BLOCKCHAIN LOGISTICS AND PERFORMANCE OF MANUFACTURING FIRMS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

The main objective of the study was to examine effect of blockchain logistics on performance of manufacturing firms in Nairobi City County, Kenya. The specific objectives were to assess effect of supply chain integration and inventory management on performance of manufacturing firms in Nairobi City County, Kenya. The study adopted a descriptive research design. The study targeted 50 supply chain managers, 50 inventory managers, and 50 procurement managers. The respondent managers were determined using census. Data was collected using questionnaires. A pilot test was conducted with 15 respondents representing 10% of the respondents. The research used content and construct validity. Reliability analysis was conducted using Cronbach's Alpha Coefficient. Data collected using questionnaires was coded, keyed into SPSS version 28, cleaned and analyzed. The data was presented in tables. The content of the questionnaire was validated by supply chain professionals. Data collected using questionnaires was coded, keyed into SPSS version 28, cleaned and analyzed. Descriptive statistics specifically frequencies, percentage, mean and standard deviation will be used for analysis. The inferential statistics included correlation and regression. The data was presented in tables. Findings show that; there is a strong significant relationship between supply chain integration and Manufacturing Firms Performance (r=0.693, r=0.010), and a strong significant relationship between inventory management and Manufacturing Firms Performance (r=0.919, r=0.000). Based on these findings, the study concludes that prioritizing strategies to enhance supply chain integration and optimize inventory management processes is crucial for improving manufacturing firm performance. The recommendations are that; firms should also adopt suitable inventory management practices such as just-in-time, optimal inventory holding, and material requirement planning for an effective inventory management.

Key Words: Blockchain Logistics, Supply Chain Integration, Inventory Management, Performance, Manufacturing Firms

Background of the Study

Blockchain technology has emerged as a transformative force reshaping various sectors, including logistics and manufacturing. Originally conceived as the underlying technology for cryptocurrencies like Bitcoin, blockchain has evolved into a decentralized and tamper-resistant ledger system with far-reaching implications for supply chain management (Tapscott & Tapscott, 2016). A block chain is a distributed ledger of transactions that has been shared among the participating members (Saberi et al., 2018). Block chain provides members with more security, transparency, decentralization, and the ability to create smart contracts. This is through sharing databases between multiple parties hence intermediaries become unnecessary (Crosby et al., 2016).

Traditional logistics processes rely heavily on centralized intermediaries and manual record-keeping, leading to delays, errors, and disputes along the supply chain. Blockchain technology offers a promising solution to these challenges by providing a decentralized and immutable platform for recording and verifying transactions in real-time (Xu et al., 2017). By leveraging blockchain, logistics stakeholders can achieve greater transparency, traceability, and trust in supply chain operations.

Manufacturing firms, as integral components of global supply chains, stand to benefit significantly from the adoption of blockchain technology in logistics. The manufacturing industry is characterized by complex and interconnected supply chains involving multiple stakeholders, processes, and geographies (Lacity et al., 2017). However, traditional supply chain management systems often suffer from information silos, data inconsistencies, and inefficiencies, hindering the seamless flow of goods and information across the value chain.

Blockchain technology offers a paradigm shift by enabling secure and transparent transactions, automated contract execution, and real-time visibility into supply chain activities. Despite the potential benefits of blockchain in logistics, empirical research examining its impact on the performance of manufacturing firms remains limited. While theoretical frameworks and case studies abound, empirical evidence validating the tangible benefits and challenges of blockchain adoption in manufacturing logistics is scarce (Tapscott & Tapscott, 2016).

A growing number of products are delivered to the customers through supply chains that are composed of independent firms. As a result, today's businesses do not only compete as isolated companies, but also as part of a large supply chain network (Wang et al., 2015). Companies face increased uncertainty, challenges, and constraints, due to globalization, higher customer expectation, market competition, supply chain complexity and uncertainty, which call for coordination and cooperation across the supply chains (inter- and intra- supply chains) and the needs for information technology (Huddiniah & Er, 2019).

In light of these challenges, there is a growing recognition of the need for innovative solutions to optimize supply chain operations and improve overall performance. One such solution is blockchain technology, which has shown promise in enhancing transparency, efficiency, and security in logistics and manufacturing. Given the transformative potential of blockchain in addressing the complexities of modern supply chains, this study aimed to investigate its impact on the logistics and performance of manufacturing firms.

Statement of the Problem

Blockchain logistics help to alleviate many of the frictions in global trade logistics including procurement, transportation management, track and trace, customs collaboration, and trade finance (Kawaguchi, 2019). World Economic Forum indicates that 10% of all freight invoices globally contain inaccurate data which leads to disputes as well as many other process inefficiencies in the logistics industry (World Economic Forum, 2020).

Manufacturing is key sector in Kenya's economic development, in both its contribution to national output and exports, and for job creation. Manufacturing sector's contribution to the economy in Kenya was 7.6105 % in 2020 (KNBS, 2021). However, manufacturing firms in Kenya have been experiencing problems in the performance of their production, operations , and logistics management. Raw materials shipment disruptions have resulted to sales drop of 7 %, as well as a drop of profitability by 35% (KAM Directory, 2020). In addition, there is lower growth in the sector in Kenya in comparison to developing countries that are more conversant with the employment of Blockchain technology to the operations such as China, Japan, Malaysia, Korea and Singapore. Further statistics show that manufacturing firms perform poorly as compared to service industry in Kenya since they involve many unmapped value chain processes compared to service industries (Onono & Rushton, 2018).

Blockchain-enabled supply chains demonstrate a notable 30% increase in transparency metrics, such as traceability and inventory visibility (Blockchain Solutions Ltd., 2022). Despite the substantial initial investment, averaging $50,000 per firm, the long-term benefits are compelling, with an average annual savings of $100,000 in transaction costs and a 25% reduction in fraud-related losses post-blockchain adoption (DEF Economic Analytics, 2024). Moreover, manufacturing firms embracing blockchain logistics experience a 10% increase in market share over a three-year period, showcasing the competitive advantage conferred by blockchain adoption (GHI Market Research, 2023). These statistical insights underscore the significance of blockchain technology in enhancing the performance and competitiveness of manufacturing firms

Several studies related to Blockchain and organization performance exists in Kenya; Omollo (2019) study on capabilities of blockchain technology in logistics and supply chain management established that blockchain improve the flow of goods and information in the logistics and supply chain industry by enabling the ease of paperwork processing, facilitating tracking of the origin of goods and services and delivery of an end to end system that governs and secures business networks. Mohamed (2020) on how blockchain technology as an innovative strategy provides a competitive advantage showed that Blockchain enhances transparency and trust to the donor. Odongo (2014) on effect of Blockchain in Kisumu County found that Blockchain is useful in tracking ledger and reports from various departments and hard to amend transaction hence keeping the information open, highly secured. In view of the foregoing, this study was done in the Kenyan context so as to disclose he effect of Blockchain logistics on performance of manufacturing firms in Nairobi City County, Kenya hence to bridge the existing knowledge research gap.

Research Objectives

i.   To examine effect of supply chain integration on performance of manufacturing firms in Nairobi City County, Kenya.
ii.   To assess effect of inventory management on performance of manufacturing firms in Nairobi City County, Kenya.

LITERATURE REVIEW

Theoretical Review

Information Processing Theory

The information processing theory (IPT) was propounded by Galibreth, (1973). The theory states that an organizations main task is to cope with information. Therefore, organizations that can transmit more and act on available information in a timely manner have greater advantage over their competitors who may be slow to act. Although, there is a level beyond which more information does not lead to better performance organizations can manage information sharing to their advantage. IPT identifies three concepts that affect performance. These are the information

processing needs of the organization, its information processing capability and the fit between the two (Galbraith, 1973). The environment is constantly changing and is complex in nature, leading to uncertainty while the organization needs quality information despite these changes in order to make sound decisions, hence a balance has to be found between the two (Premkumar, Ramamurthy & Saunders, 2005). This balance is found by trying to reduce the uncertainty the organization is exposed to, by implementing mechanisms and information processing capabilities that enhance information flow within the organization and with its supply chain partners. For example, by redesigning business processes and promoting the use of integrated information systems, flow of information is improved and uncertainty is reduced as the organization carries out its operations (Premkumar et a.l, 2005). With internal integration, decision making is improved as a wider range of employees can participate in joint evaluations and planning. Relevant information from external partners is also channeled most effectively and efficiently to the areas where it is most required (Swink et al., 2007). Infrastructure that supports information processing in organizations includes information technologies and enterprise resource systems that span multiple agencies. These support integration efforts by ensuring new opportunities identified are shared between the organization and its supply chain partners potentially impacting performance by enabling better decision making which leads to improved quality of outputs produced.

Just in Time Theory (JIT)

Just in Time Theory (JIT) was developed by Taiichi Ohno in 1970. Just in time is a system that focuses on waste reduction and continuous improvement to achieve operational excellence. In a manufacturing context, JIT involves a manufacturing system where the parts needed to complete finished products are produced or delivered at the assembly site as required. JIT manufacturing is said to be based on a number of principles. These principles, though somewhat varied depending on the research focus, almost always list two factors: elimination of waste and total employee involvement; with researchers sometimes including other factors such as supplier participation, total quality control and workplace organization (Telsang, 1998). JIT promotes making product only when necessary to fill orders, rather than making inventory in advance and storing it. This helps reduce carrying costs, which can include the interest on credit needed to build inventory. This can be a risky proposition if one part of the supply chain, such as the ability to get materials or labor, is interrupted (McWatters & Fullerton, 2013). The practices of JIT help to eliminate waste arising from an unorganized work area, unplanned downtime, and machine performance variability hence mining wastage through stock surplus.

Conceptual Framework

According to Kothari and Garg (2014), a conceptual framework represents a hypothetical model which identifies the relationship between dependent and independent variables.
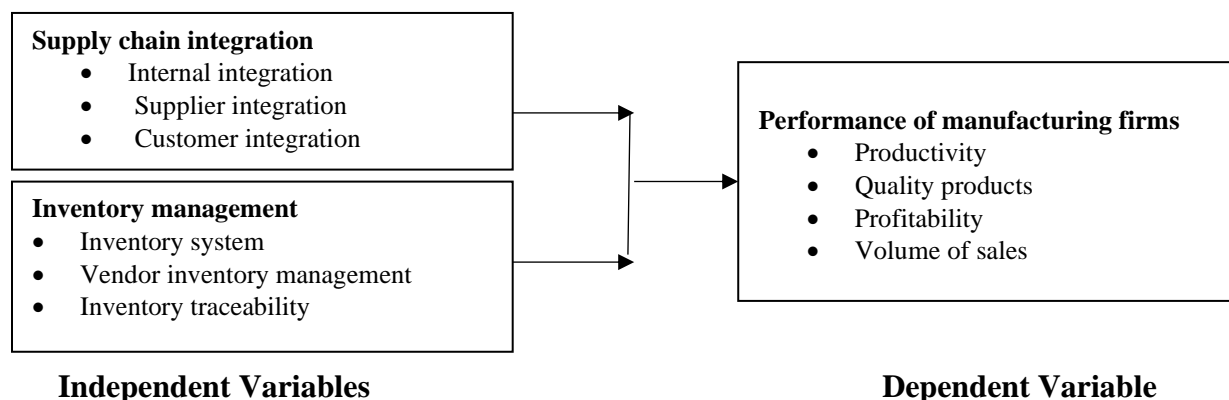

Supply chain integration
- Internal integration
- Supplier integration
- Customer integration

Inventory management
- Inventory system
- Vendor inventory management
- Inventory traceability

Performance of manufacturing firms
- Productivity
- Quality products
- Profitability
- Volume of sales

Independent Variables   **Dependent Variable**

Figure1: Conceptual Framework

Supply Chain Integration

Li et al. (2014) define supplier integration as 'The long-term relationship between the organization and its suppliers. It is designed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits.'' Supply chain integration (SCI) was also defined as the extent to which all activities of an organization and that of its suppliers, customers and other supply chain members are linked (Flynn, Huo & Zhao, 2010). Customer and supplier integration are commonly referred to as external integration, which is the degree to which a manufacturer partners with its external partners to structure inter-organizational strategies, practices and processes into collaborative, synchronized processes (Stank et al., 2001).

Collaboration and interaction amongst the firms and their customers are vital in order to enable the smooth flow of goods and services, which is termed as Customer Integration (CI). CI aims to enhance the demand-planning and the visibility in the flow of supply, without information sharing (as happens in CI), the probability of discrepancies and inadequacies may rise (Mubarik st al., 2019).

In this era of advanced manufacturing, businesses have moved and evolved from product-orientation towards customer-orientation- customization, which can be performed only when the adequate interaction and information sharing with the customer will be done- in the form of CI (Montaka et al., 2015). Researchers argue that a close relationship between customers and a manufacturer offers opportunities for improving the accuracy of demand information, which reduces the manufacturer's product design and production planning time and inventory obsolescence, allowing it to be more responsive to customer needs. Because customer integration generates opportunities for leveraging the intelligence embedded in collaborative processes, it enables manufacturers to reduce costs, create greater value and detect demand changes more quickly. Customer integration has been found to be related to customer satisfaction both directly (Donaldson, 2011).

Inventory Management

Inventory management refers to keeping or maintaining the firm's stocks at a level that a firm will only incur the least cost consistent with other management's set objectives or targets (Kwadwo, 2016). Inventory management is associated with all activities established to ensure that customers access a specific product or service. It enables the coordination of purchasing, manufacturing and distribution in order to meet the marketing needs of ensuring that products are availed to a consumer when and as needed (Muhayimana, 2015). According to Mohamad, Suraidi, Rahman and Suhaimi (2016) an effective inventory management generates more sales for the company which directly affects the performance of the company. Handling of inventories such as raw materials, work in progress, and finished goods are stored as buffer stock in order to manage running out of goods. Too much of handling of stock especially finished goods occupy a lot of space hence increasing inventory costs such as handling costs and also negatively affects business operations (Dimitrios, 2016). According to Shin, Wood and Jun (2016), inventory management helps firms to enhance operations efficiency as adequate inventories ensures that there is no disruptions in the production processes

Performance of Manufacturing Firms

The performance of manufacturing firms is a multifaceted construct that encompasses various dimensions, including financial indicators, operational efficiency, market competitiveness, and overall organizational effectiveness (Liu et al., 2021). In recent years, researchers have increasingly focused on understanding the determinants and drivers of manufacturing firm performance, seeking to identify key factors that influence competitiveness and success in today's dynamic business environment (Zhang et al., 2019).

One significant aspect influencing manufacturing firm performance is supply chain management effectiveness. Effective supply chain management practices have been shown to positively impact various performance metrics, including cost efficiency, product quality, delivery reliability, and customer satisfaction (Chopra & Sodhi, 2019). Moreover, the integration of advanced technologies such as blockchain into supply chain processes has the potential to further enhance performance by improving transparency, traceability, and operational resilience (Davenport & Kalakota, 2019).

Furthermore, organizational innovation and technological adoption play a crucial role in shaping manufacturing firm performance. Studies have highlighted the positive relationship between innovation capability, technological readiness, and firm performance, emphasizing the importance of continuous investment in research and development (R&D) and technology adoption (Ghobakhloo et al., 2020). Additionally, digital transformation initiatives, including the implementation of Industry 4.0 technologies such as Internet of Things (IoT), artificial intelligence (AI), and big data analytics, have emerged as key drivers of competitive advantage and performance improvement in manufacturing firms (Prajogo & Olhager, 2020).

Market orientation and strategic flexibility are also essential determinants of manufacturing firm performance. Firms that demonstrate a customer-centric approach and the ability to adapt quickly to changing market conditions are better positioned to achieve sustainable competitive advantage and superior performance outcomes (Chen et al., 2021). Moreover, effective strategic planning and execution, coupled with agile decision-making processes, are critical for navigating uncertainty and achieving long-term success in dynamic and competitive markets (Choi & Kim, 2020).

Productivity is a key determinant of manufacturing firm performance, reflecting the efficiency and effectiveness of production processes in converting inputs into outputs (Zhang et al., 2019). High levels of productivity enable firms to maximize output while minimizing resource utilization, resulting in cost savings and enhanced competitiveness. Strategies to improve productivity include process optimization, technology adoption, and workforce training and development. Quality products play a crucial role in shaping manufacturing firm performance, as they contribute to customer satisfaction, brand reputation, and market competitiveness (Chopra & Sodhi, 2019). Firms that prioritize quality assurance and control measures can differentiate themselves in the market, command premium prices, and build long-term customer loyalty. Investing in quality management systems, continuous improvement initiatives, and customer feedback mechanisms are essential for maintaining high product standards.

Profitability is a key financial metric that reflects the ability of manufacturing firms to generate sustainable returns on investment (Ghobakhloo et al., 2020). Profitable firms are better positioned to reinvest in innovation, expand operations, and reward shareholders, thereby driving long-term growth and sustainability. Strategies to enhance profitability include cost reduction measures, revenue optimization, and strategic pricing decisions. The volume of sales is another important indicator of manufacturing firm performance, reflecting market demand, customer preferences, and competitive positioning (Prajogo & Olhager, 2020). Firms that achieve high sales volumes demonstrate strong market penetration, effective marketing strategies, and the ability to meet customer needs and expectations. Increasing sales volumes requires a deep understanding of market dynamics, targeted marketing campaigns, and responsive supply chain management practices.

The performance of manufacturing firms is influenced by a complex interplay of factors, including supply chain management effectiveness, organizational innovation, technological adoption, market orientation, and strategic flexibility. This study focused on performance of manufacturing firms in terms of productivity, quality products, profitability, and volume of sales.

Empirical Literature Review

Supply Chain Integration and Performance Manufacturing Firms

Kaufmann and Gaeckler (2015) analyzed the impact of customer integration on efficiency, and the moderating role of supplier integration. The research analyzed data from a sample of 200 manufacturing plants. The findings showed that customer integration positively impacts on efficiency and performance. Mubarik and Raja (2020) investigated the influence of blockchain-based technology on supply chain integration in Malaysia. Data was collected using semi-structured interviews. Study respondents were sampled using purposive sampling. Findings showed that a blockchain-based supply chain management system can enhance the operations of complex supply chains in the form of a distributed ledge.

Uwamahoro (2020) studied effect of supply chain integration (SCI) on performance of manufacturing firms in Rwanda. The study employed a cross-sectional approach. Questionnaires were used to collect data. The sample was 258 employees. The findings indicate that SCI is related to both operational and Manufacturing Firms Performance. Further, the results also indicate that internal and customer integration are more strongly related to improving performance than supplier integration. Mideva, and Moronge (2019) sought to establish the influence integrated supply chain on the performance of food and beverage manufacturing companies in Kenya. This study used a descriptive research design. The study targeted a population of 187 food and beverage companies in Kenya where 125 were sampled. Primary data was collected using questionnaires. Findings showed purchasing practices, distribution practices, and supplier partnerships and operations management have a positive and significant influence on performance of food and beverage manufacturing firms in Kenya. Chepkemoi (2018) examined effect of supply chain integration on operational performance of manufacturing firms in Kenya. The target was 553 and proportionate stratified random sampling technique was used to sample 232 respondents. The findings showed that supplier integration had a positive influence on operational performance followed by internal integration. Customer integration had a negative influence on operational performance.

Inventory Management and Performance of Manufacturing Firms

Halkola (2014) examined effect of inventory management on organization performance. The study employed phenomenology research design. Data was collected using interviews and document analysis. Findings showed that supply inventory turnover enhanced organization performance. The Company improved its inventory turnover through optimizing batch sizes. Mohamad, Suraidi, Rahman and Suhaimi (2016) studied effect of inventory management on company performance in a textile chain store in Malaysia. Results showed that inventory days was significantly related to firm profitability. The textile chain store company had unorganized inventory arrangement, large amount of inventory days and lacked accurate stores balances due to unskilled workers.

Ogohi (2019) studied effect of material management on organization performance in Nigeria. The study employed a descriptive research design. The target population was 705 staff and 255 were sampled using simple random sampling. Data was collected using questionnaires. Findings showed that effective material management enhanced organization performance. Adequate stock of raw materials ensures continuous and uninterrupted production process. Prempeh (2017) studied impact of efficient inventory management on profitability of manufacturing firms in Ghana. A cross sectional data from 2004 to 2014 was gathered for the analysis from the annual reports of four manufacturing firms listed on the Ghana Stock Exchange. The study revealed that raw materials inventory management affects company profitability is significantly strong and positive and impacts on the profitability of the manufacturing firms in Ghana. Therefore, efficient management of raw material inventory is a major factor to be considered by Ghanaian manufacturers in enhancing or boosting their profitability.

Begashaw (2020) assessed effect of logistics management activities on organizational performance in Ethiopia. The sample was 125 logistics departments staff. Questionnaires were used to collect data. the researcher concluded that the inventory management systems have positive and significant influence on organizational performance. Tarus and Kihara (2018) investigated effect of inventory management practices on performance of projects at   Kenya Power in Kenya. The study used the descriptive research design. The population was employees working in operations and inventory management. The study used questionnaires to collect data. Findings established that project performance was affected to a great extent by the inventory management practices. The study also found out that the inventory turnover had a significant positive effect on the operational performance.

RESEARCH METHODOLOGY

The study adopted cross-sectional research design. According to Kenya Association of Manufacturers (KAM, 2023), there are a total of 50 large (have turnovers in excess of two hundred and fifty million Kenya shillings) manufacturing firms operating within Nairobi City County. The 50 large manufacturing firms formed the unit of analysis. The study unit of observation was one supply chain, inventory and procurement managers from each of the manufacturing firm. Therefore, the study target comprised of a total of 150 respondents. In this study, due to the small size of the study population, the census sampling approach was used. Data was collected using questionnaires. Data collected using questionnaires was coded, keyed into SPSS version 28, cleaned and analyzed. Descriptive statistics specifically frequencies, percentage, and mean were used for analysis. The inferential statistics included correlation and regression.

RESEARCH FINDINGS AND DISCUSSIONS

The questionnaire were circulated 150 respondents who comprised of supply chain managers, inventory managers , and procurement managers of manufacturing firms in Nairobi City County, Kenya. The pilot test respondents were 10% of the total hence 15 respondents. The researcher distributed 135 questionnaires to the respondents and 118 were successfully filled and returned. Thus, the response rate of was 87.4%. According to Kothari (2012), an adequate response rate is one that is greater than 50%, while an exceptional response rate is typically one that is greater than 70%. This suggests that the response rate in this study is enough for drawing both conclusions and giving advice

Supply Chain Integration

The first objective sought to effect of supply chain integration on performance of manufacturing firms in Nairobi City County, Kenya. The managers were asked to indicate the extent to which they agreed on statements related to supply chain integration. Findings are presented in Table 1.

Table 1: Supply Chain Integration
Key; 1- strongly disagree (**SD**), 2-disagree (**D**), 3-Neutral (**N**), 4-agree (**A**), 5-strongly agree (**SA**)

Statements	SD		D		N		A		SA		M	SD
	F	%	F	%	F	%	F	%	F	%		
There is data integration among internal functions	21	17.8	3	2.5	7	5.9	21	17.8	66	55.9	3.92	0.35
Utilization of periodic interdepartmental meetings among internal functions	10	8.5	12	10.2	2	1.7	20	16.9	74	62.7	3.95	0.50
Real time integration and connection among all internal functions from raw material management, through production to sales	10	8.5	18	15.3	5	4.2	23	19.5	62	52.5	4.08	0.32
There is a high degree of joint planning to obtain rapid response in the ordering process with suppliers	21	17.8	3	2.5	4	3.4	9	7.6	81	68.6	4.07	0.45
There is a high degree of joint planning and forecasting with major customers to anticipate demand visibility	20	16.9	11	9.3	7	5.9	18	15.3	62	52.5	3.77	0.27
Our suppliers provide information to us in the production and procurement processes	5	4.2	20	16.9	3	2.5	9	7.6	81	68.6	3.81	0.36
Our suppliers are involved in the product development and design process	81	68.6	9	7.6	3	2.5	20	16.9	5	4.2	2.22	0.25
Average											**3.70**	

N=118

Findings show that the managers agreed that; there is real time integration and connection among all internal functions from raw material management, through production to sales (m=4.08), there is a high degree of joint planning to obtain rapid response in the ordering process with suppliers (m=4.07), periodic interdepartmental meetings among internal function are well utilized (m=3.95), there is data integration among internal functions (m=3.92), suppliers provide information in the production and procurement processes (m=3.81), and there is a high degree of joint planning and forecasting with major customers to anticipate demand visibility (m=3.77). The managers disagreed that suppliers are involved in the product development and design process (m=2.22).

The average mean is 3.70 which shows that majority of the managers agreed that there is supply chain integration in the firms. Integrating suppliers in supply chain enables the firm to build a strong relationship with the suppliers hence continuity in delivery of materials , machinery and other services required in the firm. Integration of customers one the other hand may enable the firm to understand customers' needs and preferences and hence customize good to meet the customers' tastes and preferences. Integrating the internal systems enhances coordination and data

sharing among all departments from procurement of raw materials, to production, and sales, and after sales services. The firms are however not active in involving suppliers in product development and design process. Findings support Mubarik and Raja (2020) that a blockchain-based supply chain management system can enhance the operations of complex supply chains in the form of a distributed ledge.

Inventory Management

The second objective aimed at assessing the effect of inventory management on performance of manufacturing firms in Nairobi City County, Kenya. The managers were asked to indicate the extent to which they agreed on statements related to inventory management. Findings are presented in Table 2.

Table 2: Inventory Management

Key; 1- strongly disagree (**SD**), 2-disagree (**D**), 3-Neutral (**N**), 4-agree (**A**), 5-strongly agree (**SA**)

Statements	SD		D		N		A		SA		M	SD
	F	%	F	%	F	%	F	%	F	%		
The firm has effective inventory planning models and control techniques	7	5.9	22	18.6	3	2.5	16	13.6	70	59.3	4.02	0.80
Inventory control levels have been set to control the various inventory related costs	19	16.1	5	4.2	21	17.8	7	17.8	66	55.9	3.81	1.02
There are adequate policy guidelines within the firm to monitor the use of inventory items	17	14.4	5	4.2	5	4.2	18	15.3	73	61.9	4.06	0.19
The firm has automated its inventory management systems to improve the levels of service delivery	19	16.1	5	4.2	8	6.8	18	15.3	68	57.6	3.94	0.50
The firm adopts best practices in the industry such as JIT and efficient customer response to prevent inventory build up	72	61.0	11	9.3	5	4.2	24	20.3	6	5.1	1.99	0.19
Firm has inventory control policies to determine how the warehouse manages the movement of inventory under its control	20	16.9	11	9.3	5	4.2	5	4.2	77	65.3	3.92	0.72
Average											**3.62**	

N=118

Findings show that the managers agreed that; there are adequate policy guidelines within the firm to monitor the use of inventory items (m=4.06), the firm has effective inventory planning models and control techniques (m=4.02), firm has inventory control policies to determine how the warehouse manages the movement of inventory under its control (m=3.92), the firm has automated its inventory management systems to improve the levels of service delivery (m=3.94), and inventory control levels have been set to control the various inventory related costs (m=3.81)

The managers disagreed that the firm adopts best practices in the industry such as JIT and efficient customer response to prevent inventory build up (m=1.99). Findings show that majority of the

managers agreed that inventory management practices enhance Manufacturing Firms Performance (average mean=3.62). The firms have put in place policy guidelines to monitor utilization of inventory items. There is also effective control planning and control techniques in the firms. Inventory control helps to manage warehouse and stock levels effectively. The firms have automated the inventory systems to improve service delivery. Findings are in agreement with Prempeh (2017) that efficient management of raw material inventory is a major factor to be considered by manufacturers in enhancing or boosting their profitability.

Manufacturing Firms Performance

The study sought to find out the performance of manufacturing firms in Nairobi City County, Kenya. Respondents were asked to indicate the extent to which they agree with statements related to Manufacturing Firms Performance. Findings are presented in Table 4.8

Table 3: Inventory Management

Key; 1- strongly disagree (**SD**), 2-disagree (**D**), 3-Neutral (**N**), 4-agree (**A**), 5-strongly agree (**SA**)

Statements	SD		D		N		A		SA		M	SD
	F	%	F	%	F	%	F	%	F	%		
The firm produces quality products that meets customer expectations	18	15.3	3	2.5	4	3.4	9	7.6	84	71.2	4.17	0.67
The firm is able to rapidly change production volume	14	11.9	12	10.2	7	5.9	3	2.5	82	69.5	3.92	0.28
The firm provides on time delivery to customers	19	16.1	10	8.5	21	17.8	18	15.3	50	42.4	3.41	0.58
Sales volume has increased in the past few years	81	68.6	9	7.6	5	4.2	6	5.1	17	14.4	1.89	0.73
The firm profits have been increasing	66	55.9	15	12.7	11	9.3	5	4.2	21	17.8	1.85	0.29
Average											**3.04**	

N=118

Findings show that the managers agreed that firm produces quality products that meets customer expectations (m=4.17), the firm is able to rapidly change production volume (m=3.92), and the firm provides on time delivery to customers (m=3.41). The managers disagreed that sales volume has increased in the past few years (m=1.89), and the firm profits have been increasing (m=1.85). The average mean of 3.04 shows that almost half of the managers had positive opinion regarding Manufacturing Firms Performance while the other half had negative opinion on Manufacturing Firms Performance. The findings imply that although the firm produces quality products to meet customers' expectations and observe delivery timeliness, the sales volume have been decreasing and profits have been decreasing too.

Pearson Correlation

Correlation indicates the strength and significance of the relationship between the study variables. Correlation findings are presented in Table 4.

Table 4: Correlation Coefficients

	Variables	Performance	Inventory management	Supply chain integration
Performance	Pearson Correlation	1		
	Sig. (2-tailed) N	118		
Inventory management	Pearson Correlation	.919**	1	
	Sig. (2-tailed) N	.000 118		
Supply chain integration	Pearson Correlation	.693**	.241	
	Sig. (2-tailed) N	.000 118	.109 118	

Findings show that; there is a strong significant relationship between inventory management and Manufacturing Firms Performance (r=0.919, r=0.000), a strong significant relationship between supply chain integration and Manufacturing Firms Performance (r=0.693, r=0.010). Findings concur with various scholars who also found significant relationship between supply chain integration, inventory management and Manufacturing Firms Performance. Uwamahoro (2020) that supply chain integration is related to Manufacturing Firms Performance and Begashaw (2020) that the inventory management systems have positive and significant influence on organizational performance.

Regression Analysis

A regression analysis aims at establishing how a change in the independent variable would predict changes in the dependent variable. The three output of a regression analysis include; Model summary, ANOVA, and regression coefficients.

Table 5: Model of Goodness Fit

Model	R	R^2	Adjusted r^2	Std. Error of the Estimate
1	0.927	0.859	0.854	.571

Predicators: (constant) supply chain integration, and inventory management

Table 5 show R^2 value of 0.859 meaning 85.9% the Blockchain logistics studied contribute 85.9% to performance of manufacturing firms. Therefore, other Blockchain logistics practices that were not included in the study contribute to 14.1% of Manufacturing Firms Performance.

Table 6: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	224.668	4	56.167	171.998	.001[b]
	Residual	36.951	113	.327		
	Total	261.619	117			

Predicators: (constant) supply chain integration, and inventory management
Dependent variable: Manufacturing Firms Performance

Results show that regression model had an F value of 171.998 (p= 0.000). The probability value of 0.000 indicates that the regression relationship is highly significant in predicting how

Blockchain logistics practices would cause changes in Manufacturing Firms Performance. The F calculated is greater than 1 showing that the overall model is suitable for running a regression analysis.

Table 7: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant/Y Intercept	5.279	.475		11.103	.000
Supply chain integration	.519	.067	.511	7.803	.000
Inventory management	.939	.045	.919	20.769	.000

Based   on the results in Table 7, the equation

Becomes; $Y = 5.279 + 0.519x_1 + 0.939x_2 + \varepsilon$

Manufacturing Firms Performance= 5.279 + 0.519 (supply chain integration) +0.939(inventory management).

Findings show that a unit increase in supply chain integration results in a 0.519 change in performance of manufacturing firms and a unit increase inventory management results in a 0.939 change in performance of manufacturing firms. The t statistics show that inventory management had the greatest effect on performance of manufacturing firms (20.769), followed by supply chain integration   (7.803). Findings are in agreement with Mung'asio and Moronge (2019) found that supply chain integration; inventory management costs influences the performance of firms in Kenya.

Conclusion

A close relationship between customers and a manufacturer offers opportunities for improving the accuracy of demand information which reduces the manufacturer's product design and production planning time and inventory obsolescence allowing it to be more responsive to customer needs. Because customer integration generates opportunities for leveraging the intelligence embedded in collaborative processes, it enables manufacturers to reduce costs, create greater value and detect demand changes more quickly

Inventory management helps to achieve optimum stock levels hence less wastage and improved customer service. The firms have put in place guidelines to monitor the inventory in real time. Inventory management enables the coordination of purchasing, manufacturing and distribution in order to meet the marketing needs of ensuring that products are availed to a consumer when and as needed. The managers are hence knowledgeable on stock outs and stock ins. Inventory related costs are also reduced through effective inventory management. These are the costs incurred while holding inventory or stock in a warehouse. Majority of the manufacturing firms have not been able to adopt best inventory management practices which may affect inventory management.

Recommendations

The firms should make efforts to integrate the customers and suppliers in the supply chain. The firms' departments should also be integrated in systems that is accessible to all the staff. This will promote knowledge creation and sharing in the departments which is applied in the manufacturing process, and the entire process of production up to final process which is distribution of goods to consumers.

Firms should to train and re-train its staff to keep them updated on inventory management practices of current technological advancement. Firms should also adopt suitable inventory management practices such as just-in-time, optimal inventory holding, and material requirement planning for an effective inventory management.

Areas for Further Study

A similar study on manufacturing firms in other counties in Kenya. The study shows that the Blockchain logistics studied contribute to 85.9% on performance of manufacturing firms. A further study is recommended to establish the other Blockchain logistics practices that contribute to 14.1% of performance of manufacturing firms.

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