



SUPPLY CHAIN TRACEABILITY AND PERFORMANCE OF RETAIL FIRMS IN KENYA

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ABSTRACT

This study sought to investigate the relationship between supply chain traceability and the performance of retail firms in Kenya. The study was guided by the following specific objectives; to determine the effect of transparency and visibility on performance of retail firms in Kenya and to assess the effect of process traceability on performance of retail firms in Kenya. The study was based on the Supply Chain Traceability Theory, Total Quality Management Theory, Resource-Based View Theory, and Theory of Constraints. The study targeted 11 main local and international retail supermarket chains. The unit of observation was a total of 178 management level employees in supply chain department. The study used Krejcie and Morgan sample size determination formula to arrive at a sample size of 122 respondents. Primary data was used collected using questionnaire. The pretesting sample was made of 12 respondents, representing 10% of the sample size. Inferential and descriptive statistics was employed for analysis of quantitative data with the assistance of Statistical Package for Social Sciences (SPSS version 25). Descriptive statistics such as frequency distribution, mean (measure of dispersion), standard deviation, and percentages was used. Inferential data analysis was conducted by use of Pearson correlation coefficient, and multiple regression analysis. The findings were presented in tables and figures. The study concludes and recommends that supply chain traceability had a strong effect on performance of retail firms in Kenya.

INTRODUCTION

Supply chain traceability has emerged as a critical supply chain component in almost all sectors and is used extensively in different contexts (Kumar et al., 2017a). According to a report by Accenture (2021), supply chain traceability is the ability to track the movement of goods and services from the source of production to the end consumer. It involves the use of technology such as block chain, RFID tags, and GPS to provide visibility into the entire supply chain. The ability to track products from their origin through to the point of sale has a significant impact on the performance of retail firms (Machado et al., 2018). A study by DHL (2020) found that supply chain traceability can positively impact the performance of retail firms by improving product quality, reducing supply chain disruptions, and enhancing customer trust.

In Asia, China's e-commerce giant, Alibaba, has launched a block chain-based traceability platform called Food Trust Framework to provide consumers with information on the origin and quality of food products (Alibaba Group, 2021). In Japan, the government has implemented the Product Traceability System to track the flow of goods from the point of production to the point of sale (Ministry of Economy, Trade and Industry, 2021).

In Morocco, the government has implemented the Green Plan, which aims to promote sustainable agriculture and improve traceability along the agricultural supply chain (United Nations Conference on Trade and Development, 2015). The program includes initiatives such as the creation of a traceability system for olive oil production and the development of a quality certification system for fresh fruits and vegetables (United Nations Conference on Trade and Development, 2015).

Kenya has made significant efforts to promote supply chain traceability and enhance sustainability in its agricultural sector. The country's government and various stakeholders have launched several initiatives to improve traceability, reduce waste, and enhance competitiveness in the global market. For instance, the government has launched the Kenya Electronic Single Window System for Agricultural Trade (KeSWAT), a platform that provides traceability information on agricultural products, including their origin, quality, and safety (African Development Bank, 2021). One notable initiative is the Kenyan National Traceability System (KNTS), launched in 2011 by the Fresh Produce Exporters Association of Kenya (FPEAK) in partnership with the government and other stakeholders (United Nations Conference on Trade and Development, 2018). The system is designed to track and trace fresh produce from farm to export, using a unique identification number that enables buyers to verify the origin and quality of the products. The KNTS has helped to improve the transparency and efficiency of the supply chain, reduce waste, and enhance consumer confidence in Kenyan products.

Statement of the Problem

Supply chain traceability has emerged as a critical supply chain component in almost all sectors and is used extensively in different contexts. However, the level of adoption and implementation of supply chain traceability in the Kenyan retail industry is not well understood. This study seeks to investigate the relationship between supply chain traceability and the performance of retail firms in Kenya.

According to a study by KAM (Kenya Association of Manufacturers) and GS1 Kenya, which was published in 2018, only 33% of companies in the Kenyan retail sector had implemented traceability systems (KAM, 2018). The study also found that most companies that had implemented traceability systems had done so to meet regulatory requirements, rather than to improve supply chain efficiency or product quality. Furthermore, a survey conducted by the Kenya National Bureau of Statistics (KNBS) in 2018 revealed that only 16.2% of Kenyan firms had implemented traceability systems, with the highest adoption rates being in the food and beverage sector (KNBS,

2018). This indicates a low level of adoption of traceability systems in the Kenyan retail sector, which could be a hindrance to the sector's performance and competitiveness.

According to a survey by the Global Food Safety Partnership (GFSP) in 2019, only 17% of Kenyan food companies had implemented traceability systems, with small and medium-sized enterprises (SMEs) facing challenges in adopting these systems (GFSP, 2019). This suggests that there is a gap in the implementation of traceability systems in the Kenyan retail industry, which could affect the performance of retail firms. In addition, a study by Nyasimi (2020) found that the implementation of traceability systems in the Kenyan retail industry is hindered by factors such as limited infrastructure, technological capabilities, and difficulties in verifying information from suppliers. This study also highlighted the high cost of implementing traceability measures, which could be a significant barrier for SMEs in the retail sector. In addition, a study by Mbae and Ondieki (2020) found that the implementation of traceability systems in the Kenyan retail sector is hindered by factors such as limited access to finance, lack of skilled personnel, and inadequate infrastructure. The study also highlighted the need for more awareness and training on the benefits of traceability systems for retailers.

Several empirical studies have been conducted on the relationship between supply chain traceability and the performance. Machado et al. (2018) investigated the impact of traceability on supply chain performance in the context of the Brazilian retail sector. However, this study did not consider the specific context of the Kenyan retail sector, and the findings may not be directly applicable to the Kenyan context. Another study by Kumar et al. (2017a) explored the role of traceability in the Indian retail sector. However, the study did not specifically investigate the relationship between traceability and performance in the context of retail firms, and the findings may not be directly applicable to the Kenyan context. A more recent study by Oyaro and Ogutu (2021) examined the impact of traceability on the performance of food retail firms in Kenya. However, the study only focused on food retail firms and did not consider the broader retail sector in Kenya. There is a need for empirical research on the relationship between supply chain traceability and the performance of retail firms in the broader Kenyan context. This study aims to address this gap by investigating the specific context of the Kenyan retail sector and providing insights into the potential benefits of traceability systems for the sector's performance.

Objectives of the Study

- i. To determine the effect of transparency and visibility on performance of retail firms in Kenya.
- ii. To assess the effect of process traceability on performance of retail firms in Kenya.

LITERATURE REVIEW

Theoretical Review

Supply Chain Traceability Theory

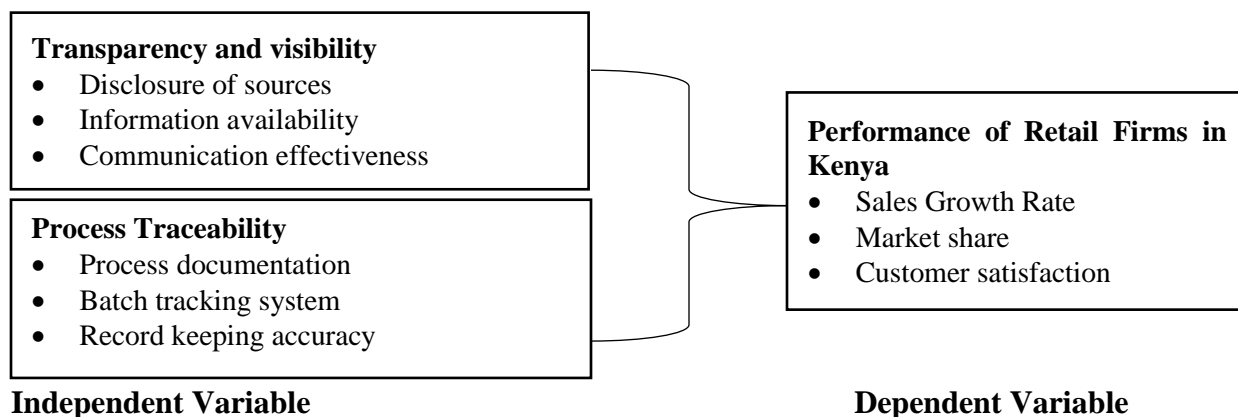
One theory that links product traceability is the Supply Chain Traceability Theory proposed by Christopher and Lee in 2004. This theory explains the importance of product traceability in enhancing supply chain performance and improving customer satisfaction. Christopher and Lee (2004) define supply chain traceability as the ability to track and trace the movement of products and their components from suppliers to customers. According to the theory, supply chain traceability can be used to enhance supply chain performance by reducing inventory levels, improving product quality, and reducing lead times. Other researchers have used this theory to investigate the relationship between supply chain traceability and various performance measures. For example, Yeh et al. (2010) used the theory to examine the impact of supply chain traceability

on supply chain responsiveness, while Kuo et al. (2012) used it to investigate the relationship between supply chain traceability and product quality.

Theory of Constraints

Theory of Constraints (TOC) was introduced by Goldratt in 1984. It emphasizes the importance of identifying and managing constraints in a production system to improve overall system performance. According to Goldratt (1984), the TOC is based on the premise that every production system has at least one constraint that limits the output of the system. The goal of the TOC is to identify and manage these constraints in a systematic way to increase the throughput, or the rate at which the system generates profit. The TOC is comprised of five focusing steps, which are designed to identify and manage constraints in a production system. The first step is to identify the system's constraint, which is often the bottleneck in the production process.

Conceptual Framework



Transparency and Visibility

Transparency and visibility are critical components of supply chain traceability that allow stakeholders to monitor and track products as they move through the supply chain. Transparency refers to the openness and clarity of information provided by the firm regarding its operations, policies, and practices, while visibility refers to the ability to track products and activities in real-time (Ayuya et al., 2017). Several studies have highlighted the importance of transparency and visibility in supply chain performance. For example, according to a study by Kumar et al. (2017), supply chain traceability, which includes transparency and visibility, can significantly improve supply chain performance by reducing the risk of product recalls, improving customer trust, and increasing operational efficiency.

In the context of the retail sector in Kenya, the importance of transparency and visibility has been emphasized by various stakeholders. According to a report by the Kenya Private Sector Alliance (KEPSA) (2018), transparency and visibility in the retail sector are critical for promoting fair competition, reducing corruption, and increasing consumer confidence. The report also highlights the need for greater collaboration between stakeholders, including retailers, suppliers, and government agencies, to enhance transparency and visibility in the sector.

Process Traceability

Process traceability refers to the ability to track the processes involved in the production of retail products. The contingency theory suggests that the effectiveness of management practices depends on the alignment between the organization's internal and external environment. A firm that can trace its processes can identify areas that need improvement, streamline its operations, and increase

efficiency, which could lead to better performance. Moreover, the study by Ayuya et al. (2017) found that process traceability is positively related In New Zealand, Schuitemaker and Xu (2020) conducted a study on product traceability in manufacturing. The study used a systematic review of literature. The review looked at framework designs, enabling technologies and implementation processes for product traceability systems in manufacturing. The results indicated that traceability framework designs have a similar fundamental structure consisting of three key components; product identification, transform/routing documentation and the tracing of product attributes. Product traceability systems tend to be interwoven into many layers of a manufacturing execution system, both at a physical and digital level, making implementation a complicated task. Product traceability in manufacturing is a risk management tool used for tracking, tracing and proving a product's authenticity.

Empirical Review

Transparency and Visibility

Zanoni (2015) studied the impact of supply chain visibility on supply chain performance: A case study of Italian grocery supply chain. This study used a case study approach to investigate the relationship between supply chain visibility and supply chain performance in the Italian grocery supply chain. Data was collected through interviews with key informants and analysis of secondary data from the company's performance records. The study used regression analysis to analyze the relationship between supply chain visibility and supply chain performance. The study found a positive relationship between supply chain visibility and supply chain performance in terms of cost reduction, inventory reduction, and improved delivery performance.

Mutwiri et al., (2020) researched on the impact of supply chain transparency on supply chain performance: A case study of the Kenyan tea industry. This study used a case study approach to investigate the impact of supply chain transparency on supply chain performance in the Kenyan tea industry. Data was collected through semi-structured interviews with key stakeholders in the industry, and a questionnaire was used to collect data from tea producers. The study used structural equation modeling to analyze the relationship between supply chain transparency and supply chain performance. The study found a positive relationship between supply chain transparency and supply chain performance in terms of efficiency, quality, and customer satisfaction.

Rahayu and Budiarto (2019) examined the impact of supply chain visibility and transparency on supply chain performance: A case study of the Indonesian palm oil industry. This study used a case study approach to investigate the relationship between supply chain visibility and transparency on supply chain performance in the Indonesian palm oil industry. Data was collected through semi-structured interviews with key informants and analysis of secondary data. The study used structural equation modelling to analyze the relationship between supply chain visibility and transparency and supply chain performance. The study found a positive relationship between supply chain visibility and transparency and supply chain performance in terms of delivery performance, cost reduction, and customer satisfaction.

Li et al., (2017) investigated the impact of supply chain transparency and visibility on supply chain performance: A case study of the Chinese automotive industry. This study used a case study approach to investigate the relationship between supply chain transparency and visibility on supply chain performance in the Chinese automotive industry. Data was collected through semi-structured interviews with key informants and analysis of secondary data. The study used structural equation modeling to analyze the relationship between supply chain transparency and visibility and supply chain performance. The study found a positive relationship between supply chain transparency and

visibility and supply chain performance in terms of cost reduction, quality improvement, and customer satisfaction.

Process Traceability

One study that investigated the relationship between process traceability and firm performance is the research conducted by Choi and Hong (2018) in the context of the Korean manufacturing industry. The target population of the study was manufacturing firms in Korea, and the authors collected data from 154 firms using a self-administered survey questionnaire. The data collection instrument was adapted from existing literature and measured process traceability through four dimensions: information system, information sharing, information transparency, and information accuracy. The study used regression analysis to examine the relationship between process traceability and firm performance, measured by sales growth and market share. The findings revealed that process traceability had a positive and significant effect on firm performance, indicating that the use of advanced information systems and processes that improve information sharing, transparency, and accuracy can enhance firm performance in terms of sales growth and market share.

Another empirical study that examined the effect of process traceability on firm performance is the research by Nieuwenhuis and de Bruijn (2016). The study targeted manufacturing firms in the Netherlands, and the sample size comprised 284 firms. The data collection instrument used was a questionnaire, and the analysis technique employed was structural equation modeling. The study found that process traceability has a positive effect on firm performance, particularly in terms of quality management and operational performance.

Similarly, another empirical study by Saad et al. (2018) investigated the relationship between process traceability and firm performance in the food industry in Egypt. The study targeted 220 food firms, and the data collection instrument used was a structured questionnaire. The data collected was analyzed using structural equation modeling. The study found that process traceability has a significant and positive effect on firm performance, particularly in terms of quality performance, supply chain performance, and customer satisfaction.

In another study, Zhang et al. (2020) explored the impact of process traceability on supply chain performance in the electronics industry in China. The study targeted 226 firms, and the data collection instrument used was a questionnaire. The data collected was analyzed using structural equation modeling. The study found that process traceability has a positive effect on supply chain performance, particularly in terms of cost performance and delivery performance.

RESEARCH METHODOLOGY

This study adopted a cross-sectional survey research design. This design suits the scenario where the correlation of two variables is to be determined at an instant in time (Mugenda, 2008; Cooper & Schindler, 2011). The target population for this study was 11 main local and international retail supermarket chains. The firms formed the unit of analysis while management level employees in supply chain department formed the unit of observation. The study's primary data was obtained using semi-structured questionnaires. The collection of data was conducted by use of the drop-off and pick-up-later method and the questionnaires will be collected after one week. This accorded the respondents enough time to answer the questions. The researcher used this method due to the variances in respondents' time availability. Before the data could be analysed, the researcher ensured the data was checked for completeness, followed by data editing, data coding, data entry, and data cleaning. Inferential and descriptive statistics was employed for analysis of quantitative data with the assistance of Statistical Package for Social Sciences (SPSS) version 26.

RESEARCH FINDINGS AND DISCUSSIONS

Response rate

Out of 110 questionnaires that were sent to the respondents, 99 of them were fully filled and returned by the respondents; yielding a response of 90%. This was considered every reliable response rate for the generalization of study findings is in line with Kothari (2011), states that a response rate of 70% and above is believed to be a reliable response rate.

Descriptive Analysis of the Variables of the Study

Transparency and Visibility and Performance of Retail Firms

Table 1 indicate the results on the statements regarding the effect of transparency and visibility on performance of retail firms in Kenya. The respondents unanimously agreed that transparency and visibility ensured performance of and periodic review in Retail firms In Kenya viable (M=3.741, SD=1.0606); Through real time basis assessment the In Kenya has been able to make rational decisions on priority and non-priority projects (M=3.832, SD=.9201); willingness to share information assessment has contribution to the quality and innovation of the planning team (M=3.902, SD=.9006); assessment of quick, frequent and accurate information transfer in transparency and visibility it is important to put in place and maintain procurement record/ register (M=4.060, SD=.8250); The management of Retail firms In Kenya implements performance of to prevent fraud in supplier evaluation (M=3.840, SD=1.3019); and transparency and visibility enhances performance of at Retail firms In Kenya (M=3.565, SD=.8016). These findings concur with the findings of Nyile *et al.* (2022) who observed that clear description of transparency and visibility, an enhance effective performance of retail firms.

Table 1: Transparency and visibility

Statement	Mean	Std. Dev.
My In Kenya ensures conformance of supplier information Sharing through Real time basis	3.3742	1.0606
Through Willingness to share information my In Kenya has been able to make decisions on	3.832	.9201
Responsiveness of supplier has contribution to performance of Retail firms	3.902	.9006
By Quick, frequent & accurate information transfer It is important to put in place transparency and visibility	4.060	.8250
The management of my In Kenya implements supplier Information sharing	3.840	1.3019
Transparency and visibility enhance performance of Retail firms	3.565	.8016

Process Visibility and Performance of retail firms in Kenya

The statements concerning effect of process visibility on performance of retail firms in Kenya. are presented in Table 2. respondents agreed that: The Retail firms In Kenya considers Strategic alliances on process traceability (M=3.850, SD=.8311); A process traceability is likely to deliver based on performance of Retail firms In Kenya (TORs) (M=4.032, SD=.9905); Early supplier involvement on performance of Retail firms In Kenya (M=4.040, SD=.8301); Through supplier evaluation has been able to get performance of Retail firms In Kenya (M=4.110, SD=.7116); proper supplier evaluation are supposed to have performance of Retail firms In Kenya (M=4.093, SD=.8004); Joint coordination of production activities enhances performance of Retail firms

In Kenya (M=4.251 SD=.8164). These findings were in agreement with the findings of Onger and Osoro (2021) that the goal of process traceability is to ensure performance of Retail firms, Kenya. Effective Process traceability minimizes or eliminates problems and potential claims and disputes. This concurs with the finding of Omide et al. (2022). It is essential for process traceability to understand the provisions of the supplier evaluation, have the ability to perform to all practices involved, and maintain control over the performance of retail firms.

Table 2: Process Visibility and Firm Performance

Statement	Mean	Std. Dev.
My In Kenya considers Strategic alliances on performance of Retail firms In Kenya	3.850	.8311
Early supplier involvement enables performance of Retail firms In Kenya	4.032	.9905
Joint coordination of production activities enhances Performance of Retail firms In Kenya	4.040	.8301
Financial stableness enhances performance of Retail firms In Kenya	4.110	.7116
Sound finance enhances procurement performance of Retail firms In Kenya	4.093	.8004
Stability of supplier can boast procurement performance of Retail firms In Kenya	4.251	.8164

Inferential Analysis

Correlation Analysis

The results in Table 3 show that there is a positive correlation is seen between each variable and performance. The strongest correlation was established between Input traceability and performance of Retail Firms in Kenya ($r = 0.538$) and the weaker relationship found between quality control and performance of Retail firms ($r = 0.183$). while process traceability and performance of Retail firms In Kenya were found to be strongly and positively correlating with performance of Retail firms In Kenya correlation coefficient of 0.307 and 0.413 respectively. This is tandem with the findings of Onger and Osoro (2021), who observed that all independent variables were found to have a statistically significant association with the dependent variable at over 0.05 level of confidence.

Table 3: Summary of Pearson's Correlations

		Performance Of Retail Firms	Transparency & Process vis.	Process traceability
Performance Of retail firms	Pearson correlation	1		
	Sig. (2-tailed)			
Transparency & V. N.	Pearson correlation	.871*	1	
	Sig. (2-tailed)	.000		
Process Traceability	Pearson correlation	.754**	.264	1
	N	99	99	
	Sig. (2-tailed)	.002	.078	

Regression Analysis

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.764	0.786	0.731	0.065

Table 5 Analysis of Variance

	Sum of Squares	d.f	Mean Square	F	Sig.
Regression	4.156	1	1.059	.441	.001
Residual	6.465	98	.531		
Total	10.611	99			

Table 6 Regression of Beta Coefficient and Significance

	Unstandardized coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(constant)	-.137	.060	-1.144	.004	.004
Transparency and V.	.471	.132	.838	5.471	.002
Process Visibility	.209	.068	.162	2.471	.003

With an R-squared of 0.786, the model shows that transparency and visibility, process traceability, input traceability and quality control contribute up to 78.6% on performance of Retail firms, while 20.4% this variation is explained by other indicators which are not inclusive in this study or model. A measure of goodness of fit synopsis the discrepancy between observed values and the values anticipated under the model in question. This finding is in line with the findings of Mwakubo and Ikiara (2007). The P-value of 0.005 implies that organizational performance of retail firms has a significant relationship with transparency and visibility, process traceability, input traceability and stakeholders' management which is significant at 5 % level of significance. Findings also revealed a positive relationship between the performance of Retail firms in Kenya. This finding is in line with the findings of Ongeru and Osoro (2021). This implies that among other factors, transparency and visibility, process traceability, input traceability and quality control are significant determinants of performance of Retail firms, Kenya.

Conclusion

The study concluded that there is a positive relationship between transparency and visibility and Performance of Speciation identification, periodic design assessment, continues improvement and proactive assessment are among the transparency and visibility factors that significantly influenced the performance of Retail firms, Kenya. The study further concludes that by implementing transparency and visibility has enhanced performance of Retail firms, Kenya, leading to operational increase in efficiency and effectiveness. Therefore, the study concludes Retail Firms in Kenya has significantly increased their suppliers' quality management in the in Kenya government in the supply chain practices.

The study also concluded that process traceability influences performance of Retail firms. The suppliers during evaluation were through adherence to the set criterion in the bid documentation during the advertisement focusing on process traceability. A well-integrated internal supply chain should provide excellence in process traceability on performance of Retail firms, Kenya. Retail firms, through embracing process traceability has benefited from facilitated teamwork, resource allocation and fulfilment of set goals between complementary functions. This has made it easy for the in Kenya to ensure increased Service delivery to the community. Therefore, the study concludes that Retail Firms in Kenya has experienced significant increase in growth, through process traceability in the supply chain practices in supply chain.

Recommendations of the Study

The study recommend that transparency and visibility formalize relations between practices within a robust legal framework, but is much more besides; it is an opportunity to define the arrangements that encompass every aspect of what outcomes the Retail firms In Kenya wants from the supplier and how it wants the relationship to work. This means that the In Kenya needs to take an active role in the development of the quality mechanism early on; it should not be left as a supplementary activity post negotiation. At preparation of every quality management can contribute to supplier evaluation on performance of Retail firms, Kenya. Proper transparency and visibility can result to high procurement in Retail firms.

This study recommends that process traceability had a good relationship with performance of Retail firms, Kenya. Hence effective process traceability minimizes or eliminates problems and potential claims towards performance of retail firms the In Kenya perspective. A key factor in successful process traceability is being arable to give credit to customers. It is essential for process traceability to understand the provisions of the purchase document, have the ability to communicate financial obligations to all practices involved, and maintain control over the performance of retail firms. A good supplier manager ensures that the process traceability requirements are satisfied, that the goods and services are delivered in a timely manner, and that the financial interests of the in Kenya are protected. The procurement staff at Retail Firms In Kenya should ensure that they do proper process traceability by maintaining an updated form of the process; assessing and managing supplier involvement; supplier being paid on time, delivering at the right time; inspection or audit of all documents before settling payment. By allocating all the necessary resources to a reputable supplier through efficiency and effectiveness analysis of previous records in the supply chain practices.

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