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LEAN PROCUREMENT PRACTICES AND PERFORMANCE OF COMMERCIAL STATE COPERATIONS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

Lean procurement practices play an important role in enhancing organizational efficiency through waste reduction, cost optimization and improved service delivery. However, the performance of commercial state corporations in Kenya remains uneven, highlighting the need for effective procurement practices. This study examined the influence of pull systems and e-procurement on the performance of commercial state corporations in Nairobi City County, Kenya. The study was guided by Just-in-Time Theory and Innovation Diffusion Theory, which explain the application of demand-driven procurement and the adoption of electronic procurement technologies, respectively. A descriptive research design was adopted, targeting 240 procurement and finance officers from commercial state corporations. A sample of 150 officers was determined using Yamane's formula, with stratified random sampling employed to select respondents. Data were collected using structured questionnaires and analysed using descriptive and inferential statistics, including Pearson correlation and multiple regression analysis, with the aid of SPSS version 28. A total of 118 valid responses were obtained, representing an 87.4% response rate. The findings revealed a strong positive and statistically significant relationship between pull systems and organizational performance ($r = 0.737$, $p < 0.001$). Similarly, e-procurement had a positive and statistically significant relationship with organizational performance ($r = 0.540$, $p < 0.001$). Regression results further established that pull systems ($\beta = 0.682$, $p < 0.001$) and e-procurement ($\beta = 0.582$, $p < 0.001$) were significant positive predictors of organizational performance. Pull systems recorded the strongest standardized contribution among the procurement practices examined. The study concludes that demand-driven procurement, effective inventory management and adoption of electronic procurement systems are important for enhancing the performance of commercial state corporations. It recommends strengthening demand forecasting, aligning procurement and replenishment with actual requirements, and improving the implementation of electronic sourcing, tendering, bidding and payment systems.

Keywords: Lean procurement, pull systems, e-procurement, organizational performance, commercial state corporations, Kenya.

INTRODUCTION

Background of the Study

Lean procurement is an approach to procurement management that applies lean principles to eliminate waste, improve operational efficiency and enhance value throughout the supply chain. It emphasizes the efficient utilization of resources, reduction of unnecessary activities and continuous improvement of procurement processes. Waste in procurement and supply chain operations may arise from overproduction, excessive inventory, unnecessary processing, errors and delays, all of which increase operational costs without adding value to the organization (Saleem, 2022). Consequently, lean procurement focuses on improving the flow of materials, information and resources to ensure that procurement activities respond effectively to organizational requirements. Its application has been associated with reduced costs, improved quality, shorter delivery times and increased operational flexibility (Gadysz et al., 2020).

Among the practices associated with lean procurement, pull systems and e-procurement are particularly important in improving the efficiency of procurement operations. Pull systems involve initiating procurement and replenishment activities in response to actual demand rather than relying on predetermined supply schedules or excessive stock accumulation. The approach is closely associated with Just-in-Time (JIT) principles, which emphasize obtaining the right products, in the required quantities and quality, at the appropriate time and place (Paneru, 2021). By aligning procurement with actual consumption requirements, organizations can minimize unnecessary inventory, reduce storage costs and improve the responsiveness of supply chain operations. E-procurement, on the other hand, involves the use of electronic technologies to facilitate procurement activities, including sourcing, tendering, bidding, ordering, contracting and payment. Its application can improve information accessibility, transaction efficiency, transparency and the coordination of procurement activities (Rosenzwei, 2020). The application of Just-in-Time manufacturing illustrates the importance of demand-driven production and replenishment in reducing operational inefficiencies. Paneru (2021) observes that JIT emphasizes the availability of products in the appropriate quantities and quality, at the required time and location. This approach supports cost reduction, improved product quality and operational efficiency. Similarly, Singh and Modgil (2020), in their study of lean practices in the Indian automotive sector, established that lean supply chain practices contribute to improved supply chain performance. These findings demonstrate the importance of integrating demand-responsive processes and efficient information management into organizational operations. However, the effectiveness of lean practices depends on how well organizations align procurement activities with actual operational requirements and coordinate the flow of materials and information.

In Kenya, organizations have increasingly recognized the importance of lean supply chain and procurement practices in addressing operational inefficiencies. Onyancha and Kimutai (2018) observed that although many Kenyan construction companies had specialized inventory control procedures, these were not always sufficient to address inventory-related costs, including stock-out costs. Ochieng (2021) similarly noted that lean supply chain management enables organizations to reduce waste, improve supply chain processes and respond more effectively to customer requirements. In addition, Osodo and Onjure (2019) established that improvements in just-in-time practices, e-procurement, supplier relationship management and continuous improvement contribute to better procurement function performance. These findings indicate the relevance of demand-driven procurement and electronic procurement systems in improving organizational efficiency. Nevertheless, their effectiveness depends on the extent to which organizations implement these practices consistently and align them with their operational requirements.

Commercial state corporations in Kenya provide an important context for examining the contribution of lean procurement practices to organizational performance. Established under the State Corporations Act, these entities undertake commercial activities in sectors such as energy, transport, manufacturing and service delivery. They play a significant role in national economic development through the provision of essential services, employment creation and revenue generation (Republic of Kenya, 2017). Unlike entities whose primary mandate is non-commercial service provision, commercial state corporations are expected to generate revenue and operate efficiently while fulfilling their respective mandates. Their performance is therefore influenced by their ability to manage financial and operational resources, control costs and deliver quality services within established performance targets. Performance evaluation involves assessing actual organizational achievements against agreed performance targets (Koech & Ogollah, 2018).

Procurement is central to the operations of commercial state corporations because it facilitates the acquisition of goods, works and services required to support their mandates. Inefficient procurement processes, excessive inventory, delayed replenishment and reliance on manual transactions can increase operational costs and affect service delivery. The application of pull systems can help these corporations align procurement and inventory replenishment with actual demand, while e-procurement can improve the efficiency and coordination of procurement transactions. Despite the recognition of lean procurement as an approach to improving organizational efficiency, there remains a need to establish how specific practices contribute to the performance of commercial state corporations in the Kenyan context. This study therefore examines the influence of pull systems and e-procurement on the performance of commercial state corporations in Nairobi City County, Kenya.

Statement of the Problem

Commercial state corporations in Kenya play an important role in economic development through the provision of essential services, employment creation and revenue generation. However, their performance remains uneven, with some corporations recording satisfactory results while others continue to experience operational inefficiencies and financial difficulties (Rugutt et al., 2019). The National Treasury and Planning (2023) reported that 11 state corporations faced high liquidity risk and were making losses, while 14 corporations had accumulated substantial pending arrears amounting to KSh 211 billion, equivalent to 2.2% of the gross domestic product. These challenges raise concerns about the efficiency with which commercial state corporations manage their financial and operational resources and deliver services.

Procurement is an important organizational function through which commercial state corporations acquire the goods and services required to support their operations. Inefficient procurement practices, poor inventory management, unnecessary stock accumulation and delays in procurement transactions can increase operating costs and constrain service delivery. Pull systems offer an approach to addressing these challenges by aligning procurement and inventory replenishment with actual demand, thereby reducing unnecessary stockholding and associated costs. Similarly, e-procurement can improve the efficiency of procurement transactions through electronic sourcing, tendering, bidding and payment processes. Effective implementation of these practices could therefore contribute to improved resource utilization, cost management and organizational performance.

Although previous studies in Kenya have examined lean procurement and supply chain practices, their findings have largely focused on other organizational contexts and performance outcomes. Osodo and Onjure (2019), for instance, established positive and significant relationships between Just-in-Time practices, e-procurement and the performance of the procurement function at the Agriculture and Food Authority. Wambui and Odari (2021) examined lean supply chain techniques among food and beverage manufacturing companies

and found positive relationships between the practices investigated and organizational performance. Similarly, Omwoyo et al. (2019) established that lean procurement initiatives enhance supply chain agility among manufacturing firms. While these studies demonstrate the relevance of lean practices, they do not adequately establish how pull systems and e-procurement influence the overall performance of commercial state corporations.

Consequently, there remains a contextual and empirical gap concerning the contribution of these two specific lean procurement practices to the performance of commercial state corporations in Kenya. Addressing this gap is important given the operational and financial challenges experienced by some of these corporations and the need to improve procurement efficiency and resource utilization. This study therefore examined the influence of pull systems and e-procurement on the performance of commercial state corporations in Nairobi City County, Kenya.

Research Objectives

General Objective

To examine the influence of pull systems and e-procurement on the performance of commercial state corporations in Nairobi City County, Kenya.

Specific Objectives

i. To establish the influence of pull systems on the performance of commercial state corporations in Nairobi City County, Kenya.
ii. To examine the influence of e-procurement on the performance of commercial state corporations in Nairobi City County, Kenya.

Research Questions

i. How do pull systems influence the performance of commercial state corporations in Nairobi City County, Kenya?
ii. How does e-procurement influence the performance of commercial state corporations in Nairobi City County, Kenya?

LITERATURE REVIEW

Theoretical Literature Review

Just-in-Time Theory

Just-in-Time (JIT) Theory was developed by Taiichi Ohno (1970) and emphasizes the production and availability of goods in the required quantities, at the appropriate time and quality. The theory advocates minimizing unnecessary inventory by ensuring that production and replenishment activities are initiated in response to actual demand rather than producing or purchasing goods in advance for storage. Its underlying assumptions include relatively stable demand, reliable suppliers, frequent deliveries, low defect rates, flexible employees and an organizational culture that supports continuous improvement (Kootanaee et al., 2013). By reducing the need to maintain excessive inventory, JIT helps organizations minimize storage and inventory-holding costs while improving the flow of materials and operational efficiency (McWatters & Fullerton, 2013).

One of the major strengths of JIT Theory is its emphasis on eliminating non-value-adding activities and reducing the seven traditional forms of waste, namely overproduction, waiting, unnecessary transportation, over-processing, excess inventory, unnecessary motion and defects. Eliminating these forms of waste can lower operational costs, improve quality, reduce lead times and release working capital that would otherwise be tied up in inventory (Ohno, 1988; Womack & Jones, 2003). The theory also promotes systematic problem-solving by making operational inefficiencies more visible when excessive inventory buffers are reduced.

Despite these benefits, JIT has limitations, particularly its vulnerability to supply chain disruptions. Maintaining minimal inventory buffers can expose organizations to shortages when suppliers fail, transport systems are disrupted or unexpected changes in demand occur (McWatters & Fullerton, 2013). Its successful implementation also depends on reliable suppliers, predictable demand, employee training and appropriate organizational processes, conditions that may not always exist in organizations experiencing high demand variability (Kootanaee et al., 2013).

JIT Theory supports the pull system variable in this study because pull systems operationalize the principle of demand-driven procurement and replenishment. Under a pull system, procurement and inventory replenishment are initiated when actual demand arises rather than being based exclusively on forecasts. Commercial state corporations in Nairobi City County can apply this approach to minimize excess inventory, reduce storage costs and improve responsiveness to operational requirements. The theory therefore provides a basis for examining how demand-driven procurement and inventory management contribute to organizational performance.

Innovation Diffusion Theory

Innovation Diffusion Theory was proposed by Rogers (1962) to explain how new ideas, technologies, products and practices are communicated and adopted within a social system over time. The theory views innovation as a process through which individuals and organizations become aware of, evaluate and adopt new approaches. According to Rogers (1962), the diffusion process involves four main elements: the innovation, communication channels, time and the social system within which adoption occurs. The theory further identifies five categories of adopters: innovators, early adopters, early majority, late majority and laggards, reflecting differences in the willingness and speed with which individuals and organizations embrace innovations (Wani & Ali, 2015).

The adoption of an innovation is influenced by its perceived relative advantage, compatibility with existing practices, complexity, trialability and observability. These attributes help explain why organizations adopt certain technologies more readily than others. The theory's strength lies in its broad applicability in explaining the adoption of technological and organizational innovations across different institutional settings (Rogers, 2003). It also provides a framework for understanding the factors that facilitate or constrain the adoption process. However, the theory has been criticized for its pro-innovation bias, particularly its tendency to assume that adopting an innovation is inherently beneficial. It has also been criticized for giving insufficient attention to organizational power relations, institutional constraints and resource limitations that may influence technology adoption (Greenhalgh et al., 2004; Lyytinen & Damsgaard, 2001).

Innovation Diffusion Theory supports the e-procurement variable in this study because e-procurement represents the adoption of digital technologies to improve procurement processes. Commercial state corporations may adopt electronic systems to facilitate activities such as e-tendering, e-bidding, e-auctions, e-contracting and electronic payments. The extent to which these systems improve organizational performance may depend on their perceived benefits, compatibility with existing procurement procedures, ease of use, availability of resources and organizational readiness. The theory therefore provides a basis for understanding variations in the adoption and utilization of e-procurement systems and how such adoption may contribute to procurement efficiency and organizational performance.

Conceptual Framework

A conceptual framework is a diagrammatic illustration that explains the relationship between the variables relevant to the study (Oso & Onen, 201). The theory presents the independent and dependent variable.

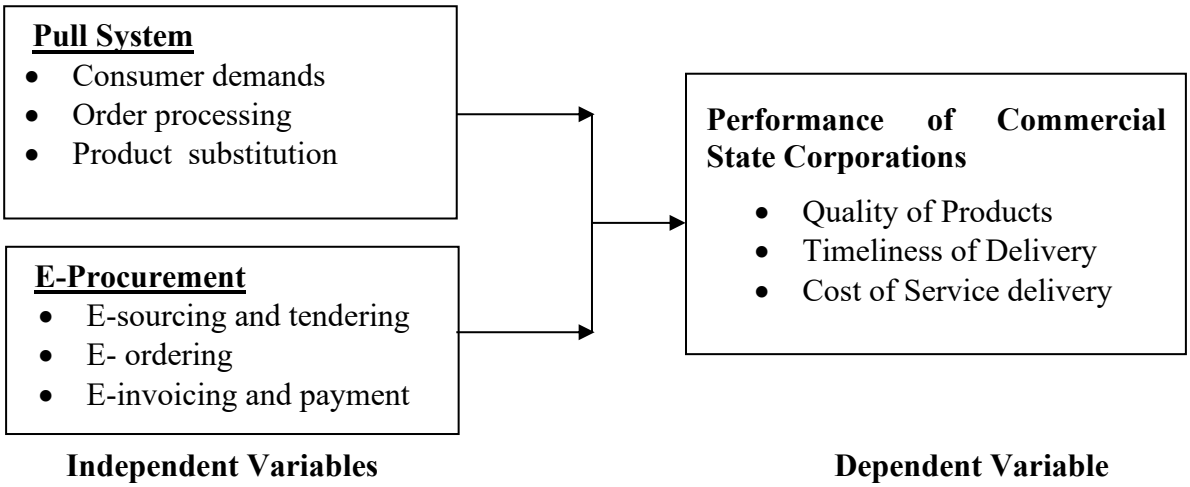


Figure 2.1: Conceptual Framework

Pull System

Pull flow system is one lean technology used to reduce waste in the manufacturing process. According to Fowler et al. (2019), this systems works in reverse order starting with customers orders.The raw materials used in production are then restocked (Araújo, Alves, & Romero, 2021). The production line pulls the product based on client demand. Factories can save time by producing items that are never sold and planning for future demand thanks to the pull mechanism. A pull system lowers the company's overall expenses, either directly or indirectly, which boosts profits. The pull method uses a number of fundamental strategies, including Kanban methodologies, to facilitate quick material movement (Mouaky, Berrado, & Benabbou, 2019).

According to Mouaky et al. (2019), the Kanban method is frequently employed as a lean tool and knowledge system to cut down on waste that is unnecessary throughout a successful cycle. It indicates that real demand, not projections or timetables, drives manufacturing or service delivery. Businesses can only begin manufacturing a new product when there is consumer demand by putting in place a pull system. Businesses can use their storage space more efficiently and cut expenses thanks to the system. In pull systems, businesses manufacture and distribute goods based on consumer preferences rather than educated estimates. They only make what is required at the appropriate time.

According to Marsh and Maureen (2019), a pull system that uses kanban is frequently employed in industrial settings to effectively control the flow of items. However, its success in service operations is restricted to procedures that resemble production lines when the output is repetitive. Businesses are generally less likely to buy excess inventory when using a pull system, which can result in cheaper prices and less waste because things are only delivered when clients purchase them. For example, a business that manufactures perishable goods, such as food, might employ a pull system to guarantee that these goods are still fresh when consumers buy them (Saxby, Cano-Kourouklis & Viza, 2020)..

E-Procurement

E-procurement is using an electronic platform to centrally manage a company's supply chain and procurement (Yevu, Yu, & Darko, 2021). All or a portion of the Procure-to-Pay (P2P) process, which consists of three primary stages; selection of suppliers, order transmission, invoicing, and payment can be completed paperless thanks to the software and information systems used in e-procurement (Boafo, Ahudey, & Darteh, 2020). The process of submitting a request for exchange (RFX) to suppliers and getting their answers online is known as e-tendering. E-Tendering improves productivity and optimizes the procurement process by

providing access to a higher-quality vendor pool through competitive tendering. The suppliers are selected online through e-sourcing and most suitable shortlisted to meet the firm's procurement needs. (Sunmola & Shehu, 2020). As a result of internet accessibility, people are able to source information online and obtain all the information they need by simply hitting a button on their laptops while lounging in their workplaces. These days, most businesses communicate with possible suppliers online and can obtain any inputs they require to improve their operations (Waithaka, & Kimani, 2021).

E-ordering is defined as the process of creating and approving procurement requisitions, placing purchase orders, as well as receiving goods and services ordered, by using software systems based on the Internet (Isoghom, & Worgu, 2024) (Lobong & Keji, 2020). Electronic payment involves making payments electronically that does not need the use of cheque or currency. The most commonly used electronic payment methods are debit cards, virtual cards, credit cards, and direct debit and direct deposits. E-payment accounts function in one of two ways. First, a payment card can be used to deposit funds into an organization's e-money account. Then, an e-payment system deducts money from the buyer's balance following a successful e-tendering process (Ibem, 2020).

E-procurement has recently taken the lead in many firms worldwide due to technical improvements that have made company processes easier, faster, and more efficient in today's competitive global village. When the Jubilee government took office in Kenya, the government actively participated in the adoption of e-procurement. Numerous adjustments and pressures have been made since then to guarantee that all governmental procurement operations are carried out online. The Kenyan government mandated that internet platforms be used for the purchase of all public commodities, projects, and services.

Empirical Review

Pull System and Firm Performance

Leal, Machado and Costa (2022) studied implementation of pull production in packing of plastics plastic packages. The study conducted a systematic review of plastic packages in São Paulo's state, Brazil. The pull production system was distinguished by its simplicity, the programming is only provided when the customer requests it and its ability to visually depict the requirement for production. It also synchronizes the stages of production. Inventories are significantly reduced because this system is dimensioned and controlled. The pull production system was distinguished by its simplicity, synchronization between production phases, and visual representation of production needs, as programming is only sent when the customer requests it. With the help of this technology, inventories were significantly reduced and are now sized and regulated.

De la Vega, Pinto, Ribeiro, and Spiegel (2022) studied lean production adopted by the automobile industry. The adaptation of pull processes for lean production in the healthcare industry (lean healthcare) was examined in this article. 267 papers on lean healthcare research were subjected to bibliometric analysis. Most of the articles came from the United States, Brazil, and the United Kingdom. The findings demonstrated that, when used in the context of healthcare, pulling has a clear goal. Healthcare waste was significantly reduced because to lean production.

Nunes, et al., (2022) compared the efficacy of push and pull models in a just-in-time supply chain. A systematic examination of the literature was used to gather data for the investigation. The Pull and Push strategy is suitable method of reaching out to potential improvements and added value for the distribution company. The best experience was promoted by the Kanban technique in terms of customer satisfaction and group level. Though it is not always the most effective when considering strong demand fluctuation, the Kanban system yields the best

results when production flow is shared throughout and in an ordered manner which involves brief and rapid interventions.

Bruna and Cláudia (2021) examined a pull system deployment in a small and medium-sized business that makes polymeric parts for the automotive sector. The primary goal was to create a pull production system for the painting line that was managed using Kanbans. According to the study, manufacturing efficiency was increased by using pertinent lean tools like the Kanban System, SMED, and VSM. It was feasible to cut setup times by 38% and generate about 83000€ in revenue annually by using the SMED application. Significant production reduction was made possible with the implementation of a Kanban System, Leveling, and Supermarket. Additionally, value-added time increased as the lead time reduced.

E-Procurement and Firm Performance

Puspita and Gultom, (2022) examined how corruption in government procurement was affected by e-procurement policies in 34 Indonesian provinces. According to this study, in provinces with comparatively high capital expenditures or government procurement spending, the adoption of e-procurement considerably lessens the level of corruption in government procurement. E-procurement facilitates application of good governance in government procurement which demonstrates the beneficial impact of e-procurement on lowering corruption cases in public sector.

Sa'adah (2020) sought to learn more about Indonesia's e-procurement implementation. A survey and secondary data from e-procurement studies conducted in a number of Indonesian local governments provided the data. The findings demonstrated that e-procurement decreased fraud. E-procurement has been shown to have more benefits (maslahah) than risks (mafsadat). Due to a lack of information, there were still questions regarding the application of sharia in procurement.

Maulida and Kurniawan (2021) analyzed the magnitude of the effect of e-procurementon employee performance in Subang Regency. An explanatory method was used. The target was 31 employees. Data was collected using questionnaires. Results showed a positive and significant effect of e-procurement on procurement function. Kimutai and Magutu (2020) studied electronic sourcing on performance of commercial state corporations in Kenya. The target was 33 commercial state corporations. Questionnaires were used in data collection. The results demonstrated that the majority of commercial state businesses use e-supplier identification, e-supplier selection, e-prequalification, and e-supplier evaluation as core e-sourcing procedures, and that each of these practices significantly and favorably affects procurement costs.

Mapendo, Mutuku, and Musau (2020) studied effect of electronic procurement on performance of Tuskys supermarket. According to findings, e-procurement in supermarkets significantly and favorably affects the organization's performance. Additionally, it is observed that e-souring affects the organization's performance by improving the efficient selection of suppliers from a larger geographic area, hence increasing effective competition in the process. The study also comes to the conclusion that the firm's performance is likely to improve if it uses e-tendering because Tuskys supermarket can process the tenders quickly and effectively, which improves their performance.

Hajir (2021) studied effect of e-procurement practices on performance of supermarkets in Nairobi City County, Kenya. The sample was 94 supermarkets' staff. Questionnaires and interview guides were the data collection instruments. The operational performance of retail supermarkets is positively impacted by e-tendering, e-sourcing, and e-payments, according to the results. Conclusion was that the performance of retail supermarkets is significantly impacted by electronic procurement processes. The study discovered that the supermarkets'

operational effectiveness was significantly predicted by their implementation of e-payment, e-tendering, and e-sourcing procedures.

RESEARCH METHODOLOGY

The study adopted a descriptive research design to examine the influence of pull systems and e-procurement on the performance of commercial state corporations in Nairobi City County, Kenya. The design was considered appropriate because it enabled the collection of information from respondents regarding existing procurement practices and organizational performance. Descriptive research facilitates the systematic characterization of study variables and provides a basis for examining relationships among them (Creswell & Plano Clark, 2017; Deckert & Wilson, 2023).

The target population comprised 240 procurement and finance officers drawn from 34 commercial state corporations in Kenya. The corporations constituted the unit of analysis, while procurement and finance officers formed the unit of observation because of their involvement in procurement-related activities and financial management. The population consisted of 172 procurement staff and 68 finance officers. A sample size of 150 respondents was determined using Yamane's (1967) formula at a 5% margin of error. Stratified random sampling was employed, with procurement and finance departments forming the two strata. The sample comprised 107 procurement staff and 43 finance officers, ensuring representation of both categories in the study.

Primary data were collected using structured questionnaires administered to the sampled respondents. The questionnaire comprised closed-ended statements measured on a five-point Likert scale ranging from strongly disagree to strongly agree. For the purposes of this article, the relevant questionnaire items focused on pull systems, e-procurement and organizational performance. Pull systems were assessed in relation to demand-driven procurement, inventory replenishment and the reduction of unnecessary stockholding, while e-procurement covered the application of electronic technologies in procurement activities. Organizational performance was assessed using indicators relating to product and service quality, timeliness of delivery and cost of service delivery. Questionnaires were considered appropriate because they enabled the collection of standardized information from respondents across different corporations.

Data collection was undertaken after obtaining authorization from Jomo Kenyatta University of Agriculture and Technology (JKUAT), a research permit from the National Commission for Science, Technology and Innovation (NACOSTI), and the necessary permissions from the participating state corporations. Respondents were contacted and briefed on the purpose of the study, after which questionnaires were administered electronically through Google Forms. Participation was voluntary, and respondents were informed that the information provided would be treated confidentially and used exclusively for academic purposes. The study observed research ethics through informed consent, respect for respondents' privacy and confidentiality of the information collected.

A pilot study involving 15 respondents, representing approximately 10% of the calculated sample size, was conducted to assess the clarity, suitability and reliability of the research instrument. The pilot participants were excluded from the main data collection exercise. Content validity was assessed through a review of the questionnaire by the research supervisor and relevant professionals to establish whether the items adequately represented the study variables and their respective indicators. Construct validity was assessed using confirmatory factor analysis, with a minimum factor loading of 0.50 adopted as the acceptable threshold (Hair et al., 2010). Reliability was evaluated using Cronbach's alpha coefficient, with a threshold of 0.70 applied to establish acceptable internal consistency. The pilot study yielded Cronbach's alpha coefficients of 0.778 for pull systems, 0.856 for e-procurement and 0.819 for organizational performance, indicating acceptable reliability of the measures used in the article.

A total of 135 questionnaires were administered during the main data collection exercise, out of which 118 valid responses were obtained, representing a response rate of 87.4%. The collected data were coded and analysed using Statistical Package for Social Sciences (SPSS) version 28. Descriptive statistics, including frequencies, percentages and means, were used to summarize respondents' perceptions of pull systems, e-procurement and organizational performance. Inferential statistics involved Pearson correlation analysis and multiple regression analysis to establish the relationships between the selected procurement practices and organizational performance.

RESEARCH FINDINGS AND DISCUSSIONS

Questionnaires were administered to 135 respondents and 118 responded to the study questionnaire which is 87.4% response rate. This is an adequate response rate as recommended by Fincham (2008) that a response rate of 60% and above should be the target of every social science researcher. The high response rate was attributed to the researcher's prior engagement with the respondents, clear explanation of the purpose of the study, and close follow-up during questionnaire administration.

Pull System

The first objective sought to establish effect of pull system on performance of commercial state corporations in Nairobi City County, Kenya. Respondents were asked to indicate the extent to which they agreed with statements on pull system. Results are presented in Table 1.

Table 1: Pull System

Statements	N	Mean	Std. Dev.
Production is based on actual demand	118	1.87	1.10
Efficient methods are used to estimate customer demands	118	1.86	1.06
Pull systems increase warehouse productivity by doing away with the requirement for delivery and orders.	118	4.34	1.00
Pull systems helps to minimize waste	118	4.19	1.06
Pull flow offers the chance to optimize storage expenses and cut down on expenditures.	118	4.47	0.88
The corporation has been able to control inventory and production	118	4.08	1.09
Average	**118**	**3.47**	**1.03**

The results show that the respondents strongly agreed that; pull flow offers the chance to optimize storage expenses and cut down on expenditures (M=4.47, Std. =0.88) and the pull systems increase warehouse productivity by doing away with the requirement for delivery and orders (M=4.34, Std. =1.00). The respondents also agreed that; pull systems helps to minimize waste (M=4.19, Std. =1.06) and the corporation has been able to control inventory and production (M=4.08, Std. =1.09). Respondents however disagreed that the production is based on actual demand (M=1.87, Std. =1.10) and that the efficient methods are used to estimate customer demands (M=1.86, Std. =1.06). The results show mixed opinions with regards to implementation and benefits of pull-system practices among the commercial state corporations. The results suggest a moderately favourable assessment on pull systems (M=3.47, Std. =1.03).

The results show that there is a mixed picture on the use of pull systems by commercial state corporations in Nairobi City County. The results also indicate that respondents understand the benefits of pull systems, especially relating to warehouse productivity, reducing waste, optimizing storage costs, and controlling inventories and production. These perceptions suggest that their organizations have a clear understanding of the conceptual qualities of pull systems. The results also show that there are substantial gaps in the actual application of the principles of the pull-system. The findings indicate that production is not always aligned with

actual demand, and methods to estimate demand have generally not been developed that will allow for efficient production. This suggests a disconnect between the recognised benefits of pull systems and what they are actually used for in the practice of everyday activities. Overall, results suggest that commercial state corporations value the benefits of pull systems, and inventory and production control have been implemented to some extent, but many of the elements of demand-driven production and accurate demand estimation are still insufficiently developed. Results concur with Bruna and Cláudia (2021) who reported improvements in efficiency, including reduction in setup time, alongside reduced lead time and estimated annual revenue gains. Nunes, et al., (2022) reported that pull and push strategy is suitable method of reaching out to potential improvements and added value for the distribution company.

E-procurement

The second objective was to examine effect of E-procurement on performance of commercial state corporations in Nairobi City County, Kenya. Respondents were asked to indicate the extent to which they agreed with statements on E-procurement. Results are presented in Table 2.

Table 2: E-procurement

Statements	N	Mean	Std. Dev.
Organizational efficiency is impacted by e-payments in terms of time savings.	118	4.25	0.99
E-payments offers more confidence and security	118	4.32	1.19
When choosing vendors, the company uses electronic quotes.	118	4.13	0.98
The corporation chooses the most economical procurement partners by using e-bidding platforms.	118	4.15	1.13
E-tendering helps to manage supplier's bids	118	4.10	1.08
E-tendering helps to reduce procurement costs	118	4.24	0.85
The corporation has been using e-auction platforms to choose qualified procurement partners	118	4.28	1.17
The corporation has used e-contracting, which guarantees that the process of choosing and finding new suppliers is efficient.	118	4.17	0.99
Average	**118**	**4.20**	**1.04**

Findings show that the respondents strongly agreed that; E-payments offers more confidence and security (M=4.32, Std. =1.19), E-tendering helps to reduce procurement costs (M=4.28, Std. =1.17), organizational efficiency is impacted by e-payments in terms of time savings. (M=4.25, Std. =0.99), and E-tendering helps to reduce procurement costs (M=4.24, Std. =0.85). The respondents also agreed that; the corporation has used e-contracting, which guarantees that the process of choosing and finding new suppliers is efficient (M=4.17, Std. =0.99), the corporation chooses the most economical procurement partners by using e-bidding platforms. (M=4.15, Std. =1.13), when choosing vendors, the corporation uses electronic quotes (M=4.13, Std. =0.98), and E-tendering helps to manage supplier's bids (M=4.10, Std. =1.08).

The results indicate that the respondents generally agreed that e-procurement practices were implemented in the commercial state corporations (M=4.20, Std. =1.04) which means a positive attitude towards electronic procurement practices in terms of payment, supplier selection, tendering, bidding, auctioning and contracting. The results show that e-procurement usage among the commercial State corporations in Nairobi City County is in place and has a positive perception. Results indicate that such organisations are actively using electronic tools in various aspects of procurement, such as e-payments, electronic quotations, e-bidding platforms, e-tendering, e-auctions and e-contracting. The respondents also appreciate the benefits of e-payments in improving efficiency (time saving) and adding greater confidence

and security. The study's results reveal that e-procurement assists organizations with executing a competitive and low-cost supply chain segment. Companies utilize electronic technologies to minimize expenditure incurred during supplier selection, to monitor the bidding process and to make the process of supplier identification and contracting more productive and efficient. These results reflect a concentration on the use of e-procurement technologies which guarantee visibility of the process, speed, and cost savings. The research clearly shows that companies are fond of e-procurement concept. This is an indicator that e-procurement is probably positively impacting the performance of Nairobi City County commercial state corporations.

Findings are in agreement with Hajir (2021) who supported potential value of digitizing various procurement stages. The results also support Kimutai and Magutu (2020) demonstrated that the majority of commercial state businesses use e-supplier identification, e-supplier selection, e-prequalification, and e-supplier evaluation as core e-sourcing procedures, and that each of these practices significantly and favorably affects procurement costs. Puspita and Gultom (2022) noted that E-procurement enhances implementation of good governance in government procurement which demonstrates the beneficial impact of e-procurement on lowering corruption cases in public sector.

Performance of Commercial State Corporations

The study further sought respondents' opinion on performance of commercial state corporations in Kenya. Results are presented in Table 3.

Table 3: Performance of Commercial State Corporations

Statements	N	Mean	Std. Dev.
The quality of products/ services have been improving	118	4.39	1.14
Service and products are delivered on time	118	2.15	1.18
The cost of service delivery has been reducing	118	2.07	1.02
There has been a reduction in operations costs	118	4.25	0.94
Average	**118**	3.21	1.07

Results show that the respondents strongly agreed that the quality of products/ services have been improving (M=4.39, Std. =1.14) and that there has been a reduction in operations costs (M=4.25, Std. =0.94). They however disagreed that; service and products are delivered on time (M=2.15, Std. =1.18) and that the cost of service delivery has been reducing (M=2.07, Std. =1.02). The overall mean of 3.21 show mixed performance assessment and not a uniform strong or weak performance. The respondents indicated positive attitudes towards quality improvement and negative attitudes towards delivery time and cost of services. The positive ratings for product and service quality indicate that respondents believed the corporations' products and services have improved in their quality relative to their expectations. Quality is one of the factors that could be controlled in procurement, which are the supplier capability, technical specifications, supplier evaluation and monitoring of procured goods and services. The reduction in operational costs was identified as another positive cost perception. The gap between perceived quality improvement and ongoing delivery challenges suggest that commercial state corporations may be seen as providing better quality products and services, but still encounter issues with delivery timelines and/or service-delivery expenses.

Correlation Analysis

Pearson correlation analysis was conducted to establish the strength and direction of the relationships between pull systems, e-procurement and the performance of commercial state corporations in Nairobi City County, Kenya. The analysis was based on 118 valid responses.

The results revealed a strong positive and statistically significant relationship between pull systems and organizational performance ($r = 0.737$, $p < 0.001$). This indicates that increased application of pull systems was associated with improved performance of commercial state

corporations. The findings suggest that demand-driven procurement and inventory replenishment practices are relevant to organizational efficiency and performance.

Similarly, e-procurement exhibited a positive and statistically significant relationship with organizational performance ($r = 0.540$, $p < 0.001$). This indicates that greater application of electronic procurement practices was associated with improved organizational performance. The findings suggest that the use of electronic procurement processes can contribute to more efficient procurement transactions and improved organizational outcomes.

The correlation between pull systems and e-procurement was positive but relatively weak ($r = 0.215$, $p = 0.019$). This indicates that the two practices were positively associated, although they represent distinct dimensions of lean procurement.

Overall, pull systems recorded a stronger correlation with organizational performance ($r = 0.737$) than e-procurement ($r = 0.540$). Both relationships were statistically significant at the 1% level, demonstrating the relevance of the two procurement practices to the performance of commercial state corporations.

Table 4: Correlation Results

Variables	Performance	Pull systems	E-procurement
Performance	1		
Pull systems	.737**	1	
E-procurement	.540**	.215*	1
N	118	118	118

**Correlation is significant at the 0.01 level (2-tailed); * significant at the 0.05 level (2-tailed).

Regression Analysis

The original regression analysis examined the combined influence of four lean procurement practices on organizational performance. The model produced an R^2 of 0.797 and an adjusted R^2 of 0.790, with an F-statistic of 110.946 ($p < 0.001$). However, these statistics represent the combined explanatory power of continuous improvement, supplier relationship, pull systems and e-procurement. They cannot be attributed exclusively to the two variables selected for this article.

The original regression coefficients nevertheless provide preliminary evidence of the relative contribution of the selected practices within the four-variable model. Pull systems recorded a standardized beta coefficient of 0.682 ($B = 0.739$, $t = 13.800$, $p < 0.001$), while e-procurement recorded a standardized beta coefficient of 0.582 ($B = 0.723$, $t = 6.889$, $p < 0.001$). Both variables had positive and statistically significant coefficients when controlling for the other two procurement practices in the original model. Pull systems recorded the larger standardized coefficient.

These coefficients should not be reported as the final regression results for the article. The original dataset must be re-analysed using pull systems and e-procurement as the only independent variables to obtain the correct model summary, ANOVA results, coefficients and regression equation.

Table 5: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant/Y Intercept	4.715	.364		12.953	.000
Pull system	.739	.054	.682	13.800	.000
E-procurement	.723	.105	.582	6.889	.000

The estimated regression equation based on the unstandardized coefficients is:

CP = 4.715+ 0.739PS + 0.723EP + ε where:

CP = Corporations' Performance

4.715 = the Constant, 0.739 and 0.723 = Slope coefficients or unstandardized coefficients (B)

PS=Pull System, and EP= E-procurement and ε is the error term.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

According to the research, pull systems have played a significant role in enhancing how state-owned businesses perform and have become the most effective of the four lean purchasing methods researched. The research shows that eliminating waste, lowering the cost of storing items, and enhancing inventory management are advantageous. However, the demand-based purchasing is not totally executed, as evidenced by the weaknesses, particularly in coordinating the purchasing and production processes with the actual demand and predicting the needs of customers. Based on this, the study concludes that corporations can perform better if they can improve their demand forecasting, match replenishment with actual demand, and prevent unnecessary stockpiling.

The research shows that e-procurement is positively related with performance of commercial state corporations. Generally, the use of e-procurement processes was viewed as favorable, especially concerning transaction security, supplier selection process, efficiency, and cost reduction. However, the results highlight that the corporations must work on improving their compliance with the use of digital tools for procurement processes. The results also suggest that e-procurement is a vital aspect of lean procurement, thereby improving the efficiency and systematic of procurement processes when utilized properly.

Recommendations

The commercial state corporations should focus on applying demand-oriented procurement and inventory techniques. Specifically, the procurement departments should improve their demand planning by using historical information on consumption, current orders and operational necessities as a basis for buying and restocking activities. Furthermore, the companies must develop appropriate systems for inventory monitoring and orders placement to ensure procurement of the materials in amounts and timing corresponding to the actual demand for these materials. Moreover, regular inventory reviews, including the evaluations of storage costs, stock movements and wastes need to be performed in order to implement necessary adjustments. Since pull systems have significantly contributed to performance of the companies in the research, it is necessary for managers to pay particular attention to the issue of inventory management in terms of reduction of unnecessary inventory detention costs and improving efficiency of procurement activities.

Commercial state corporations should step-up the successful realization and integration of electronic procurement systems throughout the procurement process, which covers e-quotes, e-bidding, e-tendering, e-auctioning and e-contracting. Management should train procurement staff in the proper use of these procedures on a continuous basis. Moreover, they should formulate and implement an appropriate policy for assessing e-bids, as well as maintaining proper electronic records and tracking procurement activities. Additionally, the corporations should regularly check the efficiency of their e-procurement procedures in terms of improving transaction efficiency, supplier selection, transparency, and cost control. It is also important to focus on the upgrading of the management of e-tendering and evaluation of supplier offers by means of e-tendering services, as this system has been evaluated less positively than other e-procurement systems.

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