

# Influence of Lean Procurement Initiatives on Supply Chain Agility in Manufacturing Firms in Nakuru County, Kenya

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**Abstract:** The emergence of environmental challenges associated with global warming has placed manufacturing organizations at the centre of environmental conservation. Through the adoption of sustainable procurement initiatives, many firms have taken up the call to conserve the environment by adopting varied initiatives. Despite increased adoption of sustainable initiatives in manufacturing sector the influence of adoption of these initiatives on the ability of these firms to effectively respond to changes in their internal and external environment remains un-assessed. This study sought to examine the influence of lean procurement initiatives on supply chain agility of manufacturing firms. The study targeted 34 licensed manufacturing firms operating within Nakuru County seeking responses from 96 procurement, finance and operation manager as the respondents. Data was collected using a structured questionnaire. A regression model was used to assess the influence of lean procurement initiatives on the agility of supply chains. The adoption of lean procurement initiatives was evident among the surveyed manufacturing firms with varying levels. Lean procurement was found to significantly enhance supply chain agility. Given the positive influence of lean procurement initiatives, it is imperative that the government supports in deepening the adoption of lean procurement initiatives in the manufacturing sector.

**Key Terms:** Lean Procurement Initiatives, Supply Chain Agility

## I. Introduction

Procurement as a core function within modern organizations has a key role in sustainability as policies and practices formulated to guide activities in the function need to extend beyond the traditional procurement boundaries to include the whole supply chains [1]. While sustainability is closely associated with environmental performance, it is a multi-facet dimension and includes economic and social elements. With private entity procurement accounting for over 70% of Gross Domestic Product in many developing countries, any effort leveraging this purchasing power by encouraging more sustainable goods and services purchases can help drive markets achieve sustainability, reduce negative impacts on organizations, and also produce more benefits for the environment and society. Globally, sustainable procurement initiatives continue to gain prominence across both public and corporate sectors. With the advent of a strong environmental protection preposition across the world because of the recognition of global warming, environmental agenda has gained prominence among governments, enterprises and development agencies. A substantial number of these institutions have taken a strong stand by advocating for all organizations to adopted environmental criteria within their supply chain system and in their corporate objectives on sustainable development [2]. Consequently there is an emerging call for firms to gel procurement practices with the growing importance of sustainability of the environment as part of the business norm targeting continuous reduction of environmental impact arising from business activities.

In Kenya, a number of policies, institutions and legislations entrusted with the responsibility of governing business activities have been established and entrusted with the mandate of protecting the environment. For instance, the Public Procurement and Asset Disposal Act of 2015 and the Procurement Regulations of 2009 were introduced as a guideline for public procurement in Kenya. Others includes; Environmental Management and Coordination Act 1999, Kenya Solid Waste Management by laws of 2007, The Factories Act (Cap 514 of the Laws of Kenya), The Environmental Management and Co-ordination Regulations, 2006. Despite the operationalization of most of this acts and subsequent reviews, the rate at which targeted institutions are adopting sustainable environmental practices is still slow. As noted by [3], Kenya continues to lag behind among developing countries in championing for sustainable procurement practices as far as legal and policy driven approach are concerned. While the manufacturing sector in Kenya remains insignificant in a global perspective, they equally bear the same levels of blame and responsibility in matters concerning environmental pollution and degradation. Consequently, for them to compete in the regional and global stage, they must demonstrate compliance with environmental protection protocols. For instance, Kenya manufacturing firms serving the regional market must comply with all the country specific environmental laws relating to packaging, recycling and disposal of their products.

## **II. Statement of the Problem**

Sustainable corporate initiatives continue to elicit interest among policy makers, scholars and environmentalist with the acceptance of global warming. Manufacturing firms globally continues to bear most of the blame as a result of their green gas emission. The role of sustainable procurement initiatives in promoting environmental conservation continues to gain traction both globally and in Kenya through enactment of acts, policies, institutional frameworks and legislated laws. However, as focus shifts to the enforcement and implementation of sustainable practices, there is need to ascertain their influence on business performance. While the objectives of sustainable procurement initiatives are to reduce negative environmental impacts, cost implications are relatively high, compromising the overall goal of doing business [4]. The manufacturing sector in Kenya contributing 9% to Gross Domestic Product, the need for the sector to continuously adopt new practices that drive competitions remains paramount. With the sustainable procurement initiatives adoption still at its infancy stage in Kenya [5], manufacturing firms have limited options in selecting suppliers and high supplier switching costs. A number of studies have explored on sustainable procurement initiatives in Kenya. [6] assessed green supply chain practices among pharmaceutical companies in Kenya, [7] explored on green procurement practices at Kenya Pipeline Company, while, [8] set out to explore the influence of green supply chain practices on financial performance of alcoholic beverage manufacturers in Kenya just to mention a few. From the foregoing, there is a bias towards the assessment of the adoption of sustainable procurement initiatives with very little on its influence on the performance of the implementing entity. Of critical significance is that none of existing studies to the best of the researcher's has sought to establish the influence of lean procurement initiatives on the agility of the implementing entities supply chain.

## **III. Objective of the Study**

The objective of the study was to establish the influence of lean procurement initiatives on supply chain agility of manufacturing firms in Nakuru County, Kenya.

## **IV. Literature Review**

Lean procurement has a closer meaning and association with Just-In- Time (JIT) concept in inventory management where waste elimination is the primary goal. JIT considers matched demand and supply through a set of operational principles including but not limited to close proximity to suppliers, use of pull system, minimal stock and strong supplier integrations. Effective deployment of lean procurement rests on long term supplier contracts and a fully synchronized communication systems, a framework that was challenging to make any significant unplanned changes in the short term. Such a restraint will directly impact on the ability of any firm to respond to changes in its operating environment compromising on its agility. According to [9] lean procurement is a dynamic practice and a philosophy that seeks to eliminate waste and continuous improve system by applying lean principles, practices and techniques in the interest of maximizing value. The lean procurement philosophy aims at achieving cost reduction, improved quality and enhanced efficiency with less effort. There are many benefits associated with the adoption of the lean procurement philosophy in the supply chain which includes: reduced cost, improved quality, faster delivery and flexibility [10]. The lean procurement dynamic practice cuts across all processes through the product life cycle from product design to the product selling and delivery [11]. As noted in [12], lean procurement practices have been found to greatly help organizations to develop flexible and responsive supply chain. Where lean procurement has been fully integrated into

the supply chain, when customers demand unexpectedly goes up, the supply chain are able to respond quickly by meeting the increase and when forecast go down, the firm acts swiftly to ensure minimal level of inventory are left.

Every phase in the supply chain process creates an environmental concern that affect, from resource mining, to processing, recycling, or disposal [13]. A firm is agile if its supply chain process is able to capture the aspect of market sensitivity that is when supply chain is able to read and respond to real demand. Three elements come into play when supply chain agility is involved: flexibility, swiftness and alertness. Flexibility is the ability of the firm's supply chain to respond to changes in market requirements, within defined constraints. The ability to use flexibility as a competency to accommodate unknown uncertainty places a firm at a relatively better advantage compared to a relatively rigid supply chain. Flexibility in an organization setting means its ability to change between processes necessary for new product, product mix, product quality, product quantity and delivery times takes the least effort and time. Swiftness according to [14] is the ability to accelerate the procurement activities on a critical path that commences with the identification of organizational need and end with the delivery of a customized product to the customer. In the modern volatile business environment where frequent supply chain disruptions are prevalent including material shortages and drops in production capacity to sudden demand spikes, the responsiveness of supply chains to changing market requirements is an important issues in supply chain design and management. Alertness is defined as the ability to quickly detect changes, opportunities, and threats and any business that intends to survive in a competitive environment it must first identify those changes. Truly agile companies have developed a high level of alertness through sensing emerging market trends, listening to customers, and interchanging information with suppliers, monitoring demand, and sensing impending disruptions before they happen.

A number of studies locally have attempted to reveal the determinants and the influence associated with sustainable procurement initiatives and agility of the supply system. For example [15] in their analysis of supply chain agility in cosmetic firms found that collaborative awareness enhances firm's ability to respond to changes in their operating environment. The analysis of the influence of information system on supply chain agility in the service industry by [16] revealed that adoption of structured information systems led to quick service delivery, better response time and better capability at Technical university of Kenya. While assessing the influence of supply chain practices in Nairobi University, [17] reports that adoption of supply chain practices was found to enhance supply chain responsiveness to changes in the supply system. In a close study, [18] in modelling success factors in supply chain found that agility remains the most influential deterrent of responsive supply chains in Kenya, however their study was limited to retail outlets within Nairobi. Broadly, lean procurement and the lean philosophy have returned a positive outlook for organizations in different sectors. A study by [19] among large scale manufacturing firms in Nairobi established that lean procurement has positively transformed manufacturing firms into efficient competitive entities. [20] in their study on factors affecting implementation of lean procurement in multinational enterprises established that integrating suppliers and creating mutual benefits by continuous improvements and development with suppliers give significant opportunities for lean procurement and better organization performance. Similarly, [15] in their study on the effects of lean production on organizational performance in the Flour manufacturing Company in Kenya and established that better inventory management leads to a more efficient practice of lean production and improved overall financial management.

## **V. Research Methodology**

The study adopted a survey research design since it is an oriented methodology used to investigate population by selecting samples to analyze and discover occurrences. In addition, survey designs are considered more economical, rapid in data collection and have the ability to create an understanding of a population from a part or its sample [21]. The target population for this study was all the 34 manufacturing firms operating in Nakuru County, Kenya. The target respondents were 96 managers heading the procurement, finance and operations functions. The choice of the three categories of managers as respondents is based on their functions and roles in decision making processes related to procurement and the overall performance of the firm and hence are the custodians of the information required in the study. Since the target population of 96 procurement staff was fairly small, the study undertook a census approach and thus all the 65 staff formed the sample. The study used closed-ended questionnaires to collect data. The survey questionnaire is seen as appropriate; it allows data from both sampled groups to be collected in a quick and efficient manner. The primary data was sourced from the answers the participants gave during the survey process. Before embarking on data collection, permission to collect data was sought from the National Council for Science, Technology and innovation (NACOSTI). The researcher also sought clearance from both the university and the relevant government departments. The data collection instrument was then piloted to evaluate its validity and reliability. The data collected

from the questionnaires was analyzed using both descriptive (means and standard deviations) and inferential statistics (correlation and regression). The results of the survey were presented in tables.

## VI. Research Findings And Discussions

The researcher issued 96 questionnaires. Out of 96 questionnaires that were issued, 79 of them were correctly filled and returned. Therefore, 79 were correctly filled and hence were used for analysis representing a response rate of 82.2%. Comparing the current response rates with recommendations by [22] who advocated for a minimum of 30%, a 82.3% response rate for this study was considered adequate for accurate for estimating parameter estimates. The study sought to establish the working experience of the respondents in the manufacturing sector. From the findings, 50.6% of the respondents had hands-on experience in their respective function of between 5 - 9 years followed by those with less than three years. Those who have worked in their respective functions for between 3-5 years accounted for 15.6% of the total respondents while those with over ten years were the least making up 11.4% of the respondents. Having the majority of the respondents with over five years' experience enhanced that quality of the responses received and better generalization of the current findings to the entire manufacturing sector.

### 6.1 Lean Procurement

One of the ways in which firms contribute to environmental protection is through waste and loss reduction. The extents to which manufacturing firms have adopted lean initiatives are as summarized in Table 1.

**TABLE 1: Lean Procurement**

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	SD
It is the firms policy to only order what is required	10.1	7.6	22.8	17.7	41.8	3.73	1.346
The firm has an efficient procurement system that allows for only what is required to be ordered.	3.8	13.9	25.3	17.7	39.2	3.75	1.224
The firm has a working Just In Time system	5.1	12.7	30.4	19	32.9	3.62	1.212
The stock management system in the organization only maintains a lean inventory	0	17.7	22.8	25.3	34.2	3.76	1.112
The firm reviews stocks levels often to ensure that we maintain minimal stock	8.9	5.1	36.7	34.2	15.2	3.42	1.093
Stringent controls are in place to ensure lean inventories are maintained all the time	3.8	13.9	25.3	17.7	39.2	3.75	1.240

From the findings, the adoption of a lean stock management system was the most widely used ( $M = 3.76$ ,  $SD = 1.112$ ) lean initiative among the sampled manufacturing firms followed by adoption of stringent inventory control systems ( $M = 3.75$ ,  $SD = 1.240$ ). Purchase of qualities that are required only was also an initiative that was evident ( $M = 3.75$ ,  $SD = 1.224$ ) followed by the existence of a policy limiting excess purchases ( $M = 3.73$ ,  $SD = 1.346$ ). The use of Just-In-Time was ranked fifth ( $M = 3.62$ ,  $SD = 1.212$ ) while review of stock levels to ensure that only what is required is maintained was the least ( $M = 3.42$ ,  $SD = 1.095$ ) adopted lean procurement initiative. Further, majority of the of respondents were unsure as to whether the firm reviews stocks levels often to ensure that they maintain minimal stock ( $M = 3.42$ ,  $SD = 1.092$ ) which could be attributed to the sensitive nature of the information sought since staff would not indict themselves in terms of stock levels.

### 6.2 Supply Chain Agility

Remaining competitive in turbulent and dynamic manufacturing sectors requires the firm to remain flexible and adoptive to the prevailing environment. There are a number of opportunities for manufacturing firms to remain flexible;

however, not all have similar outcomes. The extent to which selected initiatives were deployed among manufacturing firms in Nakuru County was as summarized in Table 2.

**TABLE 2: Supply Chain Agility**

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	SD
The firms' supply chain is highly flexible.	0	0	0	67.1	32.9	4.33	.473
The firm is able to restore supplies faster without disruption of our manufacturing processes	5.1	12.7	26.6	24.1	31.6	3.65	1.199
The firm can easily switch between suppliers and still get the right quality of supplies	8.9	8.9	32.9	22.8	26.6	3.49	1.229
Our supply chain is swift and we are able to respond to changes in the supply environment	5.1	10.1	30.4	13.9	40.5	3.75	1.235
The firm has always remained alert to any procurement related changes that might affect our operations	0	6.3	0	55.7	38	4.25	.759
The firm has systems in place that monitor changes in the procurement process.	3.8	13.9	8.9	32.9	40.5	3.92	1.185

As seen in Table 2, most manufactures noted that their supply chain was highly flexible (M = 4.25, SD = 0.473) and has the capability of responding quickly to changes in their supply market. Similarly, they strongly agreed that they were alert to any procurement related changes (M = 4.25, SD = 0.759). Existence of a system to monitor changes in procurement processes was the third ranked initiative (M = 3.92, SD = 1.185) followed by the acknowledgement that their procurement systems were designed to be swift and to respond faster to changes in the procurement environment (M = 3.75, SD = 1.235). Ability to respond faster its supply change with minimal disruption was ranked relatively lower (M = 3.65, SD = 1.199) with the ability to switch between suppliers and still get right quality supplies ranked least (M = 3.49, SD = 1.229) in all the six initiatives assessed. Since majority of the respondents were unsure whether the firm can easily switch between suppliers and still get the right quality of supplies, the study attributed this trend to the fact that most procurement contracts in these firms were bindings for every financial year contracted and thus switching suppliers has legal and financial implications to the firm. .

### 6.3 Correlation Analysis

The section presents and discusses findings resulting from correlation analysis involving lean procurement initiatives and their influence on supply chain agility. The findings of the correlation analysis were as shown in Table 3.

**TABLE 3: Lean Procurement Initiatives and Supply Chain Agility**

	Lean Procurement Initiatives
Pearson Correlation	.511**
<b>Supply Chain Agility</b> Sig. (2-tailed)	.000
N	79

\*\* . Correlation is significant at the 0.01 level (2-tailed).

From the correlation analysis in Table 3, it was established that there was a very strong and positive correlation between lean procurement initiatives and supply chain agility ( $r = 0.511^{**}$ ,  $p = .000$ ). Since the correlation was strong and positive in nature, the study deduced that it implied higher levels of supply chain agility can be associated with lean procurement initiatives. Based on these findings, the study concluded that lean procurement initiatives have significant

influence on supply chain agility. The findings are in agreement with those of [10] who noted that there are many benefits associated with the adoption of the lean procurement philosophy in the supply chain which includes reduced cost, improved quality, faster delivery and flexibility. Further, [9] opined that lean procurement philosophy is aimed at achieving cost reduction, improved quality and enhance efficiency with less effort.

### 6.4 Regression Analysis

The study carried out a regression analysis to establish the influence of lean procurement initiatives on supply chain agility and the model summary is depicted in Table 4.

**TABLE 4: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.511 <sup>a</sup>	.261	.251	.40160

The R<sup>2</sup> value of 0.261 implies that 26.1% of the variations in supply chain agility can be explained by the variations in lean procurement initiatives. This therefore means that other factors not included in this study contribute 73.9% of supply chain agility. The findings follow a similar trend to those found by [19] among large scale manufacturing firms in Nairobi established that lean procurement has positively transformed manufacturing firms into efficient competitive entities. The study conducted regression analysis and the findings are depicted in Table 5. From the multiple regression model, holding lean procurement constant, supply chain agility would increase by 2.586. It was established that a unit increase in lean procurement initiatives would cause an increase in supply chain agility by a factor of 0.358.

**TABLE 5: Regression Coefficients**

	Unstandardized Coefficients		Standardized Coefficients		
	B	SE	Beta	t	p
Constant	2.586	.256		10.109	.000
Lean Procurement Initiatives	.358	.069	.511	5.213	.000

Dependent Variable: Supply Chain Agility

From the findings on Table 5, the un-standardized beta coefficients were used to obtain the overall relationship of the independent variable and the dependent variable as:  $Y = 2.586 + 0.358X_1$ , Where Y = Supply chain Agility and  $X_1$  = Lean Procurement Initiatives. The model indicates that lean procurement initiatives positively influence supply chain agility in manufacturing firms. The findings are in agreement with those of [20] who established that integrating suppliers and creating mutual benefits by continuous improvements and development with suppliers give significant opportunities for lean procurement and better organization performance.

### 6.5 Hypotheses Testing

For purposes of this study, hypothesis testing was carried at 5% significance level. The study undertook to test the hypothesis which stated:  $H_0$ : Lean procurement initiatives have no significant influence on supply chain agility. Since the p-values ( $.000 < .05$ ), the null hypothesis was rejected and it was concluded that lean procurement initiatives have significant influence on supply chain agility. The findings of the ANOVA test are presented in Table 6.

TABLE 6: ANOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.382	1	4.382	27.172	.000 <sup>b</sup>
Residual	12.419	77	.161		
Total	16.801	78			

Dependent Variable: Supply Chain Agility

Predictors: (Constant), Lean Procurement Initiatives

From the ANOVA results, since p-value (.000<.05), we reject the null hypothesis and conclude that at 5% significance level, lean procurement initiatives have significant influence on supply chain agility. Based on results, lean procurement initiatives had significant coefficient ( $\beta = 0.358$ ,  $P < 0.05$ ) indicating that a unit increase in lean procurement initiatives leads to an increase in supply chain agility by a factor of .358. The results are in agreement with those of [9] who noted that the lean procurement philosophy aims at achieving cost reduction, improved quality and enhanced efficiency with less effort. Furthermore, as opined by [10], there are many benefits associated with the adoption of the lean procurement philosophy in the supply chain which includes: reduced cost, improved quality, faster delivery and flexibility. Similarly, as noted in [12], lean procurement practices have been found to greatly help organizations to develop flexible and responsive supply chain.

## VII. Conclusions

The study concluded that though the degree to which individual sustainable procurement initiatives influences supply chain agility among manufacturing sectors varies, lean procurement is notable the most influential sustainable initiative followed by conscious selection of suppliers who have a strong compliance and affiliation towards environmental conservation. It is further concluded that the evidence of a significant influence of lean procurement initiatives on supply chain agility is a call to manufacturers who intending to not only achieve but also sustain industry competitiveness to fully integrate environmental conservation principles into their procurement process. The advent of an environmental frontier as a dimension of competitiveness for business globally, requires future organizations that fully and strategically integrate sustainable practices across their processes.

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