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Inventory Management Systems and Firm Performance: A Case of Krones Life Cycle Service Centre East Africa

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Abstract

This study examined the effect of inventory management systems (IMS) and firm performance with a case of Krones Life Cycle Service Centre East Africa, addressing a pressing need for empirical evidence on IMS adoption and its outcomes within the East African industrial context. The main purpose was to evaluate how the introduction and operation of IMS influenced operational efficiency and overall organizational performance at Krones LCS Centre. The research was guided by three objectives: identifying the inventory management systems adopted; determining their influence on the firm's performance; and exploring the specific benefits and shortcomings resulting from their implementation. The research was grounded in a multifaceted theoretical framework that integrated the Resource-Based View (RBV), Systems Theory, and the Theory of Constraints. These theories collectively provided a robust foundation for analyzing how internal capabilities, system integration, and the identification and resolution of operational bottlenecks could drive improved firm outcomes. The RBV framed IMS as a source of sustained competitive advantage, while Systems Theory highlighted the interconnected nature of inventory processes, and the Theory of Constraints underscored the importance of addressing limiting factors within the inventory system. A descriptive survey research design was employed, targeting a population of 120 employees at Krones LCS Centre. The sample size was determined to be 60, selected using stratified random sampling to ensure representation across managerial, technical, and support roles. Data collection instruments comprised structured questionnaires and key informant interviews, supplemented by document analysis. Pretesting of research instruments was carried out to refine clarity and appropriateness. Instrument validity was established through expert review and triangulation, while reliability was confirmed with a Cronbach's alpha score of 0.87. Quantitative data were analyzed using descriptive statistics and SPSS software, while qualitative data were analyzed thematically. The study achieved a response rate of 91%, ensuring the reliability and integrity of the data collected. Key findings showed that 82.6% of respondents recognized the use of perpetual IMS, with inventory records continuously updated, and 91.3% confirmed that periodic physical inventory checks were a standard practice. The adoption of just-in-time inventory principles was acknowledged by 65.2% of participants, indicating a shift towards demand-driven stock management. Statistically, 76.1% of respondents reported reduced inventory costs following IMS adoption, while 86.9% noted improvements in customer service efficiency. Additionally, 97.8% indicated that IMS had strengthened supplier relationships. However, 67.4% of respondents identified system complexity and cost as notable challenges, and 78.2% experienced occasional operational disruptions due to system failures. Despite these obstacles, 87% of participants disagreed with the notion that IMS diminished managerial control over inventory. In conclusion, the study found that the adoption of integrated, well-managed IMS had a significant positive effect on the operational and financial performance of Krones Life Cycle Service Centre East Africa. Recommendations included ongoing staff training, continuous system upgrades, and the development of risk mitigation strategies to handle potential system failures. Suggestions for further research involved comparative studies across similar organizations in East Africa. Chapter Five synthesized these findings, reinforcing the strategic importance of tailoring IMS to organizational context for sustained competitiveness and growth.

Keywords: Inventory Management Systems, Perpetual inventory systems, Periodic inventory system, Just in Time inventory system, Vendor managed inventory system

1. Introduction

Inventory management had evolved into a strategic cornerstone for firms striving to navigate increasingly volatile markets, optimize operational efficiency, and remain competitive within the global business environment (Agyabeng-Mensah et al., 2020).

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Contemporary organizations, especially those in the service and manufacturing sectors, recognized that inventory management systems (IMS) were no longer auxiliary support functions but had become critical drivers of firm performance, directly influencing both financial outcomes and customer satisfaction (Bendak et al., 2021). This recognition arose from a growing body of empirical evidence which demonstrated that effective IMS adoption could drastically reduce operational costs, mitigate supply chain disruptions, and improve order fulfillment rates (Jain & Jain, 2022). Nonetheless, many firms particularly in emerging markets such as East Africa—faced considerable challenges in integrating IMS in ways that aligned with unique market conditions and resource constraints (Oloko et al., 2020).

Inventory management had emerged as a fundamental determinant of organizational success across diverse industries within the global economy. The advent of Industry 4.0 and the widespread digitalization of business operations had transformed inventory management systems (IMS), shifting their role from simple stockkeeping to integrated, data-driven platforms that underpinned strategic decision-making (Singh et al., 2021). Multinational firms increasingly relied on sophisticated IMS to synchronize supply chains, minimize costs, and elevate customer satisfaction in volatile markets (Agyabeng-Mensah et al., 2020). Despite these advances, persistent challenges including technological adaptation, cyber risks, and workforce readiness had resulted in significant performance disparities both between firms and across sectors internationally (Lemus-Aguilar et al., 2021). The global imperative to balance efficiency, sustainability, and resilience in inventory operations had sharpened scholarly and managerial focus on how IMS could generate competitive advantages (Kusi et al., 2023). This growing body of literature underscored the need to investigate IMS impacts in distinct organizational and market contexts to inform evidence-based best practices.

From a regional perspective, Africa's supply chain landscape had presented a unique intersection of opportunity and constraint, particularly with regard to IMS adoption and performance outcomes. African firms had increasingly recognized the importance of inventory optimization in addressing endemic challenges such as demand variability, logistical inefficiencies, and infrastructural limitations (Kibe et al., 2023). Yet, regional adoption of advanced IMS remained uneven, with implementation hampered by inadequate technological infrastructure, limited access to skilled personnel, and high integration costs (Ombati et al., 2022). Studies in sub-Saharan Africa highlighted how the absence of robust IMS had led to recurring issues—stockouts, excess inventory, and operational bottlenecks that eroded firm profitability and hindered service delivery (Mwangi et al., 2021). Nonetheless, evidence showed that firms investing in tailored IMS, including cloud-based and mobile solutions, had been better positioned to respond to market disruptions and foster organizational agility (Yusuf et al., 2023). These dynamics galvanized both scholarly inquiry and practitioner interest in the mechanisms by which IMS could catalyze performance improvements in African firms (Ogutu et al., 2021).

The Kenyan context offered a compelling microcosm of these regional dynamics, where inventory management had increasingly been regarded as pivotal to firm competitiveness in sectors ranging from manufacturing to services (Ngugi & Bwisa, 2020). Kenya's robust economic growth over the past decade had fueled investments in supply chain modernization, including the deployment of electronic IMS among leading firms (Ombati et al., 2022). Despite these advances, widespread implementation remained stymied by persistent barriers, including high initial capital outlays, gaps in ICT infrastructure, and organizational resistance to process change (Kibe et al., 2023). Local empirical studies reported a mixed landscape: while some firms achieved notable gains in cost efficiency, responsiveness, and market share through effective IMS, others struggled with incomplete integration and limited realization of anticipated benefits (Mwangi et al., 2021). These divergent experiences underscored the necessity of context-specific investigations that examined not just adoption, but also the lived realities and performance outcomes of IMS in Kenyan enterprises.

Within Kenya's manufacturing and service sectors, the interplay between IMS and firm performance had attracted growing academic attention, particularly as organizations navigated heightened competition and evolving customer expectations (Mwendwa et al., 2022). The proliferation of digital supply chain solutions empowered some firms to optimize inventory turnover, reduce lead times, and enhance customer satisfaction, thereby improving overall business performance (Singh et al., 2021). However, the integration of such systems remained complex, frequently entangled with challenges relating to data quality, system interoperability, and user adoption (Lemus-Aguilar et al., 2021). For specialized service centers such as Krones Life Cycle Service Centre East Africa, the effective management of spare parts and service inventories was critical not only for operational continuity, but also for safeguarding the company's reputation and customer relationships (Kusi et al., 2023). The nuanced interplay between technical, organizational, and market factors in this environment made it an ideal case for rigorous study.

2. Literature Review

2.1. Empirical Literature Review

In a study by Zhou and Tan (2021) focusing on large-scale Chinese manufacturing companies, the authors used a longitudinal quantitative design to investigate how inventory management system (IMS) digitalization affected firm performance metrics such as cost efficiency, fulfillment lead time, and customer satisfaction. Their findings revealed a strong positive association between advanced IMS integration and improvements in order cycle times, cost reduction, and customer experience, particularly during supply chain disruptions like the COVID-19 pandemic. However, the researchers noted significant disparities between firms based on digital readiness, with smaller manufacturers lagging due to capital

constraints and workforce digital skills deficits. This contradiction highlighted the need for research in emerging economies such as Kenya where digital readiness may be less advanced, underlining the importance of contextual adaptation and investment in workforce upskilling for successful IMS implementation.

Oloo et al. (2022) conducted a mixed-methods study in Kenya's industrial sector, examining how cloud-based IMS affected operational efficiency in Nairobi-based SMEs. Utilizing surveys and interviews with operations managers, the study established that cloud IMS implementation led to reduced stockouts, minimized wastage, and improved order accuracy. However, Oloo et al. (2022) also found that the benefits were unevenly distributed, with firms lacking robust internet infrastructure or digital literacy among staff experiencing inconsistent performance gains and even implementation setbacks. This pointed to a critical research gap regarding the organizational and infrastructural preconditions for successful IMS adoption and highlighted the need for sector-specific research in service industries like Krones Life Cycle Service Centre East Africa, where inventory requirements are unique and infrastructural challenges are common.

In research by Mwembia and Musyoka (2023) examining digital inventory systems in Kenya's retail sector, a quasi-experimental design compared 45 retailers using real-time inventory tracking with those relying on manual methods. Results indicated that digitized firms achieved significantly lower stockouts, improved profitability, and better supply chain responsiveness. However, the study found that smaller firms, especially those outside major cities, struggled with system downtime and staff adoption issues, which undermined the anticipated performance gains from IMS investment. The research gap identified was the lack of tailored IMS support for non-urban, smaller firms suggesting that further empirical work is needed in sectors like specialized services, where digital infrastructure and staff skills can vary widely.

A regional perspective was offered by Phiri et al. (2021), who used a mixed-methods approach to analyze IMS adoption in medium-sized manufacturing firms across southern Africa. Through operational surveys and focus groups, the authors found that firms adopting cloud-based IMS achieved enhanced inventory visibility, more efficient replenishment cycles, and greater adaptability to market changes. Notably, Phiri et al. (2021) reported that success hinged on stable internet access and leadership commitment to digital transformation, with organizational resistance and infrastructural weaknesses leading to suboptimal outcomes. The study recommended further research into the sector- and region-specific barriers to IMS success, directly informing the rationale for the current investigation at Krones Life Cycle Service Centre.

Kimani and Omondi (2020) undertook a case study of electronic IMS in Kenya's agro-processing sector, employing in-depth interviews and process mapping. Their results demonstrated that IMS implementation reduced spoilage rates, shortened lead times, and improved customer service levels. Nevertheless, some firms faced challenges in integrating IMS with legacy systems and achieving buy-in from operational staff. This contradiction between technological potential and on-the-ground adoption points to a need for targeted research into the alignment of IMS with existing workflows and staff training practices—key themes for service-focused organizations such as Krones.

In a global study by Beamon and Fernandes (2022) on digital transformation in European logistics, the authors analyzed 200 logistics companies' transition to advanced IMS using a quantitative panel methodology. The study found strong links between IMS adoption, supply chain resilience, and improved customer satisfaction, particularly during pandemic-induced disruptions. However, results also revealed that rapid implementation without sufficient staff training or customization led to frequent errors, data inaccuracies, and underperformance. This exposed a significant research gap concerning the role of human and organizational factors in realizing IMS performance benefits—a gap that is particularly relevant in environments where technological transitions occur rapidly, as in Kenya's evolving service sectors.

Chikuta and Banda (2023) explored the effects of mobile IMS on inventory control in Zambian healthcare facilities, using a mixed-methods survey and observational design. Their findings indicated that mobile-based IMS reduced medical stockouts and improved inventory turnover rates, yet issues of inconsistent network connectivity and limited user training limited system reliability. The study recommended further research on how context-specific infrastructural constraints affect IMS performance, underscoring the need for adaptive strategies and local capacity-building in sectors with critical inventory requirements, such as the spare parts management at Krones Life Cycle Service Centre East Africa.

Rahman et al. (2020) investigated the effect of IoT-enabled IMS in Indian auto parts manufacturers through a case-comparative analysis, finding substantial gains in demand forecasting accuracy, reduced shrinkage, and improved supplier coordination. Yet, implementation failures were reported in firms with weak IT support or inadequate integration with suppliers, resulting in lost inventory data and missed orders. The contradiction between high-level theoretical promise and inconsistent real-world results underscores a research gap around the mediating effects of organizational IT maturity directly echoing one of your core research objectives for Krones LCS.

A national Kenyan perspective was presented by Otieno and Wafula (2022), who used regression analysis to examine 120 Kenyan manufacturing and service firms' use of web-based IMS. The study reported statistically significant links between IMS adoption, operational efficiency, and revenue growth, but also found that the relationship was strongest in firms with ongoing staff training and a culture of innovation. Firms that treated IMS as a one-off investment, without continuous organizational development, realized only marginal improvements. This highlights the research gap in the long-term sustainability of IMS impacts—a key issue for service organizations such as Krones.

Juma and Mungai (2024) provided an industry-specific analysis of IMS adoption in East African engineering services. Using a combination of qualitative interviews and quantitative metrics, they demonstrated that real-time IMS improved spare parts availability, reduced downtime, and boosted client satisfaction. However, many firms encountered resistance from technicians and middle managers, who feared job loss or workflow disruptions due to new digital systems. The study called for research into change management and participatory implementation processes as crucial for IMS success in

specialized service settings, directly supporting your objective to explore the benefits and shortcomings of IMS at Krones LCS Centre.

Nyambura et al. (2023) examined the interplay between macro-economic volatility and IMS performance in Kenyan logistics SMEs using panel data and interviews. They found that firms with flexible, cloud-based IMS navigated currency fluctuations and supply chain shocks more effectively than those with manual or inflexible digital systems. However, the study also revealed that economic instability often delayed technology investments or led to rushed, poorly planned implementations that underperformed. The authors recommended context-sensitive, phased approaches to IMS adoption—directly echoing the need for evidence-based recommendations tailored to the Kenyan context and service industries like Krones Life Cycle Service Centre East Africa.

Discussion of Empirical Literature

The empirical literature revealed that while inventory management systems (IMS) have been widely acknowledged for their transformative impact on firm performance, their effectiveness varied significantly across different contexts. Many organizations that invested in advanced IMS experienced improved operational efficiency, better inventory accuracy, cost savings, and increased customer satisfaction. However, these benefits were not uniform. Firms in environments with robust digital infrastructure and high workforce digital literacy reaped more substantial gains, whereas those operating with limited resources, unreliable connectivity, or a workforce unaccustomed to digital processes often encountered barriers such as implementation setbacks, system downtimes, and resistance to change. This variability highlighted that successful IMS adoption depended not just on the technology itself, but on a broader interplay of organizational readiness, continuous staff training, leadership support, and the ability to adapt systems to local realities.

Given these disparities, the literature signaled a critical need for research focused on specialized service sectors and emerging markets, where inventory requirements and operational challenges can differ markedly from those in manufacturing or retail. In contexts like Krones Life Cycle Service Centre East Africa, managing spare parts inventories efficiently is both mission-critical and uniquely complex due to fluctuating demand, macro-economic volatility, and evolving technological standards. Previous studies seldom explored how IMS integration played out in such environments, nor did they systematically address the long-term sustainability, change management strategies, or adaptive approaches needed for success. The present research was therefore essential to fill this gap by generating context-sensitive insights on the real-world influence of IMS on firm performance. By doing so, the study aimed to inform both academic understanding and practical decision-making, supporting managers and policymakers striving to enhance efficiency and competitiveness in dynamic, resource-constrained settings

2.2. Theoretical Literature

Resource-Based View

The Resource-Based View (RBV) of the firm emerged as a foundational perspective in strategic management during the late 20th century. Its roots could be traced to Penrose's (1959) work on firm growth, but it became widely recognized after Barney's (1991) influential publication, which established the notion that unique internal resources and capabilities were primary drivers of competitive advantage (Barney, 1991; Wernerfelt, 1984; Peteraf, 1993; Furrer, 2020). Over the subsequent decades, the RBV evolved to integrate insights from economics, organizational theory, and knowledge management, culminating in a robust, multidimensional lens for understanding firm heterogeneity and performance (Kraaijenbrink et al., 2019; Furrer, 2020; Newbert, 2021; Hashimoto, 2023). This theory became a dominant paradigm for examining how organizations like Krones Life Cycle Service Centre East Africa could achieve superior outcomes through the strategic use of resources.

At its core, the RBV posited that a firm's sustained competitive advantage stemmed from resources that were valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991; Barney, 2018; Kraaijenbrink et al., 2019; Furrer, 2020). These resources could include tangible assets, such as physical inventory systems, as well as intangible assets like proprietary knowledge or organizational culture. The RBV framework delineated resources into categories of physical, human, and organizational capital, and emphasized the integration of these resources with firm capabilities to generate value (Peteraf, 1993; Barney, 2018; Newbert, 2021; Hashimoto, 2023). Notably, this theory recognized that strategic alignment and continual development of these resources were critical to sustaining firm performance amid evolving competitive landscapes.

The strengths of the RBV lay in its ability to explain persistent performance differences between firms operating in similar environments and its emphasis on internal factors as levers of strategic advantage (Wernerfelt, 1984; Barney, 1991; Newbert, 2021; Hashimoto, 2023). The framework also offered practical guidance for resource assessment and prioritization, enabling managers to identify key sources of value creation. However, critiques of the RBV included its limited attention to dynamic market changes, potential tautological reasoning, and challenges in operationalizing the VRIN criteria in empirical research (Kraaijenbrink et al., 2019; Furrer, 2020; Barney, 2018; Hashimoto, 2023). Despite these limitations, its conceptual clarity and integrative nature rendered the RBV especially useful for investigating the relationship between inventory management systems and firm performance.

In the context of this research, the RBV proved highly relevant for analyzing how Krones Life Cycle Service Centre East Africa leveraged its unique inventory management systems as strategic resources. By focusing on how these systems contributed to operational efficiency, knowledge sharing, and client responsiveness, the theory facilitated a nuanced

assessment of the mechanisms underpinning superior firm performance.

Systems Theory

Systems Theory, originating in the mid-20th century, was introduced by Ludwig von Bertalanffy to describe the interconnectedness of components within complex entities (von Bertalanffy, 1968; Kast & Rosenzweig, 1972; Skyttner, 2020; Schwarz, 2022). The theory gained traction in organizational studies, particularly as researchers began to understand firms as open systems interacting with their environments (Skyttner, 2020; Schwarz, 2022; Raisch et al., 2020; Jackson, 2021). Over time, Systems Theory evolved to encompass both the micro-level processes within organizations and the macro-level influences of industry dynamics, making it an essential framework for analyzing holistic operational effectiveness (Raisch et al., 2020; Schwarz, 2022).

Systems Theory was built upon several core components, most notably the principles of inputs, processes, outputs, feedback, and the environment (von Bertalanffy, 1968; Kast & Rosenzweig, 1972; Jackson, 2021; Schwarz, 2022). In an organizational context, this translated to firms receiving inputs (resources), transforming them through processes (operations such as inventory management), producing outputs (goods or services), and continuously adapting based on feedback from both internal and external environments (Skyttner, 2020; Jackson, 2021; Raisch et al., 2020; Schwarz, 2022). The emphasis on subsystems and their interactions highlighted the importance of integration and coordination within and across organizational functions.

The primary strengths of Systems Theory included its capacity to account for complexity, interdependence, and the dynamic nature of organizations (Skyttner, 2020; Raisch et al., 2020; Jackson, 2021; Schwarz, 2022). It provided a valuable lens for diagnosing performance issues that might emerge from misalignments or breakdowns between subsystems. Nevertheless, Systems Theory had weaknesses, such as its tendency toward abstraction, difficulty in isolating causality, and limited guidance for prioritizing specific interventions in real-world management scenarios (Schwarz, 2022; Jackson, 2021; Raisch et al., 2020; Kast & Rosenzweig, 1972). Despite these critiques, the theory remained a vital tool for understanding and managing the complexity inherent in large-scale inventory operations.

For this study, Systems Theory illuminated how inventory management systems functioned as interconnected subsystems within Krones Life Cycle Service Centre East Africa. The theory underscored the importance of seamless integration across procurement, warehousing, and distribution functions in enhancing overall firm performance.

Theory of Constraints

The Theory of Constraints (TOC), developed by Eliyahu Goldratt in the early 1980s, emerged as a significant management philosophy for optimizing organizational performance (Goldratt & Cox, 1984; Watson et al., 2007; Gupta & Boyd, 2008; Rahman, 2020). Grounded in operations research and production management, TOC rapidly gained popularity for its focus on identifying and managing bottlenecks—constraints that limited throughput and, by extension, organizational success (Watson et al., 2007; Gupta & Boyd, 2008; Rahman, 2020; Simatupang et al., 2022). The adoption of TOC spanned industries from manufacturing to services, testifying to their versatility and enduring relevance.

TOC comprised several fundamental components: identifying the system's constraints, deciding how to exploit them, subordinating other processes to these constraints, elevating the system's constraints, and returning to the first step upon overcoming the current constraint (Goldratt & Cox, 1984; Rahman, 2020; Simatupang et al., 2022; Gupta & Boyd, 2008). The approach encouraged a continuous improvement mindset by recognizing that the alleviation of one constraint often revealed new limiting factors. This cyclical methodology aimed to maximize throughput, minimize inventory, and ensure the alignment of resources with organizational goals (Simatupang et al., 2022; Rahman, 2020).

TOC's strengths resided in its pragmatic orientation, ease of application, and focus on actionable interventions to improve system-wide performance (Watson et al., 2007; Rahman, 2020; Gupta & Boyd, 2008; Simatupang et al., 2022). The approach enabled organizations to target their efforts where the greatest improvements could be achieved. However, critics argued that TOC sometimes oversimplified complex operational realities and tended to underplay the impact of external market dynamics or non-physical constraints (Gupta & Boyd, 2008; Watson et al., 2007; Rahman, 2020; Simatupang et al., 2022). Despite these limitations, TOC's clear methodology and focus on system improvement made it highly effective in inventory management and production environments.

Within the context of Krones Life Cycle Service Centre East Africa, TOC offered a practical framework for pinpointing bottlenecks in inventory processes and designing strategies to overcome these constraints. Its principles guided the prioritization of process improvements, ultimately supporting the enhancement of firm performance.

3. Research Methodology

For this study, the population consisted of all 120 employees stationed at the East African headquarters of Krones Life Cycle Service Centre. This included individuals from a range of departments, spanning from operations, logistics, and inventory management to administration and executive leadership. In this study, the sample size was set at 60 respondents, which represented exactly half of the total employee population at Krones Life Cycle Service Centre East Africa.

In this study, the primary data collection instrument consisted of structured questionnaires administered to the selected respondents at Krones Life Cycle Service Centre East Africa. In this study, the data collected consisted of both quantitative and qualitative data that were primary sources of data, carefully aligned to the research objectives. Quantitative data

emerged from responses to closed-ended questions within the structured questionnaires, providing measurable indicators such as inventory turnover rates, order accuracy, and perceived efficiency improvements. Qualitative data was gathered through open-ended questions inside the questionnaire that encouraged participants to describe their experiences, insights, and observations about the inventory management systems in their own words

4. Presentation and Discussion of Results

4.1. Inventory Management System adopted at Krones LCS Center

Table 1: Inventory Management Systems adopted at Krones LCS Center

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Inventory at Krones is continuously updated after every purchase	11(23.9%)	27(58.7%)	3(6.5%)	5(10.9%)	0(0%)
Inventory at Krones is physically counted at the end of a certain period	14(30.4%)	28(60.9%)	1(2.2%)	2(4.3%)	1(2.2%)
Krones purchases, processed and produces spare parts when a customer demand	8(17.4%)	22(47.8%)	6(13.1%)	8(17.4%)	2(4.3%)
Suppliers manage Krones inventory management system	0(0%)	6(13.1%)	5(10.9%)	21(45.6%)	14(30.4%)

Table 1 summarized respondent feedback on the forms of inventory management systems implemented at Krones Life Cycle Service Centre East Africa. The findings indicated that a majority of participants, 11 respondents (23.9%) strongly agreed and 27 (58.7%) agreed, making a total of 38 (82.6%) agreed that inventory at Krones was continuously updated after every purchase, which is a hallmark of a perpetual inventory management system. Additionally, 91.3% (42 respondents) agreed that inventory was physically counted at the end of a set period, reflecting the adoption of a periodic inventory system alongside the perpetual approach. When asked about just-in-time (JIT) practices, 65.2% (30 respondents) reported that Krones purchased, processed, and produced spare parts when there was actual customer demand—demonstrating the integration of JIT methods to reduce excess stock and improve responsiveness. On the other hand, only 13.1% (6 respondents) indicated that suppliers managed inventory at Krones, while a substantial majority 76% (35 respondents) disagreed with this statement, suggesting that vendor-managed inventory systems were not prevalent in the Centre's operations. According to Otieno and Njoroge (2020), organizations that blend perpetual, periodic, and just-in-time inventory systems are more likely to achieve a balance between stock optimization and operational flexibility in rapidly evolving markets.

Updating inventory with every purchase (Perpetual Inventory System)

The findings from Table 1 indicated that 82.6% (38) of respondents agreed that inventory at Krones Life Cycle Service Centre East Africa was continuously updated after every purchase, a characteristic feature of a perpetual inventory management system. In contrast, 10.9% (5 respondents) did not share this view, suggesting that while the system was widely adopted, there may have been areas of inconsistency or transition within certain departments. The predominance of positive responses underscored the organization's commitment to real-time inventory tracking and continuous record updating. This practice allowed for greater accuracy in reporting inventory balances and the cost of goods sold, enabling management to make more informed decisions regarding stock levels and procurement strategies. According to Kimani, Maina, and Njoroge (2021), the adoption of perpetual inventory systems is widely recognized in contemporary organizations for improving inventory visibility, minimizing stock discrepancies, and supporting operational efficiency.

Physical count of inventory at end period (Periodic Inventory System)

The analysis of responses in Table 1 revealed that 91.3% (42 respondents) agreed that inventory at Krones Life Cycle Service Centre East Africa was physically counted at the end of designated periods, demonstrating clear adoption of a periodic inventory management system within the organization. In contrast, only 6.5% (3 respondents) disagreed with this approach, indicating that periodic inventory reviews were a standard and widely accepted practice at the Centre. This approach involved performing scheduled physical counts of inventory to reconcile records, verify stock accuracy, and adjust for any discrepancies that might occur over time. Such periodic verification was essential not only for maintaining financial accuracy but also for supporting effective decision-making in procurement and stock control. According to Okello and Muturi (2019), the regular use of periodic inventory systems remains vital for organizations aiming to ensure transparency and accountability, especially in environments where inventory levels are subject to frequent changes or operational complexities.

Just-in-Time inventory system adoption

Table 1 showed that 65.2% (30 respondents) agreed that Krones Life Cycle Service Centre East Africa purchased, processed, and produced spare parts only when there was customer demand, which reflected the implementation of a Just-in-Time (JIT) inventory management system. Meanwhile, 21.7% (10 respondents) did not share this perspective, indicating that while the JIT approach was prominent, there remained some variation in its application or understanding among staff. This adoption of JIT methods suggested that Krones actively minimized excess stock and reduced waste, focusing resources on actual demand rather than forecasted needs. Such a strategy was especially valuable in-service environments where customer requirements could shift quickly and inventory obsolescence posed financial risks. According to Muthoni and Wanjohi (2019), the integration of JIT systems has enabled organizations to reduce carrying costs, increase operational efficiency, and respond more flexibly to market demands.

Suppliers manage Krones inventory management system

The data in Table 1 indicated that 76% (35 respondents) disagreed with the statement that suppliers managed the inventory management system at Krones Life Cycle Service Centre East Africa, while only 13.1% (6 respondents) agreed with this perspective. These findings suggested that Krones had not adopted a vendor managed inventory (VMI) approach and maintained internal control over its inventory processes. This trend reflected a broader hesitation among firms to fully delegate inventory management responsibilities to external suppliers, possibly due to concerns over reliability, loss of oversight, or alignment with organizational objectives. According to Nduta and Ngugi (2021), many organizations in the region have been cautious about implementing VMI systems, preferring to retain direct oversight to ensure better control and accountability within their supply chains.

Inventory management system adopted by Krones

Table 2: Inventory Management System Adoption by Respondents

Questionnaire	Response	Percentage
Yes	55	91
No	5	9
Total	60	100

Table 2 summarized respondents' perspectives on whether Krones Life Cycle Service Centre East Africa integrated different forms of inventory management systems. The results showed that 91% (55 respondents) believed by having choosen Yes that the Centre employed a combination of systems namely, perpetual, periodic, and just-in-time approaches while only 9% (5 respondents) disagreed with this assessment by having choosen No. Most participants felt that relying on a single system would be inadequate given the complexities of modern operations. Instead, the blend of multiple inventory management strategies allowed Krones to adapt more flexibly to changing demand patterns and operational requirements. According to Ochieng and Okello (2019), organizations that integrate several inventory management systems often achieve higher efficiency and effectiveness, as each method can complement the others and help address different operational challenges within the firm.

4.2. Benefits and Shortcomings of Inventory Management System adopted at Krones LCS Center

Table 3: Inventory Management System Benefits and Shortcomings

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Costs associated with inventory have significantly reduced with the adoption of the inventory management system	13(28.3%)	22(47.8%)	3(6.5%)	6(13.1%)	2(4.3%)
The firm serves clientele more efficiently as a result of the inventory management system	5(32.6%)	25(54.3%)	0(0%)	5(10.9%)	1(2.2%)
Managing and tracking inventory has become easier thanks to the inventory system	9(19.6%)	25(54.4%)	2(4.3%)	8(17.4%)	2(4.3%)
The inventory system has enhanced the firm's relations with its supplier	17(36.9%)	28(60.9%)	0(0%)	1(2.2%)	0(0%)
Inventory systems are complex and costly to manage	14(30.5%)	17(36.9%)	3(6.5%)	9(19.6%)	3(6.5%)
Inventory system failures have resulted in operational lapses	6(34.8%)	20(43.4%)	1(2.2%)	6(13.1%)	3(6.5%)
The firm has lost control over how it manages its inventory	1(2.2%)	3(6.5%)	2(4.3%)	15(32.6%)	5(54.4%)

Inventory cost reduction

Table 3 displayed the responses regarding whether the adoption of inventory management systems at Krones Life Cycle Service Centre East Africa led to significant reductions in inventory-related costs. The findings revealed that 76.1% (35 respondents) agreed that costs had decreased since implementing the system, while 17.4% (8 respondents) did not share this perception. This broad consensus indicated that the inventory management system contributed to financial savings by minimizing excess stock, reducing holding costs, and optimizing procurement cycles. Such outcomes highlighted the positive financial implications of structured inventory management and reinforced its value in achieving organizational efficiency. According to Mwangi and Wekesa (2021), organizations that implement integrated inventory management systems often realize substantial cost reductions due to improved accuracy, decreased wastage, and more strategic purchasing decisions.

Enhanced customer service

Table 2 revealed that 86.9% (30 respondents) agreed that the adoption of an inventory management system at Krones Life Cycle Service Centre East Africa enabled the firm to serve its clientele more efficiently, while 13.1% (6 respondents) did not share this perspective. The majority view suggested that streamlined inventory processes allowed the company to respond more promptly to customer needs, reduce order fulfillment times, and maintain higher service standards. Improved accuracy in stock levels and order tracking minimized delays and back orders, contributing to a more reliable customer experience. The data indicated that effective inventory management played a central role in strengthening customer relationships and supporting sustained organizational performance. According to Kipkemoi and Rono (2020), organizations that invest in robust inventory systems often realize significant improvements in service delivery and client satisfaction, directly linking operational practices to enhanced customer outcomes.

Enhanced inventory management and tracking

Table 2 showed that 74% (34 respondents) believed the inventory management system at Krones Life Cycle Service Centre East Africa had improved the efficiency of managing and tracking inventory, while 21.7% (10 respondents) did not share this perception. The majority's viewpoint suggested that adopting the system led to increased coordination, better record accuracy, and a reduction in inventory discrepancies. By facilitating real-time data updates and streamlining communication across departments, the system contributed to tighter inventory control and minimized errors associated with manual tracking. These improvements were crucial for supporting timely decision-making and maintaining consistent supply chain performance. According to Otieno and Wafula (2019), organizations that invest in automated inventory management systems typically experience enhanced visibility, traceability, and operational efficiency across their inventory operations.

Influence of inventory management on supplier relations

Table 2 indicated that 97.8% (45 respondents) agreed that the inventory management system adopted by Krones Life Cycle Service Centre East Africa had improved the firm's relationships with its suppliers, while only 2.2% (1 respondent) disagreed. This overwhelming consensus suggested that the inventory management system facilitated smoother communication, greater transparency, and stronger coordination between Krones and its supply chain partners. By enabling timely updates and accurate forecasting, the system enhanced trust and reduced friction in procurement processes, ultimately fostering more collaborative partnerships. Such strong supplier relations not only improved the flow of goods and services but also positioned the Centre to respond more flexibly to market changes and customer demands. According to Kariuki and Namusonge (2018), organizations with robust inventory management systems are more likely to achieve strategic alignment and mutual growth with their suppliers through increased integration and information sharing.

Cost implications of inventory management system

As shown in Table 2, 67.4% (31 respondents) agreed that inventory management systems at Krones Life Cycle Service Centre East Africa were complex and costly to manage, while 26.5% (12 respondents) disagreed. This majority suggested that the implementation and ongoing operation of such systems required substantial financial and human resources, encompassing software acquisition, employee training, and system maintenance. The complexity often involves integration with other business processes, the need for specialized technical support, and ongoing system upgrades to ensure optimal performance. While the benefits of enhanced efficiency and data accuracy were apparent, the cost burden could present challenges, especially for organizations with constrained budgets. According to Mwangi and Karanja (2020), organizations frequently encounter significant upfront and operational costs when deploying advanced inventory management systems, yet these investments are often justified by long-term operational gains and strategic advantages.

Organizational operational efficiency and inventory system

Table 2 highlighted that 78.2% (26 respondents) agreed that failures in the inventory management system at Krones Life Cycle Service Centre East Africa led to operational lapses, while 19.6% (9 respondents) disagreed with this view. This

strong consensus underscored the critical role inventory management systems played in maintaining seamless operations. System breakdowns could disrupt supply chain continuity, cause delays, or result in inaccurate order fulfillment, all of which could significantly impair institutional performance and customer satisfaction. The findings suggested that while robust systems brought substantial benefits, they also introduced new vulnerabilities, making reliability and risk mitigation central concerns for management. According to Omondi and Kamau (2020), organizations that experience interruptions in their inventory systems often face downstream effects on operational efficiency, underscoring the need for resilient and well-maintained inventory infrastructure.

Organizational control and inventory management systems

Table 2 demonstrated that 87% (40 respondents) disagreed with the notion that Krones Life Cycle Service Centre East Africa had lost control over its inventory management after implementing the current system, while only 8.7% (4 respondents) agreed with this sentiment. This strong consensus indicated that the adoption of an efficient inventory management system allowed the Centre to retain, and possibly even enhance, its inventory operations. Improved real-time tracking, greater transparency, and systematic controls helped mitigate the risks of losing control, which can sometimes accompany new technology adoption. The results suggested that when inventory systems are well-integrated with organizational processes, they empower managers rather than diminish their authority. According to Kimani and Ngugi (2019), organizations that successfully implement inventory management solutions often experience improved operational control and enhanced decision-making, supporting sustainable performance even as buyer-supplier relationships become more complex.

Other benefits and shortcomings of Krones inventory management system

Table 3: Other benefits and shortcomings of Krones Inventory management system

Questionnaire	Response	Percentage
Yes	37	61
No	23	39
Total	60	100

Table 3 indicated that 61% (37 respondents) agreed there were additional benefits and shortcomings to the inventory management system adopted by Krones Life Cycle Service Centre East Africa, while 39% (23 respondents) did not share this view. Among those who agreed, most highlighted that the system had notably improved inventory record keeping, resulting in greater transparency and accountability throughout the organization. Respondents also observed enhancements in the overall work environment, including smoother collaboration between departments and improved employee relations, which they attributed to the structured processes and clarity introduced by the system. Nevertheless, a portion of respondents pointed out that the adoption process introduced some challenges, such as initial resistance to change and learning curves associated with new procedures. According to Otieno and Odhiambo (2021), modern inventory management systems can provide significant organizational benefits in transparency and internal cohesion, although firms must proactively address transitional obstacles to fully realize these advantages.

4.3. Effect of Inventory Management System on Institutional Performance

Table 4: Inventory System and Operational Efficiency

Questionnaire	Response	Percentage
Yes	37	61
No	23	39
Total	60	100

Table 4 illustrated that 61% of respondents believed the inventory management system implemented at Krones Life Cycle Service Centre East Africa had improved the firm's operational efficiency, specifically by lowering operational costs and increasing customer satisfaction. Conversely, 39% of respondents did not perceive such benefits. The prevailing view suggested that structured inventory processes enabled the organization to streamline workflows, avoid unnecessary expenses, and deliver services more promptly to clients. Enhanced operational efficiency was reflected in better resource allocation, reduced lead times, and a more agile response to customer needs. According to Njoroge and Kibera (2020), effective inventory management systems contribute directly to operational excellence, fostering cost savings and improving customer outcomes in competitive service environments.

Table 5: Influence of Inventory Management Systems on Institutional Performance

Questionnaire	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Operational costs have significantly reduced with the adoption of the inventory management system	15(32.6%)	26(56.5%)	1(2.2%)	3(6.5%)	1(2.2%)
The inventory management system has increased profitability	17(36.9%)	28(60.9%)	0(0%)	1(2.2%)	0(0%)

Effect of inventory management system on Krones operational cost

Table 5 revealed that 89.1% (41 respondents) agreed that the adoption of the inventory management system at Krones Life Cycle Service Centre East Africa had led to significant reductions in operational costs, while 8.7% (4 respondents) did not perceive such savings. This strong majority indicated that systematic inventory control enabled the Centre to avoid excess stock, minimize storage expenses, and reduce losses from obsolete or slow-moving items. These efficiencies translated into tangible financial benefits, supporting better budget allocation and improved profitability. The data suggested that strategic use of inventory management technology contributed directly to the Centre's cost competitiveness. According to Nyambura and Kimani (2019), organizations that invest in modern inventory management systems often realize measurable reductions in operational expenses, supporting long-term sustainability and financial health.

Effect of inventory management system on profitability

Table 4 indicated that 97.8% (45 respondents) agreed that institutional profits at Krones Life Cycle Service Centre East Africa had increased as a result of adopting the inventory management system, while only 2.2% (1 respondent) disagreed. This strong consensus suggested that more effective control over inventory not only streamlined operations but also contributed directly to greater financial returns. Respondents observed that timely stock replenishment, fewer write-offs, and improved resource allocation supported by the inventory management system enhanced the organization's bottom line. The data implied that technological advancements in inventory processes translated into increased profitability, strengthening Krones' competitive edge in the industry. According to Ochieng and Omwenga (2022), firms that deploy modern inventory management solutions often experience notable improvements in profit margins due to reduced wastage, better demand forecasting, and optimized procurement practices.

Inventory management system and institutional performance

Table 6: Inventory System and Operational Efficiency

Questionnaire	Response	Percentage
Yes	53	89
No	7	11
Total	60	100

Table 6 demonstrated that 89% (53 respondents) agreed the inventory management system adopted by Krones Life Cycle Service Centre East Africa enhanced the firm's profitability, while 11% (7 respondents) disagreed. This strong majority pointed to a positive relationship between effective inventory management and the institution's overall performance. Respondents noted that reductions in operational costs contributed directly to wider profit margins, while improvements in customer service led to increased client retention and higher revenue generation. Many highlighted that better control over inventory, faster order fulfillment, and real-time access to stock information empowered staff to meet customer demands efficiently. According to Otieno and Karanja (2021), companies implementing advanced inventory management systems tend to report superior organizational performance and sustained profitability, thanks to streamlined operations and elevating customer satisfaction.

4.4. Discussions of Findings

Inventory Management Systems Adopted by Krones LCS Centre

The research established that Krones Life Cycle Service Centre East Africa adopted a multifaceted approach to inventory management, integrating several complementary systems to support operational efficiency. The majority of respondents 82.6% (38 respondents) agreed that the organization utilized a perpetual inventory management system, updating stock records continuously after every purchase. This approach reflected a significant commitment to real-time tracking and was instrumental in ensuring high levels of accuracy in inventory data across various departments. By maintaining up-to-date information, the Centre positioned itself to make prompt and informed procurement decisions, thereby minimizing stock discrepancies and enhancing responsiveness.

In addition to the perpetual system, a substantial 91.3% (42 respondents) confirmed the routine application of periodic inventory management, involving scheduled physical counts at defined intervals. This periodic review functioned as an essential control mechanism, allowing the Centre to reconcile physical inventory with recorded balances and to detect

discrepancies early. The co-existence of both perpetual and periodic systems indicated a deliberate strategy to leverage the strengths of each: the immediacy of perpetual tracking complemented by the accountability and verification brought by periodic counts.

Just-in-Time (JIT) inventory practices were also reported as a core element, with 65.2% (30 respondents) affirming that Krones procured and processed spare parts only in response to actual customer demand. This JIT system minimized excess stock and inventory holding costs, aligning the Centre's resources directly with real-time market requirements. However, the findings also revealed a degree of variability in JIT adoption, with some staff highlighting inconsistencies or partial implementation in specific departments.

The study found limited evidence of vendor-managed inventory (VMI) systems within the Centre. Only 13.1% (6 respondents) indicated any supplier involvement in inventory management, while 76% (35 respondents) explicitly disagreed with this notion. The data therefore indicated that Krones retained direct oversight and control over its inventory processes, reflecting an organizational preference for internal accountability and minimizing external dependencies. In summary, Krones LCS Centre utilized a blended inventory management model, combining perpetual, periodic, and JIT systems, while eschewing supplier-managed approaches in favor of internal control.

Influence of Inventory Management Systems on Firm's Performance

The findings demonstrated a strong and positive influence of inventory management systems on the performance of Krones Life Cycle Service Centre East Africa. Statistically, 85% (39 respondents) asserted that the implementation of these systems improved operational efficiency, reflected in both reduced operational costs and heightened customer satisfaction. The structure brought by automated tracking and systematic reviews enabled the Centre to streamline workflows, allocate resources more efficiently, and respond more swiftly to client needs.

Cost efficiency was a particularly notable outcome. 89.1% (41 respondents) agreed that operational costs had significantly decreased following the adoption of the inventory management system. This reduction was attributed to the Centre's ability to avoid excessive stock, reduce storage requirements, and limit the financial impact of obsolete inventory. The automation of procurement cycles and enhanced accuracy in stock monitoring also contributed to these cost savings, supporting improved financial stewardship and freeing resources for further investment.

Profitability gains were among the most significant outcomes reported. A remarkable 97.8% (45 respondents) agreed that profits increased as a result of the inventory management system, with only 2.2% (1 respondent) expressing a contrary view. Respondents linked these gains to timely stock replenishment, improved resource allocation, and a decrease in write-offs. The integration of inventory data with broader management systems empowered decision-makers to forecast demand more accurately and optimize purchasing practices, which directly enhanced the organization's bottom line.

Finally, 89% (53 respondents) attested that the inventory management system enhanced overall institutional performance, while 11% (7 respondents) disagreed. The narrative provided by respondents emphasized that cost reductions and improvements in customer service directly contributed to wider profit margins and stronger client retention. Moreover, the reliability and speed of order fulfillment, underpinned by real-time stock information, enabled staff to meet customer demands more effectively. These findings underscored the strategic role of inventory management systems in driving both operational and financial performance at Krones LCS Centre.

Benefits and Shortcomings of the Inventory Management Systems at Krones LCS Centre

The study uncovered multiple significant benefits arising from the adoption of inventory management systems at Krones LCS Centre. First, 76.1% (35 respondents) agreed that inventory-related costs had declined, citing minimized excess stock, reduced holding expenses, and optimized procurement as key contributors to financial savings. These findings reinforced the view that structured inventory management not only streamlined operations but also bolstered the Centre's cost-effectiveness and budget control.

Another major benefit was improved customer service. The data revealed that 86.9% (30 respondents) believed the system enabled the firm to serve clients more efficiently, primarily through faster order processing and more reliable fulfillment. Enhanced accuracy in stock levels and improved order tracking contributed to fewer delays and backorders, supporting higher levels of customer satisfaction and trust in the Centre's services. These outcomes demonstrated the central role of effective inventory management in sustaining client relationships and business growth.

Enhanced inventory tracking and management was highlighted by 74% (34 respondents), who reported that the system made inventory control and interdepartmental communication easier. The real-time updates and shared data access reduced errors and improved accountability, leading to more consistent and reliable inventory operations. In addition, the inventory management system was credited by 97.8% (45 respondents) with strengthening supplier relationships through greater transparency, improved forecasting, and better procurement coordination.

Despite these advantages, the study also identified notable shortcomings. Most significantly, 67.4% (31 respondents) agreed that inventory management systems were complex and costly to manage, pointing to substantial investments required for software, training, and system maintenance. Further, 78.2% (26 respondents) reported that system failures resulted in operational lapses, highlighting the importance of reliability and robust IT support. However, a substantial 87% (40 respondents) disagreed with the statement that the Centre had lost control over its inventory due to the system, suggesting that the benefits in oversight and management outweighed the challenges. Additionally, 61% (37 respondents) noted other benefits and drawbacks, such as improved record keeping and internal collaboration, but also mentioned

transitional challenges including initial staff resistance and learning curves. These findings affirmed that while inventory management systems brought significant value, they also required careful planning, investment, and ongoing support to realize their full potential.

5. Conclusion and Recommendations

The research showed that Krones LCS Centre adopted a sophisticated, hybrid approach to inventory management, integrating perpetual, periodic, and just-in-time (JIT) systems to ensure both operational agility and control. A remarkable 82.6% (38 respondents) of staff confirmed that inventory was continuously updated after every purchase, while 91.3% (42 respondents) reported that physical counts were conducted at regular intervals. This dual system fostered both accuracy and accountability in stock management, allowing the Centre to minimize discrepancies and respond swiftly to evolving operational demands.

It was also evident that just-in-time practices formed a core element of the Centre's inventory philosophy. According to 65.2% (30 respondents), spare parts were purchased and processed primarily in response to actual customer needs, reducing the risk of overstocking and financial waste. However, the research found that vendor-managed inventory models remained largely absent, with 76% (35 respondents) disagreeing that suppliers oversaw Krones' inventory. This preference for internal oversight reflected a broader commitment to accountability, strategic alignment, and the maintenance of competitive advantage.

On performance outcomes, the study revealed that the implementation of integrated inventory management systems directly contributed to both cost efficiency and enhanced customer service. 76% (35 respondents) observed reductions in inventory costs, while 86.9% (30 respondents) credited the systems with enabling more efficient and reliable service delivery. Notably, 97.8% (45 respondents) of staff agreed that these systems had improved supplier relations, strengthening procurement processes and fostering collaborative partnerships across the supply chain.

Despite these substantial gains, the research identified meaningful challenges. 67% (31 respondents) cited system complexity and high management costs as persistent barriers, and 78.2% (26 respondents) noted that system failures could result in operational lapses. Nonetheless, the overwhelming majority 87% (40 respondents) disagreed that Krones had lost managerial control through system adoption, instead viewing the technology as a tool for enhanced oversight, transparency, and continuous improvement. Overall, the research concluded that effective inventory management was pivotal in driving firm performance, profitability, and long-term sustainability at Krones LCS Centre.

Based on the findings, it was recommended that the Krones LCS Centre continue to invest in the integration and refinement of its inventory management systems. The high rate of agreement 82.6% (38 respondents) and 91.3% (42 respondents) for perpetual and periodic systems, respectively) affirmed the value of combining real-time tracking with routine verification. Management should ensure that these systems are maintained and regularly updated to reflect evolving operational needs and technological advancements, minimizing risks of obsolescence or inefficiency.

The research also suggested that Krones enhance its training programs for staff at all levels. With 67.4% (31 respondents) citing complexity and cost as key challenges, targeted training could reduce resistance, bridge knowledge gaps, and empower employees to use the systems more effectively. This would foster a culture of accountability, encourage innovation, and support a smoother transition for new employees or those adapting to procedural changes.

Given the centrality of just-in-time practices in the Centre's strategy, management was advised to further optimize demand forecasting and procurement planning. Leveraging advanced analytics and data-driven tools could enable Krones to align purchasing decisions more closely with actual demand, reducing inventory holding costs while maintaining high service standards. Strengthening supplier partnerships, as already recognized by 97.8% (45 respondents), should also remain a strategic priority, ensuring that collaborative relationships support mutual growth and responsiveness,

Krones should prioritize system reliability and risk management. With 78.2% (26 respondents) noting operational lapses following system failures, there was a clear need for robust contingency planning, IT support, and periodic audits. Investing in backup infrastructure and scenario-based training could mitigate the impacts of unexpected disruptions, ensure continuity of operations and safeguard organizational performance.

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The article followed all ethical standards appropriate for this kind of research.

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