International Journal of Management and Business Research

IJMBR

Volume 6, Issue 2, pg. 151-162, 2024

ISSN 29769-91723

LEAN PROCUREMENT PRACTICES AND PERFORMANCE OF LEVEL SIX PUBLIC HOSPITALS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

Lean procurement is an approach to procurement that focuses on maximizing value by improving efficiency and limiting waste. Despite huge investments in the health care, most public hospitals are under bad conditions; characterized by dilapidated facilities, obsolete medical equipment, inadequate drugs and low bed capacity in the wards. The general objective of the study was to examine effect of lean procurement practices on performance of level six public hospitals in Nairobi City County, Kenya. The specific objectives are to examine effect of value stream mapping, and resource optimization on performance of level six public hospitals in Nairobi City County, Kenya. The research employed a descriptive research design. The unit of analysis was four level six public hospitals in Nairobi County. The unit of observation was 194 procurement staff in the hospitals. The study adopted census sampling. Data was collected using questionnaires. A pilot test was conducted with 10% of the sample size hence 18 staff took part in the pilot study. Content and construct validity was used to assess if the items in the questionnaire match with the constructs under conceptual framework. Reliability was tested using Cronbach's Alpha Coefficient. Data was analyzed using SPSS Version 28. Findings were tabulated. The content of the questionnaire was validated by the supervisor and procurement professionals. The study findings revealed that both practices significantly influenced hospital performance, with coefficients of 0.314 ($p < 0.05$) for value stream mapping, and 0.335 ($p < 0.05$) for resource optimization, indicating their critical roles in enhancing operational efficiency and service delivery. The study concluded that these lean procurement practices significantly contribute to better hospital performance by optimizing processes, and improving resource use. Recommendations include integrating value stream mapping into procurement procedures to eliminate inefficiencies, and implementing strategic resource optimization frameworks to enhance service quality and reduce costs.

Key Words: Lean Procurement Practices, Value Stream Mapping, Resource Optimization, Performance, Level Six Public Hospitals

Background of the Study

According to Carrasco-Mora (2019), lean procurement is an active activity and way of thinking that aims to eliminate surplus by utilizing lean beliefs, methods, and procedures to exploit value. The lean procurement strategy is only focused on lowering production costs, enhancing the nature of newly created items, and enhancing the efficiency of manufacturing wooden furniture products (Borges, Tortorella, Martínez, & Thurer, 2020). Lean procurement is an approach to procurement that focuses on maximizing value by improving efficiency and limiting waste. It focuses on waste reduction to improve operations' performance (Malacina, Karttunen, & Jääskeläinen, 2022).

Lean procurement analyses the steps within the procurement process to define what adds value, by reducing anything that is not adding value (Carrassco-Mora, 2019). Gadysz, Buczacki, and Haskins (2020) asserted that just-in-time (JIT) inventory management is related to lean procurement though there are some distinctions between the two ideas. The primary objective of lean is to eliminate waste business through the use of a pull system, minimum stock, and effective supplier combinations while the main purpose of just-in-time procurement is to match demand and supply (Omwoyo, Wanyoike and Mbeche, 2019).

Statement of the Problem

Lean procurement is a valuable approach in public procurement, ensuring the delivery of services or products aligns with contractual terms, thereby improving efficiency and reducing waste. However, Kenya continues to lose billions of shillings annually due to ineffective procurement processes, with poor contract management practices being a major contributing factor (PPOA, 2018). The challenges are evident in frequent litigations, contract cancellations, and substandard service or product deliveries, which significantly undermine the effectiveness of public procurement systems. The healthcare sector, a critical component of Kenya's economy, contributes 5.1% of the country's GDP, with substantial investments in procuring medicines and essential medical supplies (Njeru & Kungu, 2018). These procurements form vital economic linkages between the health sector and both local and international industries. Despite these investments, the public healthcare system struggles with dilapidated infrastructure, outdated equipment, insufficient drugs, and inadequate bed capacity (Ministry of Health Survey, 2018).

Level six hospitals, as the highest tier of public healthcare in Kenya, have the capacity to serve as referral centers for counties across the country, handling the most complex medical cases and managing vast resources. However, recent studies highlight severe performance issues in these hospitals, directly linked to ineffective procurement practices. According to KIPPRA (2019), 81% of patients in public hospitals in Nairobi County expressed dissatisfaction with the services provided, attributing this to poor procurement and supply chain management. At Mbagathi Hospital, over 50% of patients rated the quality of healthcare services as poor (Wanjau, 2018). Additionally, Ganatra et al. (2020) found that 75% of public health facilities in Nairobi County experienced significant drug shortages, with a drug fill rate between 50% and 70%, leading to unmet patient needs. These inefficiencies are further underscored by the disparity in medicine availability between public and private facilities. In 2020/21, the average availability of essential medicines in public health facilities was approximately 44%, compared to 72.4% in private facilities (World Health Organization, 2023).

Furthermore, Nyokabi (2021) reported that 56% of patients in public hospitals in Nairobi were dissatisfied due to inadequate drug supplies, while 43% were dissatisfied with general hospital supplies. The capacity issues faced by level six hospitals, such as inadequate procurement processes, prolonged tendering and approval times, and inconsistent supply chains, directly affect their ability to provide timely and effective referral services. These delays have been linked to increased operational costs by 25% and hindered emergency service delivery for 18% of patients (Ministry of Health, 2021).

Although studies have explored lean procurement practices in various sectors in Kenya, including manufacturing (Ongaro, 2019), agriculture (Osodo & Onjure, 2019), telecommunications (Macharia, 2018), and multinational enterprises (Muthoni, 2022), there is a notable gap in literature focusing on the impact of lean procurement practices within the public healthcare supply chain in Nairobi City County. This study addresses this gap by examining the effect of lean procurement practices, particularly contract management, on the performance of level six public hospitals in Nairobi County, Kenya. Given their critical role in the healthcare system as referral centers, enhancing procurement efficiency in these hospitals is essential for improving overall healthcare service delivery across the country.

Research Objectives

The main objective of the study was to examine the effect of lean procurement practices on performance of level six public hospitals in Nairobi City County, Kenya

i. To investigate the effect of value stream mapping on performance of level six public hospitals in Nairobi City County, Kenya.
ii. To assess the effect of resource optimization on performance of level six public hospitals in Nairobi City County, Kenya.

LITERATURE REVIEW

Theoretical Review

Lean Theory

Lean theory was postulated by Henry Ford in 1913 who defined lean as a functional model comprising of comprehensive techniques which aim at reducing and eliminating wastage when combined together in a production process hence making a firm more responsive and flexible to changes in demand. Nash, Poling and Ward (2006) advanced the theory by seeing it as a systematic approach that aims at enhancing a continuous flow of quality product or service to customers just at the time they need it. According to the theory, processes that aim at fully satisfying customers' needs should follow prescribed principles while minimizing all forms of loss.

Organizations aiming at applying lean theory in their production lines should have a strong focus on customers, should be willing to remove production wastes form all production processes on daily routine and must be willing to grow and survive prevailing stiff competition. According to Moroz (2018), a well-designed production process should aim at delivering a predictable and consistent product while minimizing wastage. Lean theory capitalizes on a continuous quality delivery to customers basing on customers' needs at specific time. By doing so, the production process eliminates waste characterized by unnecessary planning meetings, unnecessary inventories, overproduction, and unnecessary transport and over processing (Rand, 2011). The theory supports the objective on value stream mapping which aims at eliminating waste along the supply chain. Firms applying this strategy aim at increasing efficiency while at the same time decreasing waste since they receive goods just when they are needed in production process. Organizations are able to reduce operational costs due to the reduction of waste in the supply chain.

Resource-based View

The resource-based view (RBV) was first developed by Barney (1991). Shibin et al. (2020) stated that the resource-based view (RBV) emphasized that an organization can create superior performance and gain a competitive advantage through the investment of resources and capabilities that are valuable, rare, difficult to imitate and non-substitutable by the rival firms in the supply chain. This can yield a sustained competitive advantage. The resource-based view (RBV) emphasizes the firm's resources as the fundamental determinants of competitive advantage and performance. The first assumption of the theory is that firms within an industry may be heterogeneous with respect to the bundle of resources that they control. The second assumption is that resource heterogeneity may persist over time because the resources used to

implement firms' strategies are not perfectly mobile across firms. Some of the resources cannot be traded in factor markets and are difficult to accumulate and imitate. The other assumptions asserts that resources are nontransferable across the industry as they remain constant over a long period of time. Due to the fact that resources are nontransferable across the industries, it means that the resources are unique to each and every firm and the more endowed the firms is, the more competitive it becomes ((Barney, 2006; Peteraf & Barney, 2003).

Resources may be categorized into physical and non-physical assets of the organization. They may also be classified as tangible and non-tangible assets such as infrastructure, information or knowledge sharing. Resources serve as an important tool for producing goods and services and they form the basis for organizations to increase their profitability (Barney, 1991). Resources based view support the variable on resource optimization. Effective utilization of resources allocated to health care ensures timely payment of suppliers and continuous procurement of medical facilities and services.

Conceptual Framework

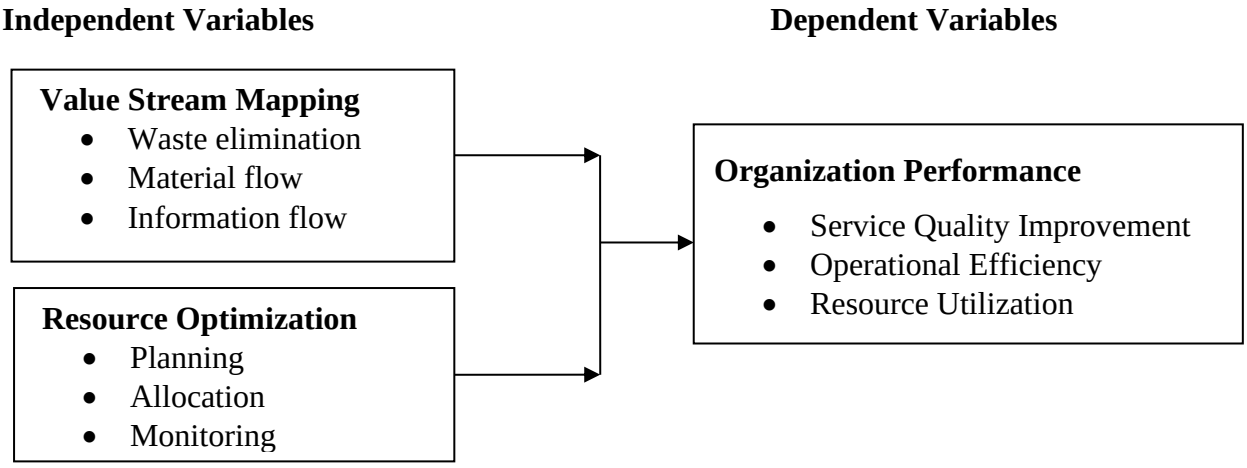

Figure 2. 1: Conceptual Framework

Value Stream Mapping

Value stream refers to those specifics of the firm that add value to the product or service under consideration. It usually starts with customer delivery and works its way back through the entire process documenting the process graphically and collecting data along the way (Singh & Sharma, 2019). Value stream mapping (VSM) is approach that assist organization to determine the steps in operational process which are adding value and those that do not add value. It visualizes the process of whole operational by using flow chart by help from symbols, metrics, and arrows. It is a tool that is used for improvement purposes and eliminating wastes (Roh, Kunz, & Wegener, 2019).

Value stream mapping was first utilized by Toyota engineers in the twentieth century. The engineers realized that by improving time between handoffs during the manufacturing process, they could improve productivity and reduce waste. By eliminating non-value added (NVA) factors and creating an overall smoother process, products and services become more valuable to the consumer as well as more competitive to rivals (Reinhart , Greitemann, & Niehues, 2019). Value stream mapping helps supply chain practitioners to identify systemic sources of waste in a process and subsequently how to eliminate these source on a structural basis. A key characteristic of the method is that it looks at a process as a whole, rather than at the level of sub-processes (Jones & Womack, 2022).

Resource Optimization

Resource optimization involves identifying, prioritizing, and utilizing resources in the most efficient and effective manner possible. The aim is to meet production requirements and quality standards, while minimizing waste, redundancies, and costs (Xu,et.al,2020). Resource

optimization is a management practice or strategy to boost employee performance, efficiency, and productivity within an organization. To achieve these goals, it comprises processes such as planning, forecasting, allocating, scheduling available resources, and utilizing them intelligently to meet the organization's objectives. Resources can be human, equipment, facilities, finance, etc. The ultimate goal of resource optimization is to leverage the employees' maximum potential to improve business profitability (Gupta, 2024).

Resource optimization is important for organizations as it helps in reducing costs, improving productivity, increasing profitability, and enhancing overall operational efficiency. By utilizing resources in the most efficient and effective manner, organizations can meet customer demands, deliver projects on time and within budget, and gain a competitive advantage in the market (Deng, Xu, Zhao & Song, 2020). Organizations can measure the effectiveness of resource optimization efforts by tracking key performance indicators (KPIs) such as resource utilization rates, productivity levels, cost savings, customer satisfaction scores, and overall profitability. Regular evaluation and analysis of these metrics can provide insights into the impact of resource optimization strategies and guide further improvements (Grincy, 2019). Organizations can optimize resource allocation by conducting thorough resource assessments to understand availability, skills, and capacity, implementing data-driven decision-making processes, prioritizing high-value projects or tasks, leveraging technology and automation for resource management, regularly monitoring resource utilization and performance, and fostering collaboration and communication across teams (Aadharshana & Shiny, 2020).

Empirical Review

Value Stream Mapping and Supply Chain Performance

Harun, Habidin, and Latip (2018) studied the relationship between value stream mapping and warehouse performance among Malaysian manufacturing industry. The population was 2,700 manufacturing companies. Questionnaires were used to collect data. Results showed that implementation of value stream mapping was an effective business strategy among Malaysian manufacturing industry. Results further showed that VSM can positively minimize waste, add value, and natural opportunities for the integration of lean procurement.

Mahlo and Chiromo (2018) studied effectiveness of value stream mapping on waste reduction at Paltechnolgies Pvt Ltd. The study was conducted through document analysis. Results showed that VSM helped to present level of wastes occurring in the organisation and the future possibility of reducing/eliminating them. After implementation of the future state map benefits were gained in throughput time, preparation time, cycle time, value-add time, time delays, distance moved and people required. Tiwari and Manoria (2017) studied the extent to which Value Stream Mapping (VSM) was successfully in manufacturing processes. Results showed that value Stream Mapping helps to identify the current flow of material and information in processes for a family of products, highlighting the opportunities for improvement that most significantly impact the overall manufacturing production system of company. Value Stream Mapping (VSM) was found to be a very comprehensive tool that allows an organization to identify sources of waste and implements process improvements.

Murimi, Cheloti, and Wekesa (2024) explored the agricultural value chains within Kakamega County, Kenya. Primary data was collected using interview schedules and focus group discussions. Results showed that some challenges faced in the agriculture value chain which included shortage of equipment, lack of technical skills, and poor marketing strategies. Onyancha and Kimutai (2018) sought to analyse the experiences of construction companies regarding value chain mapping. A descriptive research design was adopted. Data collection was done using questionnaires. Results showed that most of the firms did not have the value stream maps that guide in the construction process. There were no charts showing flow of construction displayed on site that guide in the construction process.

Resource Optimization and Supply Chain Performance

Bichii and Waruguru (2020) studied effect of resource alignment on performance of listed energy and petroleum companies in Kenya. The study adopted a descriptive survey research design. Data was collected using questionnaires. Results showed that resource alignment affected performance of listed energy and petroleum companies in Kenya. There was a significant positive relationship between resource alignment and organizational performance. Abdi (2020) assessed effect of resources management on performance of road infrastructural projects in Wajir County. The study adopted a descriptive survey design. The target was 193 project stakeholders. Semi-structured questionnaires was used to collect primary data. Results showed that resource planning, resource scheduling, resource allocation and resource monitoring had a positive and significant effect on project performance. Resource planning helps organizations to fulfill task specifications efficiently. Successful resource scheduling allows to solve problems related to resource availability and job efficiency. Efficient resource allocation allows project managers prepare to allocate resources to the task and effectively manage them.

Shadrack (2018) studied effect of resource planning on performance of the construction sector in county of Nairobi. A descriptive research design was used. The study established that equipment planning, labor planning, and material planning were resource planning practices mostly carried out in construction. Lavu and Maina (2019) sought to determine the influence of organizational resources on strategy implementation in non-profit organizations in Kilifi County, Kenya. The sample was 60 respondents. The primary data was collected using questionnaires. Results showed that that human resources, financial resources and technology competence had a positive and significant influence on the implementation of strategy at KWTRP. Proper allocation of financial resources allows managers to put together more productive and efficient workplace teams and enables them to assess their schedules and predict the availability of resources in real time effectively and that technology competence lies in its ability to streamline interaction both internally and externally

Kiungo and Otieno (2023) investigated how resource optimization techniques influence long-term viability of gated community building projects in Kenya's Nairobi County. The study adopted a descriptive survey. The target respondents were project managers, project supervisors, contractors and clients. Data was collected using questionnaires and secondary data obtained from Knight Frank database. Results revealed that there was a significant correlation between resource leveling and project sustainability. The study concluded that resources are moved from non-critical to critical activities; efficient operations and the successful completion of projects are supported by proper equipment distribution.

RESEARCH METHODOLOGY

The research employed a descriptive research design. The target population was the public health centers in Nairobi County. Nairobi County has a total of four level six public hospitals (Health Management Information System, Ministry of Health, 2022). The unit of analysis was four level six public hospitals in Nairobi County. The unit of observation was 194 procurement staff in the hospitals. The study adopted census sampling. The study sample was hence 194 procurement staff. Data was collected using questionnaires. Data was analyzed using SPSS Version 28. Descriptive and inferential statistics were used. The descriptive included frequency, percentage, and mean, while inferential included correlation and regression.

RESEARCH FINDINGS AND DISCUSSIONS

In this study, 175 questionnaires were distributed to procurement staff at level six public hospitals in Nairobi City County, Kenya, excluding the 19 questionnaires used in the pilot study. Out of the 175 questionnaires distributed, 157 were returned, resulting in a response rate of 89.7%. The response rate of 89.7% is considered excellent according to guidelines by Mugenda and Mugenda (2023), which classify response rates above 70% as very good. This high response rate indicates strong participation from the respondents, enhancing the

robustness and representativeness of the study findings. The high response rate also minimizes non-response bias, thereby strengthening the validity and credibility of the conclusions drawn from the study.

Descriptive Analysis

Descriptive statistics were used to summarize respondents' levels of agreement with statements related to each lean procurement practice. A 5-point Likert scale was employed, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. The tables below present the findings for each variable.

Value Stream Mapping

The first objective was to investigate the effect of value stream mapping on the performance of level six public hospitals. Respondents level of agreement with the statements is presented in Table 1.

Table 1: Descriptive Analysis for Value Stream Mapping

Statements	Mean	Standard Deviation
The health facility has value stream maps	3.842	0.580
Value Stream identifies non-adding value activities	4.067	0.541
Value stream mapping reduces reworks and overruns	4.080	0.523
Value stream maps influence performance	4.018	0.557
Value stream mapping is done by experts	3.973	0.559
Elimination of waste helps reduce total work time	4.052	0.549
A flowchart is used to graphically represent the flow of supplies	3.930	0.571
Value stream mapping is used to help identify waste	4.095	0.520
Aggregate Mean	**4.007**	**0.550**

The findings in Table 1 show that respondents agreed that the health facility has value stream maps (M = 3.842, SD = 0.580) and that value stream mapping identifies non-adding value activities (M = 4.067, SD = 0.541). There is also strong agreement that value stream mapping reduces reworks and overruns (M = 4.080, SD = 0.523) and that value stream maps positively influence performance (M = 4.018, SD = 0.557). Respondents agreed that value stream mapping is conducted by experts (M = 3.973, SD = 0.559) and that eliminating waste helps reduce total work time (M = 4.052, SD = 0.549). Additionally, the use of flowcharts to represent the flow of supplies scored positively (M = 3.930, SD = 0.571), as did the use of value stream mapping to identify waste (M = 4.095, SD = 0.520).

The aggregate mean of 4.007 suggests that value stream mapping is effectively integrated into hospital operations, playing a crucial role in waste reduction, process optimization, and overall performance improvement. Therefore, value stream mapping significantly improves performance by identifying and eliminating waste. This aligns with Mahlo and Chiromo (2018), who found that VSM helps reduce waste and streamline operations, thus enhancing performance. Tiwari and Manoria (2017) also demonstrated that VSM effectively identifies inefficiencies, driving improvements in process flow and organizational outcomes.

Resource Optimization

The second objective was to assess the effect of resource optimization on the performance of level six public hospitals. Respondents gave their level of agreement with various statements on resource optimization. Table 2 presents the summary of findings obtained.

Table 2: Descriptive Analysis for Resource Optimization

Statements	Mean	Standard Deviation
There is optimal use of resources in the health facility	3.992	0.534
There is wastage minimization from effective resource alignment	4.028	0.512
There is thorough planning of all the resources used in procurement	4.051	0.545
The use of resource planning software/computer packages has been adopted	3.975	0.573
There is adequate and efficient allocation of resources	4.039	0.529
The county has recognized frameworks and tools for monitoring resource use	3.964	0.552
Results and feedback from resource audits are always provided on time	4.023	0.518
Aggregate Mean	**4.010**	**0.538**

The findings in Table 2 indicate that respondents generally agree that there is optimal use of resources in the health facility (M = 3.992, SD = 0.534) and that effective resource alignment helps minimize wastage (M = 4.028, SD = 0.512). Respondents also agreed that there is thorough planning of all resources used in procurement (M = 4.051, SD = 0.545) and that resource planning software/computer packages have been adopted (M = 3.975, SD = 0.573). There is further agreement that resources are adequately and efficiently allocated (M = 4.039, SD = 0.529) and that recognized frameworks and tools are in place for monitoring resource use (M = 3.964, SD = 0.552). Additionally, respondents noted that results and feedback from resource audits are always provided on time (M = 4.023, SD = 0.518).

The overall aggregate mean of 4.010 suggests that resource optimization practices are well implemented, enhancing efficient resource use, minimizing wastage, and contributing to improved performance in the health facilities. It suggests that resource optimization enhances hospital performance. This finding is consistent with Abdi (2020), who noted that resource planning and efficient allocation significantly improve project performance. Bichii and Waruguru (2020) also confirmed that effective resource alignment positively affects organizational performance.

Performance of Level Six Public Hospitals

The primary focus of the study was to assess the performance of level six public hospitals based on service quality improvement, operational efficiency, and resource utilization. Descriptive statistics for these indicators are presented in the table 3.

Table 3: Descriptive Analysis for Performance of Level Six Public Hospitals

Statements	Mean	Standard Deviation
The hospital delivers high-quality care and services.	4.102	0.542
Hospital operations are efficient and well-coordinated.	3.965	0.574
Resources are optimally utilized to enhance service delivery.	4.038	0.556
Hospital services are timely and responsive to patient needs.	4.082	0.532
Patient outcomes have significantly improved.	4.010	0.561
The hospital minimizes wastage of resources.	3.987	0.580
Staff performance and resource alignment contribute to better service delivery.	4.065	0.549
Aggregate Mean	**4.036**	**0.556**

The findings in Table 3show that respondents generally agree that level six public hospitals deliver high-quality care and services (M = 4.102, SD = 0.542) and that hospital operations are efficient and well-coordinated (M = 3.965, SD = 0.574). There is also strong agreement that resources are optimally utilized to enhance service delivery (M = 4.038, SD = 0.556) and that

hospital services are timely and responsive to patient needs (M = 4.082, SD = 0.532). Respondents noted that patient outcomes have significantly improved (M = 4.010, SD = 0.561), and the hospitals effectively minimize wastage of resources (M = 3.987, SD = 0.580). Additionally, there was agreement that staff performance and resource alignment contribute to better service delivery (M = 4.065, SD = 0.549).

The aggregate mean of 4.036 indicates that respondents generally agree that the performance of level six public hospitals is positive, particularly in terms of service quality improvement, operational efficiency, and resource utilization. These findings suggest that lean procurement practices contribute significantly to enhancing hospital performance, aligning with studies such as Shadrack (2018), which emphasized the role of resource planning in improving operational efficiency, and Abdi (2020), who highlighted the importance of resource management in optimizing project performance.

Correlation Analysis

Correlation analysis was conducted to examine the relationships between the independent variables (value stream mapping, and resource optimization) and the dependent variable (performance of level six public hospitals) in Nairobi City County, Kenya. The correlation coefficients provide insights into the strength and direction of these relationships, where values range from -1 to +1, with positive values indicating positive relationships and negative values indicating inverse relationships. The correlation was considered small if $\pm 0.1 < r < \pm 0.29$, medium if $\pm 0.3 < r < \pm 0.49$, and strong if $r > \pm 0.5$. The results of the correlation analysis are presented in Table 4.

Table 4: Correlation Analysis

Variable		Performance of Hospitals	Value Stream Mapping	Resource Optimization
Performance of Hospitals	Pearson Correlation	1.000		
	Sig. (2-tailed)	0.000		
	N	157		
Value Stream Mapping	Pearson Correlation	0.719**	1.000	
	Sig. (2-tailed)	0.000		
	N	157	157	
Resource Optimization	Pearson Correlation	0.752**	0.621	1.000
	Sig. (2-tailed)	0.000	0.178	
	N	157	157	157

Correlation is significant at the 0.05 level (2-tailed).

Value stream mapping (VSM) was found to have a strong positive correlation with hospital performance ($r = 0.719$, $p < 0.05$), indicating that VSM practices such as identifying waste, reducing reworks, and optimizing process flows significantly enhance the overall performance of hospitals. This positive relationship suggests that VSM is instrumental in streamlining operations, reducing inefficiencies, and improving service delivery. These findings are in line with Harun et al. (2018), who reported that VSM significantly improves operational efficiency by minimizing waste and enhancing workflow in manufacturing environments. Tiwari and Manoria (2017) also noted that VSM helps organizations identify inefficiencies, making it a valuable tool for process improvement in healthcare settings.

Resource optimization showed the strongest positive correlation with hospital performance ($r = 0.752$, $p < 0.05$). This indicates that optimal use and alignment of resources significantly enhance hospital performance, leading to improved service delivery, reduced operational costs, and better patient outcomes. The strong correlation suggests that hospitals that effectively manage and allocate their resources are more likely to achieve superior performance. This finding aligns with Abdi (2020), who highlighted the significant impact of resource planning and allocation on project success in public infrastructure projects. Similarly, Bichii and

Waruguru (2020) found that resource alignment positively affects performance in the energy sector, underscoring the importance of effective resource management in achieving organizational goals.

Regression Analysis

The coefficients table provides detailed information on the contribution of each independent variable to the dependent variable, including the unstandardized and standardized coefficients (beta values) and their respective p-values.

Table 5: Coefficients of Study Variables

Variable	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	0.789	0.102		7.735	0.000
Value Stream Mapping	0.314	0.062	0.308	5.065	0.000
Resource Optimization	0.335	0.058	0.332	5.776	0.000

The coefficient for value stream mapping is 0.314 ($p < 0.05$), indicating a strong positive effect on hospital performance. This result suggests that value stream mapping, which identifies and eliminates waste in processes, plays a crucial role in optimizing hospital operations and enhancing service delivery. The findings are in line with those of Harun et al. (2018), who found that value stream mapping significantly improves operational efficiency by minimizing waste and streamlining workflows in the manufacturing sector. The strong impact of VSM in this study underscores its value as a strategic tool for process optimization in healthcare, leading to better patient outcomes and higher operational standards.

Resource optimization has the highest coefficient of 0.335 ($p < 0.05$), making it the most influential factor affecting the performance of level six public hospitals. This finding implies that optimizing the use of resources, such as staff, equipment, and supplies, is critical in enhancing hospital performance. The significant positive impact of resource optimization is supported by the study by Kiungo and Otieno (2023), which concluded that efficient resource utilization significantly supports project success and sustainability in gated community building projects. In the context of hospitals, effective resource optimization ensures that healthcare facilities can meet patient needs efficiently, reduce operational costs, and enhance overall service quality.

Based on the coefficients, the fitted regression model is:

Performance of Level Six Public Hospitals = 0.789 + 0.314(VSM) + 0.335(Resource Optimization)

Conclusions

VSM is an essential tool for identifying inefficiencies and optimizing processes in hospital procurement functions. The study concludes that value stream mapping significantly enhances hospital performance by identifying and eliminating non-value-adding activities, reducing reworks, and streamlining workflows. VSM enables hospitals to visualize processes, pinpoint areas of waste, and implement changes that lead to more efficient operations. The strong positive impact of VSM on hospital performance underscores its value as a strategic approach to continuous improvement, contributing to better service delivery and improved patient outcomes.

Resource optimization is the most influential lean procurement practice affecting hospital performance. The study concludes that the optimal use and alignment of resources, including thorough planning, efficient allocation, and the use of monitoring frameworks, are critical in enhancing the performance of level six public hospitals. Effective resource optimization leads

to minimized waste, improved service quality, and reduced operational costs. This conclusion emphasizes the need for hospitals to prioritize resource optimization strategies to ensure that all available resources are used efficiently, supporting high-quality healthcare delivery and sustainable hospital operations.

Recommendations

Value Stream Mapping

Hospitals should incorporate value stream mapping into their standard operating procedures to identify and eliminate inefficiencies in procurement processes. It is recommended that hospitals engage experts in VSM to conduct thorough process analyses, identify waste, and develop action plans to improve workflows. Management should regularly review value stream maps to ensure that processes remain optimized and aligned with the hospital's performance goals. By continuously updating value stream maps, hospitals can adapt to changes and maintain high operational efficiency.

Resource Optimization

Resource optimization should be a strategic priority for hospitals to enhance overall performance. Hospitals should implement comprehensive resource planning and alignment strategies, supported by modern software tools for monitoring and managing resources. Regular resource audits should be conducted to assess efficiency, with feedback provided promptly to inform decision-making. Management should ensure that resources are allocated effectively to meet patient needs and operational requirements, minimizing waste and maximizing the impact of available assets.

Suggestions for Further Studies

Future research could explore additional impacts of lean procurement practices on healthcare performance metrics such as patient satisfaction, staff morale, service delivery time, and financial sustainability. Studies should investigate barriers to implementing lean practices in public hospitals, such as resistance to change, lack of training, and technological challenges, and propose strategies to overcome them. Comparative studies across different hospital levels and regions could provide insights into the adaptability of lean procurement in diverse healthcare settings. Further, examining the role of technology, such as e-procurement systems, and conducting longitudinal studies on the long-term effects of lean procurement would offer a deeper understanding of its sustained impact. Integrating lean procurement with other management frameworks like Six Sigma and TQM could also be explored to assess combined effects on hospital performance.

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