

Supplier development, integration and procurement performance of steel manufacturing firms in Kenya

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Abstract

Purpose: This study examined how supplier integration moderates the relationship between supplier development and procurement performance in steel manufacturing firms within Nairobi City County, Kenya.

Research methodology: A mixed method research design and positivism approach were adopted for this study. A census with a population of 360 employees within the 10 steel firms in Nairobi City County, Kenya was conducted. Primary data was collected using questionnaires. The collected data was analyzed using SPSS V.26.0 and SmartPLS 4.0 programs to test for both direct and joint effects of the variables.

Results: The results of the study revealed that supplier selection ($\beta=0.50$, $t=8.309$, $p<0.05$), supplier partnership ($\beta=0.136$, $t=2.872$, $p<0.05$), and supplier evaluation ($\beta=0.127$, $t=2.884$, $p<0.05$) have a positive and significant impact on the procurement performance. On the other hand supplier training ($\beta= -0.086$, $t=1.683$, $p>0.05$) had an insignificant effect on procurement performance. The study findings also show that supplier integration had significant negative effects on: supplier partnership ($\beta= -0.497$, $t=10.702$, $p<0.05$), supplier evaluation ($\beta= -0.097$, $t=2.323$, $p<0.05$) and supplier training ($\beta=0.264$, $t=4.988$, $p<0.05$). However, the results indicate that supplier integration has no significant impact on supplier selection ($\beta= -0.079$, $t=1.108$, $p>0.05$). The indirect effect analysis showed that supplier integration ($\beta= -0.142$, $t=1.108$, $p<0.05$) has a negative and significant impact on procurement performance.

Contributions: Steel manufacturing firms need to emphasize the significance of supplier selection, efficient communication and collaboration with suppliers, and continuous performance monitoring and risk management to improve procurement performance. These factors enhance the reliability, quality, and cost-effectiveness of their procurement operations, resulting in better outcomes and a competitive advantage in their respective markets.

Keywords: *supplier selection, supplier evaluation, supplier training, supplier partnership, supplier integration*

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1. Introduction

1.1. Background of the study

Supplier development refers to the efforts made by a procuring entity to improve the performance and capabilities of its suppliers (Kinyua, 2017). This can be achieved by collaborating with suppliers to enhance their capabilities in areas such as delivery lead time, cost, technological advancement, quality, safety, environmental responsibility, financial viability, and managerial capability (Glock, Grosse, & Ries, 2016). However, suppliers face several challenges that hinder the attainment of the desired goals such as lack of supplier commitment, insufficient financial resources, inadequate technical capabilities, and resistance to change, among other factors (Changalima, Ismail, & Mchopa, 2021).

To address these challenges, Hanlin and Hanlin (2012) suggest that the buyer organization should implement various strategies. These strategies include reducing the supplier base by identifying, evaluating and selecting suppliers. They should also consider key suppliers for process and product development enhancements and investments. Moreover, fostering advanced buyer-supplier collaborative relationships is crucial.

1.2. Problem Statement

According to Ngechu (2017), the Kenyan steel industry forms about 13% of the country's manufacturing sector, which significantly impacts GDP growth. This was illustrated in the KAM (2018) report, which contends that steel industries are the backbone of economic activities due to the demand for steel products. According to Kamer (2022) and KPMG (2020), steel manufacturing companies' production capacity in Kenya has declined to 42 percent in the last two years.

The 2019 Kenyan economic survey indicates that the country spent Shs. 97.7 billion on the import of iron ore and steel and exported finished steel and iron products valued at only Shs. 16.3 billion (J. Kariuki, 2019). The researcher contends that these inefficiencies could be due to ineffective supplier development strategies. Several studies have been conducted on how selected supplier development strategies impact the overall firm performance of manufacturers in Kenya (Kivite, 2015; Mwale, 2014; Waluke, 2018). Despite these researchers contributing significant knowledge on the concept, the fundamental question as to whether supplier development translates into a competitive advantage for steel manufacturers in improving their procurement performance remains pending. This gave the impetus to undertake an empirical study to determine the effect of supplier development on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

1.3. Objective of the Study

The general objective of this study was to investigate the moderating effect of supplier integration on the relationship between supplier development and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

1.4. Research Hypothesis

The study was guided by the following hypotheses:

H₀₁ Supplier selection has no significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

H₀₂ Supplier partnership has no significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

H₀₃ Supplier training has no significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

H₀₄ Supplier evaluation has no significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

H₀₅ Supplier integration has no moderating effect on the relationship between supplier development practices and procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

2. Literature review

2.1. Resource-Based View Theory

According to Olokundu (2014), the Resource-based view (RBV) theory is a managerial concept employed to identify the strategic resources that a company can leverage to gain a sustainable competitive edge over other firms in the same industry. According to Design4Service (2020), the theory was originally proposed by Birger Werner in the paper “The Resource-Based View of the Firm,” the theory was later refined and developed by Jay Barney in the paper “Firm Resources and Sustained Competitive Advantage” in 1991.

RBV is the main theory of this study covering all the supplier development strategies investigated namely; supplier selection, supplier partnership, supplier training, supplier evaluation, and supplier integration.

2.2. Conceptual Framework

Supplier development was the independent variable, supplier integration the moderating variable and procurement performance the dependent variable.

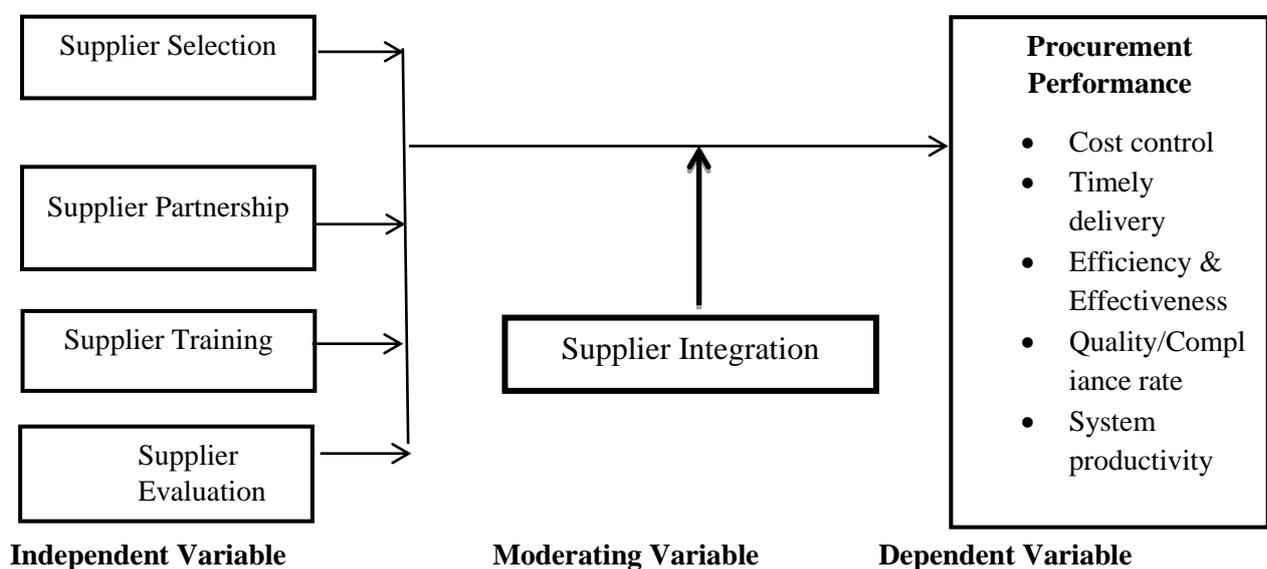


Figure 1. Conceptual Framework
Source: Researcher, 2023

2.2.1. Influence of Supplier Selection on Procurement Performance

Taherdoost and Brard (2019) define supplier selection as a procedure through which suppliers undergo inspection and assessment, and are finally selected to become part of the organization’s supply chain players. According to Mulongo, Aila, and Obura (2021), supplier evaluation by the procuring entity moderates supplier-related inefficiencies. The authors additionally avow that supplier selection results in a positive effect on procurement performance when properly conducted. According to Rodriguez (2019), the choice of suppliers can affect the quality, pricing, availability of an organization’s products, and delivery reliability. The selection of suppliers is characteristically viewed to play an important role in organizational performance. The selection process encompasses a myriad of activities used to appraise the capabilities of suppliers and select them to configure the procuring entities’ chain for long-term competitive advantage (J. G. Kariuki, Makokha, & Namusonge, 2018).

2.2.2. Influence of Supplier Partnership on Procurement Performance

Supplier partnership is the relationship commitment over an extended time between the procuring firm and their suppliers to collaborate for the mutual benefit of both entities. It encompasses the exchange of relevant information, acknowledgment of risks, reward of the relationship, contractor training, and non-adversarial alliances with suppliers (Maguto, 2019). These undertakings positively

impact the procuring entities' overall performance through improvement of supplier capabilities and performance. Partnering with suppliers has numerous benefits, which include an augmented procurement process due to the sharing of ideas that improves operations (Sedyaningrum, Prasetya, & Mawardi, 2019). According to Nenavani and Jain (2022), strategic supplier partnership significantly impacts operational performance and influences supply chain responsiveness.

2.2.3. Influence of Supplier Training on Procurement Performance

Training is the process of enhancing a person's abilities, know-how, and comprehension for carrying out a specific task. Training of suppliers is intended to build the capacity and capabilities of suppliers to support growth and improve competitiveness (Kibwana & Kavale, 2019). Nasiche, Ngugi, Kiarie, and Odhiambo (2020) discourse that most procuring entities accentuate four areas of quality training with their suppliers: quality improvement training; product design; statistical quality control techniques; and problem-solving techniques to reduce variability. According to Modi and Mabert (2007), supplier training on just-in-time delivery, quality improvement techniques, and other essential performance areas warrants that suppliers understand what is expected of them by the procuring firm. Additionally, supplier training ensures consistency, efficiency, and effectiveness which improve procurement performance.

2.2.4. Influence of Supplier Evaluation on Procurement Performance

Evaluation of suppliers is a deliberate strategy or procedure designed to determine the importance of or the impact made by the supplier in meeting the expectations of the buying organization. It may similarly be significant in determining the importance of the supplier to the firm's supply base structure (Baily, Farmer, Jessop, & Jones, 2014). One of the fundamental objectives of supplier evaluation is to monitor and measure the performance of the suppliers to ensure continuous performance improvement, minimize costs as well and reduce risks. Xometry (2023) highlights five elements that should be considered during supplier evaluation irrespective of the specific company. These include quality, capacity, risk, performance and environmental impact. Bartolini (2022) opines that by connecting certain supplier competence to procurement targets organizations are likely to achieve higher supplier performance resulting in improved procurement performance.

2.2.5. Influence of Supplier Integration on Procurement Performance

He, Lai, Sun, and Chen (2014) define supplier integration as the degree to which procuring entities and suppliers harmonize choices related to collaborative planning, inventory management, replenishment, forecasting, and the flow of physical resources. Madzimure (2020) avers that linkages between procuring entities and their suppliers enhance better relationships resulting in improved quality of materials which alternately improves procurement performance. According to Zhang, Lettice, Chan, and Nguyen (2018), integration of suppliers occurs when an organization partners with their suppliers to develop synchronized processes, share information and knowledge, and structure inter-organizational strategies.

2.2.6. Procurement Performance

Addo (2019) defines procurement as the acquisition of goods and services (purchasing) and hiring contractors and consultants to carry out works and services. Procurement performance can be reviewed in two major facets; efficiency and effectiveness. According to Mohd Nawi, Nadarajan, Ibrahim, and Mustapha (2017), effectiveness focuses on the level to which the outlined objectives and goals are being met. Procurement effectiveness denotes the interrelationship between the planned and actual performance. Whereas, procurement efficiency is the correlation between the planned and available resources to achieve the established objectives and goals as well as their associated activities, referring to the actual and planned costs.

2.3. Empirical Review

2.3.1. Supplier Selection and Procurement Performance

Manyega and Okibo (2015) undertook a study to evaluate the effect of supplier selection on the procurement performance of public institutions, in Kisii County in Kenya. The study adopted a

descriptive research design. While the study contributes to the existing literature on supplier selection, the results may lack reliability for generalization or predicting the impact of independent variables on the dependent variable due to the descriptive analysis that was employed.

Masudin, Umamy, Al-Imron, and Restuputri (2022) in their study conducted across Asia and Europe, “Green procurement implementation through supplier selection: A bibliometric review”, purposed to provide a brief bibliometric review of the previous literature review in understanding the implementation of green procurement through supplier selection. The findings add value to literature related to supplier selection and procurement performance however, it cannot be generalized for application to steel manufacturing firms in Kenya since it is a literature review and not an empirical study.

2.3.2. Supplier Partnership and Procurement Performance

In a study to determine the effect of supplier partnership and the procurement performance of public universities, Mejooli and Senelwa (2022) found that information sharing and management partnership had a positive and substantial impact on the procurement performance of public universities. Although the study used regression analysis, none of the regression assumptions was tested and this would have created the possibility of drawing a biased conclusion. This is a gap in the literature that this study sought to fill.

Khan, Liang, and Shahzad (2015) investigated the effect of buyer-supplier partnership and information integration on supply chain performance: an experience from the Chinese Manufacturing industry. The findings of the study revealed that the buyer-supplier relationships significantly affect trust and guanxi, which subsequently influences two elements of information integration, namely, quality information and real-time information. The study focused on buyer-supplier partnership and information integration especially guanxi in Chinese culture, therefore, a need to focus on other cultures’ social binding to improve the strong relationship between buyer and supplier.

2.3.3. Supplier Training and Procurement Performance

Nasiche et al. (2020) researched the influence of supplier training on the performance of sugarcane enterprises. The findings of the study postulated that there is a strong positive correlation between supplier training and the performance of sugarcane businesses. The study adds knowledge on the relationship of supplier training with the performance of an organization. Research findings often differ systematically across different groups of firms and under different business environments (Agwu & Onwuegbuzie, 2018). Therefore, the findings of the study may not apply to steel manufacturing firms that operate under different dynamic environments. This is a gap that this study intends to fill.

Kisonzo and Guyo (2018) researched the influence of training of procurement staff on supplier performance at the Rural Electrification Authority in Kenya. The researchers used descriptive statistics to analyze the data collected. Though the study adds literature on supplier training, the results cannot be reliable for generalization or predicting how supplier training will affect procurement performance because it was analyzed descriptively.

2.3.4. Supplier Evaluation and Procurement Performance

Ouko and Juma (2020) conducted a study to ascertain the impact of supplier evaluation on the effectiveness of the procurement function of private health institutions in Kisumu County. The findings of the study revealed that all the study variables investigated namely; supplier quality commitment, supplier financial stability, and supplier competence significantly influenced the performance of the procurement function of private health institutions. However, the researchers did not target user departments or customers as the target population yet they can also provide useful data. This is a gap this study sought to fill by incorporating the user departments as respondents in the research.

Mukarumongi, Mulyungi, and Saleh (2018) conducted a study to determine the effect of supplier evaluation on the procurement performance of government ministries in Rwanda. Having been conducted in a service organization in Rwanda, the findings of the study may therefore not be generalizable in the Kenyan context for physical product organizations such as steel manufacturers due to changes in the business environment as well as social dynamics thereby prompting this study.

2.3.5. The Moderating Effect of Supplier Integration and Procurement Performance

Jin, Hu, Kim, and Zhou (2019) contend that since manufacturers and suppliers should develop close partnerships for performance improvement, supplier development and supplier integration are two strategies that can cultivate supplier relationships to improve supply chain efficiency. The research by Jin, Hu, Kim, and Zhou (2019) found that manufacturers invest more in supplier development after it integrates with their suppliers and both manufacturers integrate with their suppliers at equilibrium. This gave the need to examine whether steel manufacturers apply both supplier integration and development.

Fröjd (2021) researched critical factors in supplier integration to improve the supplier-buyer relationship. The researcher conducted a literature review of previous research on the topic under study. This gave the impetus to conduct empirical research to find out the relationship between supplier development and supplier integration.

Zhang, Lettice, Chan, and Nguyen (2018) conducted a study, “*Supplier integration and firm performance: the moderating effects of internal integration and trust*” to empirically explore the moderating effects of internal integration and trust on the impacts of information, process, and strategic integration with suppliers on firm performance. However, the study does not examine the moderating role of supplier integration in the relationship between supplier development and procurement performance, a variable that was empirically tested in the current study.

2.3.6. Procurement Performance

Oppong (2020) researched electronic procurement and organizational performance among commercial state corporations in Ghana. Although the study provides some empirical evidence on e-procurement it does not give reasons for the low utilization of e-procurement that lead to some functions being performed manually. That is a gap in the literature that needs to be filled. Furthermore, there is a need to conduct a comparative study of e-procurement in physical product organizations such as steel manufacturing firms.

Owago, Ngacho, and Wafula (2021) researched the role of the Procurement Act 2015 in the relationship between buyer-supplier relationships and the performance of milk processing firms in Nairobi Kenya. The study recommended that milk processing firms should embrace quality timeliness to improve buyer-supplier relationships. Though the study provided a glimpse of the role of the Procurement Act, it may not apply to different industries such as steel manufacturing firms due to changes in the business environment and organizational dynamics.

3. Methodology

3.1 Design and Data Collection

A mixed-method research design was adopted in this study. A census was conducted since the desired data analysis technique of the partial least squares grounded structural equation model necessitates a sample size greater than 100 respondents (Byrne, 2010). Both primary and secondary data were collected during the study. A questionnaire was used to collect the primary data whereas published sources such as industry reports were used to collect secondary data.

3.2 Population and Sample

The focus of the study was at the organization level with the unit of analysis being the steel manufacturing firms in Nairobi City County, Kenya. The focus was on 10 firms picked from the Cradle (2021) list of steel manufacturing firms. All 360 employees drawn from procurement, finance,

warehousing and stores, dispatch & logistics as well as sales departments formed the unit of observation.

3.3. Data Analysis

Data analysis was conducted with the aid of a statistical package for social science (SPSS V26.0) for descriptive statistics to determine the respondents' overall perspective of the questions on the study instrument. Partial Least Squares (PLS), a component-based SEM technique, was primarily adopted to examine the paths in the structural model. Specifically, Smart PLS Version 4 (Ringle, Wende, & Becker, 2022) was used to analyze the data.

4. Results and discussions

4.1. Response Rate

The researcher issued 360 questionnaires of which 288 were returned. Explanations given included complicated organizational policies and cold-shouldering by respondents to fill the dropped questionnaires.

Table 1. Response Rate

Response	Frequency	Percent
Returned	288	80%
Unreturned	72	20%
Total	360	100%

Source: Researcher, 2023

4.2. Factor Analysis

Factor Analysis (FA) was utilized to explore how the variables are interconnected in relation to their shared underlying dimensions. According to Bollen (1989) and Mueller and Hancock (2015), Factor Analysis, as a theory-based sub-method of Structural Equation Modeling (SEM), enables the evaluation of the degree to which observed data align with theoretically established constructs.

To extract factors, the Principal Component Analysis (PCA) method was employed and the correlation matrix was adopted as input. According to Joseph F Hair, Black, Babin, Anderson, and Tatham (2010), the number of factors extracted is decided by identifying factors whose Eigenvalues are greater than 0.5.

4.2.1. Factor Analysis of Supplier Selection Indicators

Table 2. Rotated Component Matrix for Supplier Selection

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
Company-supplier selection is competitive and fair	.263	-.033	-.078	.686
Company-supplier selection process exhibits honesty and accountability	.717	-.120	.335	.037
Procured products meet the necessary quality specifications	.634	.511	.024	-.051
Procured products have little to no defects	.612	.410	.086	.165
Litigation and performance history of suppliers are critical during the selection	.042	.769	.178	.254

Selection criteria prefer those with shorter lead times	-.047	.863	.061	-.135
Supplier quality commitment is taken into consideration during selection	.012	.070	.844	.075
The company selects suppliers who have invested in IT	.045	.134	.785	-.024
Selection criteria prefer those with a history of high performance and a positive market reputation	-.728	.173	.337	.047
Selection criteria prefer those with the lowest total cost of ownership	-.220	.107	.139	.816

Source: Researcher, 2023

Key:

Kaiser Meyer-Olkin (KMO) 0.479
 Rotation Method Varimax with Kaiser Normalization
 Total Explained Variance 66.375%
 Approx. Chi-Square 454.399(0.000)
 Bartlett's Test ($\chi^2=454.399$, $df= 45$, $P<0.001$)

*Rotation converged in 5 iterations.

Renaming of Components on Supplier Selection

Three items loaded onto factor 1: **Accountability and Product Quality.**

Three items loaded onto factor 2: **Supplier Reputation.**

Two items loaded onto factor 3: **Supplier performance and technology capability.**

Two items loaded onto factor 4: **Product Pricing.**

4.2.2. Factor Analysis of Supplier Partnership Indicators

Table 3. Rotated Component Matrix for Supplier Partnership

Rotated Component Matrix ^a		
	Component	
	1	2
There is a high level of commitment between our company and our suppliers	.737	.132
The company maintains long-term relationships with its suppliers	.030	.755
Our firm undertakes joint ventures with suppliers in research and development	-.236	.690
The company shares business knowledge and exchanges information with suppliers	-.046	-.461
The company and its suppliers keep sharing information about changes	.713	-.373
Key suppliers are included in goal-setting activities and planning	.849	-.002
Information exchanged with supplier's is complete, timely, accurate and adequate	.763	-.375
The company provides technical training to its suppliers operational staff	.727	.070

Source: Researcher, 2023

Key:

Kaiser Meyer-Olkin (KMO) 0.759
 Rotation Method Varimax with Kaiser Normalization
 Total Explained Variance 56.287%
 Approx. Chi-Square 469.693(0.000)
 Bartlett's Test ($\chi^2=469.693$, $df= 28$, $P<0.001$)

*Rotation converged in 3 iterations

Renaming of components on Supplier Partnership

Five items loaded onto factor 1: **Information sharing and collaboration.**

Two items loaded onto factor 2: **Joint ventures and incentives.**

4.2.3. Factor Analysis of Supplier Training Indicators

Table 4. Rotated Component Matrix for Supplier Training

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
The company offers training to its key suppliers	.748	.203	.129	.186
The company continuously trains employees involved in procurement	-.158	.705	.239	-.164
The company encourages individual learning	.270	.195	.691	-.088
Suppliers are taken through quality requirement training	.127	-.097	.068	.793
Suppliers are educated on the requirements of the company	.204	.542	-.286	.126
The company organizes seminars and conferences to train procurement staff	-.091	-.158	.691	.145
The company assists its suppliers in acquiring certification from agencies	-.078	.443	-.107	.525
Training suppliers has enhanced flexibility in operations	.708	-.236	.052	-.012
The trained staff in the supply chain department are promoted and awarded	.411	.041	-.132	-.348

Source: Researcher, 2023

Kaiser Meyer-Olkin (KMO)

0.506

Rotation Method

Varimax with Kaiser Normalization

Total Explained Variance

53.726%

Approx. Chi-Square

51.379(0.000)

Bartlett's Test

($\chi^2=51.379$, df= 36, P<0.001)

*Rotation converged in 14 iterations

Renaming of components on Supplier Training

Two items loaded onto factor 1: **Supplier-assisted training.**

Two items loaded onto factor 2: **On-job training.**

Two items loaded onto factor 3: **Seminars and conferences.**

Two items loaded onto factor 4: **Quality management training.**

4.2.4. Factor Analysis of Supplier Evaluation Indicators

Table 5. Rotated Component Matrix for Supplier Evaluation

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
Supplier performance is measured in terms of delivery lead time, quality and costs.	-.074	.724	.154	-.015
The supplier evaluation process is guided by the ability of the supplier to meet company objectives	.012	.767	-.235	.049

The procurement personnel understand the objectives of our supplier evaluation system	.217	.213	-.712	-.181
Supplier finances are considered during the evaluation process as a measure to improve procurement performance	.762	.040	-.023	.192
The supplier identification criteria ensure that only those suppliers with a strong financial standing are selected	.170	.144	.224	.772
The company evaluation criteria include suppliers that meet ISO standards	.185	.066	.532	-.041
The company communicates supplier evaluation results to the suppliers	.247	.239	.420	-.579
The company sets and communicates challenging performance goals to suppliers	.761	-.115	.104	-.139

Source: Researcher, 2023

Key:

Kaiser Meyer-Olkin (KMO) 0.470
 Rotation Method Varimax with Kaiser Normalization
 Total Explained Variance 59.042%
 Approx. Chi-Square 47.691(0.000)
 Bartlett's Test ($\chi^2=47.691$, $df= 28$, $P<0.001$)

*Rotation converged in 7 iterations

Renaming of components on Supplier Evaluation

The two items loaded onto factor 1: **Financial stability and competence.**

The two items loaded onto factor 2: **Supplier quality performance.**

The item loaded onto factor 3: **Supplier sustainable practices.**

The item loaded onto factor 4: **Supplier financial capacity.**

4.2.5. Factor Analysis of Supplier Integration Indicators

Table 6. Rotated Component Matrix for Supplier Integration

Rotated Component Matrix ^a			
	Component		
	1	2	3
There is constant communication among key departments within the organization	-.674	.086	-.166
The company has integrated systems between departments	.166	.176	.852
The workforce is encouraged to work as a team toward a shared goal	.656	.430	-.024
Decision-making is a joint activity by the firms' top leadership	.760	.036	-.103
The company shares information with suppliers on quality improvement, standards, and performance	.658	.104	.048

Suppliers are involved in solving any problems that arise	-.094	.885	.118
Our suppliers are included when scheduling company activities and planning goals	.446	.521	-.105
We have platforms through which we collaborate with suppliers and customers	.159	.430	-.523

Source: Researcher, 2023

Key:

Kaiser Meyer-Olkin (KMO) 0.724
 Rotation Method Varimax with Kaiser Normalization
 Total Explained Variance 58.687%%
 Approx. Chi-Square 217.439(0.000)
 Bartlett's Test ($\chi^2=217.439$, $df= 28$, $P<0.001$)

*Rotation converged in 5 iterations

Renaming of components on Supplier Integration

The three items loaded onto factor 1: **Information integration.**

The two items loaded onto factor 2: **Cross-functional teams.**

The item loaded onto factor 3: **System integration.**

4.2.6. Factor Analysis of Procurement Performance Indicators

Table 7. Rotated Component Matrix for Procurement Performance

Rotated Component Matrix^a			
	Component		
	1	2	3
Conducting training for our suppliers has minimized our product costs	.585	-.041	.046
Training programs for suppliers have enhanced our product quality	.693	.119	-.089
Training our suppliers has increased the promptness at which products are delivered once ordered	.721	.057	.214
Selection criteria of suppliers have enabled the company to enhance transparency hence reducing in corruption-related costs	.458	.216	.421
Supplier selection standards have significantly minimized failure costs	.034	.770	-.113
Information sharing with suppliers has led to reduced returns of our products by customers due to defects	.031	.729	.261
Management of supplier relationships has led to continuous on-time delivery	.343	.502	.140
Supplier development practices in our company have led to efficiency and effectiveness in the procurement	-.386	.456	.334
Information sharing with suppliers has led to improved product quality	-.069	.008	.830
Better communication with suppliers has lowered product costs and enhanced operational flexibility	.228	.167	.688

Source: Researcher, 2023

Key:

Kaiser Meyer-Olkin (KMO) 0.653
 Rotation Method Varimax with Kaiser Normalization
 Total Explained Variance 51.601%
 Approx. Chi-Square 275.412(0.000)
 Bartlett's Test ($\chi^2=275.412, df= 45, P<0.001$)

*Rotation converged in 4 iterations

Renaming of components on Procurement Performance

The three items loaded onto factor 1: **Product quality and compliance.**

The three items loaded onto factor 2: **Product cost and defect rate.**

The two items loaded on factor 3: **Compliance rate.**

4.3. Structural Equation Model Analysis

To answer the study hypotheses, a partial least squares structural equation model was fitted to assist in determining how the latent variables influence the performance of procurement. The results of the fitted model are illustrated in Fig. 2.

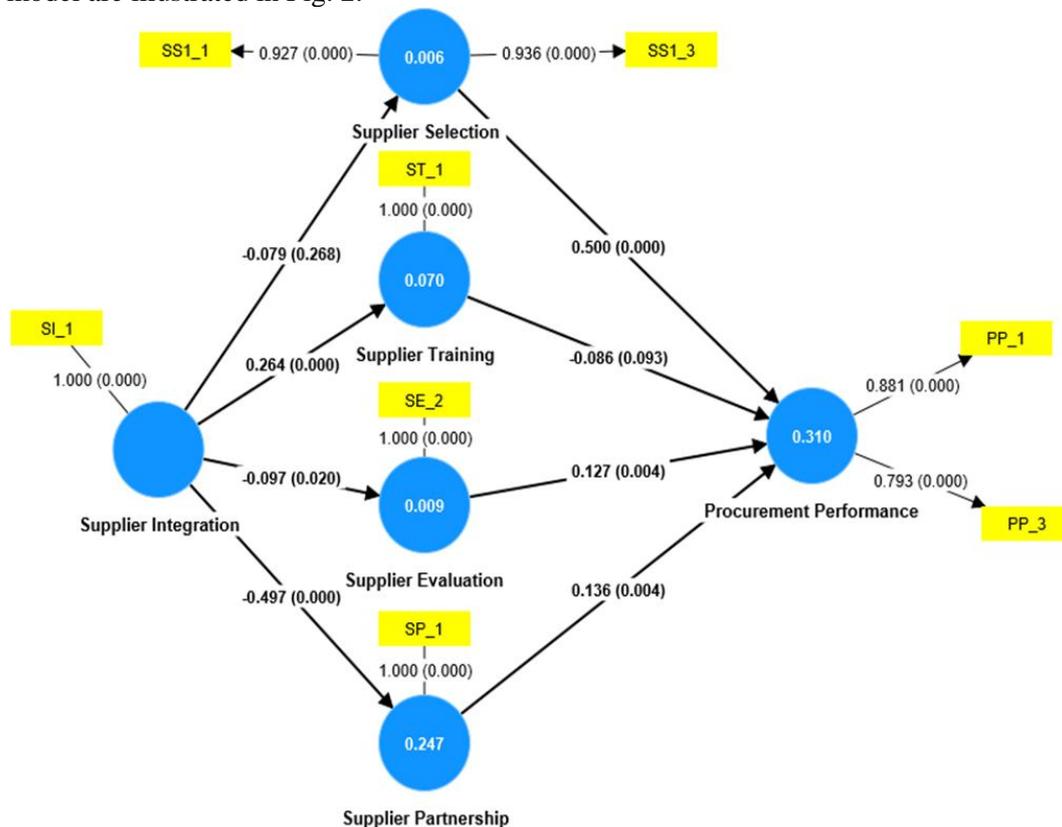


Figure 2. PLS-SEM Path Model Showing the Moderating Effect of Supplier Integration on the Relationship between Supplier Development and Procurement Performance

Source: Researcher, 2023

4.3.1. Model Diagnostics

The model was diagnosed to assess whether it was indeed a valid SEM model. The study looked into internal consistency reliability, indicator reliability, convergent validity, discriminant validity and Multi-collinearity of the model. The results of the diagnostics were as discussed below;

4.3.1.1. Indicator Reliability

Factor loadings also referred to as validity coefficients can be used to show how much of the observed variable score variance is valid (Schumacker & Lomax, 2015). Item validity in this study is shown by

the factor loadings in Fig. 2. PLS-SEM model indicators are considered to be valid when the loading of the model is 0.7 and above. From the results presented in Table 8, all the indicator loadings were determined to be above 0.7, this shows that all the indicators were reliable in signifying the respective latent variables and is in agreement with Hulland (1999) who stated that loadings of 0.4 is acceptable but 0.70 or higher are preferred for exploratory research.

Table 8. Outer Loadings of Latent Constructs

Latent Construct	Outer Loading
PP_1 <- Procurement Performance	0.881
PP_3 <- Procurement Performance	0.793
SE_2 <- Supplier Evaluation	1.000
SI_1 <- Supplier Integration	1.000
SP_1 <- Supplier Partnership	1.000
SS1_1 <- Supplier Selection	0.927
SS1_3 <- Supplier Selection	0.936
ST_1 <- Supplier Training	1.000

Source: Researcher, 2023

4.3.1.2. Internal Consistency Reliability

The internal consistency reliability of the latent variables which were measured by more than 1 indicator (Supplier Selection and Procurement Performance) was measured by the composite reliability statistic. Composite reliability is estimated based on the factor loading analysis (Lerdpornkulrat, Poondej, & Koul, 2017). Composite reliability should be 0.7 or higher (Bagozzi & Yi, 1988; Tentama & Anindita, 2020). The results of construct validity and reliability are shown in Table 9.

Table 9. Construct Reliability and Validity

Latent Construct	Composite reliability (rho_c)
Procurement Performance	0.825
Supplier Selection	0.929

4.3.1.3. Convergent Validity

The recommended value to attain this validity needs to be equal to or larger than 0.5 (Ahmad, Zulkurnain, & Khairushalimi, 2016; Bagozzi & Yi, 1988). Convergent validity of the latent variables which were measured by more than 1 indicator (Supplier Selection and Procurement Performance) was measured by Average Variance Extract (AVE) statistic. The results of the AVE statistic are shown in Table 10.

Table 10. AVE Statistic for Latent Variables

Latent Construct	Average Variance Extracted (AVE)
Procurement Performance	0.703
Supplier Selection	0.868

Source: Researcher, 2023

4.3.1.4. Discriminant Validity

Discriminant validity of the latent variables was measured using the Fornell and Larcker (1981) criterion which suggests that discriminant validity can be established by comparing the square root of the Average Variance Extracted (AVE) in each latent variable with the correlation values among the latent variables. When the square root of AVE is greater than the other correlation values, discriminant validity is supported. The results are illustrated in Table 11.

Table 11. Discriminant Validity

	Procurement Performance	Supplier Evaluation	Supplier Integration	Supplier Partnership	Supplier Selection	Supplier Training
Procurement Performance	0.838					
Supplier Evaluation	0.097	1.000				
Supplier Integration	-0.154	-0.097	1.000			
Supplier Partnership	0.236	-0.011	-0.497	1.000		
Supplier Selection	0.512	-0.049	-0.079	0.145	0.931	
Supplier Training	-0.112	0.054	0.264	-0.328	0.022	1.000

Source: Researcher, 2023

The results in Table 11 show that the square root value of the diagonal AVE is greater than other correlation coefficient values in the matrix. Detected by heterotrait–monotrait analysis, shows that all values are less than 0.9, indicating good discriminant validity (Henseler, Ringle, & Sarstedt, 2015).

Multi-collinearity

The model assumes that there was no multicollinearity between the latent variables in the model. To measure this assumption, the study looked into the Variance Inflation Factor (VIF) for the independent variables. The results were as illustrated in Table 12;

Table 12. Variance Inflation Factor

Independent Latent Variables	TOL	VIF
Supplier Evaluation	0.993996	1.006
Supplier Partnership	0.87055	1.148
Supplier Selection	0.97289	1.028
Supplier Training	0.88496	1.130
Supplier Integration	1.00000	1.000

Source: Researcher, 2023

As a rule of thumb, we need to have a VIF of 5 or lower (i.e., a tolerance level of 0.2 or higher) to avoid the collinearity problem (Joe F Hair, Ringle, & Sarstedt, 2011). Therefore, the results in Table 11 illustrate that all the VIF statistics for the independent latent variables were less than 5; the results show that there is no multi-collinearity between the independent variables.

Given that the model satisfied all the reliability and validity assumptions, the structural equation model (SEM) adopted was a valid model and conclusions made from the model were considered to be valid.

4.4. Hypothesis Testing

Using the PLS-SEM model in Fig. 2, the study used the model to measure the effects of supplier development on procurement performance. The test of hypothesis results based on Hotelling's t-test is illustrated in Table 13.

Table 13. Hypotheses Test Results

Path Analysis	Path Coefficient (β)	T-Value	p-value	Hypothesis
Mod_SI → SS-PP	-0.079	1.108	0.268	Accepted
Mod_SI → ST-PP	0.264	4.988	0.000	Rejected
Mod_SI → SE-PP	-0.097	2.323	0.020	Rejected
Mod_SI → SP-PP	-0.497	10.702	0.000	Rejected
SS → PP	0.500	8.309	0.000	Rejected
ST → PP	-0.086	1.683	0.093	Accepted
SE → PP	0.127	2.884	0.004	Rejected
SP → PP	0.136	2.872	0.004	Rejected

Source: Researcher, 2023

4.4.1. Effect of Supplier Selection on Procurement Performance

The first hypothesis of the study was stated as;

H₀₁: *Supplier selection has no significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and the hoteling's t-statistic in Table 12, the results indicate that at a 95% confidence level, there was sufficient evidence to reject the hypothesis ($\beta=0.50$, $t=8.309$, $p<0.05$). Therefore, it infers that supplier selection had a significant positive effect on procurement performance. These findings concur with Manyega and Okibo (2015) that supplier selection is critical in enhancing the procuring entities' capabilities, improving the quality of their product, and enhancing their performance. This implies that supplier selection is a strong indicator of the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

4.4.2. Effect of Supplier Partnership on Procurement Performance

The second hypothesis of the study was stated as;

H₀₂: *Supplier partnership has no significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and the hoteling's t-statistic in Table 12, the results showed that at a 95% confidence level, there was sufficient evidence to reject the hypothesis ($\beta=0.136$, $t=2.872$, $p<0.05$). The result meant that supplier partnerships had a positive significant effect on the procurement performance of steel manufacturing firms in Kenya. The finding underscores the positive and significant effect of supplier partnership on procurement performance and is concurrent with previous studies including Sedyaningrum et al. (2019) that primarily; information sharing has several effects on

procurement performance including optimized processes that improve operations and procurement performance.

4.4.3. Effect of Supplier Training on Procurement Performance

The third hypothesis of the study was stated as:

H₀₃: *Supplier training has no significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and the hoteling's t-statistic in Table 12 ($\beta = -0.086$, $t = 1.683$, $p > 0.05$) provide evidence to accept the null hypothesis. The findings imply that supplier training did not have any significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. It therefore means that supplier training activities do not really improve the performance of procurement function of steel manufacturing firms in Nairobi City County, Kenya.

Based on this finding, it can be established that supplier training did not have a significant effect on procurement performance in the context of this study. This implies that investing resources in supplier training programs may not lead to measurable improvements in procurement outcomes for steel manufacturing firms. These results are contrary to those of Nasiche et al. (2020) who argue that there exists a strong positive relationship between supplier-assisted as well as quality management training and the performance of sugarcane processing firms. The findings also conflict with that of Modi and Mabert (2007) that supplier training ensures consistency, efficiency, and effectiveness which improves procurement performance.

4.4.4. Effect of Supplier Evaluation on Procurement Performance

The fourth hypothesis stated:

H₀₄: *Supplier evaluation has no significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and the hoteling's t-statistic in Table 12, the results showed that at a 95% confidence level, there was sufficient evidence to reject the hypothesis ($\beta = 0.127$, $t = 2.884$, $p < 0.05$). The findings imply that supplier evaluation had a positive significant effect on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

The finding is consistent with Ouko and Juma (2020); Yun (2018) and Mutai and Okello (2016) that supplier competence, financial stability, and quality commitment have a significant effect on procurement performance. Steel manufacturing firms therefore need to put in place proper evaluation metrics that align with their specific procurement goals and objectives. The finding underscores the importance of implementing robust supplier evaluation mechanisms to guarantee the procurement of high-quality raw materials and the production of superior final products in the steel manufacturing industry.

4.4.5. Moderating Effect of Supplier Integration on the Relationship between Supplier Development and Procurement Performance

The fifth hypothesis states that;

H₀₅: *Supplier integration has no moderating effect on the relationship between supplier development and procurement performance of steel manufacturing firms in Nairobi City County, Kenya*

Using the path coefficient and the hoteling's t-statistic in Table 12, the results show that at a 95% confidence level, there was sufficient evidence that supplier integration had significant negative effects on supplier partnership ($\beta = -0.497$, $t = 10.702$, $p < 0.05$), supplier evaluation ($\beta = -0.097$, $t = 2.323$, $p < 0.05$) and supplier training ($\beta = 0.264$, $t = 4.988$, $p < 0.05$). However, the results showed that supplier integration had no significant effect on supplier selection ($\beta = -0.079$, $t = 1.108$, $p > 0.05$). In terms of the indirect effect of supplier integration on procurement performance, the results show that

supplier integration had a negative significant effect on procurement performance ($\beta = -0.142$, $t = 1.108$, $p < 0.05$).

The finding is consistent with Madzimore (2020) who contends that the linkage between buyer and supplier firms ensures improved coordination, which leads to better relationships and supply of materials, resulting in an improvement in procurement performance. Likewise, Jin, Hu, Kim, and Zhou (2019) show that manufacturers invest more in supplier development after it integrates with their suppliers and both manufacturers integrate with their suppliers at equilibrium.

5. Conclusion

Based on the findings of this study, it can be inferred that steel manufacturing firms would have efficient and effective procurement functions if they adopt proper supplier development strategies.

Steel manufacturing firms need to highlight the importance of robust supplier selection processes, effective communication and collaboration with suppliers, and ongoing performance monitoring and risk management to enhance procurement performance.

Steel manufacturing firms must underscore the importance of supplier partnership in enhancing procurement performance, particularly in terms of quality improvement, cost savings and supply chain resilience.

Supplier training in this case was found not to enhance the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. It would however be in the best interest of the steel manufacturing firms to embrace supplier training by reviewing some of the best supplier training practices from other sectors including methods and topics covered, as well as the duration and frequency of the training.

Since supplier evaluation influences procurement performance steel manufacturing firms in Nairobi City County, Kenya should invest in robust supplier evaluation processes to take into account various aspects such as supplier pricing, quality, and customer service and delivery performance.

Steel manufacturing firms should establish clear performance metrics and goals for supplier integration and regularly assess and monitor supplier performance to ensure alignment with the organization's strategic objectives to improve procurement inefficiencies ultimately leading to better procurement performance.

5.1. Implications of the study

The study examined the relationships between supplier development and procurement performance among steel manufacturing firms in Nairobi City County, Kenya. The research hypotheses were tested to determine the significance of the effects of supplier selection, supplier partnership, supplier training, supplier evaluation and supplier integration on procurement performance. The results yielded a nuanced understanding of these relationships, offering valuable insights for both academia and industry practitioners.

The findings emphasize the need for a holistic approach to supplier management, encompassing selection, partnership, training, evaluation and integration to optimize procurement performance. Practitioners and policymakers in the steel manufacturing industry are urged to leverage these insights to inform strategic decisions and foster sustainable supply chain practices. Additionally, these findings open avenues for further research into the intricate dynamics of supplier relationships and their impact on procurement performance in diverse organizational contexts.

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