

**SUPPLIER DEVELOPMENT AND PROCUREMENT PERFORMANCE OF  
STEEL MANUFACTURING FIRMS IN NAIROBI CITY COUNTY, KENYA**

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Philosophy in Business Administration  
(Procurement and Supply Chain Management Option).**

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## DECLARATION

This thesis is my original work and has not been presented for examination in any other university.

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## **DEDICATION**

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## **ABBREVIATIONS AND ACRONYMS**

<b>ANOVA:</b>	Analysis of Variance
<b>EAC:</b>	East African Community
<b>EFA:</b>	Exploratory Factor Analysis
<b>GDP:</b>	Gross Domestic Product
<b>ICT:</b>	Information and Communication Technology
<b>KMO:</b>	Kaiser Meyer-Olkin
<b>KPA:</b>	Kenya Ports Authority
<b>KAM:</b>	Kenya Association of Manufacturers
<b>KPIs:</b>	Key Performance Indicators
<b>PCA:</b>	Principal Component Analysis
<b>PLS:</b>	Partial Least Square
<b>ROI:</b>	Return on Investment
<b>SCRM:</b>	Supply Chain Risk Management
<b>SEM:</b>	Structural Equation Model
<b>SME:</b>	Small and Medium-sized Enterprises
<b>SPE:</b>	Supplier Performance Evaluation
<b>SPSS:</b>	Statistical Package for Social Sciences
<b>SUM:</b>	Spend Under Management
<b>RBV:</b>	Resource-Based View
<b>VIF:</b>	Variance Inflation Factor
<b>TOC:</b>	Theory of Constraints
<b>USAID:</b>	United States Agency for International Development



## DEFINITION OF TERMS

**Supplier Development** – refers to the strategic management of supplier relationships and capabilities through processes such as selection, training, evaluation, and partnership to optimize procurement performance and achieve competitive advantage.

**Procurement Performance** - refers to the measurable outcomes and achievements related to the procurement function within an organization. It encompasses various indicators and metrics used to assess the effectiveness, efficiency, and success of procurement activities in meeting organizational objectives and requirements.

**Supplier Evaluation** - refers to the systematic assessment and appraisal of supplier performance, capabilities, and overall suitability to meet the needs and requirements of an organization.

**Supplier partnership** - refers to a collaborative and strategic relationship between a company and its suppliers, built on mutual trust, open communication, and aligned objectives to foster transparency and work toward common goals.

**Supplier Training** - refers to the systematic process of providing education, instruction, and skills development to suppliers in order to enhance their capabilities, knowledge, and performance in meeting the requirements and expectations of an organization.

**Supplier Selection** - refers to the systematic process of identifying and choosing suppliers based on predefined criteria and requirements to fulfill the procurement needs of an organization.

**Supplier Integration** - refers to the strategic process of incorporating suppliers into the organization's business processes, systems, and decision-making activities to foster collaboration, streamline operations, and drive value creation throughout the supply chain.

**Steel Manufacturing Firms** -refers to industrial entities primarily engaged in the production of various steel products through the processes of smelting, casting and hot rolling.

## ABSTRACT

The business landscape has witnessed significant transformations driven by globalization and innovation. In the contemporary era, sustaining competitiveness hinges on adept supply chain management, which encompasses robust relationships with key suppliers. Suppliers play pivotal roles in organizations, contributing to their competitive advantage and overall performance. To remain competitive, procurement entities increasingly engage in supplier development activities, enhancing supplier capabilities and creating networks of competent suppliers. This study focused on steel manufacturing firms in Nairobi City County, Kenya, a field confronted with formidable competition from developed countries. The study delved into the relationship of supplier development with the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. It specifically examined relationships between supplier selection, supplier partnership, supplier training, and supplier evaluation with procurement performance. Furthermore, it investigated how supplier integration moderates the relationship between supplier development and procurement performance. Employing a quantitative research design, this study conducted a purposive sampling of employees from key departments across ten steel manufacturing firms. Data collection relied on questionnaires and a data collection sheet. The analysis of the descriptive statistics was conducted using SPSS V26.0 and SmartPLS 4.0 for factor analysis and structural equation modeling to assess both the direct and joint relationships with the variables. The findings reveal that supplier selection, supplier partnership, and supplier evaluation have a positive and significant relationship with the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. However, supplier training exhibited an insignificant relationship with procurement performance. Furthermore, supplier integration emerged as a crucial factor, significantly influencing the relationship between supplier development and procurement performance. In conclusion, this study underscores the positive and significant role of supplier development in enhancing procurement performance of steel manufacturing firms in Nairobi City County, Kenya. Moreover, supplier integration acts as a catalyst, amplifying the relationship of supplier development with procurement performance. The study recommends that steel manufacturing firms should prioritize robust supplier selection processes, effective communication and collaboration with suppliers, and ongoing performance monitoring and risk management to optimize their procurement operations. This study helps address existing gaps in literature by systematically examining supplier development initiatives and their implications for procurement performance of steel manufacturing firms in Nairobi City County, Kenya. However, future studies should delve deeper into supplier perspectives and experiences to enhance collaboration strategies and inform more effective supply chain management practices.

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background of the study**

The business environment has evolved over the years as a result of globalization and innovation. In the 1980s business competition centered on caliber of goods or services, shorter product lifecycle, as well as customer expectations among other factors (Mwale, 2018). However, in contemporary business environments, sustaining a competitive edge is contingent upon the adept management of supply chains. It is how the business links its processes with its supply chain partners; distributors, suppliers, retailers, wholesalers, and end customers. Moreover, the ability to create business relationships with suppliers, customers, and other strategic partners anchored on long-term commitment and trust has become a fundamental competitive parameter. It is for this reason organizations' senior management has made the supply chain a strategic agenda (Waluke, 2018).

Many organizations now recognize the significant impact that essential suppliers have on overall corporate performance. As a result, there has been an increased focus on initiatives designed to enhance the performance and capabilities of these key suppliers. This strategy aims to improve the purchasing company's cost efficiency, innovation, and customer service, as highlighted by Wabuti and Kioko (2016). Suppliers play a strategic role in organizations and are expressively engaged in creating a competitive advantage with their actions positively impact organizational performance (Musanga, Ondari, & Kiswili, 2020). For firms to survive and effectively compete in the global market there is a need to develop an operational strategy that ensures they maintain and build relationships with a competent and capable network of suppliers to extract optimum value from these relationships (Muthoni & Mose, 2020). The buying firm might need to employ supplier development to develop and maintain such a network and advance the capabilities necessary for the procuring entity to meet its growing competitive challenges (Kivite, 2015).

Supplier development is defined as any effort by a buying firm to increase the performance and capabilities of its supplier (Kivite, 2015). This can be achieved by working collaboratively with suppliers to improve or expand their capabilities (Andrew, 2018). The buyer organization and supplier work together to enhance the supplier's capabilities or performance in one or more of the following areas: quality, cost, lead time, delivery, technological advancement, safety, managerial capability, environmental responsibility, and financial viability (Glock, Grosse, & Ries, 2017). There are various goals that procuring entities seek to realize in their supplier development undertaking. These include; resolving serious quality issues, improving supplier performance, reducing product costs, developing new routes to supply, reducing lead times, and developing new products. Prior to initiating supplier development on a supplier, the purchasing specialist in charge of the project must identify the ideal suppliers for development based on their current capacity compared to the ideal capability, their cooperation with buying the organization's product or service supplied, nature, and scope of development required (Nyaberi, 2019).

However, supplier development faces challenges that impair the realization of the anticipated benefits. These factors can encompass insufficient financial resources, limited technical capability, lack of supplier commitment, and resistance to change, among other issues (Changalima, Ismail, & Mchopa, 2021). To tackle these challenges, the buyer organization ought to implement diverse strategies, including identifying, selecting, and evaluating suppliers with the goal of reducing diverse supplier base thereby reducing the time taken and cost involve in supplier evaluation. The critical suppliers would in turn be involved in process and product development enhancements and investments, as well as fostering advanced collaborative relationships between buyers and suppliers (Hanlin & Hanlin, 2012) This aligns with the perspective of Dza, Fisher, and Gapp (2013), who contend that a purchasing organization can enhance supplier development by instituting programs aimed at identifying, evaluating, and selecting suppliers, ensuring that the supplier's offerings meet the buyer's needs and requirements.

### **1.1.1 Global Perspective of Supplier Development**

Sichinsambwe (2019) in the United States of America avers that manufacturers increasingly implement supplier development to enhance delivery performanc, improve quality, reduce costs and sequentially enhance their supply chain performance. The result of the Sichinsambwe study revealed that supplier development positively influences

knowledge transfer effectiveness and efficiency. Sichinsambwe (2019) further hypothesizes that effectiveness and efficiency of knowledge transfer pose an impact on supplier performance but have no direct effect on supplier cost performance. It implies that when suppliers get incorporated in supplier development programs by the buyers they are likely to advance knowledge on multiple projects thus improve their capabilities. However, for this to happen effectively there should be a camaraderie in values, goals, culture, and strategies between the supplier and buyer. This would promote an environment that encourages an easier flow of knowledge (Sichinsambwe, 2019).

Sánchez-Rodríguez, Hemsworth, and Martínez-Lorente (2015) posit that the implementation of supplier development in Spain manufacturing companies contributes to improved purchasing performance. This indicates that suppliers involved in supplier development can help the buyer organization increase their purchasing performance. Therefore, managers of firms should consider selecting suppliers who are engaged in supplier development to enhance their procurement performance. Likewise, Tizro (2014) highlights that critical aspects of supplier development influencing the performance of the SME manufacturing sector in Sweden encompass communication, trust, collaboration, long-term commitment, and involvement of top management.

Xu and Peng (2018) assert that among Chinese enterprises, which implement green supplier development gain a greater competitive advantage. Xu and Peng categorise green supplier development into a direct and indirect green supplier. Direct green supplier development refers to intentional and systematic efforts made by a buying firm to enhance the capabilities and performance of its individual suppliers through collaborative initiatives and investments in resources such as training, technology transfer, and process improvement. These initiatives are aimed at strengthening the operational and strategic abilities of suppliers to satisfy the specifications and standards of the procuring entity (Dabhilkar & Bengtsson, 2013).

Indirect green supplier development, conversely, involves the improvement of supplier capabilities and performance through broader industry-wide or supply chain-focused initiatives and collaborations, rather than direct interventions by the buying firm. This

may include participation in industry consortia, knowledge-sharing networks, or collaborative research and development projects that aim to augment the effectiveness and capabilities of suppliers within the overall supply chain ecosystem (Mena, Humphries, & Choi, 2013).

Rajput and Bakar (2021) identify benefits, issues and elements of supplier development in the Middle East and Asia. They include effective communication, supplier development, collaboration to improve parts and substances, supplying capital and equipment, technical and top management support to the procurement function, buying firm's cross-functional endeavor, proactive approach of procuring firm for supplier's performance, and support and commitment of supplier's top management towards the buyer's needs. The literature also listed supplier development activities such as supplier assessment with feedback, supplier training, use of supplier awards as incentives, and supplier evaluation. There were several benefits of supplier development identified by the authors, some have been mentioned in other literature reviewed in this study.

### **1.1.2 Regional Perspective of Supplier Development**

Hafez and Elzarka (2015) conducted a study investigating supplier development initiatives that are implemented in manufacturing companies in Alexandria, Egypt. They argued that supplier development does not exist in public-owned companies, though limited in the private sector. Nonetheless, multinational companies were fully organized in implementing supplier development. Extant literature has identified some of the challenges that were preventing the implementation of supplier development were a lack of trust between buyer and supplier and lack of commitment from a supplier (Ondiek, 2021).

In Tanzania, Changalima, Ismail, and Mchopa (2021) point out that indirect supplier development improved the procurement performance of manufacturing firms. The critical elements identified were: supplier performance measurements, supplier visiting, feedback, effective communication, supplier auditing, supplier assessments and recognition (Krause & Ellram, 1997). The majority of these indirect supplier development undertakings depend on verifying that suppliers are closely monitored regarding their operational performance. Conversely, many direct supplier development activities are regarded as efforts to enhance the capabilities of involved suppliers. (Agan, Neureuther, & Acar, 2018). These practices were infrequently implemented due to several reasons, including the legal framework, the competitive nature of most public procurement activities, and the transactional focus typical of procurement functions in public organizations. Consequently, buyer organizations can utilize indirect supplier development, but they must be cautious of the legal and regulatory structures that govern the public procurement system in the country.

### **1.1.3 Local Perspective of Supplier Development**

Empirical evidence notes that supplier development in sugarcane processing firms in Kisumu County, Kenya include supplier training, knowledge transfer, supplier incentive programs, and supplier relationship (Nanyama, 2018). Empirical evidence indicates that supplier development has a significant and positive relationship with operational performance. The researcher contends that this is an indication that firms that embrace and implement supplier development can have a competitive edge in the dynamic business environment.

Nabiliki, Wanyoike, and Mbeche (2019) corroborate this view with their study of Nakuru's food and beverage manufacturing firms. The supplier development elements identified included: supplier appraisal flexibility, supplier partnership, supplier financial support and supplier training. This suggests that these elements are significantly linked to procurement performance. Existing research indicates that companies with policies guiding supplier training on procurement needs tend to receive higher quality products, thereby reducing raw material defects and increasing efficiency, which leads to fewer legal challenges within the procurement system. Consequently, to enhance procurement

performance, companies should offer financial guarantees to their suppliers and ensure prompt payment.

According to Musyoki and Ngugi (2017), pharmaceutical companies in Nairobi City County, engage in supplier development activities that include strategic partnership, management support, information sharing, and supplier training. These factors exhibit a strong positive correlation to the performance of pharmaceutical companies. Similarly, Nyaberi (2019), postulates that information exchange, supplier selection, supplier evaluation, and technical capability are critical components of procurement performance. This is an indication that supplier development does improve procurement performance and is viewed as the driving force in pharmaceutical companies' operations performance.

Despite research findings indicating that most firms have enhanced their supplier development, its contribution to procurement performance calls for in-depth inquiry for documentation. Additionally, there is limited research on the moderating role of supplier integration in the relationship between supplier development and procurement performance in steel manufacturing firms.

#### **1.1.4 Moderating Role of Supplier Integration on the Relationship between Supplier Development and Procurement Performance**

Central to this research was an examination of supplier integration as a moderating variable within the context of procurement performance of steel manufacturing firms in Nairobi City County, Kenya. Supplier integration refers to the degree to which organizations align their processes and operations with those of their key suppliers (Cao, M., Zhang, Q., & Zhang, X., 2015). It is postulated that the level of supplier integration influences the direction and strength of the relationships between supplier development (selection, evaluation, training, and partnership) and procurement performance. The study endeavored to uncover how supplier integration amplifies or mitigates the impact of these practices, providing a localized understanding of their dynamics.



Several studies have used supplier integration as a moderator variable. In their study, "Risk Management and Firm Performance: The Moderating Role of Supplier Integration," Shou, Hu, Kang, Li, and Park (2018) examined how supplier integration influences the connection between supply chain risk management (SCRM) and operational performance, specifically focusing on operational efficiency and flexibility. The findings indicated that while supplier integration boosts the effect of SCRM on operational flexibility, it does not influence the relationship between SCRM and operational efficiency. This research offers valuable insights into the potential of supplier integration serving as a moderating variable.

Another study that employed supplier integration as a moderating variable was carried out by Robert, Ronald, and Kirui (2022). This research assessed the moderating effect of supplier integration on the relationship between supply chain planning systems (SCAPS) and supply chain organizational performance (SCOP). The findings demonstrated that supplier integration significantly and strongly moderated the relationship between SCAPS and SCOP. These results are consistent with a study by Li, Yang, Singh, Sun, and Tian (2023) in their paper "Servitization and Performance: The Moderating Effect of Supply Chain Integration," which found that supplier integration significantly enhances the positive relationship between basic services and sales growth.

The aforementioned studies show how supplier integration has been used as a moderating variable. However, none of the studies has used supplier integration as a moderating variable to investigate its effect as a moderator on the correlation between supplier development and procurement performance of steel manufacturing firms. This research sought to fill this contextual gap by examining supplier development from global, regional, and local viewpoints, while also introducing supplier integration as an essential moderating factor. In doing so, it contributes to the expanding body of knowledge in procurement and supply chain management. It provides a comprehensive framework to assess and enhance the procurement performance of steel manufacturing firms in Nairobi, Kenya, while considering the broader context in which they operate.

### **1.1.5 Steel Manufacturing Industry**

To maintain their global positioning, Steel manufacturing companies as buyers integrated suppliers into their operation thus building efficient and effective delivery systems which in turn enables them sustain a flowless supplier chain system (Mumbi, 2016). The steel industry is characterized by a large number of participants worldwide, which makes coordination within the industry quite complex. In many instances, both steel producers and consumers rely on intermediaries to facilitate transactions of materials. Given that the steel industry requires significant capital investment and its products tend to have long life cycles, it is crucial for companies in this sector to focus on minimizing production costs to achieve market success, as relying on price increases alone is not a viable strategy for profitability (Umeshini & Sumathi, 2017).

Kenya's manufacturing sector contributes 70% of the industrial sector's GDP (Waluke, 2018). Within this, the steel industry which makes up roughly 13% is a key contributor to economic growth (Ngechi, 2017). The steel industry, along with its suppliers, is fundamental to the construction industry and overall economic development, as the demand for steel has surged due to the expansion of the construction sector and the implementation of major government projects targeting middle-income status under Vision 2030. However, the industry relies heavily on steel raw materials imported from Asia because domestic supply is limited and commercial iron ore mining has not yet commenced in Kenya (Ngechi, 2017).

Kenyan steel manufacturing companies are now grappling with heightened universal competition following the deregulation of markets in East Africa, which were previously significant consumers of Kenyan steel (Barasa & Simiyu, 2015). Steel producers from industrialized nations like Russia, Japan, China, Korea, and the USA, have employed strategies focusing on cost efficiency, product quality, advanced technology, and customer satisfaction to secure their competitive advantage. These firms are also skilled at meeting intricate consumer demands and adhering to global sustainability standards. Beyond this fierce competition, Kenyan steel manufacturers face additional hurdles, including steep raw material costs, insufficient transportation networks, heavy taxation, price volatility, and high energy costs, all of which hinder their ability to compete

effectively (Kivite, 2015). Although there has been substantial research on supply chain management and solutions to business challenges, many organizations are still striving to adopt key supply chain management principles that could boost their cost-effectiveness, flexibility, reliability, and quality (Barasa & Simiyu, 2015).

## **1.2 Statement of the Problem**

Steel manufacturers in Nairobi City County, Kenya, grapple with various bottlenecks impacting their overall performance and supplier development initiatives. Despite recognizing the pivotal role of key suppliers, these firms encounter hurdles in optimizing supplier relationships and enhancing procurement performance. Challenges such as inadequate financial resources, technical limitations, supplier commitment issues, and resistance to change hinder the effective implementation of supplier selection, supplier evaluation, supplier training, and supplier partnership initiatives (Changalima, Ismail, & Mchopa, 2021; Ngechi, 2017; Hafez & Elzarka, 2015).

Moreover, the geographical, regional, and global perspectives of supplier development initiatives and their impacts on procurement performance remain inadequately explored in the context of the steel manufacturers in Kenya (Sichinsambwe, 2019). Despite insights from different regions shedding light on elements and benefits of supplier development, there is a notable gap in systematically examining these initiatives within Nairobi's steel manufacturing firms and their influence on procurement performance (Rajput & Bakar, 2021; Anyona, 2012).

Furthermore, the moderating role of supplier integration, a crucial variable influencing the effectiveness of supplier development, remains largely unexplored in this specific context. Steel manufacturing firms in Nairobi City County, Kenya, operate in a fiercely competitive environment with challenges related to imported raw materials, transportation, taxation, price volatility, and energy costs (Ngechi, 2017; Anyona, 2012). Understanding how supplier integration moderates the relationship between supplier development initiatives and procurement performance is imperative for achieving sustainable competitive advantage in this industry (Mwale, 2018).

Therefore, there exists a significant gap in literature concerning supplier development and procurement performance specific to steel manufacturing firms in Nairobi City County,

Kenya, particularly in terms of supplier selection, evaluation, partnership, training, and the moderating effect of supplier integration. This study sought to bridge this gap by systematically investigating supplier development initiatives, challenges, and the moderating effect of supplier integration on the relationship between supplier development and procurement performance within this context.

### **1.3 Objectives of the Study**

This study was guided by the following general and specific objectives.

#### **1.3.1 General Objective**

The general objective of the study was to explore the relationship between supplier development and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

#### **1.3.2 Specific Research Objectives**

The specific objectives of this study were:

- i. To examine the relationship between supplier selection and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.
- ii. To investigate the relationship between supplier partnership and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.
- iii. To explore the relationship between supplier training and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.
- iv. To assess the relationship between supplier evaluation and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.
- v. To determine the moderating effect of supplier integration on the relationship between supplier development and procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

## **1.4 Study Hypotheses**

The study was guided by the following hypotheses based on the specific objectives above.

**H<sub>01</sub>** There is no significant relationship between supplier selection and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

**H<sub>02</sub>** There is no significant relationship between supplier partnership and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

**H<sub>03</sub>** There is no significant relationship between supplier training and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

**H<sub>04</sub>** There is no significant relationship between supplier evaluation and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

**H<sub>05</sub>** Supplier integration does not moderate the relationship between supplier development and procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

## **1.5 Significance of the Study**

Understanding the supplier development initiatives which positively and significantly have a relationship to the procurement performance of steel manufacturing firms will be beneficial to the following; steel manufacturing firms, managers, policy makers, researchers and scholars.

### **1.5.1 Steel Manufacturing Firms**

Steel and other manufacturing firms in Africa can gain valuable insights from this study on effective supplier development strategies. By applying these strategies, companies can enhance their procurement performance. The research offers guidance on the most beneficial approaches to supplier development in the manufacturing sector, helping organizations avoid the expense of further research into optimal practices for improving procurement outcomes.

### **1.5.2 Management**

The findings of this study will be highly valuable to supply chain managers, as they will shed light on the most crucial strategies for supplier development in relation to procurement performance. This insight will enhance the understanding of various challenges faced by stakeholders in the manufacturing sector. Additionally, the study's results will guide administrators of steel manufacturing firms in Kenya in identifying the most effective supplier development strategies to improve procurement performance. Since implementing supplier development management policies can be expensive, management must carefully consider the benefits and costs when choosing which strategies or activities to adopt. Therefore, the study's findings will help administrators make informed decisions tailored to their organizations' specific needs.

### **1.5.3 Policy Makers**

In Chapter Five, the researcher addresses several factors impacting the procurement performance and expansion of the steel industry, and offers recommendations. The findings and recommendations will support policymakers in developing countries, such as Kenya, in crafting effective supplier development strategies to boost procurement performance. This, in turn, will create a favorable environment for steel manufacturers and other sectors in Kenya to thrive and enhance their profitability.

### **1.5.4 Researchers and Scholars**

The study's findings will be valuable to academics and researchers focusing on this area. It adds to the existing knowledge on supplier development practices that can enhance procurement performance. These insights will help scholars identify the critical factors influencing procurement outcomes in the manufacturing sector and motivate them to promote the collaborative adoption of these strategies.

## **1.6 Scope of the Study**

The study focused on the relationship between supplier development and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. The supplier

development approaches and activities that were investigated include; supplier selection, supplier partnership, supplier training, and supplier evaluation. These are most significant in affecting procurement performance positively from previous studies that have been carried out in other firms. The study was conducted between October 2022 and March, 2023.

### **1.7 Limitations of the Study**

While this research aimed to comprehensively investigate supplier development and procurement performance within steel manufacturing firms in Nairobi City County, Kenya, several constraints and limitations were encountered during the research process.

The primary limitation of this study is its constrained geographical scope. Ideally, the research would have aspired to encompass steel manufacturing firms throughout Kenya to provide a more representative national perspective. However, due to resource constraints, the study was limited to firms within Nairobi. This limited scope could restrict the generalizability of the conclusions to the broader context of steel manufacturers in Kenya.

Additionally, this study was conducted against the backdrop of various external factors, such as fiscal oscillations, industry-specific challenges, and global events. These external factors could have influenced the procurement performance and supplier development initiatives of the firms studied. While efforts were made to account for these factors through robust data collection and analysis, their potential impact cannot be entirely ruled out. Future research could explore the dynamic nature of these external influences and their implications for supplier development and procurement performance.

Furthermore, the research heavily relied on data and insights provided by the steel manufacturing firms and respective respondents. While efforts were made to secure full cooperation, it was observed that some respondents were reluctant to disclose certain sensitive information, particularly concerning their firms' historical data and specific supplier relationships. This limited access to in-depth data that could have enriched the analysis and provided a more comprehensive understanding of the dynamics at play within the industry.

Despite these limitations, this study provides valuable insights into supplier development and procurement performance within the context of steel manufacturing firms in Nairobi City County, Kenya. The findings contribute to the existing body of knowledge and can serve as a foundation for future research endeavors in this area. Acknowledging and addressing these limitations will be crucial for advancing understanding and informing practical strategies for enhancing supplier development and procurement performance in the steel manufacturing industry.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

A literature review involves the methodical identification, sourcing, and examination of documents that hold information pertinent to the research problem (Hempel, 2020). The tenacity of this endeavor is to allow the researcher to identify the gaps in the subject being studied to provide new knowledge to bridge the gap. Therefore, in this chapter, various studies conducted by other researchers, books, scholarly journals, and any other relevant literature related to study variables have been reviewed. This was done to bring out additional knowledge on the topic being studied and avert duplication of knowledge and time wastage.

The sub-sections contained in this chapter include; a theoretical literature review; an empirical literature review that covers supplier selection, supplier partnership, supplier evaluation, supplier training, supplier integration, and procurement performance; the conceptual framework; critique of reviewed literature; summary of reviewed literature; and research gaps.

#### **2.2 Theoretical Framework**

This part contains a review of existing theories related to supplier development. A theory is a set of statements or principles devised to explain how a particular phenomenon or fact works. It is repeatedly tested to ascertain that it works and can be used to make predictions about a natural phenomenon or occurrence that is not well understood (Waluke, 2018). Theories serve as analytical instruments for comprehending, elucidating, and forecasting aspects of a specific subject matter (Kivunja, 2018). This study was hinged upon the following theories; Resource-Based View Theory, Social Capital Theory, Grey Theory and Theory of Constraints.

### **2.2.1 Resource-Based View Theory**

The resource-based view (RBV) theory is a management theoretical framework that identifies the strategic resources that an organisation may employ to gain a long-lasting competitive edge over other rival companies in the industry (Olukundun, 2014). According to Design4Service (2020), Birger Werner first introduced the idea in his work "The Resource-Based View of the Firm." Subsequently, Jay Barney further improved and expanded upon the theory in his 1991 publication "Firm Resources and Sustained Competitive Advantage."

The idea is based on a company formulating a strategy that aims to use the pre-existing capabilities, strategic resources, and core competences of the organisation in relation to external opportunities. It also aims to capitalise on emerging capabilities that need development. In 1991, Barney identified four characteristics of resources that, when investigated, might provide an organisation with a lasting competitive advantage: scarcity, value, lack of susceptibility to substitution, and imperfect imitability. Costless assets enable a company to develop and execute plans to optimise its efficiency and effectiveness while mitigating the possibilities and risks posed by rivals. Intermittent resources refer to resources that are possessed by a limited number or no other rivals. Highly challenging-to-replicate materials sometimes include legally protected intellectual property, such as trademarks, patents, or copyrights. Other resources that are hard to replicate, such as brand names, can need a significant amount of time to properly develop. Imitating resources becomes challenging when they are difficult to replicate due to their dynamic nature and their reflection of distinctive features of the organisation. Transposable resources are non-existent when companies are unable to replicate the strategy made available by the resource bundle of a certain company. An indispensability of a resource arises when rivals are unable to identify alternative methods to get the advantages that a resource offers (Shetri, 2014).

The classification of resources by Corte, Barney, and Arikan (2012) consists of three primary categories: intangible, tangible, and personnel-based. Tangible resources include tangible assets including cash resources, residential structures, machinery, equipment, and land. A company's intangible resources are identified long-term assets that lack physical

presence, including experience, skills, computer software, technology, databases, trade secrets, technical know-how, knowledge, and procedures. When these resources are synthesised, they generate 'Capabilities' (regarded as a distinct category of resource), some of which, either independently or in conjunction, establish a collection of "Core Competencies" (also known as "Core Capabilities" or "Strategic Capabilities"), which confer a durable competitive edge to the company.

The first hypothesis of the resource-based theory posits that the resources of all enterprises in an industry exhibit variation in terms of the available stock of resources, therefore providing them with an opportunity to achieve a competitive advantage. Furthermore, the theory posits that resource heterogeneity may persist overtime because to the imperfect mobility of resources utilised to execute a firm's strategy across rival companies. This implies that the available resources of a company are neither simply interchangeable in factor marketplaces, nor can they be quickly amassed or duplicated. Hence, the distinctiveness or originality of a company's resources is seen a necessary condition for using these resources to attain a competitive edge. Furthermore, it suggests that companies may be seen as assemblages of resources and competencies that are neither marketable or available for purchase, therefore rendering them scarce, unique, precious, and non-replaceable (Olukundun, 2014).

Proponents of the idea argue that organisations should prioritise internal analysis to discover sources of competitive advantage instead of exploring the competitive environment. They contend that it is more pragmatic to optimise current resources in creative ways to exploit external chances rather than acquire new skills for every opportunity. The allocation of firm resources is essential for attaining superior organisational performance. In contrast to old theories that focused on using external elements to distinguish a firm, the resource-based perspective theory proposes that organisations should focus on their existing resources instead of pursuing additional competences, roles, or abilities (Jurevicius, 2021).

Ultimately, the Resource-Based View (RBV) theory has been chosen as the preferable foundational theory in this research. The Resource-Based View (RBV) hypothesis offers a useful framework for comprehending the contribution of a firm's internal resources and

capabilities, including activities associated to suppliers, to its competitive advantage and overall financial success.

In the framework of this study, the variables supplier evaluation, supplier partnership, supplier selection, and supplier training can be viewed as valuable resources that contribute to the firm's procurement performance. By effectively utilizing supplier-related resources, steel manufacturing firms can improve their procurement processes, lower costs, enhance product quality, and gain a competitive edge in the market. Consequently, the RBV theory provides a theoretical framework for examining the connection between supplier development initiatives and procurement performance outcomes in the context of steel manufacturing firms in Nairobi City County, Kenya.

### **2.2.2 Grey Theory**

The Grey system, introduced by Deng in 1989, is a crucial methodology for addressing problems involving uncertainty and dealing with scenarios where information is incomplete or partially known (Deng, 1989). This system incorporates both known and unknown elements. According to this framework, information is categorized into three types based on its availability: "white" for fully known information, "black" for completely unknown information, and "grey" for information that is partial or insufficient (Liu, Forrest, & Yang, 2021). Given the complexity of these systems, human ability to gather complete information is often limited. The Grey-based approach offers a robust mathematical method for analyzing systems with incomplete and uncertain data.

One of the key assumptions of the theory is that information about the element or parameters is incomplete. Also, the theory assumes that information about the structure of the system, the boundary of the system, and the system's behavior is incomplete (Liu, 2017). The theory is useful when trying to find a solution where there is incomplete information. Liu (2017) adds that the grey-based method employs effective mathematical techniques to address systems analysis where information is uncertain and incomplete.

Dikmen (2015) applied the grey theory in the selection of the best supplier. Getting the best supplier is a problem because buyer companies may not have all the information they

require. It is a decision with risks and uncertainty. Criteria for selecting a supplier can involve uncertainty and may sometimes be inconsistent. Some of these measures can be quantified statistically, while others may be described in qualitative terms due to the inherent uncertainty. The key component of the Grey Theory is the calculation of the "possibility degree," which quantifies the degree of certainty or uncertainty associated with a given value. The possibility degree is calculated using the Grey Verhulst Model, which employs historical data to estimate the future values of a variable while considering the uncertainty or randomness inherent in the data. The decision-maker can apply the grey method to assess the degree of possibility between different supplier alternatives and the ideal reference supplier. This method helps in ranking all supplier options and selecting the best supplier based on grey numbers (Thakur & Anbanandam, 2015).

In the context of supplier selection, the Grey Theory can be applied as follows: First, gather historical data related to supplier performance, including factors such as quality, delivery time, cost, reliability, and responsiveness. Secondly apply the Grey Verhulst Model to the collected data to estimate the future performance of potential suppliers. This model takes into account the uncertainty and variability in the data to provide more accurate forecasts. Thirdly, calculate the possibility degree for each potential supplier based on their estimated performance. The possibility degree reflects the level of certainty or uncertainty associated with the supplier's predicted performance. Lastly, use the calculated possibility degrees to rank potential suppliers and identify the most suitable ones for selection. Suppliers with higher possibility degrees indicate a higher level of certainty in their predicted performance, making them more favorable choices.

By applying the Grey Theory to supplier selection, firms can effectively manage uncertainties and make more informed decisions when choosing suppliers. The theory's ability to quantify the possibility degree allows decision-makers to account for the inherent uncertainty in supplier performance data, leading to more reliable supplier selection outcomes. Therefore, the Grey Theory serves as a valuable tool for improving the supplier selection process and ultimately enhancing overall procurement performance in steel manufacturing firms in Nairobi City County, Kenya.

### **2.2.3 Social Capital Theory**

The social capital theory, proposed by Granovetter in 1985, describes social capital as the norms and networks that facilitate collective action (Bhandari & Yasunobu, 2017). The core idea of this concept is that whereas various entities within a capitalist economy focus on their own objectives and goals, they have found that collaborating with like-minded partners leads to better outcomes than working alone. Suppliers strive to sell their goods to discerning customers who can provide the most competitive pricing, frequently disregarding the connection. The concept underscores the need of fostering collaborative partnerships between purchasers and suppliers in order to attain reciprocal advantages. Therefore, it is essential that both sides allocate their resources to assist one other in attaining common objectives. As a result, buyers commit their assets and infrastructure to assist the chosen suppliers in enhancing their production abilities with the benefits being shared by the buying firms (Gannon & Roberts, 2020).

The social capital theory assumes that when like-minded partners like supplier and buyer companies combine their resources they will benefit from each other and institute an important advantage that can be exploited on in time of need. Therefore, conceptualizing supplier integration through the lens of this theory offers insightful information about the various collaborative capital characteristics as they relate to interactions amongst industrial procuring firms and their suppliers. The theory also contends that strong buyer loyalty and the development of social capital with important suppliers can improve the performance of buying firms. Additionally, the theory assumes that affiliations can serve as a foundation of material and intellectual resources (Bhandari & Yasunobu, 2017).

Supplier integration, the moderating variable in this study can be effectively anchored to social capital theory. Supplier integration involves the collaborative and strategic alignment of activities, processes, and goals between a firm and its suppliers to achieve mutual benefits and improve overall supply chain performance. Social capital theory suggests that strong interpersonal relationships and trust between a firm and its suppliers contribute to the development of social capital, which in turn enhances supplier integration. By building social capital through regular communication, collaboration, and

mutual support, firms can create long-term partnerships with their suppliers based on trust, reciprocity, and shared goals.

In the context of steel manufacturing firms in Nairobi City County, Kenya, social capital theory can inform strategies to enhance supplier integration by fostering strong relationships with suppliers. This may involve activities such as; investing in open communication, transparency, honesty in dealings with suppliers to build trust and credibility, collaborating with suppliers on joint initiatives, such as product development, process improvement, and cost reduction projects, to foster a sense of partnership and shared objectives, sharing relevant information and best practices with suppliers to facilitate mutual learning and continuous improvement.

By anchoring supplier integration to social capital theory, steel manufacturers in Nairobi City County, Kenya, can recognize the importance of interpersonal relationships and trust in achieving effective supplier integration. This approach can lead to improved procurement performance and overall supply chain effectiveness through enhanced collaboration, innovation, and responsiveness with suppliers.

#### **2.2.4 Theory of Constraints**

The Theory of Constraints (TOC), developed by Goldratt in 1984 through his book "The Goal," is based on the principle that every process has a limiting factor or bottleneck. By focusing on and resolving this constraint, organizations can rapidly and effectively improve their profitability.

According to Goldratt and Cox (1992), a constraint is any element or factor that restricts a system from achieving its intended objectives. It is assumed that every system is created with a specific goal in mind, and in a business context, the ultimate goal is to generate profits both now and in the future. Just as a chain's strength is determined by its weakest link, every system has a limiting factor that prevents it from achieving its full potential. For substantial progress to be made, it is essential to identify and effectively manage this constraint. The Theory of Constraints, therefore, urges managers to pinpoint the factors that are hindering goal achievement and to develop solutions to overcome these obstacles.

The main concept of TOC is that each process has one constraint and the process output can only be enhanced when the constraint is improved. Spending more time enhancing

non-constraints will not have any impact on the process; only improvements on the constraint will positively influence the goal which in most cases will lead to better performance (Itasca, 2021).

TOC provides a methodology that helps identify and eliminate constraints known as the five focusing steps; (i) Identify the constraint, (ii) Exploit the constraint, (iii) Subordinate and synchronize the constraint, (iv) Elevate the performance of the constraint and (v) Repeat the process. According to Goldratt (1990), every manager has to make three generic decisions. These include: a). what to change, b). what to change to and c) how to cause the change.

The core principle of the Theory of Constraints (TOC) is that businesses can be managed and assessed based on three key metrics: inventory, throughput, and operational costs. Inventory being all the funds invested by organizations in purchasing items it intends to sell. Throughput is the rate with which systems generate money through sales. Operational expenses are the funds used to turn inventory to throughput (Gupta & Snyder, 2009).

In this study, the Theory of Constraints is anchored to supplier evaluation. Supplier evaluation involves assessing the performance, capabilities, and contributions of suppliers to determine their suitability and effectiveness in meeting organizational needs. By applying the Theory of Constraints to supplier evaluation, steel manufacturing firms can identify and address weaknesses in their supplier base that may be hindering procurement performance. This may include; identifying bottlenecks in the supplier evaluation process, exploiting identified bottlenecks by implementing targeted improvement initiatives to address performance gaps and enhance supplier capabilities, providing training or support to suppliers to improve their processes, quality standards, or delivery performance and continuously monitoring the supplier evaluation process to ensure that constraints are effectively addressed and that supplier performance continues to meet evolving organizational needs.



## **2.3 Conceptual Framework**

A conceptual framework is a diagrammatic tool that shows the relationships between independent and dependent variables in a research study (Kothari, 2010). It provides a graphical or diagrammatic overview, allowing the reader to quickly grasp the proposed relationships between the variables being investigated. Figure 2.1 depicts the relationship between supplier development initiatives namely supplier selection, supplier partnership, supplier training, supplier evaluation, and supplier integration, and their relationship with the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. Each of the supplier development approaches have been shown in the empirical literature review to improve procurement performance. Supplier integration which is the overall collaboration between supplier and buying firms moderates and influences how each supplier development strategy impacts procurement performance. Figure 2.1 depicts the conceptual connections between the variables in the study.

Independent Variables

Moderating Variable

Dependent Variable

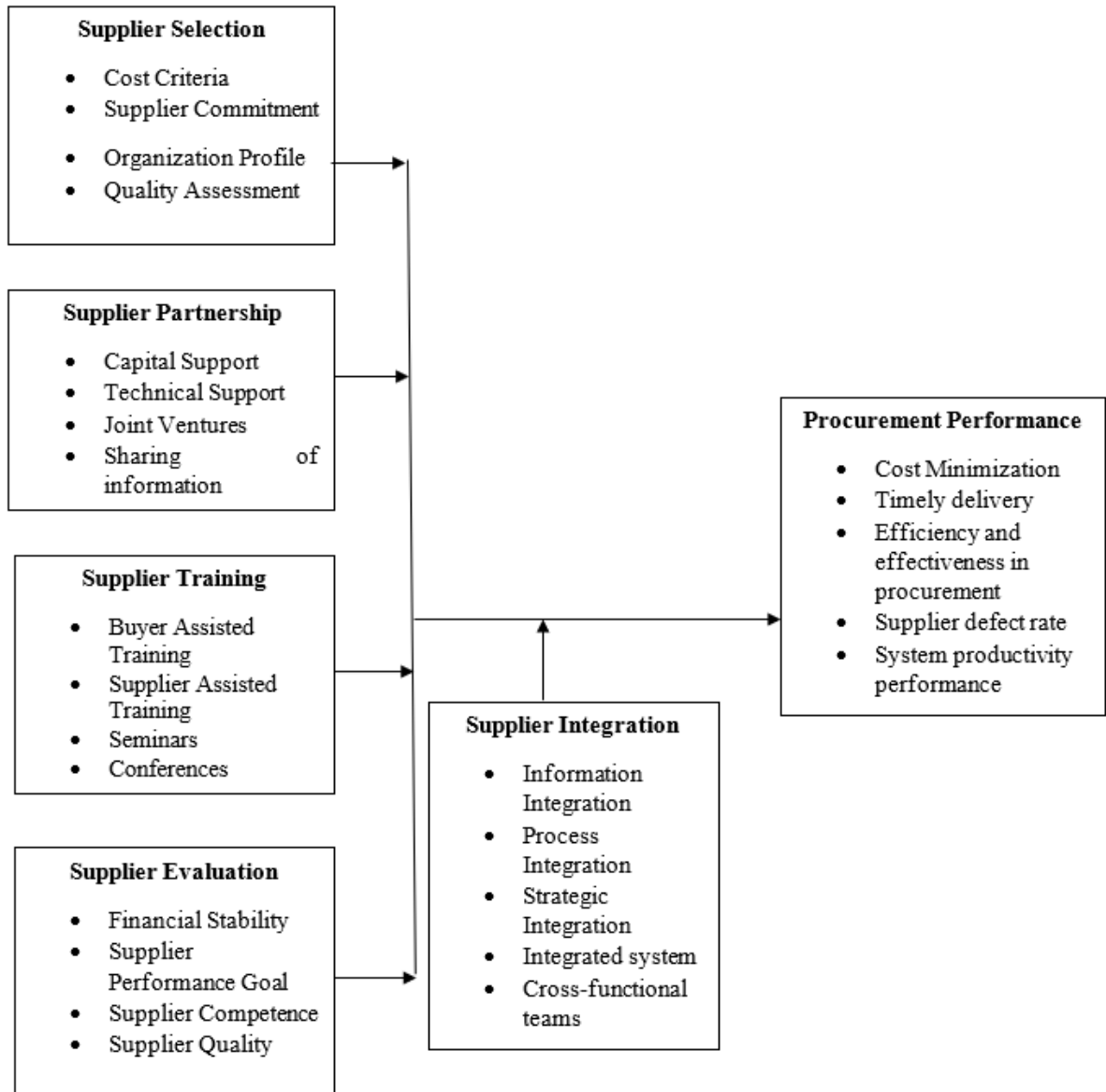


Figure 2.1: Conceptual Framework

### **2.3.1 Relationship between Supplier Selection and Procurement Performance**

Supplier selection involves the inspection, evaluation, and eventual choice of suppliers to become integrated into an organization's supply chain (Taherdoost & Brard, 2019). Supplier selection is a critical process in the procurement function of steel manufacturing firms in Nairobi City County, Kenya, as it directly influences organizational performance. This study measured selection of suppliers based on the parameters quality assessment, organization profile, price delivery, and supplier commitment.

Quality assessment involves evaluating the quality of products or services provided by potential suppliers. For steel manufacturing firms, the quality of raw materials and components directly influences the quality of the final product. Schiele, Reuter, and Haas (2018) highlight the significance of supplier quality in enhancing operational performance and customer satisfaction. Therefore, incorporating quality assessment as a sub-variable ensures that suppliers meet the required quality standards, ultimately contributing to improved procurement performance.

The organization profile refers to the overall characteristics, capabilities, and reputation of potential suppliers. Understanding the profile of suppliers allows firms to assess their reliability, financial stability, and capacity to meet demand (Azevedo, Govindan, & Carvalho, 2020). Sarkis, Zhu, and Lai (2011) emphasize the importance of supplier characteristics in supplier selection decisions. By considering the organization profile, steel manufacturing firms can mitigate risks associated with supplier instability and ensure long-term partnerships conducive to procurement performance.

Cost criteria involves evaluating the pricing structure, terms, and conditions offered by potential suppliers. Cost considerations are crucial for steel manufacturing firms to maintain competitiveness and optimize profitability (Molina-Azorín, Tarí, Pereira-Moliner, López-Gamero, & Pertusa-Ortega, 2015). Ellram and Siferd (2012) emphasize the role of cost management in supplier selection processes. Integrating cost criteria allows firms to select suppliers offering competitive pricing while ensuring value for money, thus positively impacting procurement performance.

Supplier commitment pertains to the dedication, responsiveness, and willingness of suppliers to satisfy the needs and expectations of the purchasing firm. Supplier commitment fosters collaboration, communication, and trust, essential for successful supplier relationships (Prajogo & Olhager, 2012). Gimenez and Sierra (2013) highlight the significance of supplier commitment in improving procurement performance. By assessing supplier commitment, steel manufacturing firms can identify partners aligned with their strategic objectives, leading to improved reliability and responsiveness in procurement operations.

In conclusion, the criteria used for selecting suppliers significantly impact procurement performance in steel manufacturing firms. By strategically evaluating suppliers based on quality assessment, organization profile, price delivery, and supplier commitment, organizations can enhance their operational efficiency, product quality, and overall performance in the competitive steel manufacturing industry.

### **2.3.2 Relationship between Supplier Partnership and Procurement Performance**

Supplier partnership is the relationship commitment over an extended time between the buyer and supplier firm to work together to the mutual benefit of both parties. It involves sharing of relevant information, acknowledgment of the risks, the reward of the relationship, supplier training, and non-adversarial collaboration with suppliers (Kwamboka, 2019). These activities positively influence the buying firm's overall performance through the improvement of supplier performance and capabilities. Supplier partnership also known as supplier collaboration involves a buyer firm's application of its capital, time, and human resources toward the improvement of its suppliers' performance and capabilities. Thus, the buying firm for example finances the supplier's inputs, machinery, tools, or castings.

Additionally, the purchasing firm embarks on activities that transfer understanding and qualifications into the supplier's organization (Lubale & Kioko, 2016). Supplier partnership in a firm enhances joint decision-making. To manage supplier partnerships toward improved procurement performance, a firm should separate its suppliers based on quality improvement, where quality improvement is prioritized in the procurement process. This study measured supplier partnership based on the parameters capital support, technical support, joint ventures and sharing of information. These sub-variables serve as measures to assess the effectiveness of supplier partnership in enhancing procurement performance.

Capital support refers to the financial assistance provided by suppliers to steel manufacturing firms. Financial stability is crucial for both parties to sustain long-term partnerships and ensure smooth business operations (Muduli, 2020). Suppliers offering favorable payment terms and financing options enable firms to invest in technology, infrastructure, and innovation, ultimately improving procurement performance (Auramo et al., 2019).

Technical support encompasses the provision of expertise, training, and guidance by suppliers to enhance the capabilities of steel manufacturing firms in handling technical challenges and adopting innovative solutions (Sharma & Lai, 2018). Collaborative efforts between suppliers and firms in research and development activities, process optimization, and technology transfer can lead to improved product quality, efficiency, and innovation, thereby positively impacting procurement performance (Prajogo & Olhager, 2012).

Joint ventures involve formal partnerships between steel manufacturing firms and suppliers to pursue shared objectives, such as market expansion, product development, or cost reduction initiatives (Luo & Tung, 2020). Joint ventures facilitate resource pooling, risk sharing, and access to complementary capabilities, fostering synergy and mutual growth opportunities (Narayanan & Widen, 2019). Successful joint ventures enhance collaboration and trust between partners, leading to improved procurement performance through economies of scale, market diversification, and enhanced competitiveness.

Sharing of information refers to the exchange of data, insights, and market intelligence between steel manufacturing firms and suppliers to improve decision-making and strategic alignment (Choi & Krause, 2006). Transparent communication and information sharing enable partners to anticipate changes in demand, mitigate risks, and identify opportunities for continuous improvement (Wu & Pagell, 2011). Enhanced visibility into supply chain processes and market dynamics empowers firms to optimize inventory levels, reduce lead times, and enhance responsiveness to customer needs, thereby positively influencing procurement performance (Chen et al., 2014).

By considering these sub-variables within the conceptual framework of supplier partnership, the researcher assessed the multifaceted nature of supplier-firm relationships and their impact on procurement performance in steel manufacturing firms.

### **2.3.3 Relationship between Supplier Training and Procurement Performance**

Training is the process of enhancing a person's abilities, know-how, and comprehension for carrying out a specific task. Supplier training is intended to build the capabilities and capacity of diverse suppliers to enhance competitiveness and support growth (Kibwana & Kavale, 2019). The available abstract literature indicates that buyers or procurement groups utilise training as a means to provide assistance to their suppliers, with some buyers providing more help than others. In order to enhance the efficacy of the association, the buyer designs programs for suppliers that specifically target the upgrading and augmentation of their specialised knowledge on essential competencies such as quality, manufacturing methodologies, and the executive's best practices.

Modi and Mabert (2017) argue that providing training to suppliers on just-in-time delivery, quality improvement approaches, and other key performance parameters ensures that providers possess the knowledge and skills to effectively fulfil the requirements of the buying organisation. Furthermore, providing training to suppliers ensures that the procurement function operates with effectiveness, efficiency, and consistency, therefore enhancing its productivity. Nasiche, Ngugi, Kiarie, and Odhiambo (2020) opine that utmost purchasing companies underscore four areas of quality training to their suppliers: total quality management and quality improvement training; statistical quality control techniques training; training focusing on integrating quality into the design of products and processes to reduce variability; and training in problem-solving techniques. When suppliers are adequately trained to meet buyers' firm requirements, they will provide high quality products or timely services, thus improving procurement performance of a firm. It is therefore prudent to enlighten suppliers on procurement procedure and how to enhance quality of products a buyer firm need as per their specifications.

The most common indicators used to measure supplier training are; buyer assisted training, supplier assisted training, seminars and conferences. These four indicators were used in the study to measure supplier training. Kibwana and Kavale (2019) used the same to measure the effect of supplier training on procurement performance. The buyer company can assist in financing training for their suppliers so that they provide high quality goods and services. This training can be facilitated in seminars and conferences where knowledge is disseminated to potential suppliers to enhance how they will provide quality goods in an effective manner and within shortest time. This study measured supplier training based on the parameters buyer assisted training, supplier assisted training, seminars and conferences. These sub-variables serve as measures to assess the effectiveness of supplier training initiatives.

Buyer-assisted training involves steel manufacturing firms providing training programs and resources to their suppliers. This approach ensures that suppliers understand the specific requirements, standards, and expectations of the buyer, leading to improved alignment and performance (Johnston et al., 2016). By offering training on quality standards, product specifications, and compliance requirements, buyers empower

suppliers to meet their needs more effectively, resulting in enhanced procurement performance (Caniato et al., 2012).

Supplier-assisted training refers to suppliers offering training and capacity-building initiatives to steel manufacturing firms. Suppliers possess valuable expertise and knowledge about their products, processes, and industry trends, which they can share with their buyers (Krause & Scannell, 2012). By providing training on new technologies, best practices, and process improvements, suppliers enable buyers to optimize their operations, reduce costs, and enhance product quality, ultimately leading to improved procurement performance (Wagner et al., 2019).

Seminars and conferences offer valuable platforms for knowledge exchange, networking, and learning opportunities for both suppliers and steel manufacturing firms. Participation in industry events allows stakeholders to stay abreast of the latest trends, technologies, and best practices (Bodnaruk & Harvey, 2020). By attending seminars and conferences focused on supply chain management, procurement, and industry-specific topics, participants gain insights that can inform their training programs and contribute to continuous improvement initiatives, thereby positively impacting procurement performance (Cai et al., 2017).

#### **2.3.4 Relationship between Supplier Evaluation and Procurement Performance**

Supplier evaluation is a strategic process employed by steel manufacturers in Nairobi City County, Kenya, to assess the value and performance of suppliers, ultimately aiming to satisfy the needs of the buying organization.

Lammi (2016) perceives supplier evaluation as a tool that helps buying firms understand which suppliers perform well and which do not, thus enabling them to make informed decisions regarding their supply bases. Similarly, Lopes and Nuria (2021) highlight that while supplier evaluations reveal strengths; they also expose inefficiencies, including partial delivery or contract terminations before completion.

Bartolini (2022) emphasizes that supplier evaluation has the potential to shape the future behaviors of both buyer and supplier organizations, resulting in heightened supplier performance and consequently improving procurement performance. This perspective



resonates with findings reported by Mutai and Okello (2016), which discovered that suppliers' financial capacity, quality commitment, and competence had a substantial impact on the performance of procurement functions in public universities.

To establish a framework for evaluating suppliers, Feldsine (2022) identifies five essential components: production capacity, quality, performance, risk, and environmental impact. In addition, Yun (2018) proposes five key criteria for supplier evaluation: supplier quality commitment, long-term relationship, financial stability, total quality performance and philosophy, and supplier competence. This study measured supplier evaluation based on the parameter's financial stability, supplier performance goal, supplier competence and supplier quality. These sub-variables serve as measures to assess the effectiveness of supplier evaluation initiatives.

Financial stability is an essential aspect of supplier evaluation, as it indicates the financial health and viability of a supplier. Organizations assess factors such as liquidity, solvency, profitability, and debt levels to determine the financial stability of their suppliers (Cousins et al., 2019). Suppliers with strong financial stability are more likely to fulfill their contractual obligations, deliver quality products/services, and withstand market fluctuations, thereby reducing supply chain risks and contributing to improved procurement performance (Li et al., 2018).

Setting clear and measurable performance goals is crucial for effective supplier evaluation. Organizations establish performance metrics aligned with their strategic objectives, such as on-time delivery, quality conformance, cost efficiency, and innovation (Carr & Pearson, 2019). By defining specific performance goals for suppliers, organizations can evaluate supplier performance objectively, identify areas for improvement, and drive continuous performance enhancement initiatives, ultimately leading to improved procurement performance (Luzzini et al., 2015).

Supplier competence denotes to the capability of suppliers to meet the technical, operational, and quality requirements specified by their buyers. Organizations assess supplier competence based on factors such as technological capabilities, production processes, expertise, and certifications (Hervani et al., 2005). Suppliers with demonstrated competence are better positioned to deliver high-quality products/services,

comply with specifications, and adapt to changing market demands, thereby enhancing procurement performance and fostering long-term partnerships (Wang & Kaufmann, 2016).

Supplier quality is a fundamental criterion in supplier evaluation, as it directly impacts the quality of the final products or services delivered by organizations. Organizations evaluate supplier quality based on factors such as defect rates, conformance to specifications, adherence to quality standards, and customer satisfaction (Cai *et al.*, 2018). Suppliers that consistently deliver high-quality products/services contribute to enhanced product quality, reduced rework/scrap costs, and improved customer satisfaction, thereby positively influencing procurement performance (Li *et al.*, 2020).

This study adopted the conceptualization of supplier evaluation presented herein, integrating it into a broader investigation of supplier development and procurement performance in steel manufacturing firms in Nairobi City County, Kenya. By examining the interplay between supplier evaluation and procurement performance, the study sought to identify optimal approaches for enhancing operational efficacy and competitive advantage in the steel manufacturing sector.

### **2.3.5 Moderating Effect of Supplier Integration on the Relationship between Supplier Development and Procurement Performance**

Yuanqiong *et al.* (2021) describe supplier integration as the degree to which suppliers and manufacturers coordinate on aspects such as inventory management, collaborative planning, forecasting, replenishment, and the movement of physical resources. This integration involves firms working closely with their suppliers to establish inter-organizational strategies, align processes, and exchange information and knowledge (Zhang, Lettice, Chan, & Nguyen, 2018). Integrating with suppliers entails buyer firms collaborating and sharing operational, technical, and financial information with their suppliers. Lotfi, Sahra, Mukhtar, and Zadeh (2013) note that supplier integration involves a partnership between the firm and its upstream suppliers, where suppliers contribute information and participate in decision-making. Such strong relationships and communication are crucial for advanced firms, as suppliers often have a deeper understanding of the components they provide.

According to a study conducted by Madzimore (2020), supplier integration positively improves supply chain performance. According to Madzimore, the link involving buyer and source firms ensures better coordination, resulting in improved relationships and timely provision of materials, thereby enhancing procurement performance. The findings of Madzimore's (2020) research align with a study undertaken by Mutwiri, Marendi, Riro, and Ratemo (2019) which shown a strong and favourable influence of supplier coordination and internal integration on organisational performance. The findings indicate that manufacturers can implement their supplier development successfully if they embrace supplier integration. Implementing supplier integration will enable a firm not only in supporting a firm in corroborating with their suppliers but also improve the firm's procurement performance.

Katua (2019) opines that supplier integration activities such as information sharing, including marketing information, production information, and technological information, improve quality performance for both supplying and buying firms. Similarly, Mbugua (2019) observed that indicators of internal integration such as responsiveness, integrated system, real-time inventory/logistics management, and cross-functional teams significantly contribute to operational performance. Mbugua (2019) adds that supplier integration facilitates a healthier relationship between all parties and helped to increase efficiency. Nonetheless, information technology integration is vital in facilitating collaboration and information sharing among all the partners, leading to improved operational performance. Mbugua (2019) advises buyer firms to continuously engage in joint decision-making with their critical suppliers to settle on central operating plans, and cultivate preemptive strategies that are reciprocally beneficial in achieving public health strategies.

In supplier integration, manufacturers and suppliers often exchange information such as demand forecasts, inventory levels, and production plans. This exchange improves product and production requirements, optimizes the use of both the supplier's and the manufacturer's capabilities, and helps manage costs more effectively. In this study, supplier integration was measured using indicators such as information integration, process integration, strategic integration, cross-functional teams, and integrated systems.

### **2.3.6 Procurement Performance**

Procurement performance measures how well the procurement function achieves its objectives and goals while minimizing costs (Hussein, 2014). It encompasses two primary aspects: effectiveness and efficiency. Procurement effectiveness refers to how well the stated goals and objectives are being accomplished, comparing actual performance to planned performance. In contrast, procurement efficiency evaluates the relationship between the resources planned and those actually used to achieve the goals, focusing on the costs incurred compared to what was initially planned (Nawi & Halipah, 2017).

Lord Kelvin once said, “if you cannot measure it, you cannot improve it” (Cflow, 2022). It is based on this premise that there is a need to measure how effectively the procurement process is being managed in a business. Therefore, setting Key Performance Indicators (KPIs) for the procurement department can help to demystify performance and deliver insights into where improvement can be made. A procurement KPI is a tool used to measure performance as well as monitor and evaluate the efficiency of a company's procurement management. These KPIs help businesses streamline and optimize their time, service quality, spending, and cost. In addition, procurement KPIs help companies keep in line with their business objectives, goals, and overarching procurement strategies (Taulia, 2021).

Ahmed (2021), outlines four main categories of procurement KPI, namely cost, time, quality, and technology. Regarding cost, Ahmed argues that cost drivers in the supply chain may undermine the profitability and competitiveness of customers and suppliers. It is therefore advisable to solve the cost drivers to improve the business processes. Time-based metrics such supplier lead time and as on-time delivery are the most common metrics. However, the suppliers should continue to solve the problems of internal cycle time and on-time delivery to customers. According to Ahmed quality suppliers’ processes can impact the standard of products and services. Suppliers need to respond fast when corrective actions are needed.

Prokuria (2022), categories of procurement KPIs are similar to Ahmed, they are quality, inventory, delivery, and cost-saving. On quality KPIs indicators, key indicators are

compliance rate, purchase order accuracy, and supplier defect rate. The inventory KPIs include inventory aging, inventory turnover ratio, and inventory carrying cost.

The delivery KPIs indicators are supplier lead times, emergency purchase rate, purchase order cycle time, and vendor availability. The cost-saving KPIs include price competitiveness, procurement ROI, cost reduction, cost avoidance, and spend under management (SUM).

United State Agency for International Development (USAID) (2013) summarizes 11 procurement performance indicators. In the cost performance, category, are product price variance and effective contract utilization indicators. The quality performance category has expiration management and supplier performance indicators. The timeliness performance category has procurement cycle time, and payment processing time indicators. The systems productivity performance has emergency procurement, procurement cost, and staff training indicators. The integrity performance category has transparent tendering, and transparent price information indicators. This study focused on five key procurement performance indicators to measure procurement performance as a variable. These are cost control, time delivery of goods and services, efficiency and effectiveness in procurement, quality and system productivity performance.

## **2.4 Empirical Review**

This segment contains a review of previously published works, studies, and books on supplier selection, supplier partnership, supplier training, supplier evaluation, supplier integration, and procurement performance.

### **2.4.1 Supplier Selection and Procurement Performance**

To understand the criteria Nairobi County uses to choose suppliers, Odhiambo (2015) carried out a study on supplier selection practices and procurement performance in Nairobi City County, Kenya. The study espoused a descriptive survey design to identify the criteria employed by Nairobi County to choose suppliers. A sample of 150 respondents was identified from a list of 500 respondents. Inferential statistics and descriptive analysis were used to analyze the data. The findings of the study show that a majority of respondents approved of Nairobi County's supplier selection criteria. Cost was the most important of the many adopted criterion. Additionally, a significant correlation was observed between the criteria used for supplier selection and the performance of procurement. Despite providing evidence for selecting quality suppliers, the study was done in Nairobi City County administration in a different environment compared to the steel manufacturing company. Despite using regression analysis, the study did not test any of the regression assumptions, which could have led to potentially biased conclusions.

Sabiti and Mulyungi (2018) conducted a study titled “Effect of Supplier Selection on Procurement Performance of Rwanda Manufacturing Firms: A Case Study of Bralirwa Limited.” This research aimed to assess how various supplier selection factors impact the procurement performance of Bralirwa Ltd. The researchers specifically focused on evaluating the effects of tendering, pre-qualification, supplier relationships, and ICT usage on the procurement performance at Bralirwa Ltd. Established in 1959, Bralirwa Limited is one of Rwanda's largest brewing companies and is a subsidiary of Heineken N.V. from the Netherlands, which holds a 75% stake, with the remaining 25% publicly owned.

The study employed a descriptive research design, gathering both primary and secondary data. The target population included 550 individuals, comprising suppliers, shareholders, employees and contractors of Bralirwa Ltd., from which a sample of 55 was selected. Data analysis employed both descriptive and inferential techniques, incorporating correlation and regression analyses. The findings indicated that pre-qualification, ICT usage, tendering, and supplier relationships were all strongly and significantly positively related to procurement performance. Regression analysis revealed that the four factors explained 76.4% of the variance in procurement performance. While the study provides

insights into how supplier selection can enhance procurement performance, it was based in a brewing company in Rwanda, a context distinct from the steel manufacturing industry. This study aims to address this contextual gap.

Manyega and Okibo (2015) conducted a study to assess the impact of supplier selection on the procurement performance of public institutions in Kisii County, Kenya. The study was driven by three specific objectives: to evaluate the impact of tendering, to assess the effect of pre-qualification, and to examine the influence of single-sourcing on procurement performance within these public institutions. The study employed a descriptive research design with a sample size of 26 respondents and used descriptive statistics, including tables, to present the results. The findings indicated that pre-qualification and tendering as criteria for supplier selection significantly and positively impacted procurement performance. However, the study's reliance on descriptive analysis limited its ability to predict how independent variables affect the dependent variable. To address this limitation, the study utilized structural equation models to better explore the relationship between supplier selection and procurement performance.

In their study titled “Green Procurement Implementation through Supplier Selection: A Bibliometric Review,” Masudin, Umamy, Al-Imron, and Restuputri (2022) aimed to offer a concise bibliometric analysis of existing literature on the implementation of green procurement via supplier selection. This study was conducted across Asia and Europe to enhance understanding in this area. The researchers used a structured literature sample of 220 articles published between 1994 to 2022. They used green procurement and supplier selection as key words in search of the articles. The study found that supplier selection is a crucial component of green procurement management, given that suppliers, being at the top of the supply chain, impact every stage. While the study contributes valuable insights to the literature on supplier selection and procurement, its findings cannot be generalized to steel manufacturing firms in Kenya, as it is a literature review rather than an empirical investigation.

Kariuki, Makokha, and Namusonge (2018) aimed to assess how supplier selection impacts the procurement performance of technical institutes in Trans Nzoia County. Their study employed a survey design with a sample of 100 employees out of a total of 210 staff from eight technical and vocational institutions in the county. Data were collected using questionnaires and analyzed through descriptive statistics, including mean and standard deviation, as well as correlational and multiple regression analyses to evaluate the overall effect of supplier selection on procurement performance. The result revealed that a supplier's quality commitment has a noteworthy influence on procurement performance. This study was conducted in technical and vocational institutes in Trans Nzoia County which is a different business environment to steel manufacturing firms in Nairobi City County, Kenya therefore, not applicable.

The study conducted by Ogendo (2018) examined the impact of supplier selection criteria on the organisational performance of the Kisumu County government. The research investigated the correlations among the financial capacity, production capacity, and human resource base of suppliers and their influence on the financial performance of the organisation. A sample of 132 people was recruited from a population of 200. By using both descriptive and inferential statistics, the study demonstrated that these supplier selection criteria had a substantial and favourable impact on the performance of the organisation. The report advised that the county should make significant investments in supplier selection policies in order to improve performance. Nevertheless, the emphasis on the public sector and the particular geographical conditions restrict the applicability of these results to the steel manufacturing industry in Nairobi, Kenya, where distinct dynamics are in operation.

The study conducted by Makhitha (2020) examined the impact of supplier selection on the correlated marketing performance of independent retailers in South Africa. A survey was conducted among a sample of 105 stores in South Africa. The data was analysed using descriptive analysis, factor analysis, and multiple linear regression statistical methods. The components of supplier selection evaluated were delivery reliability, total cost and quality, supplier reputation and supplier innovation. The findings suggest that independent retailers prioritize total cost, quality, and supplier innovation as the most crucial criteria when selecting suppliers. The research shows glimpses of the best criteria



for supplier selection, however, it was done in South Africa a different country, and therefore, not applicable for generalization to Kenyan steel manufacturing firms.

In conclusion, the reviewed empirical studies highlight the critical role of supplier selection in influencing procurement performance. Nonetheless, issues related to context, research methods, and generalizability point to the need for additional research to gain deeper insight into how supplier selection impacts procurement performance, especially within the framework of supplier development within steel manufacturing firms in Nairobi City County, Kenya. This study aimed to fill these gaps and provide meaningful insights into this area of research.

#### **2.4.2 Supplier Partnership and Procurement Performance**

Kibwana and Kavale (2019) researched the impact of supplier development on the procurement performance at the Kenya Ports Authority. The components of supplier development investigated included supplier partnership, supplier financing, supplier training, supplier auditing, and their relationship with procurement performance. The research used a graphic research plan targeting a population of 1238 out of which a sample of 302 respondents were selected from the procurement and user department staff in KPA. The data were analyzed using descriptive statistics, correlation analysis, and regression techniques. The conclusions indicated that supplier partnership was crucial for improving procurement performance at the Kenya Ports Authority. The study concluded that both supplier partnership and supplier training significantly impact procurement performance, while supplier financing and supplier audits do not significantly influence procurement performance at the Kenya Ports Authority. Although showing a relationship between supplier partnership with procurement performance it was done in a service organization, thereby, not applicable to the physical product organizations such as steel manufacturing firms, which operate in a different business environment. This is the gap that this study sought to fill.

Lubale and Kioko (2016) researched the effects of supplier development on organizational performance at Kenya Power and Lighting Company. The components of supplier development that were analyzed were supplier incentives, supplier evaluation, supplier partnership, and their relationship with organizational performance. The study utilized a descriptive research design. The target population comprised 474 individuals, from which a cluster sampling method was used to select a sample of 142 respondents.

Descriptive statistics, including mean and standard deviation, were employed for data analysis. Inferential statistics utilized included correlational analysis and multiple regression analysis. The study revealed a strong, positive, and significant relationship between supplier partnership and organizational performance at KPLC. Despite the positive impact of supplier partnership on organizational performance, there is a need for further research with a larger and more representative sample to explore the effect of supplier development on procurement performance in various industrial sectors, including steel manufacturing firms.

Khan, Liang, and Shahzad (2015) examined how buyer-supplier partnerships and information integration impact supply chain performance, using the Chinese manufacturing sector as a case study. The researchers argued that coordination, collaboration, and cooperation are key to boosting productivity and performance. Their study utilized descriptive survey design, targeting procurement and supply chain professionals from 218 large and medium-sized manufacturing companies in China, with a sample size of 800 respondents. The researchers used both descriptive statistics and structural equation modelling techniques for their data analysis. The findings demonstrated that the connections between buyers and suppliers have a substantial influence on trust and guanxi, which subsequently affect two components of information integration: the quality of information and the relevance of real-time information. Furthermore, both buyer-supplier partnership and information integration were found to significantly influence supply performance. Trust and guanxi were identified as crucial for maintaining long-term, effective buyer-supplier relationships. The study underscores that trust is essential for developing long-term collaborative strategies between buyers and suppliers. While the findings are applicable to other Asian countries with similar cultural contexts, such as Pakistan and Malaysia, they may not extend to different cultural

settings due to varying socio-dynamic factors. The focus on Chinese cultural aspects, particularly guanxi, highlights the need for research into other cultural practices that influence buyer-supplier relationships.

In a 2017 study, Lagat evaluated the impact of supplier partnership management strategies on Almasi Beverages Limited's procurement performance. Components of supplier management investigated were supplier collaboration, supplier segmentation, supplier education, and their relationship with procurement performance. From a target population of 426, a sample size of 128 respondents was selected. Results revealed that the firm instructs its suppliers by walking them through the quality standards. To simplify supplier partnership management toward procurement performance, the company subdivides its suppliers based on quality improvement. This is highlighted in the company's procurement process. Supplier partnership in firms enhances cooperative decision-making. However, the study's limitation in relying solely on descriptive analysis restricts its generalizability to predict the relationship between supplier partnership and procurement performance in other organizations. Our research aims to overcome this limitation by employing more robust analytical methods to provide a clearer understanding of this relationship.

Building great partnerships with suppliers is one method for departments to enhance their performance and service to other functions while also strengthening the firm's competitiveness. In an investigation to find out the effect of supplier partnership on 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 in Nairobi County.

Even so, the researchers contend that despite the positive relationship, there are still challenges in supplier partnerships since the institutions are not in a position to ensure efficient feedback in a way that it is challenging to maintain regular information sharing with the suppliers. While the study employed regression analysis, it did not test regression assumptions, potentially affecting the reliability of its conclusions. Furthermore, its applicability to physical product organizations, like steel manufacturing firms, remains uncertain. This study sought to address these gaps by investigating supplier partnerships and their impact on procurement performance within the Kenyan business context.

In summary, the reviewed empirical studies underscore the significance of supplier partnership in shaping procurement performance. Nevertheless, limitations in research methodologies, sample sizes, and generalizability necessitate further exploration to gain a comprehensive understanding of this relationship across diverse industrial sectors and operational contexts. This study sought to contribute by offering insights into how supplier partnership in the context of supplier development relates to procurement performance, particularly within the steel manufacturing industry in Nairobi City County, Kenya while addressing the limitations identified in the existing literature.

### **2.4.3. Supplier Training and Procurement Performance**

In their 2014 study, Oteki, Nyamasege, and Nambwa investigated the effect of training on the efficiency of supply chain management in the Kenyan public sector. Employing a descriptive research design, they targeted a population of 120 participants and selected a sample of 60 respondents. The data, gathered through questionnaires, were analyzed using descriptive statistics and Pearson correlation. The study revealed that supplier training has a significant impact on the effectiveness of supply chain management. The researchers recommended continuous training for suppliers to tackle current and emerging issues in supply chain management. Nevertheless, the reliance on descriptive and correlation analyses constrained the study's ability to thoroughly evaluate the extent of training's effect on supply chain management efficiency. Nasiche, Ngugi, Kiarie, and Odhiambo (2020) conducted a study to examine the impact of supplier training on the performance of sugarcane processing enterprises in Kenya. The research employed a descriptive design and selected a sample of 400 participants from a total population of 250,000 active farmers. The study used linear regression to analyze the data collected by questionnaires.

The findings of the investigation postulated that there exists a strong positive correlation between the performance of sugarcane businesses and supplier training. To increase sugarcane yields and help the country's ongoing shortfall, it was determined that farmers needed to be trained by sugarcane millers in cutting-edge modern techniques. Even so, Nasiche *et al.* (2020) highlighted many gaps which included the need to construct a demonstration plot to strengthen the capability and capacity to deliver training by each miller and the development of a complete policy to govern their relationship with farmers.

The study adds knowledge on the relationship of supplier training with the performance of an organization. Their study revealed a robust positive correlation between supplier training and the performance of sugarcane businesses. The findings underscored the significance of providing farmers with cutting-edge techniques through training programs. Nevertheless, the study identified gaps, including the need for more extensive training initiatives and a comprehensive policy framework. Furthermore, the study's applicability to different industries and dynamic environments, such as steel manufacturing firms, remains uncertain. This is a contextual gap that this study research filled. Agwu and Onwuegbuzie (2018) note that research outcomes frequently vary in a systematic manner across various groups of firms and within distinct business environments.

In a related study, Adera and Senelwa (2019) investigated the effect of procurement training practices on the implementation of procurement practices in public institutions. The study utilized a descriptive research approach, selecting a sample of 120 respondents through simple random sampling from a total population of 400 staff members within the procurement department of the National Youth Service. Data analysis involved both descriptive statistics (mean, percentages, mode) and inferential methods, including regression and correlation analysis. The study's results indicate that training has a significant influence on how procurement processes are implemented in Kenyan public organizations. Moreover, it was discovered that supplier training in procurement practices enhances the execution of procurement procedures in public institutions in Kenya. Although, the research adds literature to supplier training, it may not apply to physical product organizations such as steel manufacturing firms, which operate in different environments.

The reviewed empirical studies underscore the significance of supplier training in shaping procurement performance within specific contexts. However, there are gaps in terms of research methodologies and generalizability to different industries and environments. This study endeavored to contribute by offering a more rigorous examination of how supplier training influences procurement performance, specifically in the context supplier development among steel manufacturing firms in Nairobi City County, Kenya, while addressing the limitations identified in the existing literature.

#### **2.4.4 Supplier Evaluation and Procurement Performance**

In a 2016 study, Mutai and Okello investigated how supplier evaluation impacts the efficiency of procurement functions at public universities. The study used a cross-sectional survey design where the target population was all employees in finance and procurement departments in all public university campuses in Kericho County. Both descriptive and inferential statistics were used to analyze the data that was collected by questionnaires. Criteria for supplier evaluation investigated were supplier quality commitment, financial stability of supplier, and supplier competence and their relationship with the performance of procurement function.

The results of the study reveal that supplier financial, suppliers' quality commitment, capacity, and suppliers' competence have a significant effect on the performance of procurement function of public university campuses in Kericho County. Furthermore, it was revealed that evaluation leads to stronger supplier performance, which in turn contributes to improved procurement performance, by linking procurement aims to specific supplier competency. This study was conducted in public universities, which are service organizations, it may, therefore, not apply to physical product organizations such as steel manufacturing firms. Also, the use of the seven progressive steps of supplier evaluation was not investigated.

An investigation of the influence of supplier assessment on the efficiency of the procurement function of private health institutions in Kisumu County was undertaken by Ouko and Juma (2020). The sample used in this study consisted of 75 procurement staff members from 25 private health facilities in Kisumu County. Descriptive and inferential statistics were used to analyse the data. The research results indicated that the factors examined, namely supplier quality commitment, supplier financial stability, and supplier competence, had a substantial impact on the performance of the procurement function in private health institutions in Kisumu County. In addition, the research revealed that the dedication of suppliers to maintaining high standards of quality is crucial for improving the procurement process. Furthermore, the financial stability of suppliers plays a role in enhancing procurement performance by minimising expenses associated with re-advertising tenders caused by financially distressed prequalified suppliers. While supplier competence was shown to enhance procurement functions by increasing customer

satisfaction, the research did not include an evaluation of electronic procurement to determine its impact on procurement performance. It also did not target user departments or customers as the target population who can also provide useful data.

Mukarumongi, Mulyungi, and Saleh (2018) carried out a study to examine the impact of supplier evaluation on the procurement performance of government ministries in Rwanda. The study focused on four specific objectives: assessing the effects of supplier quality commitment, supplier financial stability, supplier competence, and ICT integration on the procurement performance of these ministries. A descriptive research design was utilized, with a sample size comprising 650 employees from the Ministry of Health in Rwanda. Data were analyzed using descriptive analysis, correlation, and regression techniques. The study's findings indicated that supplier quality commitment, financial capacity, and competence significantly influence the performance of procurement functions in Rwanda. The results underscore the critical role of supplier evaluation in enhancing procurement performance. However, the study was conducted within a service organization in Rwanda. The results may therefore not be generalized for physical product organizations such as steel manufacturing firms in the Kenyan context due to changes in the business environment and social dynamics.

In their study of supplier evaluation procedures, Das and Bুদ্ধress (2017) found that structuring and redefining supplier performance is necessary to improve quality and maintain competitiveness. They listed 13 additional variables that could help to focus the supplier's evaluation. Evaluation group organization, decision-making power, performance intricacy, and data measurability are factors influencing supplier evaluation system design. Other elements influencing the adoption of supplier evaluation systems encompass performance rating and translation models, the buyer's strategy for encouraging suppliers, the variability of the supplier evaluation system, and the resources needed for maintaining up-to-date data. Additionally, the use of information, the lack of benchmarking supplier performance, the failure to link it to the buying firm's performance, reluctance to inform suppliers, and the need to repeatedly communicate performance data are also significant elements influencing the use of supplier evaluation systems.



Hawkins, Gravier, and Maj (2020) investigated the role of supplier performance evaluations in mitigating risk in the USA. The research employed a mixed method of qualitative interviews of buyers and suppliers to develop a model of supplier performance evaluation risk mitigation effectiveness using structural equation modeling of survey data from a sample of 131 performance assessors. The context selected for the study were contract performance between U.S. federal government agencies and their suppliers. The findings of the study implicated the importance of a thoroughly defined scope of work, accurate supplier performance evaluation, and documented rating justifications.

The findings also indicated that disagreements among performance evaluators and the concern over potential disputes with suppliers reduce the effectiveness of Supplier Performance Evaluations (SPE) in mitigating risks. Furthermore, it was discovered that SPEs are sometimes used strategically for short-term advantages, which distorts the perception of a supplier's performance and undermines the long-term risk mitigation goals of SPEs. Although the study demonstrates how supplier evaluation can help prevent losses for buyer firms, it was a qualitative study that did not utilize inferential statistics, limiting its generalizability to physical product firms within the Kenyan business context.

Reflecting on the aforementioned studies, they collectively highlight the crucial role that supplier evaluation plays in shaping procurement performance. They highlight the multifaceted relationship between supplier evaluation criteria, procurement processes, and overall procurement effectiveness. While these insights provide valuable perspectives, it's crucial to consider the contextual variations in different industries and regions. This study endeavoured to add to extant literature by exploring the interplay between supplier evaluation and procurement performance within the specific context of supplier development in steel manufacturing firms in Nairobi City County, Kenya thereby addressing the contextual gaps identified in the reviewed literature.



### **2.4.5 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, then supplier development and supplier integration are two strategies that can cultivate supplier relationships to improve supply chain efficiency. The research by Jin *et al.*, (2019) found that manufacturers invest more in supplier development after it integrates with their suppliers and both manufacturers integrate with their suppliers at equilibrium. There is a need to examine whether steel manufacturers apply both supplier integration and development.

Shou et al. (2018) in their paper titled “Risk management and firm performance: the moderating role of supplier integration” examined the impact of supply chain risk management on firm performance. The primary aim of the paper was to investigate how supplier integration moderates the relationship between supply chain risk management (SCRM) and operational performance, specifically focusing on operational efficiency and flexibility. The study was guided by the following hypothesis 1. SCRM is positively associated with financial performance. 2. SCRM is positively associated with operational efficiency and operational flexibility. 3. The firm operational efficiency and operational flexibility are positively associated with financial performance. 4. The level of supplier integration positively moderates the relationship between SCRM and operational efficiency. 5. The level of supplier integration positively moderates the relationship between SCRM and operational flexibility.

The researchers gathered data from plant managers in manufacturing companies through the International Manufacturing Strategy Survey (IMSS), selecting a sample of 652 participants from 22 countries across Europe, Asia, and America. Structural equation modeling and the latent moderated structural equations approach were employed to test the hypotheses. The findings indicated that supply chain risk management (SCRM) positively impacts both operational efficiency and flexibility and has an indirect effect on financial performance. Additionally, supplier integration was found to enhance the effect of SCRM on operational flexibility but did not moderate the relationship between SCRM and operational efficiency. While the study offers valuable managerial insights into SCRM, risk management, and supplier integration, it was conducted in developed countries, presenting a different context compared to Kenya, a developing country. This contextual difference is a gap that this study addressed.

Wambua (2021) carried out research to assess how supply chain integration impacts the performance of manufacturing companies in Kenya. The research employed a descriptive approach to gather data from 40 respondents selected from a total of 836 manufacturers selected from the Kenya Association of Manufacturers (KAM) register in 2020. Questionnaires were used to collect data which was analyzed using both inferential and descriptive statistics. The findings indicated that internal integration had a negative and statistically insignificant impact on the performance of manufacturing firms in Kenya.

This is a contrary result compared to a similar study conducted by Yuanqiong, Lai, Sun, and Chen (2014), which indicated that supplier integration had a significantly positive influence on new product performance in a manufacturing company. This highlighted the need for additional research to achieve a consensus. This study addressed this need by investigating the issue further, contributing to the development of a more comprehensive understanding.

Fröjd (2021) researched critical factors in supplier integration to improve the supplier-buyer relationship. The researcher conducted the study through a literature review of previous research on the topic under study. The researcher observes that companies that fail to integrate important suppliers are risking omitting meaningful collaborations and are likely to lose the market advantage. Fröjd suggests that supplier integration enhances the efficiency and effectiveness of material and information flow between manufacturers

and suppliers. Some of the critical factors identified to improve supplier-buyer relationships include lean culture, dedication, person-specific, and handovers. The research was a literature review and a case study performed at Alpha with three supplier integration cases. There is a need for empirical research to be conducted to find out the relationship between supplier development practices and supplier integration a gap this study sought to fill.

Zhang et al. (2018) conducted a study, “Supplier integration and firm performance: the moderating effects of internal integration and trust”. The purpose of this study was 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. The hypotheses being tested were, 1. Internal integration positively associates with information integration, process integration, and strategic integration with suppliers. 2. Information integration with suppliers positively associates with firm performance. 3. Internal integration enhances the effect of information integration with suppliers on firm performance. 4. Internal integration enhances the effect of process integration with suppliers on firm performance. 5. Internal trust enhances the effect of information integration with suppliers on firm performance.

Data was collected using questionnaires from a sample of 261 manufacturing firms in Vietnam. The analysis was conducted using Partial Least Squares (PLS), a structural equation modeling technique. The results indicated that information, process, and strategic integration significantly and positively impact firm performance. While internal integration strengthens the effect of process integration with suppliers on firm performance, it does not influence the effects of information and strategic integration. Additionally, internal trust had no significant impact on any of the three aspects of supplier integration. These findings highlight that internal integration and trust have distinct roles in moderating the relationship between supplier integration and firm performance.

The paper presents management suggestions for establishing supplier integration in order to improve company performance. Although this study illuminates the potential moderating influence of internal integration and trust on the correlation between supplier

integration and firm performance in Vietnam, it is important to note that these results may not be generalisable to other countries because of the diverse socio-dynamic circumstances. Furthermore, the study did not examine moderating role of supplier integration between relationship of supplier development practices with procurement performance a variable that was empirically tested in the current study.

Bahambari and Soufi (2019), in their paper "Investigating the Moderating Role of Competitive Strategies on the Impact of Supply Chain Integration on the Financial and Operational Performance (Case Study: The Car Manufacturing Industry in Iran)," explore how companies seek to enhance reliability and profitability by fostering mutual cooperation with their suppliers. The study was guided by two primary questions: (1) does supply chain integration affect company performance? and (2) Can competitive strategies moderate the relationship between supply chain integration and company performance? The research employed both descriptive and analytical approaches to examine the correlations between the variables. The sample comprised 81 car parts manufacturers with a grade A rating from SAPCO, selected using a combination of census, non-probability, and judgmental sampling techniques.

PLS method was used to analyze the data. The findings of the study show that supplier integration leads to improvement of operational performance of companies under investigation. Additionally, the moderating effects of competitive strategies on the relationship between supplier integration and performance of car manufacturers was not significant. The study adds knowledge on the supplier integration especially regarding car manufacturing firms, however, the results may not be generalized in steel manufacturing companies since they work under different business environments in the Kenyan context.

In summary, the studies highlighted above collectively provide a foundation for examining the moderating role of supplier integration on procurement performance. While supplier integration has been associated with improved supply chain efficiency and firm performance, the context-specific nature of these relationships is evident. This study sought to contribute to the existing body of knowledge by investigating how supplier integration influences procurement performance, particularly in the unique context of steel manufacturing firms in Kenya.

#### **2.4.6 Procurement Performance**

The study conducted by Owago, Ngacho, and Wafula (2019) examined the impact of the Procurement Act 2015 on the correlation between buyer-supplier relationships and the operational effectiveness of milk processing companies in Nairobi County. Applying an explanatory research approach, the study specifically examined 8 prominent milk processing firms located in Nairobi County. Statistical approaches, both descriptive and inferential, were used to analyse data acquired from a sample of 262 respondents via questionnaires. The findings indicate that the Procurement Act 2015 has a crucial role in influencing the link between buyer-supplier interactions and the economic success of milk processing companies. Moreover, the research revealed that these companies were committed to upholding quality standards via efficient dissemination of information, and referral programs played a crucial role in establishing enduring customer connections. The researchers advised milk processing companies to implement rigorous quality timeliness procedures in order to improve buyer-supplier relationships. While the research offered insight into the function of the Procurement Act, its applicability to businesses like steel manufacturing enterprises may be limited owing to changes in the prevailing economic climate.

Procurement, as described by Addo (2019), refers to the process of acquiring products and services by buying and engaging contractors and consultants to do works and services. In addition, Addo (2019) asserts that procurement has other goals such as cost-effectiveness, effectiveness, equity (absence of prejudice among possible suppliers), responsibility, openness, and adherence to international commitments. A study conducted by Addo (2019) titled "Challenges of E-Procurement Adoption in the Ghanaian Public Sector" identified employee competence, inadequate technological infrastructure, insufficient legal framework, and concerns about the security of procurement transaction data as major barriers to the implementation of e-procurement in the examined organisations. In order to mitigate the difficulties associated with E-procurement, the author proposed the implementation of ongoing training for new personnel and the seamless connection of the organization's system with those of the suppliers.

In a pertinent study, Oppong (2020) examined the relationship between electronic procurement and organisational effectiveness in commercial state enterprises. The objective of the research was to assess the extent to which state enterprises in Ghana have adopted e-procurement and to analyse its influence on the performance of these commercial state enterprises. The study used a descriptive research approach and included a sample of 40 participants. The data obtained from questionnaires were examined using both descriptive and inferential statistical methods. The findings indicate that commercial enterprises in Ghana have implemented e-procurement, however the majority of their processes are still carried out manually. Furthermore, it has been shown that e-procurement has resulted in enhanced transparency, decreased costs, and increased accountability, among other benefits. 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 operations being performed manually. Furthermore, there is a need to conduct a comparative study of e-procurement in physical product organizations such as steel manufacturing firms.

In conclusion, these studies collectively emphasize that procurement performance is a multidimensional concept. It encompasses cost-efficiency, quality assurance, compliance with regulations, transparency, and technology adoption. To assess and enhance procurement performance effectively, organizations should consider these various facets and adopt a holistic approach that aligns with their specific goals and contexts. The insights from these studies can inform practitioners and policymakers in their efforts to optimize procurement processes and contribute to overall organizational success.

## **2.5 Summary of Review and Research Gaps**

The Table 2.1 outlines a summary of knowledge gaps of studies reviewed in relation to supplier development such as supplier selection, supplier partnership, supplier training, supplier evaluation, supplier integration and procurement performance. Authors, topic, purpose, methodology used, findings and knowledge gaps that this study sought to address are summarized.

**Table 2.1 Summary of Knowledge Gaps**

<b>Author(s)</b>	<b>Topic</b>	<b>Objectives</b>	<b>Methodology</b>	<b>Findings</b>	<b>Knowledge Gap</b>
Sabiti and Mulyungi (2018)	Effect of Supplier Selection on Procurement Performance of Rwanda Manufacturing Firms: A Case Study of Bralirwa Limited”	To establish the contribution of supplier selection concepts to the procurement performance of the Bralirwa Ltd. The specific objectives were; to determine the effect of tendering, pre-qualification, supplier relationship and ICT usage on procurement performance of Bralirwa Ltd.	The study used descriptive research design collecting both primary and secondary data. The target population was 550 consisting of shareholders, suppliers, contractors, and employees of Bralirwa Ltd, with a sample size of 55 were selected. Data analysis was both descriptive and inferential using both correlation and regression analysis	Results revealed that pre-qualification, ICT usage, tendering, and supplier relationship had a positively significant relationship with procurement performance. The regression analysis indicated that the four factors explained 76.4% of the variance in procurement performance.	The study was conducted in Rwanda in a brewing company. This is a different business environment and a different firm compared with steel manufacturing company.
Manyega and Okibo (2015)	Effects of Supplier Selection on Procurement	The study was guided by three specific	Descriptive research design with a sample	The result of the study revealed that pre-	The results are not reliable for generalization

Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
	Performance of Public Institutions; A Case Study of Kisii County, Kenya	objectives: to determine the effect of tendering; to establish the effect of pre-qualification and; to investigate the effect of single-sourcing on procurement performance in public institutions.	size of 26 respondents. Descriptive statistics using tables to present results were used	qualification and tendering as a criterion for supplier selection were positively significant to influence procurement performance.	n or prediction of how the independent variable affects the dependent variable as it was analyzed descriptively .
Lagat (2017)	An investigation of the effect of supplier relationship management strategies on procurement performance: a case study of Almasi beverages limited	The specific objective of the study was to determine the effect of supplier education on the procurement performance of Almasi Beverages Limited;	A descriptive research design was employed for the study, targeting 426 respondents from Almasi Beverages Limited. A stratified random sampling technique was utilized to select a sample of 128 respondents. Data were collected using a questionnaire and analyzed with	Results revealed that the firm instructs its suppliers by walking them through the quality standards. To simplify supplier partnership management toward procurement performance, the company segments its suppliers based on quality improvement . This is highlighted in the company's procurement process. Supplier	The study used descriptive analysis only, and therefore, the result cannot be generalized or used to predict the relationship of supplier partnership with procurement performance in other firms.



Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
			descriptive statistics, including weighted averages and percentages. The results were presented using frequency tables and charts.	partnership in firms enhances cooperative decision-making	
Kibwana and Kavale (2019)	Effects of Supplier Development on Procurement Performance of Kenya Ports Authority	The author researched the effects of supplier development on the procurement performance of the Kenya Ports Authority. The components of supplier development investigated included supplier partnership, supplier financing, supplier training, supplier auditing, and their relationship with procurement performance.	The researchers used a graphic research plan targeting a population of 1238 from which a sample size of 302 respondents were selected from the procurement and user department staff employed in KPA. The data were analyzed using descriptive statistics, correlation analysis, and regression analysis.	The results indicate that supplier partnership is critical for the enhancement of the procurement performance of the Kenya Ports Authority. The study found that supplier partnership and supplier training significantly impact procurement performance, while supplier financing and supplier audit do not significantly affect procurement performance	Although the study shows a relationship between supplier partnership with procurement performance it was done in a service organization, thereby, not applicable to physical product organizations such as steel manufacturing firms, which operate in a different business environment.

Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
Khan, Liang, and Shahzad (2015)	The Effect of Buyer-supplier Partnership and Information Integration on Supply Chain Performance: An experience from the Chinese Manufacturing Industry	To investigate the effect of buyer-supplier partnership and information integration on supply chain performance: an experience from the Chinese Manufacturing industry	The research utilized a descriptive design, focusing on procurement and supply chain professionals from 218 large and medium-sized manufacturing firms in China. A sample of 800 respondents was selected, and data were analyzed using both descriptive statistics and structural equation modeling.	at Kenya Ports Authority. The results showed that buyer-supplier relationships significantly influence trust and guanxi, which in turn affect the quality and timeliness of information. Additionally, the study found that buyer-supplier partnerships and information integration significantly impact supply chain performance. Trust and guanxi were also identified as crucial for maintaining long-term, growth-oriented relationships between suppliers and businesses.	This study can be generalized to other Asian countries that share similar cultures but may not apply to other cultures. Additionally, 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.
Adera and Senelwa	Effect of Procurement	To determine the effect of	The study employed a	The study's results	The study was carried

<b>Author(s)</b>	<b>Topic</b>	<b>Objectives</b>	<b>Methodology</b>	<b>Findings</b>	<b>Knowledge Gap</b>
(2019)	Training Practices on Implementation of Procurement Practices in Public Institutions	procurement training practices using staff skills, staff competency, and staff proficiency as an indicator of training on the implementation of procurement practices in Public institutions in Kenya, using cost reduction, timely delivery of goods and services, and improved efficiency and effectiveness as indicators of procurement practices	descriptive research approach with a sample of 120 respondents, chosen through a simple random sampling method from a population of 400 staff members in the procurement department of the National Youth Service. Data analysis involved both descriptive statistics (such as mean, percentages, and mode) and inferential statistics, including regression and correlation analysis.	demonstrated that training significantly impacts the implementation of procurement processes in Kenyan public organizations . Additionally, it was observed that supplier training in procurement practices enhances the execution of procurement procedures within public institutions in Kenya.	out in an organization offering services to its clients, it may not apply to physical product organizations such as steel manufacturing firms, which operate in different business environments.
Oteki, Nyamasege, and Nambwa,	Effect of Training on the Effectiveness	The study sought to determine the impact of	The study employed a descriptive research	The findings of the study revealed that the	The study used descriptive analysis and

Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
(2014)	of Supply Chain Management in the Kenyan Public Sector	training on the effectiveness of supply chain management within the Kenyan public sector, focusing specifically on the Ministry of Finance as a case study.	design, focusing on a population of 120 individuals from which a sample of 60 respondents was drawn. Data collected through questionnaires were analyzed using descriptive statistics and Pearson correlation.	effectiveness of supply chain management is heavily dependent on supplier training. The researchers recommended that suppliers participate in ongoing training programs on new and pressing supply chain management concerns.	Pearson correlation analysis, therefore, does not show the extent to which training affects the efficiency of supply chain management. The results cannot be used to predict the relationship of supplier training with the procurement performance of a firm.
Ouko and Juma, (2020)	Effect of Supplier Evaluation on Performance of the Procurement Function of Private Health Institutions in Kisumu County, Kenya	The primary aim of this study was to assess how supplier evaluation impacts the overall performance of the procurement function in private health institutions within Kisumu County. The independent variables	The study's target population comprised the 75 procurement staff members from 25 private health institutions in Kisumu County, all of whom were included in the sample. Data	All the study variables investigated namely; supplier quality commitment, supplier financial stability, and supplier competence significantly influenced the performance of the procurement	The research omitted electronic procurement from its analysis, thus failing to evaluate its impact on procurement performance. Additionally, it did not include user departments or customers in the target population,

Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
		examined were supplier quality commitment, supplier financial stability, and supplier competence, along with their effects on procurement performance.	analysis was conducted using both descriptive and inferential statistics.	function of private health institutions in Kisumu County. .	who could have provided valuable insights.
Hawkins, Gravier, and Maj (2020)	The Role of Supplier Performance Evaluations in Mitigating Risk: Assessing Evaluation Processes and Behaviors	The researchers examined how supplier performance evaluations contribute to risk mitigation in the USA.	The researchers used a mixed- method approach, combining qualitative interviews with buyers and suppliers to create a model assessing the effectiveness of supplier performance evaluations in mitigating risk. They applied structural equation modeling to survey data from 131 performance assessors. The study focused on	The findings highlighted the critical need for a clearly defined scope of work, precise supplier performance evaluations, and well- documented rating justifications. The results also indicated that inconsistenci es among different evaluators and concerns about potential disputes with suppliers undermine the effectiveness of supplier	This study was a qualitative study that did not employ inferential statistics and thereby cannot be generalized for physical product firms in the Kenyan business environment .

Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
			contract performance between U.S. federal government agencies and their suppliers.	performance evaluations (SPE) in managing risks. Furthermore, the study revealed that supplier performance evaluations are sometimes misused for short-term gains, which obscures the true performance of suppliers and impedes long-term risk mitigation efforts.	
Shou, Hu, Kang, Li, and Park (2018)	Risk management and firm performance: the moderating role of supplier integration	The primary objective of the paper was to examine how supplier integration influences the relationship between supply chain risk management (SCRM) and operational performance, specifically focusing on operational efficiency	Data was collected from plant managers in manufacturing firms using the International Manufacturing Strategy Survey (IMSS). They sampled 652 respondents from 22 countries across Europe, Asia, and	The study found that supply chain risk management (SCRM) positively affects both operational efficiency and flexibility and indirectly influences financial performance. Additionally, while supplier integration	The research was conducted in developed countries, which is a different environment compared to Kenya a developing country.

Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
		and flexibility.	America. The data was analyzed using structural equation modeling and the latent moderated structural equations approach to evaluate the hypotheses.	strengthens the effect of SCRM on operational flexibility, it does not influence the relationship between SCRM and operational efficiency.	
Zhang, Lettice, Chan, and Nguyen (2018)	Supplier integration and firm performance: the moderating effects of internal integration and trust	The main objective of this study was 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.	Data was collected using questionnaires from a sample of 261 manufacturing firms in Vietnam. The analysis was conducted using Partial Least Squares (PLS), a structural equation modeling technique.	The findings indicated that information, process, and strategic integration have a significant and positive effect on firm performance. Internal integration boosts the effect of process integration with suppliers on firm performance but does not influence the effects of information and strategic integration with suppliers.	While this study offers insights into how internal integration and trust affect the relationship between supplier integration and firm performance in Vietnam, its applicability to other countries is uncertain due to socio-dynamic differences. Additionally, the study does not explore how supplier integration moderates the

Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
Bahambari, and Soufi (2019)	Investigating the Moderating Role of Competitive Strategies on the Impact of Supply Chain Integration on Financial and Operational Performance (Case Study: The car manufacturing industry in Iran)	The paper was structured around two key questions: 1. Does supply chain integration positively impact company performance? 2. Can competitive strategies influence the relationship between supply chain integration and company performance?	The study used a descriptive and analytical approach in which the correlation between variables under study was investigated. The sample size was 81 companies that produce car parts with a grade A of SAPCO company, which were selected through census; and improbable and judgmental sampling techniques. The PLS method was used to analyze the data.	The study utilized descriptive and analytical methods to assess the correlation between the variables in question. A sample of 81 companies, all producing car parts for SAPCO, was selected using census and judgmental sampling techniques. The data was analyzed using the Partial Least Squares (PLS) method.	relationship between supplier development and procurement performance. The result may not be generalized in steel manufacturing companies since they work under different business environments with those studied.
Oppong	Electronic Procurement	The study sought to	The study employed a	The findings revealed that	The study does not



Author(s)	Topic	Objectives	Methodology	Findings	Knowledge Gap
(2020)	and Organizational Performance Among Commercial State Corporations	determine the level of e- procurement adoption among state corporations and assess its impact on the performance of commercial state corporations in Ghana.	descriptive research design and included a sample of 40 respondents. Data collected through questionnaires were analyzed using both descriptive and inferential statistical methods.	while commercial corporations in Ghana have implemented e- procurement, several functions are still handled manually. The study also showed that e- procurement has resulted in cost savings, enhanced transparency, and increased accountability, among other benefits.	give reasons for the low utilization of e- procurement that led to some functions being performed manually. Furthermore , there is a need to conduct a comparative study of e- procurement in physical product organizations such as steel manufacturing firms.

## 2.6 Critique of Literature Reviewed

Supplier development and its relationship with procurement performance are critical considerations for enhancing operational efficiency and competitiveness within the manufacturing sector. In Nairobi City County, Kenya, the steel manufacturing industry plays a pivotal role in the economy, yet there is a paucity of empirical research specifically examining how supplier development relates to procurement outcomes. This literature review critically evaluates existing studies on supplier development across various industries and geographical locations, aiming to identify gaps and provide a foundation for further exploration within the unique setting of steel manufacturing firms in Nairobi City County, Kenya.

The reviewed literature strongly supports the beneficial effects of supplier integration and supplier development efforts on procurement performance across different sectors and

countries. Nevertheless, there is a significant gap regarding the specific application of these initiatives amongst steel manufacturing in Nairobi City County, Kenya. Jin et al. (2019) emphasize the need for close partnerships and equilibrium in supplier relationships to enhance supply chain efficiency, yet it remains unclear how extensively these initiatives are adopted by steel manufacturers in Nairobi.

Wambua (2021) and Bahambari and Soufi (2019), underscore the importance of considering contextual factors when examining the effects of supplier integration on firm performance. While these studies offer insights into different industrial contexts, there is a distinct lack of research tailored to the unique dynamics of steel manufacturing firms specifically in Nairobi City County, Kenya. This gap highlights a need for localized empirical studies to better understand the applicability of existing findings to the Nairobi steel manufacturing sector.

The literature review encompasses a range of methodologies, including structural equation modeling (SEM), case studies, and descriptive research. As an example, Zhang et al. (2018) used Structural Equation Modelling (SEM) to examine the impact of internal integration and trust on the correlation between supplier integration and firm performance in Vietnam. The adopted methodological techniques provide a solid basis for conducting rigorous empirical study to comprehend the intricate connections between supplier development and procurement results in steel manufacturing companies located in Nairobi City County, Kenya.

Notwithstanding the abundance of available information, there are still notable deficiencies in comprehending the process of supplier development and its effects on procurement performance in steel manufacturing companies located in Nairobi City County, Kenya. Fröjd (2021) proposes doing more extensive empirical research on the correlation between supplier development and integration. This study has the potential to provide new insights and empirical data specifically from the setting of steel manufacturing companies.

A study by Owago et al. (2019) emphasises the significance of policy frameworks in influencing procurement practices. However, additional investigation is needed to directly apply these results to the regulatory environment and operational issues encountered by

steel factories in Nairobi City County, Kenya. The present analysis offers significant suggestions for policy makers and industry practitioners who want to enhance procurement performance in the steel manufacturing sector.

Ultimately, while the current body of knowledge offers useful understanding of supplier development and its influence on procurement performance, there is a distinct requirement for research that is tailored to the specific circumstances and concerns encountered by steel manufacturing companies in Nairobi City County, Kenya. In order to address these deficiencies, this research presented factual information and practical suggestions specifically designed for the steel production environment in Nairobi City County, Kenya.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines the methodology for gathering the data required to achieve the research objectives and evaluate the hypotheses. It covers the following sections: Research Design, Research Philosophy, Target Population, Sampling Frame, Sample Size and Sampling Technique, Data Collection Instruments, Data Collection Procedures, Pilot Study, Instrument Validity, Instrument Reliability, Data Analysis and Presentation, Hypothesis Testing, and Assumptions Testing.

#### **3.2 Research Design**

The general objective of the study was to determine the relationship between supplier development and procurement performance of steel manufacturing firms in Nairobi City County, Kenya. Research design is a plan that shows how the study was carried out. It is the blueprint for the collection, measurement, and data analysis (Information Resources Management Association, 2021).

This study employed a quantitative research design. Quantitative research is a systematic investigation aimed at quantifying variables and analyzing their relationships through structured methods and statistical analysis (Creswell & Creswell, 2017). This section provides a rationale for adopting a quantitative research design, specifically focusing on the utilization of Likert scale questions and a data collection sheet.

Quantitative research employs standardized measures to obtain numerical data, facilitating objective measurement and analysis (Bryman, 2016). Likert scale questions provide a structured format for respondents to express their opinions or attitudes on a predetermined scale, enabling the researcher to quantify perceptions or behaviors (Sullivan & Artino, 2013).

Quantitative data collected through Likert scale questions can be analyzed using statistical techniques, allowing for rigorous examination of relationships and patterns (Hair et al., 2018). Statistical analysis offers insights into the strength and direction of

relationships between variables, thereby improving the validity and reliability of research outcomes (Field, 2018).

Quantitative research facilitates the generalization of findings to broader populations, contributing to the external validity of the study (Creswell & Creswell, 2017). By employing a standardized data collection method such as Likert scales, researchers can draw conclusions that are applicable beyond the specific sample studied, thereby enhancing the relevance and significance of the research (Trochim, 2016).

Likert scale questions offer a time-efficient data collection method, allowing researchers to gather large volumes of data from multiple respondents in a structured manner (Dillman et al., 2014). Additionally, the use of a data collection sheet provides a systematic framework for recording responses, minimizing errors and ensuring consistency in data collection procedures (Fowler Jr, 2013).

In summary, the adoption of a quantitative research design incorporating Likert scale questions and a data collection sheet offers several advantages, including objective measurement, statistical analysis capabilities, generalizability of findings, and data collection efficiency. These methodological decisions are consistent with the research objectives and enhance the robustness and validity of the study's results.

### **3.3 Research Philosophy**

Robert (2018) describes research philosophy as the viewpoint on how data related to a phenomenon should be gathered, examined, and utilized. Conversely, Žukauskas, Vveinhardt, and Andriukaitienė (2018) define it as the framework of the researcher's beliefs that guide the acquisition of new and reliable knowledge about a research subject. The authors further add that it involves the choice of strategy, formulation of the problem, data collection, processing, and analysis. Therefore, research philosophy is a framework that will enable the researcher to conduct the study founded on ideas about veracity and the nature of knowledge (Ramsberg, 2018). It involves epistemology, which concerns what is considered to be true as opposed to what is merely believed to be true (Doxology). The researcher's role is to convert beliefs into knowledge, shifting from doxa (opinion) to episteme (knowledge).

According to Ramsberg (2018), there are two primary research philosophies: positivism, sometimes referred to as scientific, and interpretivism, also known as anti-positivism. These philosophies offer contrasting approaches to understanding the world. Positivism views reality as objective and independent of individuals, allowing researchers to observe it objectively. In contrast, interpretivism considers reality to be highly subjective, shaped by individual perceptions.

This study adopted a positivist approach, which asserts that reliable knowledge is obtained exclusively through scientific methods and views reality as consistent and objectively observable without interference. According to positivists, by altering only one independent variable, researchers can detect patterns and establish connections within the social world (Saunders, Lewis, & Thornhill, 2019). This method facilitates making predictions based on previously observed and understood realities and their interconnections (Creswell & Creswell, 2023). The study embraced positivism as it aimed to scientifically explain the relationships between variables. The study explored quantitative data to determine the extent to which supplier development relates with procurement performance among steel manufacturing firms in Nairobi City County, Kenya.

### **3.4 Target Population**

A population is defined as a specific group of individuals, elements, events, or items within a particular study that share common observable attributes or characteristics, from which the researcher plans to gather data and draw conclusions (Orodho, 2009). The Kenya Association of Manufacturers (2021), reports that there are 60 companies operating within the metals and allied sectors in Kenya, employing approximately 40,000 individuals. In this study, the population of interest comprised of steel manufacturing firms in Nairobi, Kenya, particularly those involved in smelting and hot rolling.

From the Kenya Association of Manufacturers (2021) list there are 20 steel firms involved in smelting and hot rolling , 10 of which are loacted within Nairobi City County, Kenya with an estimated total of about 7,000 employees. The selection of steel manufacturing firms involved in smelting and hot rolling processes aligns with the research focus on investigating the relationship between supplier development and procurement performance within this specific industry sector. Given their pivotal role in the steel manufacturing supply chain, these firms represent a pertinent subject for examination. In this study the target population was therefore, all the employees of the smelting and hot rolling steel firms in Nairobi City County, Kenya.

### **3.5 Sampling and Sample Size**

This study endeavoured to investigate the correlation between supplier development and procurement performance of steel manufacturing firms in Nairobi City County, Kenya. To gain insights into these specialized areas, it is essential to select participants who possess expertise and in-depth knowledge. This study undertook purposive sampling of staff in the target departments due to the strategic nature of the reseach.

Purposive sampling allows researchers to target individuals within these firms who have the necessary insights and experience (Bougie & Sekaran, 2019). Given the potentially large number of employee in steel manufacturing firms, it may not be feasible to study all of them comprehensively. Purposive sampling enhances efficiency by allowing the selection of a manageable subset of respondents, optimizing the use of available resources (Yin, 2018).

For the purpose of this study, the inclusion criteria involved targeting employees of steel manufacturing firms within Nairobi City County, Kenya who are directly involved in procurement, supplier development, or related departments. These individuals are deemed to possess the requisite expertise, knowledge, and experience relevant to the research topic. Conversely, respondents who do not work in procurement, supplier development, or related departments within the steel manufacturing firms were excluded from the study. This criterion ensured that the participants selected have direct relevance to the research focus.

The distribution of personnel within the targeted departments of the 10 steel manufacturing firms within Nairobi City County, Kenya is as shown in Table 3.1



**Table 3.1 Distribution of Employees**

<b>Company Name</b>	<b>Procurement</b>	<b>Finance</b>	<b>Warehousing &amp; Stores</b>	<b>Dispatch &amp; Logistics</b>	<b>Sales</b>	<b>Total</b>
Nails & Steel	7	3	8	10	12	34
Abbyssinia Group	5	5	12	8	15	38
Bachu & Industries	7	6	12	18	10	41
Accurate Steel	5	5	14	14	8	41
Devki Steel	8	2	6	8	5	26
Athi River Steel Mills	3	2	5	6	5	14
Metco Ltd	2	2	5	8	6	16
Mabati Rolling Mills	8	6	12	10	10	31
Maruti Steel	2	2	4	4	3	13
Apex Steel Ltd	5	3	3	10	8	24
Kalu Works Steel	2	2	2	4	3	10
<b>Total Number of Employees</b>						<b>360</b>

### 3.6 Data Collection Instrument

The primary data were collected by use of questionnaires (APPENDIX I). A questionnaire is a collection of standardized questions, often referred to as items, designed to systematically gather data from a large group of individuals. It is administered in the same way to all respondents and is an instrument mainly used in survey research (Lavrakas, 2008). The questionnaire (APPENDIX I) comprised of close-ended questions. The close-ended questions were used to collect quantitative data, by confining the respondents to answer questions related to the variables in the study. Closed-ended questions used a five-point Likert scale to standardize the responses. The questionnaire adopted a five-point Likert scale where: 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree and 5= Strongly Disagree.

The Likert scale instructions were designed to directly align with the research objectives, where respondents were asked to express their level of agreement or disagreement regarding statements related to the supplier selection process (Sekaran & Bougie, 2016). This alignment ensures that higher scores naturally indicate higher levels of disagreement, while lower scores represent agreement, thereby facilitating a clear interpretation of the data.

### **3.7 Ethical Considerations**

This study meticulously adhered to ethical principles and standards to guarantee the protection of contributors' rights and welfare throughout the research process. In accordance with the ethical guidelines outlined by the American Psychological Association (APA, 2020), all participants were provided with comprehensive information regarding the research objectives, procedures, potential risks, and benefits before their participation. Informed consent was diligently obtained from each participant, emphasizing their voluntary involvement and the confidentiality of their responses.

To uphold the confidentiality and anonymity of participants, stringent measures were implemented. Personal identifying information was either removed or coded to ensure anonymity, and access to identifiable data was restricted to authorized research personnel only. These practices align with the National Institutes of Health's standards for protecting human research participants (NIH, 2021).

A letter of introduction (Appendix II) was issued from the School of Business and Economics, Maasai Mara University validating the status of the researcher as a student. This letter served to authenticate the researcher's status as a student of the university. The purpose of this document was to establish the researcher's affiliation with the academic institution, providing credibility and legitimacy to the research endeavor.

A research permit (Appendix III) was later sourced from the National Council for Science, Technology, and Innovation (NACOSTI). This permit was necessary to obtain official authorization from the relevant regulatory body for conducting research activities within the specified scope and jurisdiction. The Research Permit from NACOSTI ensured compliance with legal and ethical requirements governing research practices, safeguarding the rights and interests of both the researcher and the participants involved.

Both documents were essential prerequisites before initiating the data collection process. The letter from the university validated the researcher's academic affiliation, while the Research Permit from NACOSTI provided official authorization and regulatory approval for conducting the research activities in accordance with established guidelines and protocols.

By meticulously addressing these ethical considerations, this study upheld the fundamental principles of integrity, respect, and fairness in research conduct, thereby enhancing the credibility and trustworthiness of the research findings.

### **3.8 Data Collection Procedure**

The researcher designed and prepared a questionnaire to gather the primary data. The researcher made initial contact with the target organizations through sending introductory emails, walk-ins or making direct phone calls to the firms to request appointments for data collection. Prior to initiating data collection activities within the target organizations, formal permission was obtained. This permission was sought from the Human Resource Manager of each organization. The objective of the research, the data collection process, and expected time commitment were communicated during this interaction. The research used this initial contact to obtain phone numbers for future communication.

To suit the convenience and preferences of the target organizations, the questionnaires were administered using a "drop and pick up" method. The data collection tools were handed over to the respondents, who were given a specified period to complete them.

To ensure a high response rate and the timely return of completed questionnaires and data collection sheets, follow-up activities were conducted through phone calls to remind and encourage the respondents to fill and submit the questionnaires.

### **3.9 Pilot Study**

According to Saris and Gallhofer (2014), a pilot study helps researchers identify potential issues that could affect the quality and validity of their results. It involves testing research instruments to determine if any adjustments are needed, thereby improving the study's overall effectiveness and efficiency. Conducting a pilot study also offers insight into possible shortcomings in the main research project or indicates whether the instruments used are inappropriate. Typically, this process involves testing one or two cases (Saris & Gallhofer, 2014).

The researcher pre-tested the questionnaires used in this study in two steel firms that were not part of the target of the study to help test the clarity and comprehensibility of the research questions. Conducting the pilot study outside the actual population but within the same industry, ensured that the pilot group closely mirrors the characteristics of the target population. This provides more accurate insights into how data collection methods will work in the real research context.

The pilot study resulted in a few adjustments on the questionnaire with a few questions being rephrased and some section heads and numbering being edited.

### **3.10 Reliability of the Instruments**

Reliability, as described by Blischke and Murthy (2011), refers to the consistency of results or data yielded by a research instrument across repeated trials. The study utilized the test-retest method to evaluate the reliability of the research instruments. The method involves issuing the same instrument twofold to the same group of respondents to gauge consistency over time.

To ensure a representative sample and account for the diverse steel manufacturers in Nairobi City County, Kenya, a subset of respondents was systematically selected from the total study populace of 360. Following the recommendation of Creswell and Creswell (2017), approximately 10% of the total sample size, equating to 36 respondents, participated in the test-retest exercise.

After the initial administration of the instruments, the same set of instruments was re-issued to the same respondents after a week-long interval. This allowed for an evaluation of the instruments' consistency over time. Subsequently, the reliability coefficient was computed by means of Cronbach's alpha formula, which is a widely accepted measure in reliability analysis.

Despite the rigorous approach, it's essential to acknowledge potential limitations encountered during the assessment process. For instance, factors such as respondent fatigue or memory bias may have influenced the consistency of responses between the test and retest administrations. Additionally, external factors such as changes in the respondents' circumstances or external events may have impacted their responses. These limitations highlight the need for caution when interpreting the reliability coefficients obtained from the test-retest method (Tavakol & Dennick, 2011).

The obtained correlation coefficient of above 0.7, as recommended by Mugenda (2010), recommends a high consistency level among the items within the research instruments. This indicates that the instruments are reliable in measuring the intended variables.

### **3.11 Validity of the Instruments**

Validity pertains to how accurately a test measures what it is designed to measure and whether the results from the data analysis truly reflect the phenomenon under investigation (Orodho, 2009). Similarly, Mugenda and Mugenda (2010) define validity as the degree to which the results from data analysis accurately represent the variables being studied. This research employed both content validity and face validity. Content validity, a qualitative measure, evaluates if the questionnaire's content is appropriate and aligns with the study's objectives. Face validity ensures that the questionnaire is practical, readable, well-structured, and clearly written (Parsian, 2009).

Face validity serves as an initial quality assessment to identify and address any obvious issues with the instrument's clarity, wording, and relevance (DeVellis, 2016). This study engaged experts in the face validity assessment to help ensure that research instruments align with the construct or concept they are intended to measure and help in improving instrument design.

The results of the face validity assessment indicated positive feedback from the expert panel. Specifically, the experts commented favorably on the clarity and relevance of the instrument's items, noting that the questions appeared to capture the key aspects of supplier development and procurement performance within the context of steel manufacturing firms in Nairobi City County, Kenya. Additionally, they highlighted that the wording of the items was comprehensible and aligned well with the research objectives and constructs under investigation. Overall, the feedback from the expert panel provided confidence that the research instruments were appropriately designed and would effectively measure the intended variables. This initial assessment of face validity helped ensure that the instruments appeared credible and relevant to the research topic, laying a solid foundation for subsequent data collection and analysis.

Conducting a content validity test is essential to ensure that research instruments accurately represent the content domain under investigation. It verifies that the items included in the instrument are relevant and comprehensive, covering all essential aspects of the construct (Polit & Yang, 2015). The researcher engaged a group of four experts; two research supervisors and two procurement and supply chain practitioners whom were tasked to evaluate each item on the instrument for relevance, clarity, and representativeness. The responses from the experts were assessed using a content validity index (CVI) The utilization of the content validity index (CVI) serves as a robust quantitative measure to gauge the experts' consensus on the validity of the instrument's content (Polit & Beck, 2006). According to Waltz, Strickland, and Lenz (2017), the CVI provides researchers with a systematic approach to evaluate the relevance, clarity, and representativeness of items on the instrument. The CVI results yielded high scores for clarity (0.90), relevance (0.85), and representativeness (0.88). This outcome suggests a strong level of agreement among the experts regarding the suitability of the research instrument's items.

In summary, involving supply chain professionals and experts, along with the use of the Content Validity Index (CVI), bolsters the content validity of the research instrument. By ensuring that the instrument's content aligns with the complexities of procurement processes within the steel manufacturing industry, this method reinforces the study's foundation and enhances confidence in the validity of its results.

### **3.12 Data Processing and Analysis**

Data analysis involves structuring and classifying collected data into groups or categories based on common features (Orodho, 2009). According to McKinney (2012), this process encompasses capturing, preparing, analyzing, and presenting data. In this study, data processing and analysis included reviewing and editing questionnaires, coding responses, testing underlying assumptions, and analyzing and assessing the structural model.

The initial phase of analysis in this study was centered on the examination and presentation of primary data collected from C-suite employees through a data collection sheet spanning a 5-year period. An extended data collection period spanning 5 years provides a cross-sectional perspective, enabling the identification of long-term trends,

patterns, and fluctuations in supplier development and procurement performance (Bryman, 2016). However, this approach can also be justified as a cross-sectional study, centering on multiple variables at a given instance rather than tracking changes over time. Such a study would allow for the examination of associations between variables without considering the influence of time, offering a static picture of the situation at a particular moment (Caruana, Roman, Hernández-Sánchez, & Solli, 2015)

This historical context is essential for drawing meaningful conclusions as it allows researchers to distinguish between short-term fluctuations and sustained trends. To effectively scrutinize the historical dataset and provide a comprehensive view of procurement performance over time, the analysis predominantly relied on graphical representations, specifically bar charts. This approach allowed for a holistic understanding of the trends, patterns, and fluctuations within the data. Each bar chart represented a specific metric, making it easier to discern trends, variations, and comparisons across different periods.

The second part involved primary data analysis and presentation of descriptive statistics. The analysis presents the general idea of the respondent's perspectives on the questions presented on the questionnaire. In order to achieve this, SPSS version 26.0 was used for tasks initiated from the pilot study to the main study.

The third part involved Exploratory Factor Analysis (EFA). EFA was employed by this study as a crucial data reduction and dimensionality reduction technique to uncover the underlying structure and relationships amongst the observed variables (Hair et al., 2019). Factor analysis is a method used to explore potential underlying dimensions by identifying the characteristics of variables that can be meaningfully grouped together. This is accomplished by clustering variables that exhibit high correlations with each other (Tabachnick & Fidell, 2019).

The Principal Component Analysis (PCA) method was chosen to extract factors, utilizing the correlation matrix as input. Factors were selected based on the criterion of having Eigenvalues greater than 0.5 (Hair et al., 2010). To fulfill the analytical objectives, four key criteria were assessed: (1) the variance explained by each factor, (2) the total variance



explained by the factor model, (3) factor loadings, and (4) communalities (Hair et al., 2019).

The final analysis involved evaluating the structural equation model to explore the interrelationships among multiple independent variables, the dependent variable, and the moderating variable. Structural Equation Modeling (SEM), also referred to as path analysis with latent variables (Bagozzi, 1984; Bagozzi & Yi, 1988), was used to test the theoretical model. According to Tabachnick & Fidell (2019), SEM is a collection of statistical techniques that allows for the simultaneous assessment of relationships between multiple constructs. SEM techniques can be broadly categorized into two families: covariance-based modeling (e.g., LISREL, AMOS) and variance-based or component-based modeling (e.g., PLS) (Gefen, Straub & Boudreau, 2000). In this study, Partial Least Squares (PLS), a component-based SEM technique, was predominantly utilized to assess the paths in the structural model. Specifically, Smart PLS Version 4 (Ringle et al., 2022) was employed for data analysis. The choice of Partial Least Squares Structural Equation Modeling (PLS-SEM) in this study is justified by several factors. A key reason is the flexibility of PLS-SEM in handling complex models with latent constructs and multiple indicators, particularly in exploratory research contexts (Hair Jr. et al., 2017). Unlike covariance-based SEM (CB-SEM), PLS-SEM does not require large sample sizes, making it suitable for studies with smaller samples or data that may not meet the assumptions of traditional parametric tests (Hair Jr. et al., 2019). Additionally, PLS-SEM supports the inclusion of formative indicators, which are advantageous when measuring constructs that are multidimensional or conceptually intricate (Hair Jr. et al., 2017). Overall, the versatility and robustness of PLS-SEM make it an appropriate choice for analyzing the relationships between supplier development and procurement performance in the steel manufacturing industry in Nairobi City County, Kenya.



### **3.12.1 Structural Equation Model**

The development of Structural Equation Modeling (SEM), a second-generation multivariate analysis technique, has greatly influenced various fields, including social sciences, where it has been instrumental in developing, validating, and empirically testing theories (Xiong et al., 2015). Relationships within a structural equation model can be estimated using two primary methods (Hair et al., 2019): Covariance-Based SEM (CB-SEM) and Variance-Based Partial Least Squares (VB-PLS) (Hair et al., 2012). Although these methods share common origins, PLS has the advantage of serving as an alternative to CB-SEM (Hair et al., 2012). Each method is suited to different research contexts, so researchers must understand their distinctions and apply the correct approach (Marcoulides & Chin, 2013; Rigdon, Sarstedt, & Ringle, 2017).

PLS-SEM, also known as PLS path modeling, is a variance-based or component-based modeling technique often referred to as a soft modeling method (Ferrer et al., 2012; Xiong et al., 2015). Path analysis models, a specific form of structural equations, analyze models with only observable variables (Xiong et al., 2015). Unlike covariance-based methods, PLS-SEM does not require strict assumptions about the model and allows for the estimation of biased parameters (Xiong et al., 2015). According to Ringle et al. (2012), who reviewed 65 papers published in *MIS Quarterly*, researchers often choose the PLS-SEM technique for various reasons, including small sample sizes, non-normal data, the use of formative indicators, a focus on prediction, high model complexity, exploratory research, or theory development.

The choice of SEM method depends on the research objective. CB-SEM is best suited for theory testing and confirmation, while PLS-SEM is preferred for prediction and theory development. Hair et al. (2011) explain that the philosophical difference between CB-SEM and PLS-SEM is clear: CB-SEM is appropriate when the goal is theory testing and confirmation, whereas PLS-SEM is more suitable for prediction and theory building. Practically, PLS-SEM resembles multiple regression analysis, focusing primarily on maximizing explained variance in dependent constructs while also assessing data quality based on measurement model characteristics.

Deciding between CB-SEM and PLS-SEM requires careful consideration, as the two methods differ statistically, and neither is universally superior or appropriate for all situations. Generally, PLS-SEM's strengths are CB-SEM's weaknesses, and vice versa. Researchers must understand the distinct purposes each approach serves and apply them accordingly (Hair et al., 2014).

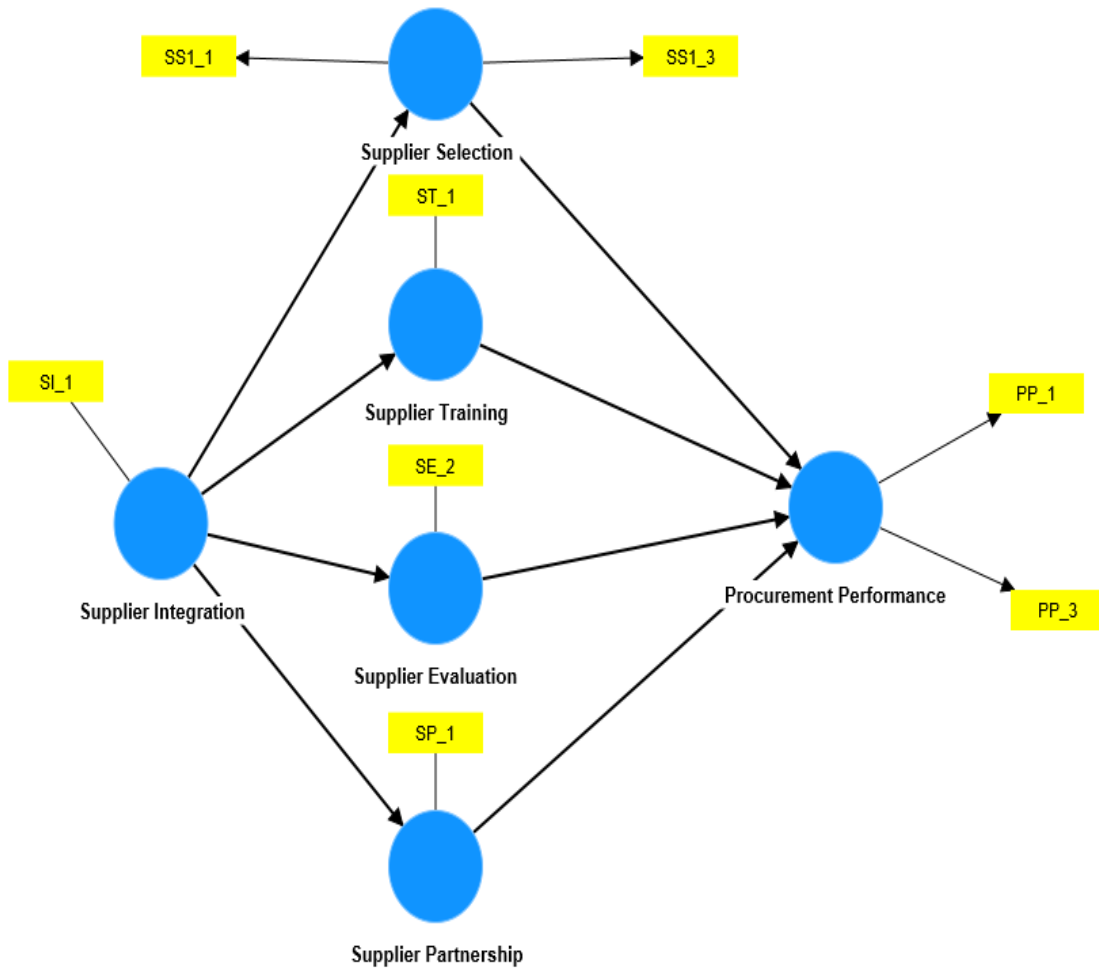
This study aimed to examine the relationship between supplier development initiatives and procurement performance in steel manufacturing firms in Nairobi, Kenya. PLS-SEM was deemed appropriate for addressing the research hypotheses and objectives due to its flexibility in managing complex relationships and its capability to incorporate both formative and reflective constructs within the SEM framework (Hair et al., 2019). Additionally, PLS-SEM is particularly well-suited for exploratory research focused on theory development and hypothesis testing, as it allows for the simultaneous estimation of measurement and structural models without strict distributional assumptions (Hair et al., 2019; Ringle et al., 2015). Given the specific context of supplier development and procurement performance in Nairobi's steel manufacturing industry, PLS-SEM provided a robust methodological approach for analyzing complex variable interrelationships and testing the hypothesized causal pathways.

Furthermore, the choice of PLS-SEM was reinforced by its suitability for handling relatively small sample sizes, which is common in studies involving specialized or niche industries such as steel manufacturing (Hair et al., 2019). PLS-SEM has been shown to produce reliable results even with smaller sample sizes, making it an appropriate choice for this study. To facilitate the implementation of PLS-SEM, calculations and analyses were conducted using SmartPLS 4.0 software, a widely used tool for performing PLS-SEM analyses (Ringle et al., 2015).

### **3.12.1.1 One-step or two-step SEM Approach**

In the SEM domain, the two-step approach is typically favored over the one-step approach (Hair et al., 2006). The two-step approach involves first evaluating the measurement model by checking its reliability, unidimensionality, and validity (both convergent and discriminant). In the second step, the structural model is assessed by examining the causal relationships and path significance between the proposed latent constructs (Anderson & Gerbing, 1988; Garver & Mentzer, 1999). Conversely, the one-step approach estimates both the measurement and structural models simultaneously (Hair et al., 2006). This one-step method is generally recommended when the model is strongly supported by theoretical justifications and when measurement items are well-established in previous research (Hair et al., 2006; Fornell & Yi, 1992). However, it is less commonly used due to challenges in achieving good model fit (Hulland et al., 1996). Therefore, this study adopted the two-step approach, which is widely supported by SEM researchers (Chin et al., 1998; Anderson & Gerbing, 1988).

In order to answer the research objectives, the study fitted a Partial Least Squares Structural Equation Model (PLS-SEM) as illustrated in Figure 3.1.



**Figure 3.1: Structural Equation Model: Moderating Effect of Supplier Integration on the Relationship between Supplier Development and Procurement Performance**

In the PLS-SEM, each of the latent variables (supplier evaluation (SE), supplier training (ST), supplier partnership (SP), supplier selection (SS), supplier integration (SI) and procurement performance (PP)) was represented by a number of indicators that were selected from the set of indicators using factors analysis. In the model, the latent variable supplier integration was used as a moderating variable for the effects of the exogenous variables (supplier training, supplier evaluation, supplier partnership and supplier selection) on the endogenous variable (procurement performance).

The path coefficients in the PLS-SEM analysis indicated the impact of the exogenous latent variables on the endogenous variable. Specifically, the path coefficient for the latent variable "supplier integration" demonstrated its moderating effect within the model. To assess the significance of the exogenous variables' effects on the endogenous variable, the Hotelling's  $T^2$  statistic was used at a 95% confidence level. Exogenous variables with p-values less than 0.05 were deemed to have a significant impact on procurement performance. On the other hand, if the p-value exceeded 0.05, it indicated that the exogenous variable did not have a significant impact on procurement performance.

### **3.12.2 PLS-SEM Model Diagnostic Checks**

In order to ensure that the conclusions made from the PLS-SEM model were valid, a number of diagnostic checks were carried out on the fitted SEM model in order to determine the validity of the model. These diagnostic checks included;

#### **3.12.2.1 Indicator Reliability**

Each latent variable in the model was represented by multiple indicators. Therefore, for the latent variables to be deemed reliable, the indicators used to represent them must also be reliable. The reliability of the latent variables was assessed by examining the outer loadings of their indicators. Indicators with outer loadings above 0.7 were considered reliable (Wong, 2013).

#### **3.12.2.2 Internal Consistency Reliability**

In order for the PLS-SEM model to be valid, the latent variables must be reliable. The internal consistency reliability of the latent variables in the PLS-SEM model was measured using the composite reliability statistic. For a latent variable to be considered reliable, the composite reliability of the latent variable will be required to be 0.7 and above (Hair et al., 2012).

#### **3.12.2.3 Convergent Validity**

Ensuring proper convergence of the PLS-SEM model during iteration is crucial for validating the model. The study assessed the convergent validity of the latent variables in the PLS-SEM model using the Average Variance Extracted (AVE) statistic. A latent variable is considered to have convergent validity if its AVE value is 0.5 or higher (Wong, 2013).

#### **3.12.2.4 Discriminant Validity**

Finally, the study assessed the validity of each latent variable in relation to others in the model by examining discriminant validity. This was done using the Fornell and Larcker (1981) criteria, which involve comparing the correlation statistics between latent variables with the square root of the Average Variance Extracted (AVE) for those variables. Discriminant validity is considered achieved when the correlation statistic for latent variables is lower than the square root of the AVE for each variable in the same row and column. If the PLS-SEM model meets all the validity and reliability criteria, it is deemed valid and reliable for drawing conclusions in the study (Pang, 2023).

## **CHAPTER FOUR**

### **RESEARCH FINDINGS**

#### **4.1 Introduction**

This chapter details the response rate and the presentation of research results. It also includes the presentation of descriptive data and indicators. Results are aligned to the study objectives. Partial least squares structural equation model (PLS-SEM) details relating to the estimations and measurements with the aid of SmartPLS undertaken with the objective of establishing mediation and moderation as well as the joint effects of variable performance are outlined in this chapter.

The study aimed to explore the relationship between supplier development and procurement performance among steel manufacturing firms in Nairobi City County, Kenya. It was guided by five specific objectives: First, to examine the relationship between supplier selection and procurement performance within these firms. Second, to analyze the relationship between supplier partnership and procurement performance. Third, to assess the relationship between supplier training and procurement performance. Fourth, to evaluate the relationship between supplier evaluation and procurement performance. Finally, to investigate the moderating role of supplier integration on the relationship between supplier development and procurement performance in these firms.

#### **4.2 Response Rate**

Out of 360 distributed questionnaires, 288 were completed and returned. This means that 72 questionnaires were either not received or not returned on time, due to reasons such as complex organizational policies or reluctance from respondents to complete them. Consequently, the response rate for the distributed questionnaires was 80%.

**Table 4.1 Response Rate**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
Returned	288	80%
Unreturned	72	20%
<b>Total</b>	<b>360</b>	<b>100%</b>

Upon review, ten (10) questionnaires were identified to be having significant missing data on critical performance variables. These questionnaires were expunged from the initial analysis leaving a total of two hundred and seventy-eight (278) dully filled questionnaires. Therefore, the effective response rate was 77.22%.

### **4.3 Relationship between Supplier Selection and Procurement Performance of Steel Manufacturers in Nairobi City County, Kenya**

The study sought the opinion of respondents with regard to supplier selection on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

#### **4.3.1 Descriptive Statistics for the Relationship between Supplier Selection and Procurement Performance of Steel Manufacturers in Nairobi City County, Kenya**

The respondents were asked to rate their degree of agreement or disagreement with given statements on supplier selection based on four elements: quality assessment, organization profile, cost criteria and supplier commitment, on a five-point Likert scale of 1-5, where: 1-Strongly Agree (SA), 2-Agree (A), 3-Not Sure (NS), 4-Disagree (D), 5- Strongly Disagree (SD). Descriptive statistics were calculated and the results are presented in Table 4.2



**Table 4.2 Descriptive Statistics for Supplier Selection Items**

Supplier Selection Items	N	Mean	Std. Deviation	Variance
Company supplier selection process is competitive	278	1.50	0.501	0.251
Company selection process exhibits honesty	278	1.72	0.663	0.439
Procured products meet the necessary quality specifications	278	1.78	0.802	0.643
Procured products have little to no defects	278	1.84	0.866	0.750
Performance history of a supplier is a determinant factor	278	1.80	0.666	0.443
Supplier quality commitment is taken into consideration	278	1.94	0.748	0.560
The company selects suppliers who have invested in IT	278	1.87	0.854	0.560
Supplier selection prefers those with a positive market reputation	278	1.97	0.687	0.472
Selection criteria prefer those with lowest total cost of acquisition	278	1.81	0.590	0.348

**Key:**

Mean of 1.00-3.44 – High level of agreement.

Mean of 3.45-5.00 – High level of disagreement.

The result in Table 4.2 reveals a generally positive perception of the supplier selection processes among respondents. Items such as "Company supplier selection process is competitive," "Company selection process exhibits honesty," and "Procured products meet the necessary quality specifications" exhibit means close to or below 2, suggesting a high level of agreement among respondents. These findings indicate that the surveyed companies prioritize fairness, transparency, and quality in their supplier selection processes, with responses clustered closely around the mean as indicated by the relatively low standard deviations and variances.

However, there are variations in perceptions regarding certain aspects of supplier selection. Items such as "Supplier quality commitment is taken into consideration," "The company selects suppliers who have invested in IT," and "Supplier selection prefers those with a positive market reputation" display means closer to 2, accompanied by slightly

higher standard deviations and variances. These findings suggest a moderate level of agreement among respondents, indicating that while these factors are considered in the supplier selection process, there may be some degree of variability in their prioritization or evaluation.

Additionally, the item "Selection criteria prefer those with the lowest total cost of acquisition" exhibits a mean above 2, along with a slightly higher standard deviation and variance. This indicates a slightly lower level of consensus among respondents regarding the emphasis on cost considerations in supplier selection, suggesting potential divergence in opinions or practices.

The findings are in agreement with Kibwana and Kavale (2019) that it is crucial to choose suppliers that are managerially aligned with the organization since they affect an organization's entire performance. The findings also align with Sabiti and Patrick (2018), who argue that effective supplier selection provides a competitive edge to a buyer firm by positively influencing the institution's competitive performance.

In conclusion, these descriptive statistics results underscore the importance of further examining the supplier selection processes within the studied companies. By understanding the perceptions and practices surrounding supplier selection criteria and processes, companies can identify areas for improvement and implement strategies to enhance their supplier selection practices, ultimately contributing to improved procurement performance and organizational success.

#### **4.3.2 Factor Analysis of Supplier Selection Indicators**

A Principal Component Analysis (PCA) with Varimax rotation and Kaiser Normalization was performed on 10 Likert scale questions from the study questionnaire, using data from 278 respondents. The Kaiser-Meyer-Olkin measure of sampling adequacy indicated that the sample was suitable for factor analysis (KMO = 0.479).

**Table 4.3: Rotated Component Matrix for Supplier Selection**

**Rotated Component Matrix<sup>a</sup>**

Item	Component 1	Component 2	Component 3	Component 4
Company supplier selection is competitive	.263	-.033	-.078	.686
Company supplier selection process exhibits honesty	.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
Performance history of supplier is determinant in selection	.042	.769	.178	.254
Selection criteria prefers those with shorter lead times	-.047	.863	.061	-.135
Supplier quality commitment is taken into consideration during selection	.012	.070	.844	.075
Company selects suppliers who have invested in IT	.045	.134	.785	-.024
Selection criteria prefers those with a history of positive market reputation	-.728	.173	.337	.047
Selection criteria prefers those with lowest total cost of acquisition	-.220	.107	.139	.816

**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.*

The results of a varimax with Kaiser Normalization of the solution are shown in Table 4.3. When loadings less than 0.5 were excluded, the analysis yielded a four-factor solution with a simple structure (factor loadings  $\Rightarrow$  0.5).

Following factor analysis on supplier selection indicators, the indicators were renamed to more accurately reflect the underlying components identified through the analysis, thus augmenting the clarity and precision of the study's findings. Three items were associated with Factor 1. These items collectively pertain to the company's supplier selection process demonstrating honesty and accountability, the products meeting required quality standards, and the products having minimal defects. Consequently, this factor was labeled "Accountability and Product Quality."

Factor 2 had three items, which were related to the products meeting quality specifications, the importance of suppliers' performance and litigation history in selection, and the preference for suppliers with shorter lead times. This factor was named "Supplier Reputation."

Factor 3 contained two items that focused on supplier quality commitment and investment in information technology. This factor was labeled "Supplier Performance and Technology Capability."

Factor 4 also had two items, which were associated with competitive and fair supplier selection and the preference for suppliers offering the lowest total cost of ownership. This factor was termed "Product Pricing."

#### **4.4 Relationship between Supplier Partnership and Procurement Performance of Steel Manufacturers in Nairobi City County, Kenya**

The study sought the opinion of respondents with regard to supplier partnership on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

#### 4.4.1 Descriptive Statistics for the Relationship between Supplier Partnership and Procurement Performance of Steel Manufacturers in Nairobi City County, Kenya

The respondents were asked to rate their degree of agreement or disagreement with given statements on supplier partnership based on three elements: capital support, technical support, joint ventures and sharing of information on a five-point Likert scale of 1-5, where: 1-Strongly Agree (SA), 2-Agree (A), 3-Not Sure (NS), 4-Disagree (D), 5- Strongly Disagree (SD). Descriptive statistics were calculated and the results are presented in Table 4.4

**Table 4.4 Descriptive Statistics for Supplier Partnership Items**

Supplier Partnership Items	N	Mean	Std. Deviation	Variance
There is a high level of commitment between the company and its suppliers	278	1.69	0.593	0.352
The company maintains long-term relationships with its suppliers	278	1.49	0.452	0.294
Our firm undertakes joint ventures with suppliers in research programs	278	1.61	0.510	0.260
The company shares business information with suppliers	278	2.91	2.003	4.013
The company and its suppliers keep inform each other about changes that may affect the other	278	1.59	0.861	0.741
The company includes key suppliers in the company goal-setting activities	278	1.46	0.573	3.28
The information exchanged between the company and its suppliers is accurate	278	1.72	0.899	0.809
The company provides technical training to its supplier's operational staff	278	1.53	0.634	0.402

**Key:**

Mean of 1.00-3.44 – High level of agreement.

Mean of 3.45-5.00 – High level of disagreement.

Table 4.4 indicates that all items related to supplier partnership have mean ratings below 3.40, reflecting a high level of agreement among respondents regarding the supplier partnership questions. Notably, the inclusion of suppliers in the organization's goal-setting activities had the highest mean rating of 1.46, highlighting it as a key aspect of supplier partnership.

The descriptive statistics offer insights into how respondents perceive supplier partnership within the steel manufacturing industry. The means represent the average level of agreement with statements about supplier development and procurement performance, while the standard deviations and variances illustrate the variability in responses.

Overall, the results suggest a positive perception of supplier partnership. Items like "High Level of Commitment between Company and Suppliers," "Long-term Relationships with Suppliers," and "Joint Ventures with Suppliers in Research Programs" have means close to or below 2, indicating strong agreement among respondents. This implies that the surveyed steel manufacturing firms value solid, long-term relationships with their suppliers and engage in collaborative ventures to foster innovation and mutual success.

However, there is notable variability in perceptions regarding certain aspects of supplier partnership. For example, "Sharing Business Information with Suppliers" has a relatively high standard deviation and variance, indicating diverse practices among firms. This suggests that while some firms excel in sharing information, others may not, resulting in varied perceptions.

Similarly, items such as "Keeping Each Other Informed about Changes" and "Including Key Suppliers in Goal-setting Activities" show moderate variability in responses, indicating differences in practices or experiences among the firms.

These findings align with Mejooli and Senelwa (2022), who found that sharing relevant information and management cooperation in supplier partnerships positively and significantly affect procurement performance. The study confirmed that steel manufacturing firms in Nairobi, Kenya, do involve their suppliers in planning and goal-setting activities to enhance collaboration.

Overall, these descriptive statistics results underscore the importance of further investigation into the practices and strategies employed by steel manufacturing firms in managing their supplier relationships. By understanding the nuances and variability in perceptions among respondents, firms can identify areas for improvement and implement targeted initiatives to enhance supplier development and procurement performance, in the end contributing to their overall competitiveness and success in the industry.

#### **4.4.2 Factor Analysis of Supplier Partnership Indicators**

A Principal Component Analysis (PCA) with Varimax rotation using Kaiser Normalization was performed on 8 Likert scale questions from the study questionnaire, based on data from 278 respondents. The Kaiser-Meyer Olkin measure of sampling adequacy indicated that the sample was suitable for factor analysis (KMO = 0.759).

**Table 4.5: Rotated Component Matrix for Supplier Partnership****Rotated Component Matrix<sup>a</sup>**

Supplier Partnership Items	Component 1	Component 2
There is a high level of commitment between the company and its suppliers	0.737	0.132
The company maintains long-term relationships with its suppliers	0.030	0.755
Our firm undertakes joint ventures with suppliers in research programs	-0.236	0.690
The company shares business information with suppliers	-0.046	-0.461
The company and its suppliers keep each other informed about changes that may affect the other	0.713	-0.373
The company includes key suppliers in the company goal-setting activities	0.849	-0.002
The information exchanged between the company and its suppliers is accurate	0.763	-0.375
The company provides technical training to its supplier's operational staff	0.727	0.070

**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*

Following factor analysis on supplier partnership indicators, the indicators were renamed to more accurately reflect the underlying components identified through the analysis, thus augmenting the clarity and precision of the study's findings. Five items were associated with factor 1. The table shows that these items are all related to; level of commitment between the suppliers and the companies, information sharing between supply chain players, inclusion of suppliers in company goal setting, exchange of accurate and timely information between the company and suppliers and the companies training of its



suppliers’ operational staff. The five items were therefore labeled as “Information sharing and collaboration.”

Two items were associated with factor 2. It is evident that both items pertain to the company's relationship with its suppliers and the extent to which the company engages in joint ventures with them. Consequently, this factor was labeled “Joint Ventures and Incentives.”

#### **4.6 Relationship between Supplier Training and Procurement Performance of Steel Manufacturers in Nairobi City County, Kenya**

The study aimed to gather respondents' views on the impact of supplier training on the procurement performance of steel manufacturing companies in Nairobi City County, Kenya.

##### **4.6.1 Descriptive Statistics for the Relationship between Supplier Training and Procurement Performance of Steel Manufacturers in Nairobi City County, Kenya**

The respondents were asked to rate their degree of agreement or disagreement with given statements on supplier partnership based on four elements: buyer assisted training, supplier assisted training, seminars and conferences on a five-point Likert scale of 1-5, where: 1-Strongly Agree (SA), 2-Agree (A), 3-Not Sure (NS), 4-Disagree (D), 5-Strongly Disagree (SD). Descriptive statistics were calculated and the results are presented in Table 4.6

**Table 4.6 Descriptive Statistics for Supplier Training Items**

<b>Supplier Partnership Items</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Variance</b>
The company offers training programs to its key suppliers	278	4.32	0.601	0.362
The company continuously trains employees involved in procurement	278	4.44	3.114	9.698
The company encourages individual learning	278	4.08	0.659	0.434
Suppliers are taken through quality requirement trainings	278	4.47	4.383	19.210

Supplier Partnership Items	N	Mean	Std. Deviation	Variance
Suppliers are educated on the requirements of the organization	278	4.58	4.358	18.996
The company organizes seminars and conferences to train involved in procurement	278	4.13	2.510	6.301
The company assists suppliers in acquiring certification from agencies	278	4.15	0.775	0.601
Conducting trainings for key suppliers has improved our operational flexibility	278	4.02	0.690	0.476
The trained supply chain staff are promoted and awarded effectively	278	4.50	6.198	38.417

**Key:**

Mean of 1.00-3.44 – High level of agreement.

Mean of 3.45-5.00 – High level of disagreement.

The findings shown in Table 4.6 reveal that the average scores for all measured elements surpassed 4, therefore suggesting a prevailing inclination towards disagreement over the efficacy or significance of these training programs. However, it is crucial to take into account the standard deviations and variances in addition to the means in order to have a deeper understanding of the variety in the views of the respondents.

The average score for the item "The company provides training programs to its key suppliers" was 4.32, accompanied by a rather modest standard deviation of 0.601 and a variance of 0.362. These findings indicate a considerable degree of consensus among participants about the efficacy of this training program.

By comparison, the item "The company consistently provides training to personnel engaged in procurement" had a mean score of 4.44, but a greater standard deviation of 3.114 and a variance of 9.698. These findings demonstrate significant diversity in the opinions of the participants about this training program, despite the fact that the average score implies a lack of consensus on its efficacy.

The average rating for "Suppliers are taken through quality requirement trainings" was 4.47, with a significant standard deviation of 4.383 and variation of 19.210. This observation highlights the considerable range of perspectives, even if the average score suggests a lack of consensus about the efficacy of the training intervention.

The statement "Suppliers are educated on the requirements of the organisation" had an average score of 4.58, accompanied by a significant standard deviation of 4.358 and variance of 18.996, indicating a substantial lack of consistency in the views of the respondents.

The statement "The company arranges seminars and conferences to educate individuals engaged in procurement" had an average rating of 4.13, associated with a standard deviation of 2.510 and variance of 6.301, indicating a moderate level of variation in opinions.

The mean score for "The company assists suppliers in acquiring certification from agencies" was 4.15, with a low standard deviation of 0.775 and variation of 0.601. These numerical values suggest a reasonable degree of agreement among the respondents.

These results contradict the current body of research that highlights the need of providing training to suppliers in areas such as enhancing quality, implementing just-in-time delivery, and using problem-solving strategies (Modi & Mabert, 2017). Academic research indicates that providing training to suppliers improves procurement performance by promoting more uniformity, productivity, and efficacy. Nevertheless, the empirical findings suggest that this may not be true in the steel manufacturing companies examined. According to Kibwana and Kavale (2019), the implementation of supplier training has the potential to enhance capacities and competitiveness. However, it seems that steel manufacturing companies in Nairobi City County, Kenya, are less likely to use this approach.

The empirical results highlight that supplier training is not a prominent practice among steel manufacturing firms in Nairobi, Kenya, despite its theoretical importance. This suggests a gap between theory and practice within these firms. The long-standing relationships with suppliers and a potential lack of awareness regarding the benefits of supplier training may contribute to this discrepancy. Further research and intervention may be needed to bridge this gap and promote the adoption of supplier training practices in the steel manufacturing sector in Nairobi.

In conclusion, while the means suggest disagreement with the effectiveness or significance of these training initiatives, the variability in respondents' perceptions, as indicated by the standard deviations and variances, underscores the complexity and diversity of opinions regarding supplier training within the firms surveyed.

#### **4.6.2 Factor Analysis of Supplier Training Indicators**

A Principal Component Analysis (PCA) with Varimax rotation and Kaiser Normalization was performed on 9 Likert scale questions from the study's questionnaire, based on data from 278 respondents. The Kaiser-Meyer Olkin (KMO) measure of sampling adequacy indicated that the sample was suitable for factor analysis (KMO = 0.506)

**Table 4.7 Rotated Component Matrix for Supplier Training**

**Rotated Component Matrix<sup>a</sup>**

<b>Supplier Training Initiatives</b>	<b>Component 1</b>	<b>Component 2</b>	<b>Component 3</b>	<b>Component 4</b>
Buyer-assisted training programs have enhanced our organization's procurement efficiency	0.748	0.203	0.129	0.186
Supplier-assisted training initiatives have improved the quality of our procurement processes	-0.158	0.705	0.239	-0.164
The company encourages individual learning	0.270	0.195	0.691	-0.088
Suppliers are taken through quality requirement trainings	0.127	-0.097	0.068	0.793
Suppliers are educated on the requirements of the company	0.204	0.542	-0.286	0.126
The company organizes seminars and conferences to train procurement staff	-0.091	-0.158	0.691	0.145
The company assists its suppliers in acquiring certification from agencies	-0.078	0.443	-0.107	0.525
Conducting training programs for suppliers has improved our operational flexibility	0.708	-0.236	0.052	-0.012
The trained staff in the supply chain department are promoted and awarded	0.411	0.041	-0.132	-0.348

**Key:**

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*

Following factor analysis on the indicators of supplier training, the indicators were renamed to more accurately reflect the underlying components identified through the analysis, thus augmenting the clarity and precision of the study's findings. Two items loaded onto factor 1, it is clear from the table that they are related to the company offering

training to its suppliers and that the trainings improve operational flexibility. These factors were therefore labelled “Supplier assisted training.”

Two items loaded onto factor 2 are indicators on the respondent’s perception on employee training as well as supplier education and understanding of the company requirements. These factors were therefore labeled “On-job training.”

Two items loaded onto factor 3 are indicators on the respondent’s perception on whether the company encourages individual learning or the company organizes conferences and seminars for staff. These factors were therefore labeled “Seminars and conferences.”

Two items loaded onto factor 4 shows how the respondents feel in regard to suppliers being taken through quality trainings by the company as well as suppliers being assisted to acquire certification from agencies. These factors were therefore labelled “Quality management training.”

#### **4.7 Relationship between Supplier Evaluation and Procurement Performance of Steel Manufacturing in Nairobi City County, Kenya**

The study aimed to gather respondents' views on the impact of supplier evaluation on the procurement performance of steel manufacturing companies in Nairobi City County, Kenya.

##### **4.7.1 Descriptive Statistics for the Relationship between Supplier Evaluation and Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The respondents were asked to rate their degree of agreement or disagreement with given statements on supplier evaluation based on four elements: financial stability, supplier performance goal, supplier competence and supplier quality on a five-point Likert scale of 1-5, where: 1- Strongly Agree (SA), 2-Agree (A), 3-Not Sure (NS), 4-Disagree (D), 5- Strongly Disagree (SD). Descriptive statistics were calculated and the results are presented in Table 4.8

**Table 4.8 Descriptive Statistics for Supplier Evaluation Items**

Supplier Evaluation Items	N	Mean	Std. Deviation	Variance
The company regularly assesses the performance of suppliers	278	1.86	1.340	1.796
Supplier evaluation process is guided by the ability of the supplier	278	1.62	0.557	0.310
Purpose and objectives of our supplier evaluation system are widely understood	278	1.74	1.364	1.860
Supplier finances are considered during the evaluation process	278	1.99	1.602	2.567
Identification criterion ensures that only suppliers with a strong financial standing are selected	278	2.03	1.831	3.353
The company evaluation criteria include suppliers that meet ISO standards	278	2.04	1.836	3.371
The company communicates supplier evaluation results to the suppliers	278	1.81	0.701	0.492
Company sets and communicates challenging performance goals to suppliers	278	2.09	1.935	3.743

**Key:**

Mean of 1.00-3.39 – High level of agreement.

Mean of 3.40-5.00 – High level of disagreement.

The results presented in Table 4.5 show that the mean scores for all aspects of supplier evaluation practices were below 2, indicating general agreement on their effectiveness and significance. However, it is important to consider both the standard deviations and variances to understand the variability in respondents' perceptions.

For "The company regularly assesses the performance of suppliers," the mean was 1.86, with a standard deviation of 1.340 and a variance of 1.796, suggesting a moderate level of agreement on the effectiveness of regular performance assessments.

For "Supplier evaluation process is guided by the ability of the supplier," the mean was 1.62, with a low standard deviation of 0.557 and a variance of 0.310, reflecting a higher level of agreement on the guiding principle of supplier ability in the evaluation process.

In contrast, "Supplier finances are considered during the evaluation process" had a mean of 1.99, with a higher standard deviation of 1.602 and a variance of 2.567, indicating greater variability in opinions regarding the inclusion of financial considerations, despite overall agreement.

Similarly, " Identification criterion ensures that only suppliers with a strong financial standing are selected " had a mean of 2.03, with a high standard deviation of 1.831 and a variance of 3.353, reflecting significant variability in perceptions about using financial standing as a selection criterion.

For "The company communicates supplier evaluation results to the suppliers," the mean was 1.81, with a standard deviation of 0.701 and a variance of 0.492, suggesting a moderate level of agreement on the importance of communicating evaluation results.

Finally, "Company sets and communicates challenging performance goals to suppliers" had a mean of 2.09, with a high standard deviation of 1.935 and a variance of 3.743, indicating considerable variability in perceptions about setting and communicating challenging performance goals.

These findings align with Bartolini (2022), who notes that linking procurement targets to supplier competence enhances supplier performance and improves procurement outcomes. Similarly, Mutai and Okello (2016) argue that effective evaluation leads to better supplier performance, which, in turn, contributes to improved procurement performance by connecting procurement objectives to specific supplier competencies.

In conclusion, while the means suggest agreement with the effectiveness or significance of these supplier evaluation practices, the variability in respondents' perceptions, as indicated by the standard deviations and variances, underscores the diversity of opinions regarding supplier evaluation within the firms surveyed.

#### **4.7.2 Factor Analysis of Supplier Evaluation Indicators**

A Principal Component Analysis (PCA) with Varimax rotation and Kaiser Normalization was performed on 8 Likert scale questions from the study questionnaire, using data from 278 respondents. The Kaiser-Meyer Olkin measure of sampling adequacy indicated that the sample was suitable for factor analysis (KMO = 0.470)



**Table 4.9: Rotated Component Matrix for Supplier Evaluation**

**Rotated Component Matrix<sup>a</sup>**

Supplier Evaluation Items	Component 1	Component 2	Component 3	Component 4
The company regularly assesses the performance of suppliers in terms of quality, delivery time 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 purpose and objectives of our supplier evaluation system are widely understood	.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

**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*

Following factor analysis on supplier evaluation indicators, the indicators were renamed to more accurately reflect the underlying components identified through the analysis, thus augmenting the clarity and precision of the study's findings. The two items loaded onto factor 1 relate to the company considering supplier finances during selection and whether the company communicates challenging performance goals to suppliers. The factors were therefore labelled as “Financial stability and competence.”

The two items loaded onto factor 2 give the respondent's perception on whether the company assesses their supplier's past performance or whether the evaluation process is guided by the suppliers' ability to meet objectives. These factors were therefore labelled "Supplier quality performance." The item for factor 3 relates to the companies' evaluation criteria including suppliers with ISO certifications. The factor was therefore labelled "Supplier sustainable practices." The item for factor 4 relates to supplier identification picking only those suppliers with a strong financial standing. The factor was therefore labelled "Supplier financial capacity."

#### **4.8 Relationship between Supplier Integration and Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The study sought the opinion of respondents with regard to supplier integration on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

##### **4.8.1 Descriptive Statistics for the Relationship between Supplier Integration and Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The respondents were asked to rate their degree of agreement or disagreement with given statements on supplier integration based on five elements: information integration, process integration, strategic integration, integrated systems and cross functional teams on a five-point Likert scale of 1-5, where: 1-Strongly Agree (SA), 2-Agree (A), 3-Not Sure (NS), 4-Disagree (D), 5- Strongly Disagree (SD). Descriptive statistics were calculated and the results are presented in Table 4.10

**Table 4.10 Descriptive Statistics for Supplier Integration Items**

Supplier Integration Items	N	Mean	Std. Deviation	Variance
There is frequent communication amongst all key departments within the organization	278	1.92	.673	.453
There is a high level of system integration among the departments	278	1.34	.344	.118
The organization encourages the workforce to work as a team	278	3.03	1.452	2.108
Decision-making process is a joint activity by the company's leadership	278	2.80	1.473	2.169
Our company shares information with suppliers on how to improve our quality	278	2.64	1.365	1.864
We work as a team with our suppliers to solve problems that arise	278	2.88	1.310	1.715
We consider the inclusion of our suppliers in the course of scheduling	278	3.00	1.246	1.552
We have collaborative platforms through which we partner with suppliers	278	2.96	1.294	1.673

**Key:**

Mean of 1.00-3.44 – High level of agreement.

Mean of 3.45-5.00 – High level of disagreement.

The results in Table 4.10 reveal varied perceptions of supplier integration within the surveyed organization, as reflected by the means, standard deviations, and variances for the different aspects studied.

For "There is frequent communication amongst all key departments within the organization," the mean was 1.92, indicating strong agreement on the frequency of communication. The low standard deviation of 0.673 and variance of 0.453 suggest consistent views among respondents.

Conversely, "There is a high level of system integration among the departments" had a mean of 1.34, showing even stronger agreement with system integration. The low standard deviation of 0.344 and variance of 0.118 also point to uniform perceptions

among respondents. In terms of "The organization encourages the workforce to work as a team," the mean was 3.03, reflecting a neutral to slightly positive view. The higher standard deviation of 1.452 and variance of 2.108 indicate a range of opinions about the organization's encouragement of teamwork.

For "Decision-making process is a joint activity by the company's leadership," the mean was 2.80, suggesting a neutral to slightly positive perception of joint decision-making. The standard deviation of 1.473 and variance of 2.169 reveal variability in respondents' views. Regarding "Our company shares information with suppliers on how to improve our quality," the mean was 2.64, indicating a neutral to slightly positive perception of information sharing with suppliers. The standard deviation of 1.365 and variance of 1.864 suggest varied opinions on this aspect.

For "We work as a team with our suppliers to solve problems that arise," the mean was 2.88, showing a neutral to slightly positive perception of collaboration with suppliers. The standard deviation of 1.310 and variance of 1.715 indicate variability in perceptions.

The aspect "We consider the inclusion of our suppliers in the course of scheduling" had a mean of 3.00, reflecting a neutral view on including suppliers in scheduling decisions. The standard deviation of 1.246 and variance of 1.552 suggest a range of opinions. Finally, "We have collaborative platforms through which we partner with suppliers" had a mean of 2.96, indicating a neutral to slightly positive view on collaborative platforms. The standard deviation of 1.294 and variance of 1.673 reveal variability in respondents' perceptions.

The findings are consistent with that of Madzimore (2020) that the linkage between buyer and supplier firm ensures there is improved coordination, which leads to better relationships and supply of materials resulting to improvement on procurement performance. This is also echoed by Mbugua (2019) who observed that indicators of internal integration such as responsiveness, integrated system, real-time inventory/logistics management, and cross-functional teams significantly contribute to operational performance.

In conclusion, the descriptive statistics results highlight varied perceptions of supplier integration within the organizations, with some aspects receiving stronger agreement than others. The standard deviations and variances indicate the degree of variability in respondents' perceptions across these aspects.

#### 4.8.2 Factor Analysis of Supplier Integration Indicators

A Principal Component Analysis (PCA) with Varimax rotation and Kaiser Normalization was performed on 8 Likert scale questions from the study questionnaire, based on data from 278 respondents. The Kaiser-Meyer Olkin measure of sampling adequacy indicated that the sample was suitable for factor analysis (KMO= 0.724).

**Table 4.11: Rotated Component Matrix for Supplier Integration**

	Component 1	Component 2	Component 3
There is frequent communication amongst all key units and departments within the organization	-.674	.086	-.166
There is a high level of system integration among the departments	.166	.176	.852
The organization encourages the workforce to work as a team towards achieving a shared goal	.656	.430	-.024
Our company decision making process is a joint activity by the company's leadership	.760	.036	-.103
Our company often shares information with suppliers on how to improve our quality standards, responsiveness and performance	.658	.104	.048
We work as a team with suppliers to solve problems that arise	-.094	.885	.118
We consider the inclusion of our main suppliers in the course of scheduling our activities and planning goals	.446	.521	-.105
We have collaborative platforms through which we partner with customers and suppliers	.159	.430	-.523

**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*

Following factor analysis on supplier integration indicators, the three items loaded onto component 1 indicate that the company's decision making is jointly undertaken by top leadership, the workforce is encouraged to work as a team and information is shared with suppliers to improve quality. The factors were therefore labeled "Information integration."

The two items loaded on component 2 are all related to including suppliers in solving problems and sharing with supplier's information on quality improvement. The factors were therefore labeled "Cross functional teams." The item loaded onto factor 3 indicate a high level of system integration within the departments in the organization. This factor was therefore relabeled "System integration."

#### **4.9 Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The study sought the opinion of respondents with regard to the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

##### **4.9.1 Descriptive Statistics for Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The respondents were asked to rate their degree of agreement or disagreement with given statements on procurement performance based on five elements: cost minimization, timely delivery, efficiency and effectiveness, supplies defect rate and system productivity performance on a five-point Likert scale of 1-5, where: 1-Strongly Agree (SA), 2-Agree (A), 3-Not Sure (NS), 4-Disagree (D), 5- Strongly Disagree (SD). Descriptive statistics were calculated and the results are presented in Table 4.12

**Table 4.12 Descriptive Statistics for Procurement Performance Items**

Procurement Performance Items	N	Mean	Std. Deviation	Variance
Conducting training programs for key suppliers has reduced our product cost	278	1.96	.646	.417
Conducting training programs for key suppliers has improved our product quality	278	2.04	1.820	3.312
Conducting training for our suppliers has improved the speed at which products are delivered	278	1.93	.730	.533
Selection criteria of suppliers has enabled the company to enhance transparency	278	1.90	.714	.510
Supplier selection criteria has significantly reduced failure costs	278	1.83	.631	.399
Information sharing with suppliers has led to reduced return of our products	278	1.76	.703	.494
Management of supplier relationships has led to continuous on-time delivery	278	1.75	.654	.428
Supplier development has led to efficiency and effectiveness in procurement	278	2.96	1.294	1.673
Information sharing with suppliers has led to improved product quality	278	1.62	.612	.374
Improved communication with suppliers has led to reduced product cost and operational flexibility	278	1.59	.703	.495

**Key:**

Mean of 1.00-3.44 – High level of agreement.

Mean of 3.45-5.00 – High level of disagreement.

The analysis of descriptive statistics in Table 4.7 yields significant insights into respondents' perceptions concerning various aspects of procurement performance, as evaluated.

Respondents expressed strong agreement that training programs for key suppliers have effectively reduced product costs supported by a mean of 1.96. The relatively low standard deviation standard deviation of 0.646 further suggests high levels of consensus

among participants vis-à-vis the cost-saving impact of supplier training initiatives on procurement performance.

Respondents strongly agreed that the criteria for supplier selection have increased transparency, reflected in a mean score of 1.90. The low standard deviation of 0.714 indicates consistent perceptions among respondents, supporting the view that the supplier selection process is transparent. Similarly, respondents felt that sharing information with suppliers has improved product quality, with a mean score of 1.62 and a standard deviation of 0.612, suggesting agreement on this benefit.

Respondents also agreed that supplier development has enhanced procurement efficiency and effectiveness, with a mean score of 2.96. The standard deviation of 1.294 indicates some variability in opinions, although the mean reflects overall agreement on the positive impact of supplier development. Effective management of supplier relationships was seen to ensure timely delivery, with a mean score of 1.75 and a standard deviation of 0.654, showing consistent agreement among respondents.

These results highlight the importance of various factors in determining procurement performance within organizations. The findings align with Owago, Ngacho, and Wafula (2019), who emphasized the role of information sharing and referral programs in building long-term customer relationships. Addo (2019) highlighted the broad goals of procurement, such as economy, efficiency, fairness, accountability, transparency, and adherence to international standards. Recommendations for ongoing training and system integration stress the need to address these challenges systematically.

The studies that have been empirically reviewed provide a valuable backdrop for interpreting the descriptive findings related to procurement performance. They highlight the relevance of procurement processes, regulations, and technologies in enhancing organizational performance, and the high levels of agreement among respondents further emphasize the critical role of these factors in the steel manufacturing firms.

The descriptive statistics results reveal a consistent pattern of agreement among respondents across various dimensions of procurement performance. The low standard deviations or variances associated with the mean scores further affirm the high level of



consensus among participants regarding the positive impact of strategic procurement practices, including supplier training, transparent selection criteria, information sharing, supplier development, and relationship management. The results underscore the critical role of these factors in driving procurement performance within the steel manufacturing industry, providing valuable insights for organizations seeking to optimize their procurement practices and achieve strategic objectives.

#### **4.9.2 Factor Analysis of Procurement Performance Indicators**

A Principal Component Analysis (PCA) with Varimax and Kaiser Normalization rotation was performed on 10 Likert scale questions from the study questionnaire using data from 278 respondents. The Kaiser-Meyer Olkin (KMO) measure of sampling adequacy indicated that the sample was suitable for factor analysis, with a KMO value of 0.653.

**Table 4.13 Rotated Component Matrix for Procurement Performance****Rotated Component Matrix<sup>a</sup>**

	Component 1	Component 2	Component 3
Conducting training programs for key suppliers has reduced our product costs	.585	-.041	.046
Conducting training programs for key suppliers has improved our product quality	.693	.119	-.089
Conducting training for our suppliers has improved the speed at which products are delivered once ordered	.721	.057	.214
Selection criteria of suppliers has enabled the company to enhance transparency hence reduction in corruption related costs	.458	.216	.421
Supplier selection criteria has significantly reduced failure costs; suppliers deliver more quality and customized goods	.034	.770	-.113
Information sharing with suppliers has led to reduced return 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 effectiveness in procurement	-.386	.456	.334
Information sharing with suppliers has led to improved product quality	-.069	.008	.830
Improved communication with suppliers has led to reduced product cost and operational flexibility	.228	.167	.688

**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*

Following factor analysis for supplier integration indicators, the indicators were renamed to more accurately reflect the underlying components identified through the analysis, thus augmenting the clarity and precision of the study's findings. The three items loaded onto factor 1 reveal that the different training programs undertaken for key suppliers has positively impacted costs, quality and lead times. These factors were therefore labeled “Product quality and compliance.”

Three items loaded onto factor 2 reveal that supplier selection processes within the organizations have led to reduced failure costs, management of supplier relationships has led to on-time delivery and information sharing has led to reduced defects. These factors were therefore labeled “Product cost and defect rate.” The two items loaded on component 3 relate to communication and exchange of information leading to improved quality and flexibility. These factors were labeled “Compliance rate.”

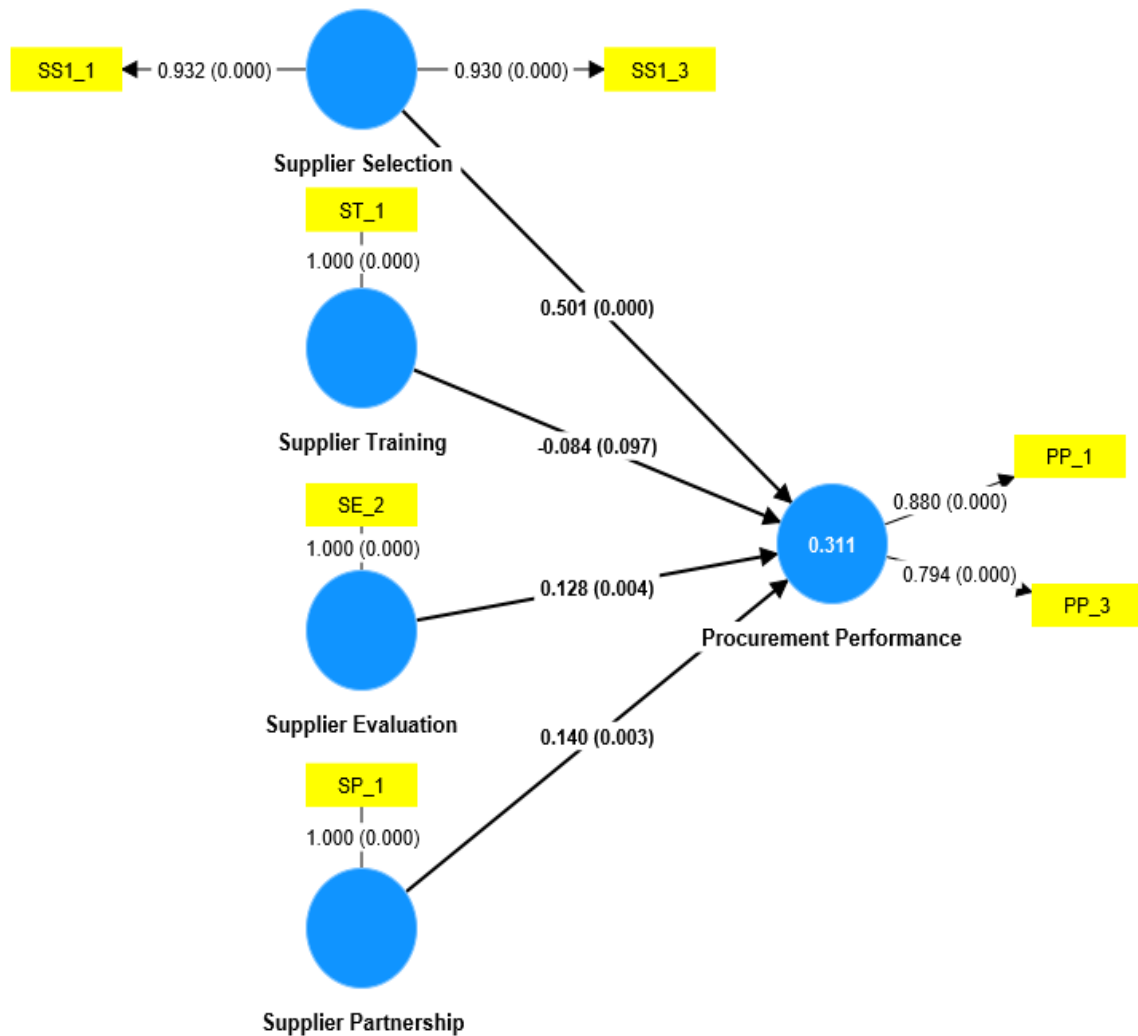
#### **4.10 Partial Least Squares Structural Equation Model**

The study utilized Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the complex relationships between latent constructs within the research model. PLS-SEM was chosen for its advantages over traditional covariance-based structural equation modeling (CB-SEM), especially when dealing with intricate models that include both reflective and formative constructs (Hair et al., 2019). This method was employed to examine the intricate relationships between various factors influencing supplier development efforts and their impact on procurement performance within the steel manufacturing industry. The objective of utilizing PLS-SEM was to uncover the complex interactions among constructs such as supplier selection, evaluation, partnership, training, integration, and procurement performance.

#### 4.10.1 Structural Equation with No Moderating Variable: Measurement Model

In order to answer the research hypotheses, the study fitted two sets of partial least squares structural equation models to assist in determining how the latent variables influence procurement performance. Testing theory with PLS-SEM involves a two-step process (Hair, Black, Babin, & Anderson, 2019). The first step is to evaluate the measurement models to ensure their reliability and validity. Once the measurement models are validated, the focus shifts to testing the structural theory. This sequential approach is necessary because the structural theory's validity cannot be established if the measurement models are not reliable or valid.

Initially, the study evaluated a PLS-SEM model without including the moderating variable (Supplier Integration). The findings are illustrated in Figure 4.1.



## **Figure 4.1: PLS-SEM Measurement Model Relationship between Supplier Development and Procurement Performance**

### **4.10.2 Measurement Model Diagnostics**

The research evaluated the model to determine its validity as a Structural Equation Modelling (SEM) model. An investigation was conducted on the reliability of indicators, internal consistency, convergent validity, discriminant validity of the model, and multi-collinearity. The diagnostic findings are detailed below;

#### **4.10.2.1 Indicator Reliability**

The factor loadings indicate the relative importance of each item on each construct. Factor loadings, also known as validity coefficients, provide an indication of the extent to which the observed variation in variable scores is really legitimate (Schumacker & Lomax, 2016). The present work demonstrates item validity via the factor loadings shown in Figure 4.10. For strong convergent validity, large loadings on a factor suggest that the items converge towards a shared point, known as the latent construct.

The indicators of a PLS-SEM model are considered to be valid when the loading of the model is 0.7 and above. According to the results presented in Table 4.13, all the loadings of the indicators were determined to be above 0.7, this shows that all the indicators were reliable in indicating the respective latent variables and is in agreement with Hulland, (1999) who stated that loadings higher than or equal to 0.7 are preferred however 0.4 is acceptable for exploratory research. Accordingly, indicator loadings should be significantly different from zero, at least at the 0.05 level, and greater than 0.7 (Chin, 2010). The results of the outer loadings of the latent constructs are as shown in Table 4.14

**Table 4.14: Outer Loadings of Latent Constructs**

<b>Latent Construct</b>	<b>Outer Loading</b>
PP_1: Procurement Performance	0.881
PP_3: Procurement Performance	0.793

<b>Latent Construct</b>	<b>Outer Loading</b>
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

#### **4.10.2.2 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 *et al.*, 2017). The composite reliability (CR) statistic for supplier selection was determined to be 0.929 while that for Procurement Performance was determined to be 0.825. Given that the values of the composite reliability statistic were both higher than 0.7, the latent variables were considered to be reliable. Composite reliability should be 0.7 or higher (Bagozzi & Yi, 1988; Tentama & Anindita, 2020). For exploratory research, a value of 0.6 or higher is considered acceptable. Since all values are above the threshold, internal consistency reliability was demonstrated among both latent variables. Regardless of the reliability coefficient used, an internal consistency reliability value above 0.7 is deemed satisfactory in the initial stages of research, and values above 0.8 are considered acceptable in more advanced stages (Nunnally & Bernstein, 1994; Hair et al., 2022). Conversely, a value below 0.6 suggests a weak contribution to the construct. The results of construct validity and reliability are shown in Table 4.15.

**Table 4.15: Construct Reliability and Validity**

<b>Latent Construct</b>	<b>Composite Reliability (rho_c)</b>
Procurement Performance	0.825
Supplier Selection	0.929

**4.10.2.3 Convergent Validity**

Convergent validity primarily evaluates the correlation among items within the same dimension and measures the Average Variance Extracted (AVE). To establish convergent validity, the AVE value is examined (Hamid, 2017; Engellant et al., 2016). It is recommended that the AVE value be equal to or greater than 0.5 to confirm this validity (Bagozzi et al., 1988; Ahmad, 2016).

The 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 Average Variance Extract (AVE) statistic for supplier selection was determined to be 0.868 while that for Procurement Performance was determined to be 0.703 indicating a good convergent validity. The findings of the AVE statistic are presented in Table 4.16

**Table 4.16: AVE Statistic for Latent Variables**

<b>Latent Construct</b>	<b>Average Variance Extracted (AVE)</b>
Procurement Performance	0.703
Supplier Selection	0.868

#### 4.10.2.4 Discriminant Validity

Discriminant validity is used to measure the correlation between items with different facets, using the square root value of AVE to test. The discriminant validity of the latent variables in this study was measured using the Fornell and Larcker (1981) criterion which suggests that the square root of AVE in each latent variable can be used to establish discriminant validity, if this value is larger than other correlation values among the latent variables. The criterion involves comparing the correlation statistics for the latent variables and the square root of the AVE statistic. When the correlation statistic for the latent variables in each row and column is determined to be less than the square root of the AVE statistic in the same row and column, then the discriminant validity of the latent variable will be considered to be satisfied. The results of the analysis were as illustrated in Table 4.17

**Table 4.17 Discriminant Validity for Supplier Development**

	Procurement Performance	Supplier Evaluation	Supplier Partnership	Supplier Selection	Supplier Training
Procurement Performance	<b>0.838</b>				
Supplier Evaluation	0.097	<b>1.000</b>			
Supplier Partnership	0.235	-0.011	<b>1.000</b>		
Supplier Selection	0.512	-0.050	0.138	<b>0.931</b>	
Supplier Training	-0.112	0.054	-0.328	0.022	<b>1.000</b>

The results in Table 4.17 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 et al., 2015).

The model presupposes that there is no multicollinearity among the independent variables. To evaluate this assumption, the study examined the Variance Inflation Factor (VIF) for these variables, with the findings detailed in Table 4.18.



**Table 4.18: Variance Inflation Factor for Supplier Development**

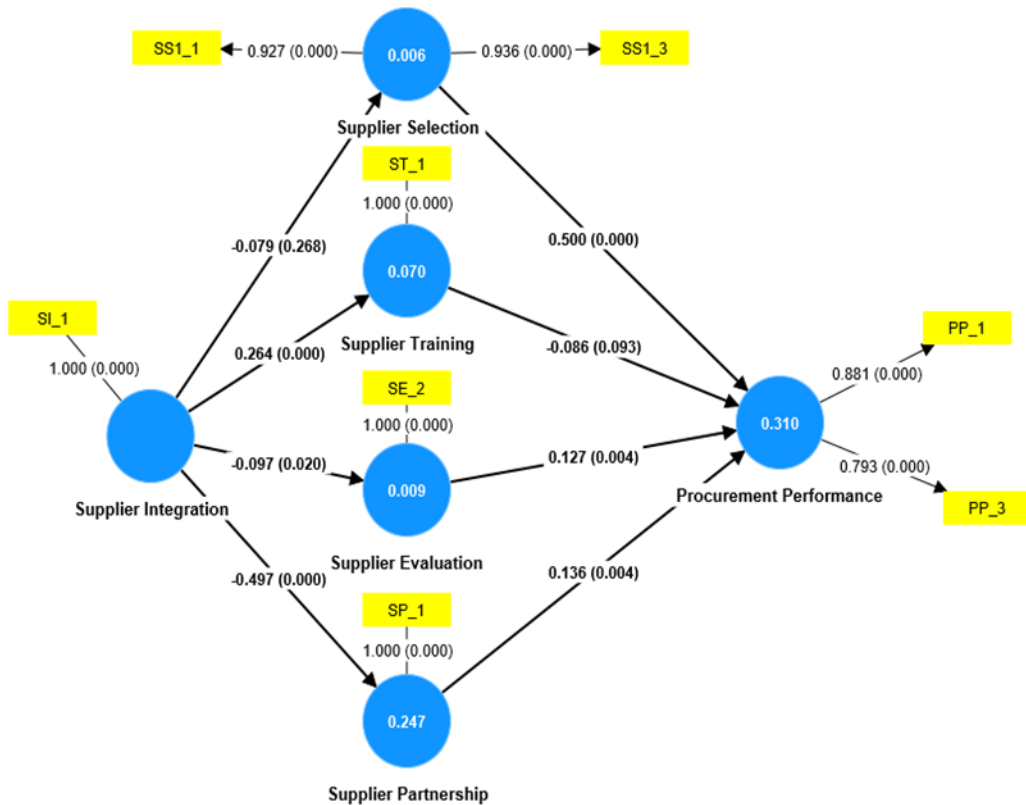
Independent Latent Variables	TOL	VIF
Supplier Evaluation	0.993996	1.006
Supplier Partnership	0.87055	1.148
Supplier Selection	0.97289	1.028
Supplier Training	0.88496	1.130

In order to prevent the collinearity issue, it is generally recommended to have a Variance Inflation Factor (VIF) of 5 or less, which corresponds to a Tolerance level of 0.2 or higher (Hair et al., 2011). The Variance Inflation Factor (VIF) quantifies the degree to which the variability of one indicator is explained by other indicators within the same construct. Values below the traditionally acknowledged threshold of 10 indicate that there is no issue of multicollinearity (Diamantopoulos & Siguaw, 2006; Gujarati, 2003). As to the recommendation of Hair et al. (2022), the correlation between a concept tested formatively and the item(s) measured reflectively should be equal to or greater than 0.708. Hence, based on the findings shown in Table 4.18, it can be concluded that all the VIF statistics for the independent latent variables were below 5. This suggests that there was no presence of multicollinearity among the independent variables.

The proposed structural equation model (SEM) was deemed valid as it met all the reliability and validity criteria. Consequently, the inferences drawn from the model were regarded to be also valid.

#### **4.11 PLS-SEM Path Model with Moderating Variable: Structural Model**

In order to assess how Supplier Integration influenced the relationship illustrated in Fig. 4.10, the study fitted a second PLS-SEM with Supplier Integration as a moderating variable. The results of the model were as illustrated in Figure. 4.2



**Figure 4.2: PLS-SEM Structural Model Moderating Effect of Supplier Integration on the Relationship between Supplier Development and Procurement Performance**

The results in Figure 4.11 show that based on the standardized path coefficients and the  $p$ -values provided in the parenthesis, adoption of better supplier selection strategy improved the procurement performance by approximately 50%. An improvement in supplier training reduced the performance by 8.6%. However, this effect was not significant. Enhanced supplier evaluation strategy increased procurement performance by 12.7%. Lastly, strengthening supplier partnership improved procurement performance by 13.6%. Looking at how the moderating variable influenced the independent variables, embracing supplier integration reduced the need for supplier partnership by 49.7%, reduced need to conduct supplier evaluation by 9.7%, reduced the need for supplier selection by 7.9%. Lastly, it raised the necessity of undertaking supplier training by 26.4%, However, the effect on supplier selection was not significant at 95% confidence level ( $p=0.268$ ). The five variables generally account for 31% of the variation in procurement performance. Supplier Integration accounts for 24.7% of the variation in Supplier Partnership, 0.9% of the variation in supplier evaluation and 7% of the variation in supplier training.

### 4.11.1 Model Diagnostics

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

#### 4.11.1.1 Structural Model Diagnostics

Analysis of the structural model can only be performed after successfully validating the measurement model. According to Urbach and Ahlemann (2010), validating the structural model is essential for assessing whether the hypotheses proposed by the model are supported by the data. In PLS-SEM, the structural model is evaluated using path coefficients and the coefficient of determination ( $R^2$ ).

Assessing the coefficient of determination ( $R^2$ ) is crucial for evaluating the structural model, as it measures the proportion of variance in each endogenous latent variable explained by the model. Chin (2010) suggests that an  $R^2$  value of approximately 0.67 is considered substantial, around 0.333 is average, and 0.19 or lower is weak. The  $R^2$  values for the endogenous latent variables are detailed in Table 4.19.

**Table 4.19:  $R^2$  Values of Latent Variables**

<b>Endogenous Latent Variable</b>	<b>R-square</b>	<b>Consideration</b>
Procurement Performance	0.310	Average
Supplier Evaluation	0.009	Weak
Supplier Partnership	0.247	Average
Supplier Selection	0.006	Weak
Supplier Training	0.070	Weak

The results in Table 4.19 reveal that an R-squared value of 0.310 indicates that 31% of the variance in Procurement Performance is explained by the Supplier Development initiatives and the moderating effect of supplier integration. For supplier evaluation, an R-squared value of 0.009 means that only 0.9% of the variance in supplier evaluation is accounted for by the overall supplier development initiatives and supplier integration. The R-squared value of 0.247 indicates that 24.7% of the variability in supplier partnership is accounted for by supplier development and the moderating influence of supplier integration.

Similarly, an R-squared value of 0.006 for supplier selection indicates that only 0.6% of the variance in supplier selection is explained by the supplier development and supplier integration factors, suggesting minimal influence. Lastly, the R-squared value of 0.070 means that 7% of the variance in supplier training is explained by the supplier development initiatives and the moderating effect of supplier integration.

In summary, the R-squared values highlight varying degrees of influence of supplier development initiatives on different aspects of supplier development and procurement performance. Specifically: Procurement Performance shows an average level of explanatory power, indicating a significant but not comprehensive influence of supplier development initiatives. Supplier evaluation, supplier selection, and supplier training show weak explanatory power, suggesting the need for additional variables or a re-evaluation of measurement approaches. Supplier partnership shows an average level of explanatory power, underscoring its importance within the supplier development framework.

#### **4.11.1.2 Moderation Analysis**

Moderation analysis enables researchers to explore how one or more variables impact the relationships between other variables. It assesses whether the connection between two variables changes depending on the levels of a third variable, known as a moderator (Cohen et al., 2014). Statistically, the effect of a moderator is represented as an interaction and can involve either a categorical variable (such as gender) or a quantitative variable (like self-efficacy level) that affects the direction and/or strength of the relationship between dependent and independent variables (Cohen et al., 2014).

#### **4.11.1.3 Indicator Reliability**

The indicator of a PL-SEM model is considered to be valid when the loading of the model is 0.7 and above. Based on the results in Fig. 4.2, all the loadings of the indicators were determined to be above 0.7, this showed that all the indicators were reliable in indicating the respective latent variables.

#### **4.11.1.4 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. The composite reliability statistic for supplier selection was determined to be 0.929 while that for Procurement Performance was determined to be 0.825. Since the composite reliability values exceeded 0.7, the latent variables were deemed reliable.

#### 4.11.1.5 Convergent Validity

The 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 Average Variance Extract (AVE) statistic for supplier selection was determined to be 0.868 while that for Procurement Performance was determined to be 0.703. Given that the values of Average Variance Extract (AVE) statistic were both higher than 0.5, the latent variables were convergent.

#### 4.11.1.6 Discriminant Validity

The discriminant validity of the latent variables was looked into by the study using the Fornell and Larcker (1981) criteria. The criteria involve comparing the correlation statistics for the latent variables and the square root of the AVE statistic. Discriminant validity is considered satisfactory when the correlation statistic for the latent variables in each row and column is lower than the square root of the AVE statistic in the corresponding row and column. The results of the analysis were as illustrated in table 4.20

**Table 4.20: Discriminant Validity of Supplier Development with Moderating Variable**

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

Based on the findings presented in Table 4.20, the correlation statistics for all latent variables in each row and column are lower than the square root of the AVE statistic along the main diagonal of the matrix. This indicates that discriminant validity has been achieved.

#### 4.11.1.7 Multi-collinearity

The model presumes the absence of multi-collinearity among the independent variables. To evaluate this assumption, the study examined the Variance Inflation Factor (VIF) for these variables. The findings are shown in Table 4.21.

**Table 4.21: Variance Inflation Factor for Supplier Development with Moderating Variable**

<b>Independent Latent Variables</b>	<b>TOL</b>	<b>VIF</b>
Supplier Evaluation	0.99440	1.006
Supplier Partnership	0.86957	1.150
Supplier Selection	0.92087	1.030
Supplier Training	0.88496	1.130
Supplier Integration	1.00000	1.000

According to the results in Table 4.20, since the VIF statistics for all independent latent variables ranged from 1 to 10, it indicates that there was no multi-collinearity among the independent variables.

Given that the model satisfied all the reliability and validity assumptions, the SEM was a valid model and the conclusions made from the model were valid.

#### 4.12 Model Comparison

The study compared the two models using the Bayesian Information Criteria (BIC) to assess the model that was the best among the two. Using the BIC technique, the model with the lowest BIC is always considered as the best. The first model without the moderating variable shown in Figure 4.10 had a BIC of -76.435 while the second model with the intervening variable in Figure 4.11 had a BIC of -75.969. This shows that the first model had a smaller BIC compared to the second model hence the first model is superior to the second model. This decision was supported by the principle of Occam's razor, which states that, all other things being equal; a simpler model is preferred over a more complex one.

### 4.13 Hypothesis Testing

Using the PLS-SEM model fitted in the equation shown in Fig 4.11, the study used the model to test for the effects of the supplier development on procurement performance. The test of hypothesis results based on the Hotelling's t-test was as illustrated in Table 4.22.

**Table 4.22 Hypotheses Test Results**

Path Analysis	Path Coefficient ( $\beta$ )	T-Value	<i>p-value</i>	<i>Hypothesis</i>
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

**Key:** SS – Supplier selection, SI- Supplier integration, ST – Supplier training, SE – Supplier evaluation, SP – Supplier Partnership, PP – Procurement Performance.

#### 4.13.1 Relationship between Supplier Selection and Procurement Performance

The first hypothesis of the study was stated as;

**H<sub>01</sub>:** *There is no significant relationship between supplier selection and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and T2- statistic in Table 4.22, the results show that at 95% confidence level, there was adequate evidence to disprove the hypothesis. ( $\beta=0.50$ ,  $t=8.309$ ,  $p<0.05$ ). This shows that supplier selection had a significant positive relationship with procurement performance. This indicates that supplier selection is essential to the procurement performance of steel manufacturing firms. 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.



Moreover, the procuring firm's ability to enhance their capability does not only depend on supplier capabilities but also on the ability of the procuring firm to effectively incorporate the supplier into the organization's operations and network.

Therefore, the more a firm improves on its supplier selection strategies, the better the performance of the procurement department. This implies that supplier selection is a strong indicator of procurement performance of steel manufacturing firms in Nairobi City County, Kenya. As a result, when the steel manufacturing firms enhance their supplier selection processes, then their procurement performance would be better as they would get reliable and quality inputs for their production processes. Prior research has shown that supplier performance (Mayenga & Okibo, 2018; Makhitha, 2020), product quality (Kariuki *et al.*, 2018; Makhitha, 2020), supplier accountability (Waluke, 2018) and ICT adoption by suppliers (Sabiti & Mulyungi, 2018) positively impact procurement performance.

This study therefore contributes to existing literature by showing that application of supplier selection strategies impacts positively on procurement performance of steel manufacturing firms in Nairobi City County, Kenya. This finding aligns with the theoretical expectations that a careful and strategic selection of suppliers can enhance the overall performance of procurement processes. This therefore suggests that steel manufacturing firms should prioritize the process of selecting suitable suppliers by carefully evaluating and choosing suppliers based on factors such as product quality, supplier reliability, product cost-effectiveness, and delivery performance in order to optimize their procurement operations and improve overall performance. Firms should ensure that selected suppliers are able to deliver quality billets and that the total cost of acquisition of furnace oil is the lowest possible. By choosing reliable and competent suppliers, steel manufacturing firms can enhance the reliability, consistency, and overall quality of the materials they acquire. This, in turn, can enhance production efficiency, improve product quality, and boost customer satisfaction.



It is therefore evident that the more a firm improves on its supplier selection strategies, the better the performance of the procurement function. As a result, when the steel manufacturing firms enhance their supplier selection processes, then their procurement performance would be better as they would get reliable and quality inputs for their production processes. Steel manufacturing firms can leverage these findings to develop more effective supplier selection strategies which can result in improved operational efficiency, cost savings, and enhanced product or service quality. Moreover, these findings contribute to the extant knowledge by providing empirical data to support the positive influence of supplier selection on procurement performance.

#### **4.13.2 Relationship between Supplier Partnership on Procurement Performance**

The second hypothesis of the study was stated as;

**H<sub>02</sub>:** *There is no significant relationship between supplier partnership and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and the hoteling's  $T^2$ -statistic in Table 4.22, the results show that at 95% confidence level, there was adequate evidence to disprove the hypothesis ( $\beta=0.136$ ,  $t=2.872$ ,  $p<0.05$ ).

This result suggests that there is a significant positive relationship between supplier partnership and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

The finding underscores the significantly positive relationship of supplier partnership and procurement performance and is consistent with previous studies including Mawardi (2019) that primarily; information sharing has several effects on procurement performance including optimized processes that improve operations and procurement performance. Kioko (2016) found a strong positive and significant correlation between supplier incentives and organizational performance. Likewise, Liang, and Shahzad (2015) aver that collaboration and information sharing with suppliers would lead to short order fulfillment times and minimize price volatility which the steel manufacturing firms could take advantage of to sign long term contracts.

This finding is in assonance with existing theoretical expectations, emphasizing the importance of collaborative relationships with suppliers in driving positive outcomes in procurement. This therefore suggests that the more a firm strengthens its supplier partnership activities the better its procurement performance. The significant positive

effect of supplier partnership on procurement performance highlights the importance of developing strong collaborative relationships with suppliers. By fostering partnerships based on trust, communication, and mutual cooperation, steel manufacturing firms can enhance their procurement operations and achieve improved overall performance. Procurement personnel in the steel manufacturing firms can leverage this knowledge to prioritize and invest in supplier partnership initiatives, which can lead to improved operational efficiency, cost savings, increased innovation, and better-quality control.

In the steel manufacturing sector, the availability and quality of raw materials are crucial factors that impact the efficiency and effectiveness of production processes. Raw materials such as scrap metal and manganese are vital components in the manufacturing of steel products. Supplier partnership characterized by close collaboration and shared goals between steel manufacturing firms and their raw material suppliers, can significantly impact the procurement of high-quality raw materials. Effective supplier partnerships extend beyond raw materials to encompass finished products, such as steel plates and angle lines, which are critical for meeting customer demands. By cultivating strong supplier partnerships, steel manufacturers can enhance the quality, reliability, and timeliness of their raw material inputs and finished products, leading to improved production efficiency and customer satisfaction.

Based on the theory of constraints, steel manufacturing firms need to identify various constraints that affect their processes and collectively work to eliminate them. The theory has been applied to address procurement inefficiencies, including extended lead times, material shortages, and quality issues. Therefore, by strengthening their supplier partnership strategies, steel manufacturing firms will be able to ensure that effective cooperation, open communication and real time delivery of supplies is achieved and hence better stakeholder relationships and reduced supply chain risks leading to an overall improvement of their procurement performance.

### 4.13.3 Relationship between Supplier Training and Procurement Performance

The third hypothesis of the study was stated as:

**H<sub>03</sub>:** *There is no significant relationship between supplier training and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and the hoteling's  $T^2$ -statistic in Table 4.22, the results show that at 95% confidence level, there was no sufficient evidence to reject the hypothesis ( $\beta = -0.086$ ,  $t = 1.683$ ,  $p > 0.05$ ) providing evidence to accept the null hypothesis.

The findings imply that supplier training has no significant relationship with procurement performance of steel manufacturing firms in Nairobi City County, Kenya. It therefore means that supplier training activities do not really improve the procurement performance of steel manufacturing firms.

Based on this finding, it can be concluded that supplier training did not have a significant relationship with 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 the steel manufacturing firms. These findings differ from those of Nasiche et al. (2020), who report a strong positive correlation between supplier assistance, quality management training, and the performance of sugarcane processing firms. The findings also conflict that of Modi and Mabert (2017) who found that supplier training ensures consistency, efficiency, and effectiveness which improves procurement performance.

The results raise a plethora of issues. Chief among them is that the steel manufacturing firms in Nairobi, Kenya mostly rely on single sourcing and engage most of their suppliers for long periods. This is mostly because the owners who are mostly of Asian origin believe that as long as a supplier is able to meet their quality expectations, then there is no need of sourcing elsewhere up to and until the said supplier delivers goods whose quality is compromised. The results can be linked to the social capital theory that contends that strong buyer loyalty and the development of social capital with important suppliers can improve the performance of buying firms.

The quality of raw materials, such as Sulphur, carbon, and scrap metals, directly influences the manufacturing process and the final product quality in the steel industry. In

addition to raw materials, the quality of final products, including round bars, British reinforced concrete (BRC) mesh, and nails among others is critical for the overall performance and customer satisfaction of steel manufacturing firms. The lack of a significant effect suggests that the current supplier training activities implemented by steel manufacturers may not effectively translate into tangible improvements in procurement performance. One possible explanation for the insignificant effect of supplier training on procurement performance could be the limited impact of training on enhancing the quality of raw materials. Further investigation is needed to determine whether the supplier training programs adequately address the specific quality requirements and processes related to raw materials in the steel manufacturing industry.

Although this study did not find a significant effect, it is possible that other factors or variables not included in the analysis may impact the relationship between supplier training and procurement performance in steel manufacturing firms in Nairobi City County, Kenya. Exploring the relationship between supplier training and the quality control processes for final products may provide insights into how training activities can contribute to meeting customer expectations and improving the overall product quality. Future research could explore additional variables such as the quality of training programs, the level of engagement and participation of suppliers, or the alignment between training content and organizational needs to gain a deeper understanding of the relationship.

#### **4.13.4 Relationship between Supplier Evaluation and Procurement Performance**

The fourth hypothesis stated that:

**H<sub>04</sub>**; *There is no significant relationship between supplier evaluation and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and the hoteling's T<sup>2</sup>-statistic in Table 4.22, the results show that at 95% confidence level, there was sufficient evidence to reject the hypothesis ( $\beta=0.127$ ,  $t=2.884$ ,  $p<0.05$ ). The findings suggest that supplier evaluation is positively and significantly associated with the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

The results align with the findings of Ouko and Juma (2020), Yun (2018), and Mutai and Okello (2016), who found that factors such as supplier quality commitment, financial stability, and competence significantly impact procurement performance. Consequently, steel manufacturing firms should establish effective evaluation metrics tailored to their procurement goals and objectives. Implementing a comprehensive set of performance metrics facilitates thorough supplier assessment, helps identify areas for improvement, and enables ongoing performance tracking. Additionally, supplier evaluation plays a crucial role in managing supply chain risks. By regularly assessing supplier performance and monitoring key risk indicators, organizations can proactively identify and mitigate potential risks in their supply chain. Supplier evaluation results can inform risk mitigation strategies, such as supplier diversification, contingency planning, or supplier development efforts aimed at addressing critical vulnerabilities. Integrating supplier evaluation within the broader risk management framework enables organizations to enhance supply chain resilience and mitigate potential disruptions thereby improving the overall procurement performance.

The positive coefficient suggests that an improvement in supplier evaluation is associated with better procurement performance. The finding aligns with extant theoretical expectations, highlighting the importance of effectively assessing and monitoring suppliers to achieve improved procurement outcomes. The finding further suggests that steel manufacturing firms should prioritize the systematic assessment of suppliers. By evaluating supplier performance based on criteria such as quality, delivery reliability, responsiveness, and financial stability, organizations can make more informed decisions, mitigate risks, and improve overall procurement performance. Steel manufacturing firms should therefore develop effective supplier evaluation strategies, establish performance metrics, and implement ongoing monitoring processes. By doing so they can enhance their supplier management practices, optimize supplier selection, and improve overall procurement outcomes.

One possible explanation for the significant influence of supplier evaluation on procurement performance could be the improved raw material quality, including sulphur, carbon, and scrap metal obtained through thorough supplier evaluation processes. The

finding suggests that a comprehensive supplier evaluation approach helps steel manufacturers select suppliers who consistently provide high-quality raw materials, contributing to enhanced production processes and final product quality. The positive influence of supplier evaluation on procurement performance further implies that the evaluation process may also contribute to the improved quality of final products such as angle lines, steel plates, steel tubes, round bars, BRC, and nails. By evaluating suppliers based on quality criteria, steel manufacturers can ensure the acquisition of superior final products that meet specifications, conform to industry standards, and satisfy customer expectations.

The finding underscores the importance of implementing robust supplier evaluation mechanisms to ensure the procurement of high-quality raw materials and the production of superior final products in the steel manufacturing industry. Effective supplier evaluation strategies should encompass quality control measures, adherence to specifications, and close collaboration with suppliers to maintain a consistent supply of top-notch raw materials and final products.

#### **4.13.5 Moderating effect of Supplier Integration on the Relationship between Supplier Development and Procurement Performance**

The fifth hypothesis was stated as;

**H<sub>05</sub>:** *Supplier integration does not moderate the relationship between supplier development and procurement performance of steel manufacturing firms in Nairobi City County, Kenya.*

Using the path coefficient and the T<sup>2</sup>-statistic in Table 4.22, the results show that at 95% confidence level, there was sufficient evidence that supplier integration has significant negative relationship with: 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 show that supplier integration has no significant relationship with 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 has a negative significant relationship with procurement performance ( $\beta = -0.142$ ,  $t = 1.108$ ,  $p < 0.05$ ). Given that supplier integration significantly affected three of the variables that measured supplier development and it also had a significant indirect relationship with procurement performance, there was sufficient evidence at 95% level of confidence to reject the null hypothesis thereby concluding that supplier integration has a significant relationship on the relationship between supplier development and procurement performance.

These results concur 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 improvement of procurement performance. Likewise, Mutwiri *et al.*, (2019) observed that supplier integration and internal integration have a statistically positive and significant effect on organizational performance. Other evidence from the manufacturing sector (Jin *et al.*, 2019) show that manufacturers invest more in supplier development after it integrates with their suppliers and both manufacturers integrate with their suppliers at equilibrium.

The findings imply that supplier integration in the relationship with supplier partnership ( $\beta = -0.497$ ,  $t = 10.702$ ,  $p < 0.05$ ) and supplier evaluation ( $\beta = -0.097$ ,  $t = 2.323$ ,  $p < 0.05$ ) indicating that a high level of supplier integration is associated with lower levels of partnership and evaluation. On the other hand, in the relationship with supplier training ( $\beta = 0.264$ ,  $t = 4.988$ ,  $p < 0.05$ ) indicates that higher levels of supplier integration correspond to higher levels of supplier training. These findings suggest that supplier integration influences the adoption and implementation of supplier development. However, it is noteworthy that supplier integration has no significant effect on supplier selection ( $\beta = -0.079$ ,  $t = 1.108$ ,  $p > 0.05$ ). This implies that, in the context of this study, supplier integration does not significantly impact the process of selecting suppliers.

The analysis of the indirect effect of supplier integration on procurement performance reveals a significant negative coefficient ( $\beta = -0.142$ ). This postulates that a higher level of supplier integration is associated with low levels of procurement performance. It indicates that the influence of supplier development on procurement performance is contingent on the level of supplier integration. The negative indirect effect suggests that disproportionate integration may hinder procurement performance, possibly due to reduced flexibility, increased dependence on specific suppliers, or limited access to alternative suppliers. These findings underscore the importance of carefully managing

supplier integration to maximize the benefits of supplier development while avoiding potential drawbacks.

These findings provide support for the hypothesis that supplier integration moderates the relationship between supplier development and procurement performance. The significant effects of supplier integration on supplier partnership, supplier evaluation, and supplier training, coupled with the negative indirect effect on procurement performance, highlight the importance of considering the role of supplier integration in understanding the impact of supplier development. Steel manufacturing firms in Nairobi, Kenya should recognize that supplier integration can have either positive or negative effects on supplier development and procurement performance. Striking a balance between integration and maintaining flexibility and diversity in the supply chain is crucial. Emphasis should therefore be on industry characteristics and business objectives when determining the optimal level of supplier integration.

This study therefore contributes to existing literature by showing that supplier integration significantly enhances overall procurement performance by collaborating with and incorporating suppliers into the processes, strategies and systems of steel manufacturing firms in Nairobi, Kenya. This may be achieved through information sharing, systems integration, innovation and co-creation, and collaborative planning which would in turn translate to efficient procurement processes, improved supplier performance, and better overall organizational outcomes. Succinctly, the findings add to the understanding of the complex relationships between supplier integration, supplier development, and procurement performance. Future studies could further explore the mechanisms and contextual factors that influence the interface between supplier integration and supplier development. Additionally, investigating the potential mitigating strategies or approaches to mitigate the negative effects of excessive integration on procurement performance would be valuable.



## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter summarizes the findings, draws conclusions, and outlines recommendations based on those conclusions. It also proposes areas for future research.

#### **5.2 Summary of Findings**

This study aimed to explore the connection between supplier development and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya based on the responses from 10 selected steel firms. Prior to the analysis of data obtained to ascertain the existing relationship between the constructs, reliability and construct validity was confirmed through exploratory factor analysis. All items of the constructs were confirmed to have factor loadings above the prescribed thresholds and were therefore retained for further analysis. Descriptive statistics was conducted to illustrate the level of agreement or disagreement of the respondents to the extent of adoption of the supplier development strategies. Subsequently, Partial Least Squares Structural Equation Modelling (PLS-SEM) with the aid of SmartPLS 4.0 and Statistical Package for Social Sciences (SPSS V26.0) software's was used for data analysis to ascertain the different study end points.

##### **5.2.1 Relationship between Supplier Selection and Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The first research objective of this study was to assess how supplier selection impacts the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. Data analysis shows that, supplier selection has a significant positive relationship with procurement performance. The study shows that various factors such as accountability and product quality, supplier reputation, supplier performance and technology capability, and product pricing all play critical roles in enhancing procurement performance. By prioritizing these factors during supplier selection, steel manufacturing firms in Nairobi City County, Kenya can improve the quality, reliability and cost effectiveness of their procurement operations.

### **5.2.2 Relationship between Supplier Partnership and Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The second research objective of this study was to determine the relationship between supplier partnership and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. The data analysis revealed a notable positive correlation between supplier partnership and procurement performance. The study shows that information sharing; collaboration and supplier relationships are critical factors that enhance procurement performance. By prioritizing these factors and investing in strong collaborative relationships with suppliers, steel manufacturing firms in Nairobi City County, Kenya can improve quality, reliability and cost-effectiveness of their procurement operations. Ultimately, this can help in achieving better outcomes and achieving a competitive edge in the industry.

### **5.2.3 Relationship between Supplier Training on Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The third research objective of this study was to determine the relationship between supplier training and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. Data analysis shows that supplier training has no significant relationship with procurement performance of steel manufacturing firms in Nairobi City County, Kenya. The study shows that on-job trainings, seminars and conferences, supplier assisted trainings and quality management trainings do not really improve the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

### **5.2.4 Relationship between Supplier Evaluation and Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The fourth research objective of this study was to determine the relationship between supplier evaluation and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. Data analysis shows a significant positive relationship between supplier evaluation and procurement performance of steel manufacturing firms in Nairobi City County, Kenya. The study shows that supplier financial capacity and stability, quality performance and supplier competence are important factors that can enhance procurement performance.

By working with suppliers who have the necessary skills, resources, and experience, steel manufacturing firms in Nairobi City County, Kenya can improve the quality and

timeliness of goods and services they receive. This can help reduce lead times and improve product quality leading to improved procurement performance.

#### **5.2.5 Moderating Effect of Supplier Integration on the Relationship between Supplier Development and Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya**

The fifth research objective aimed to explore the moderating effect of supplier integration on the relationship between supplier development and procurement performance of steel manufacturing firms in Nairobi City County, Kenya. The findings reveal that supplier integration exerts a significant impact on supplier partnership, supplier evaluation and supplier training. However, no significant effect was observed on supplier selection. Notably, the study unveils a significant negative indirect effect of supplier integration on procurement performance.

These results underscore a crucial aspect of the relationship between supplier development and procurement performance in the steel manufacturing context. The negative indirect effect suggests that higher levels of supplier integration are associated with lower levels of procurement performance. This implies that while supplier development initiatives may positively impact certain aspects of supplier integration, an excessive level of integration may have adverse consequences on the overall procurement performance. Factors such as reduced flexibility, increased dependence on specific suppliers, or limited access to alternative suppliers might contribute to this negative influence.

In conclusion, the study provides compelling evidence that supplier integration significantly influences the dynamics between supplier development and procurement performance in steel manufacturing firms in Nairobi City County, Kenya. The negative indirect effect on procurement performance emphasizes the need for careful consideration and strategic management of supplier integration to ensure that the benefits of supplier development are maximized while potential drawbacks are mitigated. Future research avenues could explore specific mechanisms and strategies to optimize supplier integration and strike a balance that fosters positive procurement outcomes within the steel manufacturing industry.

### **5.3 Conclusions**

This study investigated the relationship between supplier development and the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. It was intended to produce an appropriate mix of supplier development initiatives for the improvement of procurement performance of steel manufacturing firms in Nairobi City County, Kenya. The study specifically sought to investigate the relationship between supplier development: supplier selection, supplier partnership, supplier training, supplier evaluation and supplier integration on the procurement performance of steel manufacturing firms in Nairobi City County, Kenya. The following conclusions were drawn:

1. Supplier selection has a positive relationship with the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.
2. Supplier partnership has a positive relationship with the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.
3. Supplier training has no significant relationship with the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.
4. Supplier evaluation has a positive relationship with the procurement performance of steel manufacturing firms in Nairobi City County, Kenya.
5. Supplier integration positively affects aspects of supplier development; such as partnership, evaluation, and training, it also has a negative indirect effect on procurement performance of steel manufacturing firms in Nairobi City County, Kenya.

### **5.4 Recommendations**

Despite the acknowledged limitations, including the constrained geographical scope, the influence of external factors like economic fluctuations and global events such as the Covid-19 pandemic, as well as constraints related to data collection and respondent cooperation, it is essential to recognize the substantial contribution of this study to academic knowledge and practical applications. Moreover, this research underscores

critical areas that warrant further exploration in the future. This section highlights specific recommendations as well as points out who should take the necessary responsibility.

First, basing generalizations on the findings of this study, steel manufacturing firms need to prioritize the importance of robust supplier selection processes, effective communication and collaboration with suppliers, and ongoing performance monitoring and risk management to enhance procurement performance. By prioritizing these areas, organizations can improve the reliability, quality and cost effectiveness of their procurement operations, leading to better outcomes and competitive advantage in their respective markets.

Second, it is important for steel manufacturing firms to understand the importance of supplier partnership in enhancing procurement performance particularly in terms of cost savings, quality improvement and supply chain resilience. The burden is on the steel manufacturing firms to review the best supplier partnership strategies that would fit their organization's needs including strategies for building trust, communication and collaboration with suppliers, as well as tools and technologies that can facilitate the partnership.

Third, supplier training in this case was found not to improve the procurement performance of steel manufacturing firms in Nairobi, Kenya. This could be attributed to the social inclination and culture of the owners of these firms who are mostly of Asian origin who tend to work with suppliers based on trust as long as product quality is not compromised. 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 trainings. At organizational level, steel manufacturing firms should be encouraged to be proactive in supplier training as this will not only enhance their procurement performance but also the overall performance of the organizations.

Fourth, since supplier evaluation influences procurement performance, steel manufacturing firms in Nairobi, Kenya should invest in robust supplier evaluation processes to take into account various factors such as supplier quality, pricing, and customer service and delivery performance. The procurement personnel should also be trained in risk management and mitigation to enable them identify potential risks during evaluation as well as take necessary proactive steps to manage them. Steel manufacturing firms should also invest in technology enabled procurement solutions to streamline their procurement processes and improve supplier evaluation and management.

Fifth, steel manufacturing firms in Nairobi, Kenya should prioritize supplier integration by developing collaborative relationships with suppliers to create a shared vision and common goals. At the same time, the procurement personnel should craft a mechanism of frequently and openly communicating with suppliers to develop a culture of trust and transparency. This should in turn lead to the establishment of clear performance metrics and goals for supplier integration and regularly assess and monitor supplier performance to ensure alignment with the organization's strategic objectives. By developing strong

supplier integration strategies, organizations can improve procurement inefficiencies, product innovation and ultimately achieve better procurement performance.

The study also provides implications for policy makers. There is a need to strengthen research institutions to collaborate with steel manufacturing firms if procurement performance is to be enhanced. The government should encourage and support collaboration between steel manufacturing firms and research institutions. This will enable both researchers and steel manufacturers to mutually benefit from each other's knowledge areas and expertise.

### **5.5 Areas for Further Research**

This study has advanced the understanding of supplier development and its impact on procurement performance in Nairobi's steel manufacturing sector. However, additional research is needed to explore supplier development's effects and relevance across various sectors that depend on steel.

Replicating this research in different sectors and industries that heavily depend on steel, such as transportation, oil and gas, aerospace, infrastructure development, and consumer goods industries, for comparative analysis to offer insights into the universality of supplier development's influence on procurement performance. Comparing findings across various industries could reveal industry-specific nuances and highlight best practices.

Expanding the scope of future studies to include larger samples drawn from a more extensive pool of manufacturers can lead to a deeper understanding of the relationship between supplier development and procurement performance. Large-scale studies can provide statistical robustness and more accurate generalizability of findings.

Consideration should be given to conducting longitudinal research to capture how supplier development strategies evolve and impact procurement performance over time. Tracking changes in the implementation of supplier development initiatives and their long-term effects can offer valuable insights for both researchers and industry practitioners.

Comparative studies that analyze the procurement performance of steel manufacturing firms in Nairobi, Kenya, against similar firms in other regions or countries can shed light on the influence of geographical factors, regulatory environments, and global market dynamics on supplier development outcomes.

Future research could explore the supplier's perspective in more depth, assessing how supplier development programs affect their operations, competitiveness, and relationships with multiple buyers. Understanding supplier experiences and challenges can lead to more effective collaboration strategies.

By exploring these areas for further research, scholars and practitioners can continue to advance our understanding of the intricate relationship between supplier development and procurement performance, ultimately contributing to more effective and sustainable supply chain management practices across various industries and regions. These research endeavors have the potential to shape the future of supplier development strategies and procurement excellence.

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### **APPENDIX I: QUESTIONNAIRE**

This questionnaire is aimed at collecting data on Supplier Development and Procurement Performance of Steel Manufacturing Firms in Nairobi, Kenya for a PhD. Thesis. The data will solely be used for academic purposes and will be treated with strict confidence. You are requested to participate in the study by providing responses to the items in the various sections as indicated.

#### **SECTION ONE: SUPPLIER SELECTION**

Please indicate your level of disagreement in respect to the following statements as they relate to the supplier selection process in your organization. Please tick (✓) the option applicable to each statement. Strongly Agree (SA) = 1, Agree (A) = 2, Not Sure (NS) = 3, Disagree (D) = 4 and Strongly Disagree (SD) = 5.

	<b>Statements</b>	<b>SD</b>	<b>D</b>	<b>NS</b>	<b>A</b>	<b>SA</b>
1.	The company supplier selection process is competitive.					
2.	The company supplier selection process exhibits honesty.					
3.	The procured products meet the necessary quality specifications.					
4.	The procured products have little to no defects.					
5.	The performance history on a supplier's profile is a determinant factor in selection.					
6.	The company supplier selection criterion prefers those with shorter lead times.					

7.	The supplier quality commitment is taken into consideration when making supplier selection decisions.					
8.	The company selects suppliers who have invested in IT.					
9.	The criterion for supplier selection prefers those with a positive market reputation.					
10.	The selection criteria prefer those who offer the lowest total cost of acquisition.					

## SECTION TWO: SUPPLIER PARTNERSHIP

Please indicate your level of disagreement in respect to the following statements as they relate to the supplier partnership process in your organization. Please tick (√) the option applicable to each statement. Strongly Agree (SA) = 1, Agree (A) = 2, Not Sure (NS) = 3, Disagree (D) = 4 and Strongly Disagree (SD) = 5.

	Statements	SD	D	U	A	SA
1.	There is a high level of commitment between our company and our suppliers.					
2.	The company maintains long-term relationships with its suppliers.					
3.	Our firm undertakes joint ventures with suppliers in research and development programs.					
4.	The company exchanges information with suppliers.					
5.	The company and its suppliers keep inform each other about changes that may affect the other.					
6.	The company includes key suppliers in planning and goal-setting activities.					
7.	The information exchanged between the company and its suppliers is complete, timely, accurate, and adequate.					
8.	The company provides technical training to its supplier's operational staff.					

## SECTION THREE: SUPPLIER TRAINING

Please indicate your level of disagreement in respect to the following statements as they relate to the supplier training process in your organization. Please tick (√) the option applicable to each statement. Strongly Agree (SA) = 1, Agree (A) = 2, Not Sure (NS) = 3, Disagree (D) = 4 and Strongly Disagree (SD) = 5.

	Statements	SD	D	NS	A	SA
1.	The company offers training programs to its key suppliers.					
2.	The company continuously trains employees across the ranks involved in the procurement process.					
3.	The company encourages individual learning.					
4.	Suppliers are taken through quality requirement trainings.					
5.	Suppliers are educated on the requirements of the organization.					



6.	The company organizes seminars and conferences to train all staff involved in procurement.					
7	The company assists suppliers in acquiring certification from agencies.					
8	Conducting training programs for key suppliers has improved our operational flexibility.					
9.	The trained staff in the supply chain department are promoted and awarded effectively.					

#### SECTION FOUR: SUPPLIER EVALUATION

Please indicate your level of disagreement in respect to the following statements as they relate to the supplier evaluation process in your organization. Please tick (√) the option applicable to each statement. Strongly Agree (SA) = 1, Agree (A) =2, Not Sure (NS) = 3, Disagree (D) = 4 and Strongly Disagree (SD) = 5.

	Statements	SD	D	NS	A	SA
1.	The company regularly assesses the performance of suppliers in terms of quality, delivery time, and costs.					
2.	The supplier evaluation process is guided by the ability of the supplier to meet the company objectives.					
3.	The purpose and objectives of our supplier evaluation system are widely understood.					
4.	Supplier finances are considered during the evaluation process					
5.	Identification criterion ensures that only suppliers with a strong financial standing are selected					
6.	The company evaluation criteria include suppliers that meet ISO standards.					
7.	The company communicates supplier evaluation results to the suppliers.					
8.	The company sets and communicates challenging performance goals to the suppliers.					

#### SECTION FIVE: SUPPLIER INTEGRATION

Please indicate your level of disagreement in respect to the following statements as they relate to the supplier integration process in your organization. Please tick (√) the option applicable to each statement. Strongly Agree (SA) = 1, Agree (A) =2, Not Sure (NS) = 3, Disagree (D) = 4 and Strongly Disagree (SD) = 5.

	Statements	SD	D	NS	A	SA
1.	There is frequent communication amongst all key units and departments within the organization.					
2.	There is a high level of system integration among the departments.					
3.	The organization encourages the workforce to work as a team towards achieving a shared goal.					
4.	Our company decision-making process is a joint activity by the company's leadership.					

5.	Our company often shares information with suppliers on how to improve our quality standards, responsiveness, and performance.					
6.	We work as a team with our suppliers to solve problems that arise.					
7.	We consider the inclusion of our main suppliers in the course of scheduling our activities and planning goals.					
8.	We have collaborative platforms through which we partner with suppliers.					

## SECTION SIX: PROCUREMENT PERFORMANCE

Please indicate your level of disagreement in respect to the following statements as they relate to the procurement performance process in your organization. Please tick (✓) the option applicable to each statement. Strongly Agree (SA) = 1, Agree (A) =2, Not Sure (NS) = 3, Disagree (D) = 4 and Strongly Disagree (SD) = 5.

	Statements	SD	D	NS	A	SA
1.	Conducting training programs for key suppliers has reduced our product cost.					
2.	Conducting training programs for key suppliers has improved our product quality.					
3.	Conducting training for our suppliers has improved the speed at which products are delivered once ordered.					
4.	Selection criteria of suppliers has enabled the company to enhance transparency hence reduction in corruption-related costs.					
5.	Supplier selection criteria have significantly reduced failure costs; suppliers deliver more quality and customized good.					
6.	Information sharing with suppliers has led to reduced return of our products by customers due to defects.					
7.	Management of supplier relationships has led to continuous on-time delivery.					
8.	Supplier development initiatives in our company have led to efficiency and effectiveness in procurement.					
9.	Information sharing with suppliers has led to improved product quality.					
10.	Improved communication with suppliers has led to reduced product cost					

## APPENDIX II: LETTER OF INTRODUCTION



**Maasai Mara University**  
BOARD OF POSTGRADUATE STUDIES  
OFFICE OF THE DIRECTOR

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30<sup>th</sup> November, 2022

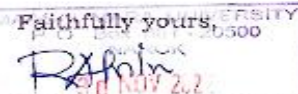
**RESEARCH PERMITS SECTION  
NACOSTI  
UTALII HOUSE**

**REF: KEVIN GUDDA OCHEING (REG. NO. BP01/JP/MN/13608/2021)**

We wish to confirm that the above named is a bona fide Ph.D student at Maasai Mara University pursuing Ph.D in Business Administration (Procurement and Supply Chain Management) in the School of Business and Economics. His proposed research is '*Effects of Supplier Development on Procurement Performance of Steel Manufacturing Firms in Nairobi City County, Kenya*'. He would like to apply for a research permit from NACOSTI before she can proceed for field work and data collection.

We further confirm that the candidate has adhered to all research protocol requirements of Maasai Mara University and the proposed research has been rated as having no known adverse impacts on the environment and does not pose any ethical concerns.

This is therefore to request your office to issue him with a research permit.


Faithfully yours,  
  
28 NOV 2022

**Prof. Romulus Abila, PhD.**

**Director, Board of Postgraduate Studies**

[abila@mmarau.ac.ke](mailto:abila@mmarau.ac.ke) - <https://orcid.org/0000-0001-8762-7153>

APPENDIX III: RESEARCH PERMIT


**REPUBLIC OF KENYA**


**NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION**

**Ref No: 254162**
**Date of Issue: 20/December/2022**

**RESEARCH LICENSE**



**This is to Certify that Mr.. Kevin Gudda of Maasai Mara University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: EFFECTS OF SUPPLIER DEVELOPMENT ON THE PROCUREMENT PERFORMANCE OF STEEL MANUFACTURING FIRMS IN NAIROBI CITY, COUNTY-KENYA for the period ending : 20/December/2023.**

**License No: NACOSTI/P/22/22706**

**254162**  
**Applicant Identification Number**

  
**Director General**  
**NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION**

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