

## **RESEARCH PAPER**

# **Modelling Organizational Performance in Kenya's Construction Sector: A Canonical Correlation Approach**

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### **Abstract**

Local contractors in Kenya face persistent challenges, including operational inefficiencies and weak management structures, which undermine their ability to compete with international firms. While previous research has focused narrowly on project-level success—emphasizing cost, time, and quality—this study addresses a critical conceptual gap by shifting the analysis to the organizational level. Further, existing literature often treats firm performance as a unidimensional construct and fails to model the complex multivariate relationships between organizational determinants and performance outcomes. The research sought to establish the relationship between ten dimensions of organizational performance and ten key determinants. A canonical correlation analysis (CCA) of the criterion (dimensions) and the predictor (determinants) variables is presented herein using perceptual data from 378 dual-perspective respondents (235 contractors, 143 consultants) drawn from a 612-sample of NCA-registered Kenyan firms (response rate=62%). The results of CCA showed a significant relationship between the dimensions and determinants of organizational performance. The model was statistically significant, with a Wilks's lambda,  $\lambda$ , of .05197,  $F(100, 1551.20) = 7.93263$ ,  $p < 0.001$ . Significance across all multivariate tests indicated a good overall model fit. The findings reveal that the most influential drivers of performance are the firm's organizational structure, quality of service, and strategic planning practices. These determinants most strongly impact non-financial outcomes such as employee satisfaction, managerial capability, and overall firm growth. The results were validated using a second dataset, confirming the robustness of the model. For contractors, these findings offer a diagnostic roadmap: to improve profitability and growth, firms must prioritize management flexibility and formalize strategic planning rather than focusing solely on project-specific tasks. For policymakers and regulators, the study underscores the need for institutional support that incentivizes organizational capacity building. By shifting the focus from individual project metrics to holistic firm health, stakeholders can enhance the long-term sustainability and competitiveness of the local construction sector in alignment with national development goals.

**Keywords:** Canonical correlation analysis, Determinants, Dimensions, Local contractors, Organizational performance

## **1. INTRODUCTION**

The main goals of most organizations include effectiveness, efficiency, and growth. Contractors are no exception. Due to the highly competitive nature of the construction industry, those who do not live up to these goals are destined to fail (Masila, 2023). Increased competition in recent years has been fuelled by globalization. International contractors are able to enter local markets with ease (Lewis, 2007). While there

may be a debate as to whether the entry of foreign contractors in developing countries has a net positive impact on local economies, based on international trade regulations, these contractors cannot be barred from doing business in developing countries. There is also no doubt that buying from local organizations promotes their growth and stability. Indeed, Larcher (1999) observes that local contractors hold the greatest potential for overall economic development since they minimize the outflow of financial resources from the country. However, consumers cannot just be compelled to procure local products in the midst of cheaper and better quality foreign products (Karugia and Mwanzia, 2025; Lewis, 2007; Masila, 2023). Studies have also proven that the protection of local businesses ends up hurting them and the economy in the long run (Kabiru and Irechukwu, 2023; Kanyanja and Muathe, 2023; Kanyora and Okello, 2024). It is for these reasons that local contractors have no option but to improve their effectiveness and efficiency if they are to compete favourably with their foreign counterparts. This research seeks to provide information that can be used to improve the organizational performance of local contractors and give them a competitive advantage over foreign contractors. This can result in a scenario where clients who demand quality at competitive prices do not automatically prefer foreign contractors. Local contractors in Kenya have been reported to have a myriad of weaknesses, including external and internal inefficiencies, poor growth, reduced profitability, poor technology, ineffective strategies, and weak management structures, among many others (Kwamboka and Maina, 2022; Ngiri and Njagi, 2022). This is a clear demonstration of poor organizational performance.

Therefore, this paper aimed to establish the relationship between the dimensions and determinants of organizational performance for local contractors in Kenya. The study was guided by the following specific objectives:

- i. To identify and categorize the critical dimensions and determinants of organizational performance relevant to the unique context of the Kenyan construction industry.
- ii. To develop and validate a canonical correlation model that articulates the strength and nature of the multivariate relationship between these organizational determinants and performance outcomes.

## **2. LITERATURE REVIEW**

### **2.1. Concept of Organizational Performance**

The concept of performance has its origins in the world of sports and is currently incorporated in virtually all economic sectors and other aspects of life. Performance in general is concerned with the relationship between the desired objective and the achieved result. Kaplan and Norton (1992) described performance as a set of financial and non-financial indicators that define the extent to which objectives and results have been achieved. Didier (2002) defines performance as the achievement of given goals in the convergence of a firm's orientation. He argues that performance is not just about achieving an outcome, but rather a positive outcome matching set objectives. In the construction industry, performance is often traditionally confined to the "iron triangle" of project-level success: cost, time, and quality. However, modern construction management theory treats performance as a multidimensional construct that defines the extent to which organizational objectives and results are achieved.

While early studies, especially in developing countries, primarily addressed causes of project delays and failure factors, contemporary international research emphasizes that project success is a subset of broader organizational performance. Performance at the firm level is a complex relationship involving criteria such as efficiency, productivity, and innovation. For construction firms, this includes both financial stability and "soft" non-financial indicators like client support and technical capability.

The organizational performance of any system has been described as a complex relationship that involves seven critical performance criteria: efficiency, effectiveness, productivity, quality, quality of work, profitability, and innovation (Abdelwahed and Doghan, 2023). Said et al. (2025) also agree that effectiveness and productivity are both ingredients of organizational performance. Organizational performance of a firm is so important that it determines its potential success (Almatrooshi et al., 2016).

### **2.2 Dimensions of Organizational Performance**

Organizational performance is a multidimensional concept. Indicators of organizational performance can be categorized either as financial or non-financial. Any performance enhancement measures biased towards either category are not likely to yield maximum results. This is because most dimensions of organizational performance are positively related (Fegade and Sharma, 2023). Therefore, it is important

to identify the correct measures for evaluating organizational performance. Oyewobi et al. (2017) pointed out that although very relevant, research into organizational performance suffers from a number of deficiencies, including the selection of indicators based on convenience, a lack of consensus, and little consideration of its multidimensionality.

The following dimensions of organizational performance were identified from various research: profitability, financial stability, business efficiency, growth, employee satisfaction, client satisfaction, technical capability, managerial capability, quality of products, and safety performance (Castillo et al., 2018; Huang et al., 2023; Mahmoudi and Javed, 2022; Mbugua et al., 2021; Oluwatayo and Amole, 2011; Oyewobi et al., 2017; Satpathy et al., 2025; Singh et al., 2016). These dimensions incorporate both financial and non-financial aspects of performance.

### **2.3 Determinants of Organizational Performance**

The organizational performance of a firm is dependent on a number of factors existing both internally and externally. For example, a conducive economic environment provided by the government is bound to affect organizational performance positively. The following determinants of organizational performance were also identified from various studies; performance measurement practices, strategic planning practices, employee performance, organizational structure, client support, government support, innovativeness, supplier effectiveness, quality of service, and competition (Awan and Javed, 2024; Castillo et al., 2018; Huang et al., 2023; Mahmoudi and Javed, 2022; Mousa et al., 2024; Oluwatayo and Amole, 2011; Oyewobi et al., 2017; Saputra et al., 2024; Satpathy et al., 2025; Singh et al., 2016). These factors incorporate both the internal and external environments within which the contractor exists. Previous studies (Al-Dhaafri et al., 2024; Oyewobi et al., 2017) argue that selecting indicators based on convenience or a lack of consensus limits the practical value of performance research.

### **2.4 Research gap**

Most research done on performance in the construction industry is, in most cases, targeted towards improving the success of projects rather than the entities executing the projects (Gichunge, 2000; Kibuchi, 2012; Kihoro and Waiganjo, 2015; Kithinji and Kamaara, 2017; Mbiti, 2017; Ogutu and Muturi, 2017; Talukhaba, 1999; Wafula, 2017; and Wanjau, 2015). While it may be important to seek improvement at the project level, it is of more significance to address the issue at the organizational level since such improvement has the likelihood of translating into improved project performance as well.

Where research has been carried out with regard to organizational performance, it has been outside the construction industry. This is the case in Khatun et al., (2014). Such research cannot be relied upon in an effort to improve the performance of contractors since the construction industry is unique. Construction projects are temporary endeavors, each with unique working conditions and challenges.

Carton (2004) did some extensive research on how to measure organizational performance. First, while the study developed a measurement model that captures wider information regarding the impacts of organizational actions, they failed to establish the relationships existing between organizational actions and outcomes. Secondly, while the researcher sought to describe the nature of organizational performance, he failed to examine the determinants of organizational performance. Thirdly, the focus of the research was only on the financial aspect of organizational performance, making it unidimensional. Fourth, not only was the research not conducted in the context of the construction industry, it was conducted in the USA., a developed country.

This study advances the existing body of Kenyan construction literature in three significant ways. First, while seminal local works by Gichunge (2000) and Talukhaba (1999) established the foundation for project-level analysis, this research shifts the unit of analysis to the firm level, recognizing that organizational health is the primary engine for consistent project delivery. Second, it addresses the contextual gap by tailoring performance determinants specifically to the unique regulatory and economic environment of Kenyan contractors rather than relying on general management models from developed economies like the USA. Finally, it introduces methodological rigor through Canonical Correlation Analysis (CCA), moving beyond descriptive statistics to model the complex shared variance between multiple determinants and dimensions, a level of multivariate analysis previously absent in local sector studies. Unlike multiple regression, which links several predictors to a single outcome, CCA simultaneously models the relationship between multiple predictors and multiple outcome variables (Everitt, 2005). This makes CCA particularly suitable for organizational performance research, where both determinants and performance dimensions are multidimensional constructs.

### 3. METHODOLOGY

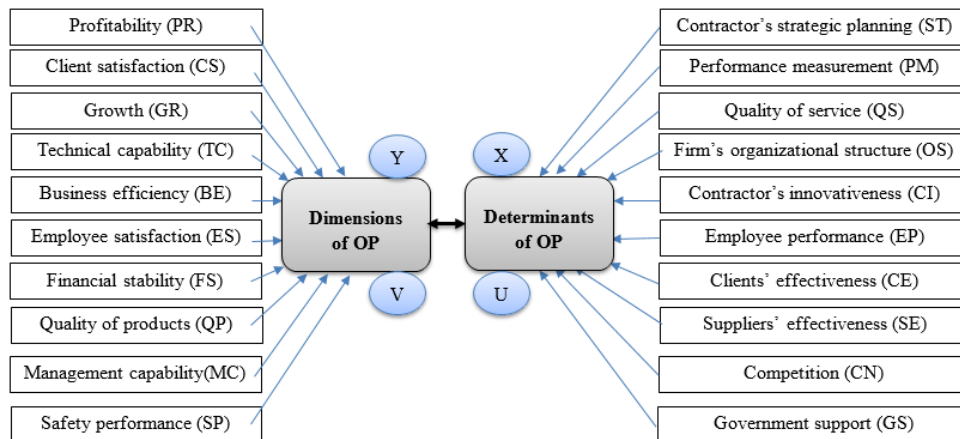
A quantitative research strategy and a survey research design were adopted. The target population comprised local contractors and consultants. The number of local contractors targeted was 1,427. Their sample size was estimated at 306. An equal number of consultants was adopted, with their inclusion being dependent on their involvement in projects handled by the sampled contractors. The overall response rate was 62%. Data was collected by use of questionnaires.

The studied dimensions of organizational performance (OP) comprised of; technical capability (TC), growth (GR), client satisfaction (CS), financial stability (FS), managerial capability (MC), quality of products (QP), profitability (PR), employee satisfaction (ES), business efficiency (BE), and safety performance (SP). The determinants of organizational performance (DT) studied included; employee performance (EP), clients' effectiveness (CE), contractor's strategic planning practices (ST), quality of service (QS), contractor's innovativeness (CI), organizational structure of the firm (OS), competition (CN), performance measurement practices (PM), suppliers' effectiveness (SE), and government support (GS). These variables were measured subjectively using a 10-point rating scale. All the attributes have been measured on a numerical rating scale of 1-10, ranging from very low to very high. The 10-point scale was chosen due to its ability to not only offer more variance compared to smaller scales but also its higher degree of measurement precision. It not only provides an improved opportunity to detect changes but gives more power in explaining a point of view (Taherdoost, 2019). The 10-point scale is also said to provide better reliance (Dawes, 2008).

While the 10 point scale offered greater variance and measurement precision compared to smaller scales, its use is not without limitations. Because the ratings were perceptual and self-reported, they are inherently subjective and may reflect respondent bias rather than objective organizational realities. This subjectivity raises questions about the acceptability of such scales in organizational performance research, particularly when comparing across firms or sectors. However, the scale remains widely adopted in management and social science studies due to its ability to capture detailed perceptions and provide sufficient statistical power for multivariate analysis. In this study, the robustness of the canonical correlation model and validation with a second dataset mitigated some of these concerns, suggesting that while subjectivity is a limitation, the 10-point scale remains an acceptable tool for exploring complex organizational relationships

This study hypothesizes that there is a statistically significant relationship between the dimensions and determinants of organizational performance. The following statistical assumptions were complied with: linearity, normality, homogeneity, and absence of multicollinearity.

Canonical correlation analysis (CCA), a statistical method for exploring the relationship between two multivariate sets of variables, was used to explore the linkage between the dimensions and determinants of organizational performance. Fedelis and Anthonia (2018) referred to CCA as a multivariate analysis of correlation, which summarizes the number of variables while preserving the structural characteristics of the relationships. This enables easier interpretation of various analyses on the data sets by reducing the number of scatter plots. CCA is not concerned with the prediction or explanation of one set of variables using another, but rather measures the association between two sets of variables (Que et al., 2020). Figure 1 shows the canonical relationship between the two sets of variables, organizational performance and its determinants.



**Figure 1.** Hypothesized Canonical Relationship between Dimensions of Organizational Performance and their Determinants

Source: (Author, 2025)

## 4. RESULTS AND DISCUSSION

A Canonical Correlation Analysis (CCA) was executed using syntax commands in IBM® SPSS® Statistics v21. The dimensions of organizational performance were treated as criterion variables, while the determinants of organizational performance were treated as the predictor variables. Since there were 10 dimensions versus 10 determinants in the CCA, it meant that the analysis would yield 10 canonical correlation models. Other than testing the overall model fit of the full canonical model, the following criteria were used to interpret the results: canonical correlation coefficient ( $R_c$ ), squared canonical correlation coefficient ( $R_c^2$ ), canonical coefficients (canonical weights), canonical loadings (canonical structure correlations), canonical cross-loadings, and redundancy index based on recommendations by Hair Jr et al. (2014). The data was split into two sets (calibration and validation samples), and analysis was carried out on both samples separately. This was for the purposes of statistical validation based on the advice given by Lee et al. (2019).

### 4.1 Results for the Calibration Sample

Multivariate tests of significance results presented in Table 1 indicate that there is a statistically significant correlation between the two sets of variables. The full model was statistically significant, with a Wilks's lambda,  $\lambda$ , of .05197,  $F(100, 1551.20) = 7.93263$ ,  $p < 0.001$ . Significance across all the multivariate tests is an indication of good overall model fit. A Wilks  $\lambda$  value of 0.05197 meant that the full canonical model explained approximately 94.803% of the variance shared between the dimensions and determinants of organizational performance. This is because the Wilks Lambda is the measure of the unexplained variance by the model (Prince et al., 2019). This means that the overall model has a large effect size on the population.

**Table 1.** Multivariate Tests of Significance (calibration sample)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillai's	1.69030	4.55645	100.00	2240.00	0.000
Hotelling's	7.67309	16.35902	100.00	2132.00	0.000
Wilk's	0.05197	7.93263	100.00	1551.20	0.000
Roy's	0.86867				

Source: (Author, 2025)

The results in Table 1 provide robust statistical confirmation of the validity of the research model, demonstrating that the observed relationships are systematic rather than attributable to random variation. Rather than relying on a single test, the table presents four different global measures—Pillai's Trace, Hotelling's Trace, Wilks's Lambda, and Roy's Largest Root—all of which consistently confirm that the relationship between how a construction firm is managed and its ultimate performance is not a result of random chance. The most critical takeaway from this table is the significance (sig.) value of .000 across all tests. In practical language, this indicates a 100% confidence level that a real, systematic link exists between the determinants (such as a firm's internal structure and planning) and the dimensions of its success (such as growth and client satisfaction). Furthermore, the Wilks' Lambda value specifically suggests that the variables chosen for this study capture the vast majority of the shared characteristics between management practices and firm outcomes. This means the model isn't just a mathematical exercise; it is a highly accurate reflection of the Kenyan construction landscape. Ultimately, the results prove that if a contractor improves the specific organizational factors identified in this paper, they can expect a predictable and significant improvement in their overall business performance.

The root numbers in Table 2 represent the 10 pairs of canonical variates together with canonical correlation values ( $R_c$ ) demonstrating the strength of the relationship between the two sets of variables. The canonical correlation values are the Pearson correlations of the pairs of canonical variates. The squared canonical correlations ( $R_c^2$ ), also known as canonical roots, represent the shared variance between the two sets of variables in each pair of canonical variates. All ten yielded functions had a positive canonical correlation. Though the second and third roots had some considerable shared variance (32.83% and 20.02%), the first root had a very high value of  $R_c^2$ , thereby indicating a high amount of shared variance (86.87%). The eigenvalues are calculated using the squared canonical correlations ( $R_c^2/1-R_c^2$ ), and their relative sizes reflect the extent to which the variance in the canonical variates is explained by the corresponding canonical correlation.

The analysis presented in Table 2 provides the first major insight into the strength of the relationship between management practices and firm success. The data reveals a primary connection (the first canonical root) with a correlation of 0.932. In practical terms, this demonstrates an almost near-perfect

alignment between the internal and external environment of a firm and its resulting performance. Because the shared variance is approximately 87%, it confirms that success in the Kenyan construction sector is not a product of luck or random market shifts; rather, it is deeply rooted in the specific organizational choices made by firm leadership.

As shown in Table 3, out of the ten extracted canonical functions, only the first four were statistically significant ( $p < 0.05$ ) using the F test, and therefore, the interpretation of the results would be focused on these four models. Additionally, the shared variances of the excluded roots were noted to be too low (6.56%, 4.61%, 2.56%, 2.07%, 0.8% and 0.06%) as seen in the previous table.

**Table 2.** Eigenvalues and Canonical Correlations (calibration sample)

Root No.	Eigenvalue	%	Cum. %	Canon Cor. ( $R_c$ )	Sq. Corr. ( $R_c^2$ )
1	6.61468	86.20621	86.20621	0.93203	0.86867
2	0.48865	6.36840	92.57461	0.57293	0.32825
3	0.25036	3.26280	95.83741	0.44747	0.20023
4	0.14449	1.88306	97.72046	0.35531	0.12625
5	0.07020	0.91486	98.63532	0.25611	0.06559
6	0.04835	0.63019	99.26551	0.21477	0.04612
7	0.02624	0.34204	99.60754	0.15992	0.02557
8	0.02113	0.27534	99.88288	0.14384	0.02069
9	0.00837	0.10913	99.99201	0.09112	0.00830
10	0.00061	0.00799	100.00000	0.02475	0.00061

Source: (Author, 2025)

**Table 3.** Dimension Reduction Analysis (calibration sample)

Roots	Wilks L.	F	Hypoth. DF	Error DF	Sig. of F
1 to 10	0.05197	7.93263	100.00	1551.20	0.000
2 to 10	0.39570	2.67544	81.00	1404.88	0.000
3 to 10	0.58907	1.88902	64.00	1258.12	0.000
4 to 10	0.73654	1.40785	49.00	1111.17	0.035
5 to 10	0.84296	1.06274	36.00	964.46	0.371
6 to 10	0.90214	0.92065	25.00	818.77	0.577
7 to 10	0.94576	0.77806	16.00	675.80	0.712
8 to 10	0.97058	0.74125	9.00	540.44	0.671
9 to 10	0.99109	0.50016	4.00	446.00	0.736
10 to 10	0.99939	0.13735	1.00	224.00	0.711

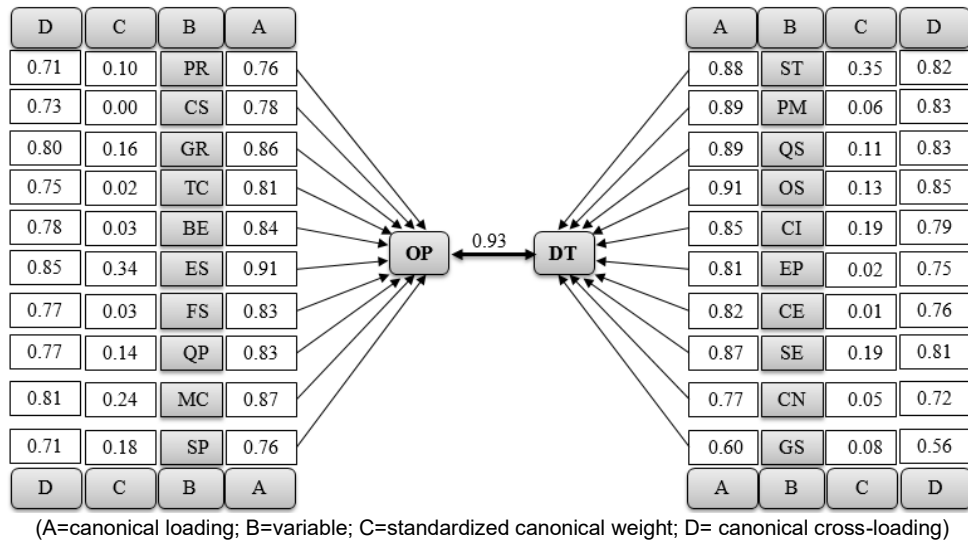
Source: (Author, 2025)

To avoid oversimplification, Table 3 applies dimension reduction techniques to eliminate non-systematic variance, thereby isolating the statistically meaningful relationships between determinants and performance dimensions. The results indicate that while there are many theoretical ways a firm could perform, only four specific combinations of management factors and performance outcomes are statistically reliable. This finding is particularly important for practitioners, as it refines the broad spectrum of management theories into four empirically validated models that demonstrate statistically reliable outcomes within the local context.

Figures 2, 3, and 5 represent the four significant canonical models. The value at the centre represents the canonical correlation between the pair of canonical variates. The inner column (A) of values represents the canonical loadings (canonical structure correlations) while the outer columns represent the canonical cross-loadings (D) and standardized canonical coefficients/canonical weights (C) of each of the variables. Canonical loadings are the correlations between variables and canonical variates; they represent the direct contribution of one variable to the variate, regardless of other variables (Sherry and Henson, 2005). The canonical coefficients define the linear relationship between the variables and the canonical variates and are interpreted just like the regression coefficients (Prince et al., 2019). They represent the contribution of each variable to the variate, given the contribution of other variables (Sherry and Henson, 2005).

As demonstrated in Table 2, the first canonical function had a correlation coefficient of 0.93203, an eigenvalue of 6.61468, and a shared variance (between the variates) of 86.87%. The correlation coefficient indicates a high degree of association between the two variates. Based on the standardized canonical weights, the three variables which contribute most to the criterion variate are employee satisfaction (0.34), managerial capability (0.24), and safety performance (0.18) while the three variables which have the highest effect on the predictor variate are strategic planning practices (0.35), contractors' innovativeness (0.19) and supplier effectiveness (0.19). These are the most critical dimensions and determinants based on this criterion. However, canonical weights are typically unstable and vary greatly across samples (Hair

Jr et al., 2010). Therefore, where there are inconsistencies, canonical loadings shall prevail. All the canonical loadings in the first canonical function were considered to be high, with the lowest at 0.60. The three dimensions with the highest relationship with the criterion variate were employee satisfaction (0.91), managerial capability (0.87), and growth (0.86), while the three determinants with the strongest influence on the predictor variate are organizational structure of the firm (0.91), quality of service (0.89), and performance measurement practices (0.89). These results are largely consistent with those of the standardized canonical weights. The canonical loadings for this model were above the threshold of 0.3, adapted from Milanović et al. (2020).



**Figure 2.** Canonical Model for the First Canonical Function (calibration sample, n=235); Source: (Author, 2025)

The cross-loadings were obtained by multiplying the canonical function’s correlation with the individual canonical loadings for all the variables. Within the criterion variate, the dimensions with the highest cross-loadings are employee satisfaction (0.85) and managerial capability (0.81). This means that 72.25% and 65.61% of the variance in each of these respective variables was explained by the predictor variate (determinants of organizational performance). This was obtained by squaring the correlation coefficients, as advised by Hair Jr et al (2010). However, it can be noted that all the cross-loadings were generally high, with the lowest at 0.71. This meant that at least 50% of the variance in each of the dimensions could be explained by the study’s determinants of organizational performance.

The canonical correlation values tend to be inflated and do not actually represent the shared variance in the original criterion and predictor variables (Lambert and Durand, 1975). It is for this reason that redundancy index values were computed. The redundancy index values in Table 4 were obtained by multiplying the average of the squared canonical loadings (in Figure 2) for each variate by the squared canonical correlation values. The redundancy index represents the amount of variance in one set of variables that can be explained by the variables in the other set (Hair Jr et al., 2010). It is the amount of variance overlap or redundancy between the two sets of variables. It is also worth noting that there are no set thresholds for interpreting canonical loadings and redundancy indices, though the higher the values, the higher the predictive ability (Dattalo, 2014). Since the redundancy index values for the second, third, and fourth roots were very low (1.6%, 1.1 % and 0.5% for the criterion variate), these canonical functions were excluded from the final interpretation of the results. This is because in such models, the determinants would have a very low predictive ability of the organizational performance.

The redundancy index values for the first canonical function are 0.593 and 0.606. This means that 59.3% of the variance in the Y variate can be explained by the predictor variables (determinants of organizational performance), while 60.6% of the variance in the X variate can be explained by the criterion variables (dimensions of organizational performance). In this study, the researcher was more interested in the variance within the criterion variate (59.3%), which is explained by the predictor variables. The high value not only indicates a high predictive capability but also means that the studied predictor variables (determinants) are theoretically and statistically sound in explaining the dimensions of organizational performance.

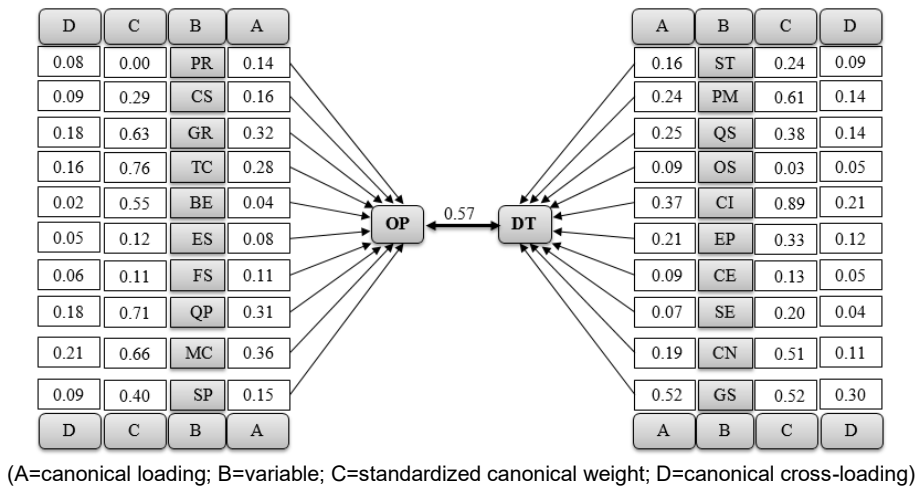
**Table 4.** Redundancy Index (RI) (calibration sample)

Root	Criterion Variate (OP)			Predictor Variate (DT)		
	Average Canonical Loading Squared	R <sub>c</sub> <sup>2</sup>	RI	Average Canonical Loading Squared	R <sub>c</sub> <sup>2</sup>	RI
1	0.682	0.87	0.593	0.697	0.87	0.606
2	0.049	0.33	0.016	0.066	0.33	0.022
3	0.056	0.20	0.011	0.039	0.20	0.008
4	0.039	0.13	0.005	0.029	0.13	0.004

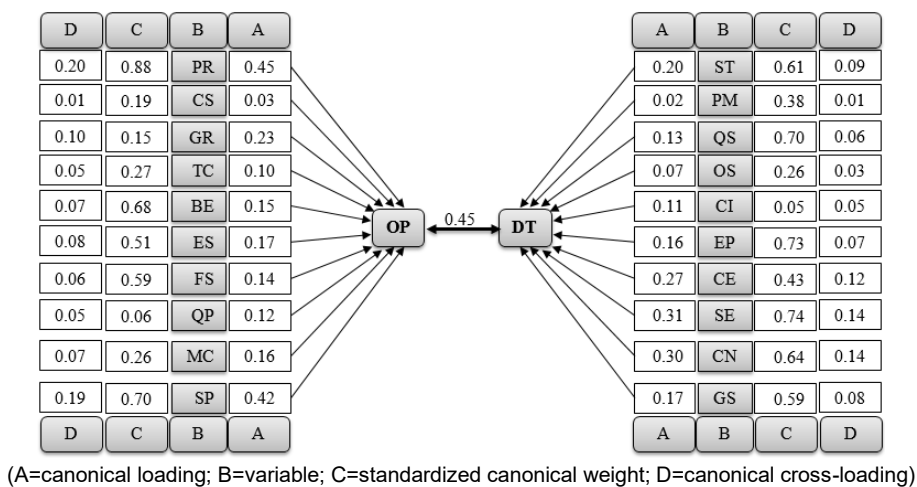
Source: (Author, 2025)

The predictive value of the study is further clarified in Table 4 through the redundancy index. This table indicates that the management factors identified in this study, such as organizational structure and strategic planning, can directly account for nearly 60% of a firm’s overall performance. While external economic factors beyond a contractor’s control certainly exist, this finding empowers managers by proving that the majority of their firm’s success is determined by internal decisions that they can actively change and improve.

Figure 3 presents the 2<sup>nd</sup> canonical function. Though there is a relatively high canonical correlation between the variates (57%), the redundancy index values shown in Table 4 were found to be too low (1.6%, 2.2%), and therefore, there was no need to interpret further results about these variates. Additionally, the canonical cross-loadings were also seen to be low.

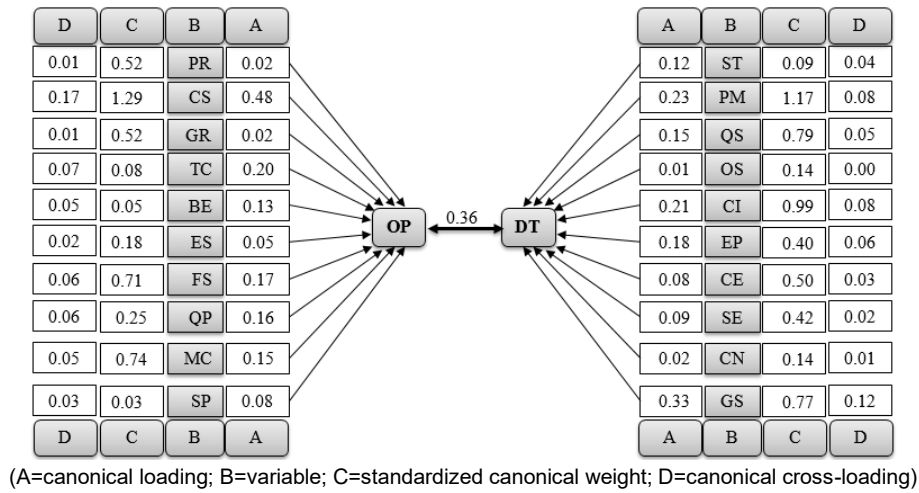


**Figure 3.** Canonical Model for the 2<sup>nd</sup> Canonical Function (calibration sample, n=235)  
Source: (Author, 2025)



**Figure 4.** Canonical Model for the 3<sup>rd</sup> Canonical Function (calibration sample, n=235)  
Source: (Author, 2025)

Figures 4 and 5 present the 3<sup>rd</sup> and 4<sup>th</sup> canonical functions. Not only were the canonical correlations considered to be low, but the redundancy index values presented in Table 4 were also almost negligible. The canonical cross-loadings were also observed to be very low.



**Figure 5.** Canonical Model for the 4<sup>th</sup> Canonical Function (calibration sample, n=235)  
Source: (Author, 2025)

### 4.2 Validation of the Canonical Model

Validation is an essential step towards model acceptance (Mayer and Butler, 1993). It assists in checking the predictive robustness of the calibration model (Lee et al., 2019). In this study, statistical validation was achieved through sample splitting. The previous presented results were obtained from the calibration sample whereas the results discussed hereafter are for the second data set. Previously stated statistical assumptions were also checked for the validation sample.

Just like in the calibration sample, multivariate tests of significance results demonstrated a statistically significant correlation between the two sets of variables. The full model was statistically significant, with a Wilks’s lambda,  $\lambda$ , of .03190,  $F(100, 892.50) = 5.51589, p < 0.001$ . Significance across all the multivariate tests is an indication of good overall model fit. The full canonical model explained approximately 96.81% of the variance shared between the dimensions and determinants of organizational performance. This was even higher than the value obtained previously (94.803%). Table 5 presents the eigenvalues and canonical correlations. These two sets of results were found to be similar to those obtained earlier. The first four functions explained approximately 95.38% (compared to 97.72%) of the shared variance by the canonical variates.

**Table 5.** Eigenvalues and Canonical Correlations (validation sample)

Root No.	Eigenvalue	%	Cum. %	Canon Cor. ( $R_c$ )	Sq. Corr. ( $R_c^2$ )
1	5.78741	75.42105	75.42105	0.92340	0.85267
2	0.83420	10.87117	86.29222	0.67439	0.45480
3	0.45427	5.92007	92.21229	0.55890	0.31237
4	0.24332	3.17088	95.38317	0.44238	0.19570
5	0.20987	2.73497	98.11814	0.41649	0.17346
6	0.07552	0.98417	99.10231	0.26499	0.07022
7	0.03274	0.42673	99.52904	0.17806	0.03171
8	0.02231	0.29077	99.81980	0.14773	0.02182
9	0.01366	0.17795	99.99776	0.11607	0.01347
10	0.00017	0.00224	100.00000	0.01312	0.00017

Source: (Author, 2025)

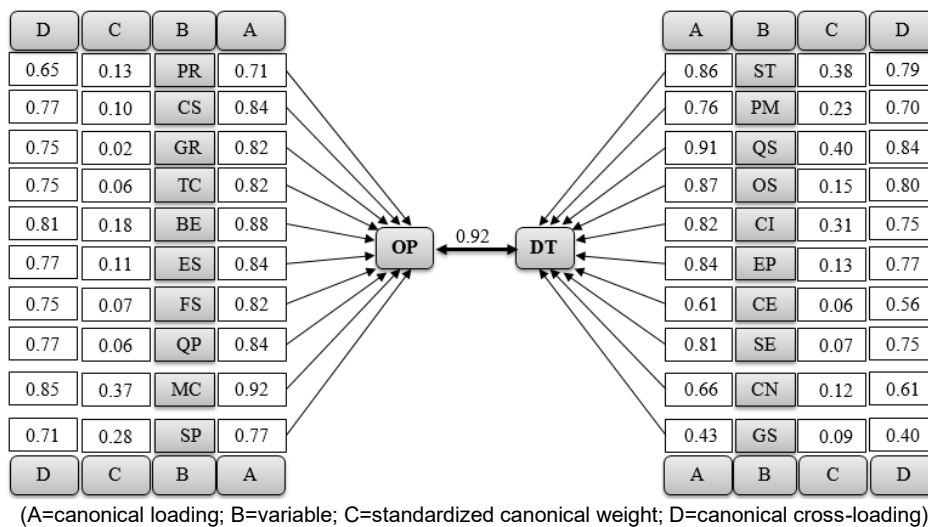
Table 6 presents the results of the significance of each of the canonical roots. The first four functions were found to be statistically significant ( $p < 0.05$ ). This meant that the remaining six functions were to be ignored in any further analysis. This was consistent with the results found in the calibration sample. However, since the adopted canonical model for this study was based on the first canonical function (Figure 2), any further comparison of results was based on such.

**Table 6.** Dimension Reduction Analysis (validation sample)

Roots	Wilks L.	F	Hypoth. DF	Error DF	Sig. of F
1 to 10	0.03190	5.51589	100.00	892.50	0.000
2 to 10	0.21649	2.67275	81.00	810.32	0.000
3 to 10	0.39708	1.97404	64.00	727.47	0.000
4 to 10	0.57746	1.50152	49.00	644.10	0.017
5 to 10	0.71796	1.22012	36.00	560.46	0.181
6 to 10	0.86864	0.73719	25.00	477.00	0.820
7 to 10	0.93424	0.55547	16.00	394.74	0.916
8 to 10	0.96483	0.52120	9.00	316.54	0.859
9 to 10	0.98636	0.45137	4.00	262.00	0.771
10 to 10	0.99983	0.02273	1.00	132.00	0.880

Source: (Author, 2025)

The RI for the criterion variate in the validation sample was found to be 0.581, while that of the predictor variate was 0.506. These were almost similar to the results found in the first data set, 0.593 and 0.606, respectively. Figure 6 presents the canonical model based on the validation data sample. As seen, the canonical weights and loadings were largely consistent with the previously established ones. This was also the case with the canonical cross-loadings.



**Figure 6.** Canonical Model for the First Canonical Function (validation sample, n=143)

Source: (Author, 2025)

Finally, to ensure these findings were not unique to the specific group of people surveyed, the study underwent a rigorous validation process shown in Tables 5 and 6. By testing the model against a second, independent dataset, the research found nearly identical results, with a correlation of 0.923 and the same four significant patterns of success. This consistency confirms that the model is robust and highly applicable to the wider Kenyan construction industry. It provides a reliable benchmark that both contractors and policymakers can use to predict how improvements in organizational structure or quality of service will translate into long-term growth and stability.

### 4.3 Summary of Findings

The results in Table 1 provide robust statistical confirmation of the validity of the research model, demonstrating that the observed relationships are systematic rather than attributable to random variation. The four measures employed demonstrate that the relationship between how a construction firm is managed and its ultimate performance is not a result of random chance. It is an indication that a real, systematic link exists between the determinants (such as a firm's internal structure and planning) and the dimensions of its success (such as growth and client satisfaction). Furthermore, the Wilks' Lambda value specifically suggests that the variables chosen for this study capture the vast majority of the shared characteristics between management practices and firm outcomes. This means the model isn't just a mathematical exercise; it is a highly accurate reflection of the Kenyan construction landscape. Ultimately, the results prove that if a contractor improves the specific organizational factors identified in this paper, they can expect a predictable and significant improvement in their overall business performance.

The analysis presented in Table 2 provided the foundational evidence for the strength of the relationship between management practices and firm success. The data reveals a primary connection (the first canonical root) with a correlation of 0.932. In practical terms, this demonstrates an almost near-perfect alignment between the internal determinants of a firm and its resulting performance. Because the shared variance is approximately 87%, it confirms that success in the Kenyan construction sector is not a product of luck or random market shifts; rather, it is deeply rooted in the specific organizational choices made by firm leadership.

Figure 2 illustrates the first canonical function, which serves as the primary explanatory model of organizational performance. The figure represents the most important and statistically robust relationship in the entire study. It shows how a combination of ten determinants (like strategic planning and organizational structure) impacts ten dimensions of performance (like growth and profitability). This is the benchmark model for Kenyan contractors. The high correlation value at the center (0.932) tells us that if a firm gets its internal setup right—specifically its organizational structure and quality of service—it will almost certainly see high employee satisfaction and managerial growth. For practitioners, this figure provides a structured guide, identifying the organizational determinants that exert the greatest influence on overall firm performance and health.

To ensure analytical rigor, Table 3 employs dimension reduction to control for extraneous variance and highlight the most reliable canonical functions. The results indicate that while there are many theoretical ways a firm could perform, only four specific combinations of management factors and performance outcomes are statistically reliable and significant. This is a critical insight for practitioners as it narrows the focus from a broad list of management theories to a few practical ways that actually yield results in the local context.

The predictive value of the study is further clarified in Table 4 through the redundancy index. This analysis indicates that the management factors identified in this study—such as organizational structure and strategic planning—can directly account for nearly 60% of a firm’s overall performance. While external economic factors beyond a contractor’s control certainly exist, this finding empowers managers by proving that the majority of their firm’s success is determined by internal decisions that they can actively change and improve.

Figure 3 illustrates the second canonical function, which is a second, separate way that management factors might relate to performance. Practically, it means that while there is still a moderate connection (57%) between the variables here, the predictive power is very low (only 1.6%). This means that while these specific patterns of management exist, they are not reliable ways to run a business in Kenya. For contractors, this figure underscores the importance of prioritizing primary determinants identified in Figure 2, as concentrating on secondary factors in isolation is unlikely to yield substantial improvements in organizational performance. Figures 4 and 5 present the third and fourth canonical functions, which show the third and fourth potential ways management and performance could be linked. These figures represent relationships that are statistically significant but practically negligible. The connections are weak, and their ability to predict success is nearly zero. The study includes these to be thorough, but for a contractor or policymaker, they confirm that there is really only one major way to win in the Kenyan market (the one shown in Figure 2). All other ways of combining management factors simply do not have enough "punch" to reliably drive firm performance. The key takeaways for the four canonical functions have been summarised in Table 7.

Finally, to ensure these findings were not unique to the specific group of people surveyed, the study underwent a rigorous validation process shown in Tables 5 and 6. By testing the model against a second, independent dataset, the research found nearly identical results, with a correlation of 0.923 and the same four significant patterns of success. This consistency confirms that the model is robust and highly applicable to the wider Kenyan construction industry. It provides a reliable benchmark that both contractors and policymakers can use to predict how improvements in organizational structure or quality of service will translate into long-term growth and stability.

**Table 7.** Summary of Key Findings

Figure	Role in the Study	Takeaway for Contractors
Figure 2	The adopted success model	Priority 1: Focus on quality of service and structure to drive growth.
Figure 3	Secondary pattern	Caution: These factors exist but are not strong drivers of success.
Figures 4 and 5	Weak patterns	Low Priority: These relationships have almost zero predictive value for your firm.

#### 4.4 Discussion

The findings of this study underscore the significant influence the determinants have on the organizational performance of local contractors in Kenya. This was demonstrated by the high canonical correlation value (0.932) and shared variance (86.87%) between the synthetic dimensions and determinants of organizational performance, coupled with consistently high canonical loadings and cross-loadings across all the study variables in the adopted canonical model (Figure 2). The results demonstrated a statistically significant relationship between organizational performance and its determinants. All the canonical loadings of the dimensions of organizational performance were consistently high, with the lowest at 0.76 and the highest at 0.91. This demonstrates the significant role played by each dimension, including both financial and non-financial. A redundancy index of 0.593 indicated that 59.3% of the variance in organizational performance was explained by the studied determinants, meaning that they were not exhaustive.

Strategic planning practices were found to have a standardized canonical weight of 0.35, implying a strong contributing influence. Previous studies have indeed associated enhanced organizational performance with effective strategic planning practices. A study by K'Obonyo and Arasa (2012) revealed a Pearson's correlation coefficient of 0.616 between strategic planning and overall organizational performance. An earlier study by Greenley (1986) had also suggested that strategic planning has potential advantages and intrinsic values that lead to enhanced organizational performance.

The employee performance was found to have a significantly high canonical loading of 0.81. The performance of an organization has been known to depend on its employees since they are an integral part that works towards the realization of the organization's goals (Almatrooshi et al., 2016). Employee satisfaction and employee performance are two aspects of the organization that are highly dependent on each other. Highly satisfied employees are associated with improved productivity. As established in this study, satisfaction extends beyond monetary reward to non-financial aspects like inclusion in decision-making and opportunities for professional growth. Indeed, Jones and Kato (2005) demonstrated that employee involvement leads to improved firm performance through enhanced discretionary effort. Another study by Bakotić (2016) established a strong relationship between job satisfaction and firm performance among Croatian companies.

This study established performance practices among the highest contributions to the predictor variate with a canonical loading of 0.89. This highlights its significance. Studies have suggested that the integration of performance measurement systems within internal structures of an organization can improve its overall performance. The research by Koufteros et al. (2014) indeed demonstrated that the adoption of performance measurement systems enhances an organization's capabilities both at the individual and firm level, thereby improving its performance.

The determinant of organizational found to have the strongest influence based on its canonical loading was the organizational structure of the firm (0.91). Therefore, the management structure of an organization is a key factor in determining its performance. Previous studies have had no consensus on the effect of an organizational structure's formality on its performance. Chen and Huang (2007) associated informal structures with improved performance. Germain (2008) on the other hand, argued that formal organizational structures lead to high performance in a stable environment. However, the researcher further asserted that when the environment is dynamic rather than stable, formality in an organization can be its undoing in the pursuit of success. This demonstrates the importance of flexibility of organizational structures in their quest for improved performance, especially in a dynamic construction industry where technology and market trends are constantly changing. Another significant aspect of an organizational structure is its simplicity. Haid et al. (2010) established that complex structures are most of the time associated with ineffective implementation of the organization's strategy, therefore negatively affecting its performance. Stability, flexibility, simplicity, and continuity of the management structure are therefore important contributors to an organization's success.

Innovativeness is a key ingredient towards improved organizational performance due to the wide range of benefits associated with improved innovation. Varis and Littunen (2010) argued that the main reason behind organizations engaging in innovativeness was to enhance their performance. Advancements in products and processes result in highly efficient and profitable firms (Atalay et al., 2013). Another study by Calantone et al. (2002) established a positive relationship between innovativeness and organizational performance. A longitudinal multi-industry study in the U.S.A established that improved innovation through increased product innovations and patents had a significant impact on organizational performance (Artz et al., 2010). In another study, product and market innovation were also found to positively influence firm performance (Therrien et al., 2011). Though the discussed studies were not based

on the construction industry, this study's findings were found to have similar results. It is therefore critical for local contractors to embrace innovation by adopting modern techniques for executing their operations.

## **5. IMPLICATIONS AND CONCLUSIONS**

### **5.1 Implications**

The findings of this study carry significant implications for practice, policy, and theory within Kenya's construction industry. At the practical level, the canonical model provides local contractors with a diagnostic framework for assessing their organizational performance. By identifying the strongest determinants—quality of service, organizational structure, and strategic planning practices—contractors can prioritize interventions that yield the greatest impact. For instance, firms that invest in restructuring management hierarchies, formalizing strategic planning processes, and embedding quality assurance systems are more likely to achieve improvements in employee satisfaction, managerial capability, and growth. This creates a virtuous cycle where enhanced organizational performance translates into better project outcomes, stronger client relationships, and improved profitability.

At the policy level, the results highlight the need for government agencies and regulators to shift their focus from project-level monitoring to organizational capacity building. Current regulatory frameworks, such as those enforced by the National Construction Authority (NCA), tend to emphasize compliance with project standards and contractor registration. While important, these measures do not directly address the structural and strategic weaknesses that undermine contractor competitiveness. Policymakers can use the canonical model to design targeted interventions, such as training programs in strategic management, incentives for quality certification, and support for organizational restructuring. Such initiatives would not only strengthen local contractors but also reduce Kenya's reliance on foreign firms, thereby retaining more economic value within the country.

From a theoretical perspective, this study advances the discourse on organizational performance by applying canonical correlation analysis (CCA) in a construction context. Previous research has often treated performance as a unidimensional construct, focusing narrowly on financial outcomes or project success. By demonstrating the multidimensionality of performance and its determinants, this study contributes to a more holistic understanding of organizational dynamics. It shows that non-financial dimensions such as employee satisfaction and managerial capability are not peripheral but central to organizational success. This insight challenges scholars to rethink performance measurement frameworks and to integrate both financial and non-financial indicators in future research.

The sectoral implications are equally important. Strengthening local contractors enhances Kenya's economic resilience by reducing dependence on foreign firms and ensuring that construction projects contribute more directly to national development goals. Improved organizational performance among contractors supports the realization of Vision 2030, the Sustainable Development Goals (SDGs), and the African Union's Agenda 2063, all of which emphasize sustainable infrastructure and inclusive growth. Moreover, by embedding quality and strategic planning into organizational culture, local contractors can position themselves to compete regionally within the East African Community (EAC), opening opportunities for cross-border projects and regional integration.

Finally, the study has implications for clients and stakeholders. Clients, whether public or private, can use the model to evaluate contractors not only on project delivery but also on organizational robustness. This shifts procurement decisions toward firms that demonstrate strong internal structures and strategic capacity, thereby raising overall industry standards. Industry associations, such as KABCEC and AAK, can also leverage the findings to design capacity-building workshops and promote best practices among their members.

### **5.2 Conclusions**

Not only was the study hypothesis confirmed, but the results obtained were supportive of the theoretically anticipated relationship between the dimensions and determinants of organizational performance. The construction industry is very dynamic. It is paramount that any local contractor on a quest to achieve enhanced organizational performance should be flexible to a changing economic environment and be innovative in order to exploit the opportunities presented by the dynamics of the industry. To this effect, instead of local contractors trying to seek protection from the government from the influx of foreign contractors, they should seek to optimize effectiveness and efficiency in their operations and embrace globalization. Basic aspects such as employee satisfaction are crucial as they affect other features such

as employee performance, which in turn affects the quality of products/works. This means that the local contractor cannot afford to focus only on certain aspects of organizational performance, such as financial, because all the dimensions of organizational performance are intertwined. It is only through a holistic approach that the local contractor will be able to thrive in the globalized construction industry.

Lastly, no study is without limitations. Based on the redundancy index, the variance in organizational performance, which was explained by the study's determinants, was 59.3%. This means that the list of determinants picked for this study was not exhaustive. This means that other determinants either exist out there or lie within the dimensions of organizational performance. Future research may therefore be undertaken: (i) to explore other determinants of organizational performance, and (ii) to establish the effects of dimensions of organizational performance on each other.

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