RESIL mediate the relationship between COMP and PPS	β = 0.278, t = 3.261, $p < 0.05$	Supported

6.0 CONCLUSION AND IMPLICATIONS

This study investigated the relationships between contractor competence (COMP) and public project success (PPS), with and without the mediation of commitment (COMT), cooperation (COLAB), and resilience (RESIL). Two of the four hypotheses were supported, suggesting that contractor competence alone can ensure public project success when the factors likely to affect project completion remain constant. In this context, the supply chain operates smoothly, and no additional resource commitment is required. However, empirical findings show that collaboration among members of the supply chain has mediating effects, emphasising the importance of collaboration over commitment in achieving successful project outcomes. The absence of mediation by COMT in the COMP-PPS relationship underscores the need for effective collaboration in managing project complexities.

However, supply chain resilience was found to play a critical role in ensuring public project success when coupled with contractor competence. This finding implies that a supply chain must be sufficiently resilient to combat disruption waves. This underscores the significance of resilience in achieving successful project outcomes and the need to consider context-specific factors in project-based relationships that are likely to affect project completion. Therefore, based on these findings, it is concluded that the supply chain attributes of collaboration and resilience have significant effects on project success. In this sense, we recommend that supply chain attributes of collaboration and resilience be included among the main criteria for evaluating contractors for certain construction projects.

Putting this into practice, a procuring entity may be a contractor to submit the names and addresses of the key suppliers she normally works with and considers working with if she wins the tender in question. She may also be provided with a checklist of the likely areas of collaboration between the buyer and supplier in continued business relationships and be asked to tick whatever is applicable in their relationship. Concerning resilience, a procuring entity may ask potential contractors to submit proof of any disruptions dealt with or the collective strategies to deal with disruptions in case they happen. The inclusion of supply chain attributes, which makes the evaluation process a holistic approach, is vital for ensuring successful public projects. However, this study was limited to only three supply chain attributes of commitment, collaboration, and resilience, and future research should explore other supply chain attributes and their effects on project success, given contractor competence in other contexts and industries.

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APPENDIX: PROJECTS CITED

S/N	Project Name	Project Budget	Region	District
1	Amsha Secondary School	470,000,000	Arusha	Arumeru
2	Ayalabe Secondary School	470,000,000	Arusha	Karatu
3	Chamanzi Secondary School	470,000,000	Dar es Salaam	Temeke
4	Hananasifu Secondary Schol	470,000,000	Dar es Salaam	Kinondoni
5	Msakuzi Secondary School	470,000,000	Dar es Salaam	Ubungo
6	Tundwi Songani Secondary School	470,000,000	Dar es Salaam	Kigamboni
7	Galigali Secondary School	470,000,000	Dodoma	Mpwapwa
8	Iwondo Secondary School	470,000,000	Dodoma	Mpwapwa
9	Lenjulu Secondary School	470,000,000	Dodoma	Kongwa
10	Nhinhi Secondary School	470,000,000	Dodoma	Chamwino
11	Zajilwa Secondary School	470,000,000	Dodoma	Chamwino
12	Mpinga Secondary School	470,000,000	Dodoma	Bahi
13	Churuku Secondary School	470,000,000	Dodoma	Chemba
14	Mailisita Secondary School	470,000,000	Kilimanjaro	Hai
15	Moshi Technical Secondary School	470,000,000	Kilimanjaro	Moshi
16	Kifaru Secondary School	470,000,000	Kilimanjaro	Mwanga
17	Mindu Secondary School	470,000,000	Morogoro	Morogoro
18	Homboza Secondary School	470,000,000	Morogoro	Mvomero
19	Buruguza Secondary School	470,000,000	Mwanza	Ilemela
20	Kibanda Secondary School	470,000,000	Mwanza	Nyamagana
	Total	**9,400,000,000**		