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Effects of Supply Chain Security on Supermarkets Performance in Kenya

(A case of Nakumatt supermarkets in Nairobi)

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ABSTRACT

Ensuring a supply chain is secure from intentional as well as unintentional incidents is critical in today's global economy. This study conceptualized and develops four supply chain security practices (trading partner security, procedural security, physical security and access control) and tested the relationships between the supply chain security and the performance of supermarkets in Kenya. The research adopted a descriptive design. The population of the study consisted of 120 employees from all Nakumatt branches in Nairobi. The study employed a census approach to collect data from the population of 120 respondents hence the study utilized 100% of the target population. Data for the study was collected and the findings were used to determine whether supply chain security can enhance supermarkets performance. Questionnaires were used as the main collection instrument and a pilot test was subsequently carried out to pre-test questionnaires for validity and reliability. The gathered data was analyzed using descriptive and inferential statistics aided by Statistical Package for Social Sciences (SPSS) version 20 and findings presented on tables, pie charts, figures and graphs. Correlation analysis and multiple regressions were used to establish the relationship between the research variables. The findings of the study suggest that access control, procedural security and physical security practices have a significant impact on supermarket performance. Thus the study recommended that management of the supermarkets should improve on provision of security awareness and training to its trading partners as this will help enhance the supply chain security culture. Also Total Security Management philosophy should be initiated to enhance supply chain security.

Background of the study

According to Arway, (2013) supply chain is a complex system of numerous, integrated stakeholders. The stakeholders are responsible for the transportation, storage, documentation, and handling of material goods and cargo. Each entity has its own unique relationship with and role within the chain—as well as its own unique security requirements. The challenge of trying to secure the supply chain at every level is both a domestic and global concern (Arway, 2013). Supply chain security is currently perceived as an important area in managing business risks (Martens et al., 2011). Supply chain security management is concerned with reducing the risk of intentionally crated disruptions in the supply chain operations including product and information theft and activities seeking to endanger personnel or sabotage supply chain infrastructure (Wisner, Tan & Leong, 2009). Unfortunately terrorist attacks and crimes against property have become almost an everyday feature of life in today's world (Ekwall, 2010). Consequently these disruptions affect the operations of the supply chain. The disruptions lead to loss and long lead time in the delivery of products and services downstream (Andrew, 2010).

Government departments as well as supermarkets lose colossal sums of money caused by disruption and delay in supply chain operations. Unfortunately, as supply chain venture into countries in search of cheaper suppliers and implement practices to reduce transit times, the security risks grow. The costs associated with the disruption caused by these events are difficult to quantify but are too real to the victims. Management time, replacement of assets, service failures, increased insurance costs, legal costs and general upheaval are some of the consequences that may be expected, (Rushton, Croucher & Baker, 2006).

After the September 11, 2001 attack, Li and Ye (2008) put it that supply chain security was taken to a next level of meaning and immediacy, many organization took the effort to

implement various supply chain security measures (Martens et al., 2011). Joel et al., (2009) mentioned that the U.S attack of the September 11, 2001 was a wakeup call to many businesses to begin assessing their needs for supply chain security systems. Prior to that time, most executive were aware that their operations might be vulnerable to security problems, however, most firms as well as governments chose to put off improving security practices. Locally the September 21, 2013 attack of Westgate exposed the need for supply chain security capability. With the memory of attacks by Somali pirates still fresh in mind, supply chain security has come to the attention of supply chain managers. Secure supply chains are a prerequisite that enables firms to continue exchanging goods and services in unrestricted and uninterrupted manner.

Supply Chain Management

Supply chain management requires security because of the complexity, dependence, and extensive trust and commitment between supply chain partners (Sarath, 2006; Williams, 2008). Lysons and Farrington (2006), define supply chain as that network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer or consumer. Therefore supply chain management is the coordination of all the activities at upstream and downstream of the supply chain. Wisner et al (2009), describe supply chain as the series of companies making products and services available to consumers. This including all the functions enabling the production, delivery and recycling of materials, components, end products and services. The council of supply chain management Professionals (CSCMP) defines supply chain management as: 'the planning and management of all activities involved in sourcing and procurement, conversion and all logistic management activities. It also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers and customers'. The Institute for Supply Management (ISM) describes supply chain management as: 'The design

and management of seamless, value-added processes across organizational boundaries to meet the real needs of the end customer" (Lysons, 2006). Across these definitions is the idea of coordinating a number of goods and services related activities among the supply chain participants to improve on the performance, quality and meet customer's need. Thus for supply chain to be successful, a firm must work to secure it.

Supply Chain Security

Supply chain security management (SCSM) can be defined as, the application of policies, procedures, and technology to protect supply chain assets from theft, damage, or terrorism, and to prevent the introduction of unauthorized contraband, people, or weapons of mass destruction into the supply chain, (Hesseling, 1994). Whereas supply chain security is the obligation to meet security requirements to protect supply chain (William et al., 2008). Van Oosterhout et al. (2007) categorised supply chain security measures into Preventive measures and corrective measures. The preventive measures consist of physical security and non physical security. Preventive measures focuses mainly on preventing security related risk to occur in the supply chain whereas corrective measures focuses to limit the impact caused by security related risk. An example of corrective measures is resilience management. Hence corrective action helps firms to recover to normal state after facing a crisis.

Closs et al. (2008) mentioned that security is needed in every firm for brand protection and provide assurance to customer that they are receiving the original product. Also to meet customer's security requirement because nowadays customer prefer to work with supplier who have proper quality certifications and basic security regulations. The objective of supply chain security is to improve efficiency of business process and resilience to security incidents (Gould et al.), 2010. Securing the supply chain takes a full understanding of the chain. It also requires that you know where you are positioned to view that chain. The supply chain manager should be sure to align security program and its function to those interests, based on

position and relationship to the supply chain. These stakeholders are responsible for the transportation, storage, documentation, and handling of material goods and cargo. Each entity has its own unique relationship with and role within the chain- as well as its own unique security requirements (Banomyong, 2009)

Global Perspective on Supermarkets Performance

The wholesale trade sector has been a key engine of growth for the Singapore economy, with foreign wholesale trade playing an increasingly important role (Ess, 2008). Singapore's foreign wholesale trade has enjoyed robust growth over the due to strong growth in their re-exports and offshore trade. Sales volume of total foreign wholesale trade grew 6.0 per cent per annum over the period 2008 – 2013 more than twice the rate of growth in total domestic wholesale trade. Despite the short-term headwinds facing the sector arising from the global economic crisis, its longer term outlook remains positive as Singapore is moving into new offshore trading products and opening up new export markets (Ess, 2014).

The global economic crisis has adversely affected the wholesale trade sector in the short-term, as global demand and trade flows have been badly hit by the crisis. However, the long –term prospects for wholesale trade sector remain positive. On the other hand Italian economy has been slow to recover and remains volatile, with unemployment continuing to rise and consumers still holding back on discretionary spending. Nevertheless, retail sales saw slight growth in current value terms in 2010 and 2011 (IES, 2013).

Statement of the Problem

The performance of supermarkets has been dwindling over years in both their home and global markets. However, supermarkets play a significant role in Kenya's economy since they provide a large number of employment opportunities. In terms of employment the

wholesale and retail trade accounted for 196,000 jobs (KIPPRA 2013). Despite wholesale and retail trade sector which supermarkets being an important sector in spurring economic growth and the Nation Gross Product, many global supermarkets have not been performing well in terms of productivity, cost reductions, customer satisfaction and profitability (Lee, 2002). Kenya economic survey of 2013 shows a drop in growth as far as wholesale and retail trade are concern from 7.3% in 2011 to 6.4% in 2012. There is need to ensure the supermarkets growth and continuity.

There have been reports of supermarkets facing market challenges resulting to low returns and closure. A recent study finds 69 percent of chief financial officers surveyed indicate that supply chain disruptions resulting from a supply chain security failure are a major threat to revenue sources (Craighead et al, 2005). As an indicator of the potential short-term financial impact, an announcement of a supply chain disruption is associated with a 10 percent decrease in shareholder value (Hendricks & Singal 2003). While the financial impact of a disruption is clear problematic, additional negative consequences exist with respect to disruptions caused by a supply chain security failure. In particular, loss of consumer confidence in a firm's brand is a key concern prompting more attention to supply chain security. Consumer safety and product liability is another driver of enhanced security initiatives (Russell & Saldanha 2003).

Economic Survey, 2012/13, shows that organised retail crime is a major concern and retailers should set up internal teams to assess the scale of the problem and produce appropriate solutions, as well as work together with other retailers and law enforcement. To address this issue there is a need to secure the supply chain through trading partner security, physical security, access control and procedural security (Rice & Spayd, 2005). Managing supply chains effectively and efficiently is frequently heralded as a critical advantage in an increasingly competitive business environment (Lee, 2002; Fisher, 1997) at the same time, breakdowns in supply chains are cited as one of the main threats to firm profitability both in

terms of revenue loss and customer dissatisfaction. There is a need to secure supply chains to enable supermarkets to continue exchanging goods and services without disruptions (Rice & Spayd 2005).

Objectives of the Study

i. To determine the effect of trading partner security on performance of supermarkets in Kenya
ii. To establish the effect of procedural security in the supply chain on performance of the supermarkets in Kenya
iii. To establish the effect of access control on the performance of the supermarkets in Kenya
iv. To determine the effect of physical security on the performance of the supermarkets in Kenya.

Conceptual Framework

This study examined the relations between supermarkets performance and the four elements of supply chain security; physical security, trading partner security, access control and procedural security. Based on the study's objectives, the following conceptual model was drawn:

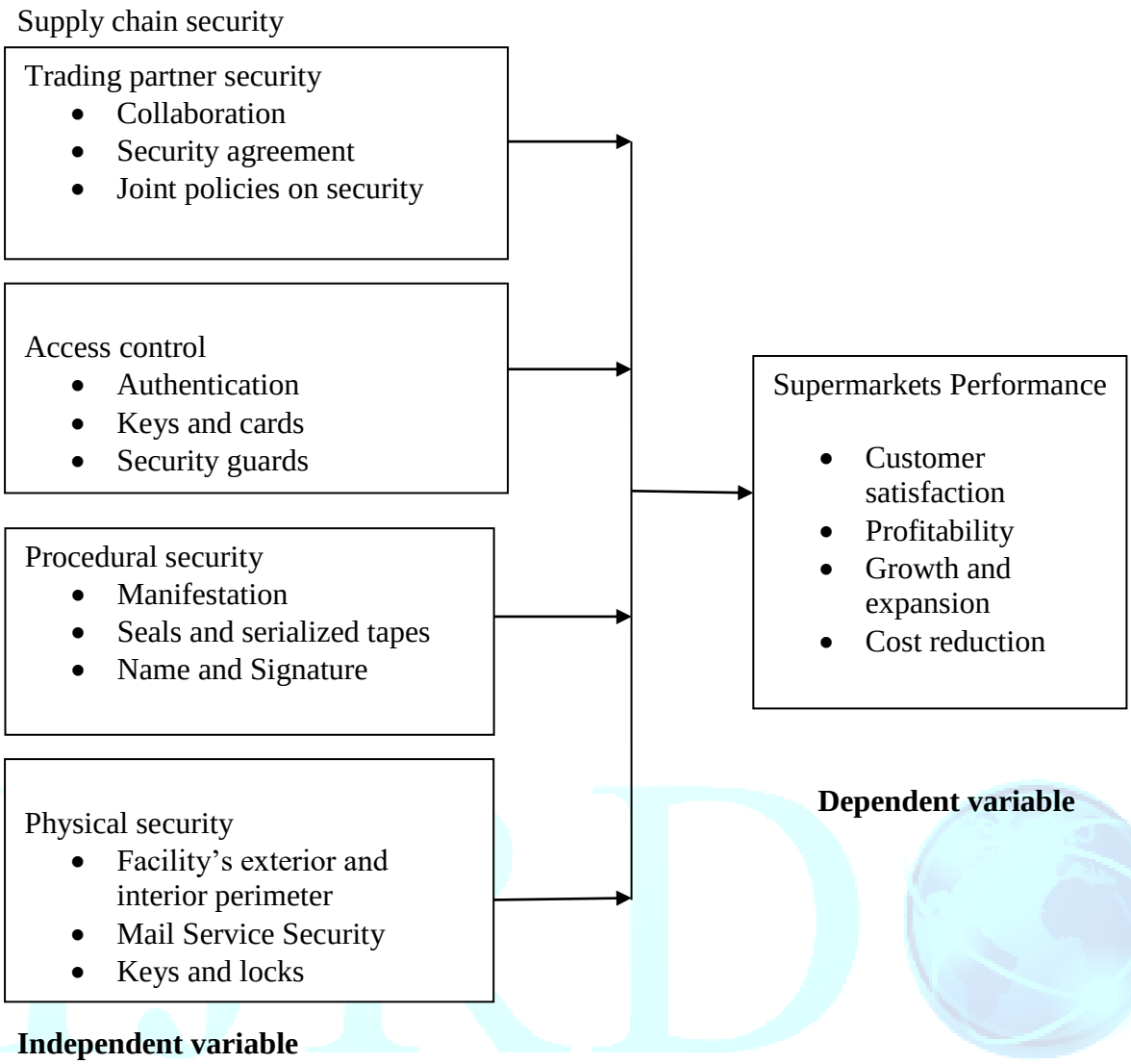

Figure. 1: Conceptual framework

Trading Partner Security

Supply chain security requires a joint effort and collaboration of all involved supply chain entities (Russell & Saldanha, 2003). Many authors have stated that collaboration between supply chain partners is the key to security success (Rice & Caniato, 2003; Rinehart et al. 2004; Sheffi 2001; Cook 2003; Kleindorfer & Saad, 2005). Firms should reach out to suppliers and customers to collaboratively improve their security competency (Cook, 2003). Development of security plans in isolation from other parts of the chain can create weaknesses that may not be obvious to the individual, but through discussion these gaps can be identified and actions taken to close them (PACIA 2013).

To reduce supply risks and be positioned to achieve a competitive advantage, firms must coordinate relationships across the supply chain (Giunipero & Eltantawy, 2004). Firms should collaborate across the supply chain in an effort to develop security best practices as well as share organizational knowledge to continuously improve these practices (Sheffi, 2001). Gulisano (2003) posits that improved security levels begin with management practices and information sharing. Firms that collaborate with supply chain partners, or at least monitor security across the supply chain, are likely to develop more accurate and timely supply chain security information, which should assist in detecting, recovering from, and reducing security incidents.

Further, some authors have stated that it is important to employ a higher-level manager in charge of security (Cook, 2003; Sheffi, 2001). This manager would oversee the firm's security initiatives, ensuring that other managers provide important buy-in to security actions (Radjou, 2003; Kleindorfer & Saad, 2005; Quinn, 2003), and assist in implementing a security culture, which has been cited as another key to improved security (Rice & Caniato, 2003). Knight (2003) posits that security agreement and joint policies between the counterparts is a source of security in the supply chain. Written security agreements procure responsibilities and/or obligations and also rights to the signatory parties. Joint policies and obligations call for commitment between the parties. Also seal, signature and other relevant authentication codes have to be mutually recognizable and sound for partner security (Kleindorfer & Saad, 2005).

Access Control

Access of people to the premises, carriers and cargo has to be restricted. Access controls and identification mechanisms have to be enacted for preserving security. Keys and cards should be issued to personnel who make the navigation in the building much easier and reliable (Knight, 2003). Information help improve the utilization of supply chain assets and the

coordination of supply chain flows to increase responsiveness and reduce costs (Chopra & Meindi, 2013). However access of information by unauthorized persons affects the performance of the supply chain.

Access control in information management is achieved by means of a three step process that includes user identification, user authentication, and user authorization. Users first identify themselves by providing something that they know, such as a password. User authentication once initial identification has been accomplished, users verify their right to access by providing something that they have, such as a smart card or token or an identification chip. User authorization once the identification and authentication checks passed, a person can then be authorized to access certain levels or degrees of use (Laudin & Jane, 2010).

Procedural Security

Procedural security assures recorded and verifiable introduction and removal of goods into the supply chain. Contingency procedures should be included within the scope of procedural security (Knight, 2003). Procedural security measures are defined as security measures that must be in place to ensure the integrity and security of processes relevant to the transportation, handling, and storage of cargo in the supply chain (Arway, 2013). Procedures must be in place to prevent, detect, or deter un-manifested material and un-authorized personal from gaining access in the supply chain (Ekwall, 2009). Every kind of anomalies concerning the removal and insertion of materials that occur throughout related processes have to be reported to the authorities (Sheffi, 2001).

To detect abnormalities in the procedural security the following items are frequently used:

Manifestation: manifest documents provide valuable information regarding the delivery time, content and dimensions of the cargo and responsible actors. Cargo related actions: cargos and containers used in the transportation are also prone to various terrorist and malevolent attempts (Anderson, 2007). Manifests that are issued by the parties in the chain and legal

bodies might be employed to identify such kinds of endeavors. Responsible units might compare the cargo at hand and the manifests that are released by the partners and verify the content (Rice & Caniato, 2003). Counting, measuring, weight checks and documenting of the cargo and cargo related equipment should be encountered with a reference to manifested documents (Veenstra et al, 2008). Un-manifested items in the cargo should also be reported, due to the potential risk of smuggling. Adequate inspections should be carried out during the shipping process (Hintsa et al, 2009).

Seals and serialized tapes: seals and serialized tapes laced on the cargos can be another indicator of a malicious attempt. Firms have to incorporate procedures for affixing, replacing, recording, tracking and verifying seals and serialized tapes on the boxes in their procedural security strategies (Knight, 2003). The seals can be imitated and reproduced by malevolent people; hence the serials on the tapes should not be generated with the same patterns which might cause fraud. Seals should be properly stored by responsible people in the organization (Arway, 2013). Lastly, name and signature: in the all of either final or intermediary destination points, responsible bodies have to sign and authenticate the procedures that have been undertaken under their jurisdiction. Carrier investigations, cargo delivery and loads should be noted, as well as any uncharted activities such as distorted seals and last minutes deliveries have to be recorded with the name and signature of the authors (Knight, 2003).

Physical Security

Physical security includes security measures that monitor and control the facility's exterior and interior perimeter. This will include Mail service security, lock and key control, and perimeter and interior alarms (Arway, 2013). Physical and personnel security is the area of supply chain and flow processes management that focuses on the security of cargo in particular. according to the ISO 28000 standard, the supply chain is secure when it can resist, fend off, or withstand unauthorized acts that are designed to cause intentional harm or

damage.' the standard also stresses that security is unstable changes over time and must therefore be monitored regularly (ISO 28000:2007). Buildings should be constructed of materials that resist unlawful entry and protect against outside intrusion. The firms should carry out periodic inspection and repair to assure integrity of security measures. According to Knight (2003), premises with locking devices on external and internal doors, windows, gates and fences should be equipped with alarms. For shared facilities, there should be lighting around the warehouse, trailers that contain cargo, offices, and points of entrance and exit. Criminals in general do not like to operate where the area is well lit. Manager should ensure that there is sufficient lighting to deter would be thieves (Rushton, Croucher & Baker, 2010).

Empirical Perspective on Supply Chain Security and Supermarkets Performance

Rice and Spayd (2005) carried a research on investing in supply chain security: collateral benefits. The research considered physical security as commonly one of the first security initiatives that firms undertake to improve system security. Physically preventing access and controlling access keeps out unauthorized personnel, protecting site intellectual property, capital equipment, personnel, inventory, work in progress, finished goods, and product integrity. Traditional approaches to security have focused on theft reduction, which entails protecting against the unauthorized removal of items from the process. Physical security investments often focus on local site security and not system-wide security. The new security paradigm, however, now requires inverse thinking by developing systems that prevent the addition of unauthorized items into the supply process.

Ahokas and Hintsa (2006) present that access control is an operation, which must be predicted, managed and improved in continues way. Crime and necessary prevention measures should be primarily based on combination of access and process control instead of relying on costly inspections or reaction to sudden property damages and injuries, and restoring operations to normal conditions. The central theme of the quality movement –

higher quality can be attained at lower cost by proper management and operational design is applicable here. Access and operational control must be intertwined with each other in order to be able improving in daily security operations. Complaint access control is a continuous sequence of processed, where incoming passenger and vehicle traffic is identified before it enters company's facilities and area, internal traffic is controlled in planned areas or facilities, preconditions and resources for secure and safe operations are provided and all traffic is controlled back to the gate, where exit is recorded in access control system. The model declines risk, where passengers or vehicle operate attended or unattended on area, which are planned for only authorized people. This reduces excuses to move inside secured area, which is often argued to be very effective crime preventing method.

Gould et al (2010) did a research on Emergence of security in supply chain management. The study considered three benefits for the supply chain security. These include improving security, making supply chain processes more efficient, and improving supply chain resilience. Gould et al (2010) found out that weakest aspect that seems to recur in the proposed security solutions is the lack of a means to quantify the benefits, in terms of costs as well as in reduced vulnerability. A second major objective is that of improving business processes. The research towards this objective aims at fixing guidelines for implementing structural changes to business processes along supply chains to make them more efficient (Gould et al, 2010).

Martens et al (2011) did a research on Examining Antecedents to Supply Chain Effectiveness. Martens et al (2011) study aimed at exploring the relationship between security management practices and the perceived effectiveness of supply chain security. Martens et al (2011) noted that proactive reasons resulted in a greater positive effect on the effectiveness of supply chain security than supply chain security established simply for reactive reasons. Also the operating

environments of firms can have a significant impact on the effectiveness of supply chain security (Autry & Bobbitt, 2008).

Coombs (2008) in his book handbook of business security noted that supply chain security is an organization concern which should be shared by its suppliers and customers. Trading partners should agree to security procedures, even to the point of writing them into contracts. Key activities include requesting supply chain partners to assess supply chain-related security, using seals or other security devices, and documenting supply chain security policies. Coordination is central to trading partner security. Trading partners must share security related information, share educational and training materials, and work together to identify, prioritize, and address supply chain security concerns.

A survey study about the possible impacts of supply chain security on efficiency revealed that there is a positive relationship between security and efficiency; higher security bring higher efficiency (Urciuoli & Ekwall, 2010). The researchers noted that Authorized Economic Operator Certifications (AEO-C) seems to provide less security but still good efficiency advantages. Ekwall (2010) noted that risks, uncertainties and vulnerabilities in the supply chain and the transport network affect, contribute, and neutralize each other. Supply chain security is indented to safeguard the supply chain from different antagonistic threats and thereby reduce the vulnerability of modern global trade.

Methodology

In this study, descriptive survey design was used to carry out the study, the population comprised of heads of business operations, procurement in charges, security section and the Logistic section, from all the 12 branches in Nairobi making a total population of 120 staff members. The study employed a census approach to collect data from the population of 120 respondents therefore no sampling techniques were used. According to Kothari (2013) census survey is where all items in the population are enumerated. Questionnaires were used to

collect primary data from respondents and were designed to address the various research objectives. The completed questionnaires were edited for completeness and consistency**.** Both descriptive and inferential statistics were used. The forms of descriptive statistics used were: frequency tables, bar and pie charts, mean and standard deviation. While inferential statistics involved correlation and regression analyses. Pearson coefficient correlation analysis was used to determine the relationship between each of the effects of supply chain security practices and supermarkets performance.

Multiple Regression analysis was further used to estimate the causal relationships between the variables under study. With the aid of Statistical Package for Social Sciences (SPSS) version 20, the research performed a multiple regressions analysis on primary data to estimate the beta values of factors and t-test to determine the significance of the coefficients at 95% confidence level. F–test statistics was also used to determine the overall significance of the model at confidence level of 95%. F-test is used in the context of analysis of variance to test whether a variable is statistically and significantly different from another (Kothari, 2013).

The multiple regression equation of the study was as below;

$$y = \alpha + \beta_1 x_{1+} \beta_2 x_{2+} \beta_3 x_{3+} \beta_4 x_{4+E}$$

Where;

y= supermarkets performance

α = Constant

$\beta 1 \ldots \beta 4$ = the slope representing degree of change in dependent variable due to unit change in independent variable.

x_1 = Trading partners security, x_2= Procedural security, x_3= Access control

x_4= Physical security, E= error

Study findings

The targeted respondents were 120. Those filled and returned questionnaires were 115 respondents, making a response rate of 95.83%. According to Mugenda and Mugenda (2008), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent

Trading Partner Security

According to the study findings, majority of the respondents as indicated by 57.5% strongly agreed collaboration between supply chain partners is the key to security success. Also 17.5% of the respondents agreed while 12.5% of the respondents neither agreed nor disagreed with the statement. However 2.5% of the respondents disagreed while 10% strongly agreed that collaboration between supply chain partners is the key to security success. This is in line with cook (2003), that firms should reach out suppliers and customers to collaboratively improve their security competency. This implied that collaboration was regarded as crucial to the performance of the supermarket.

Access Control

The study sought to find out the significance of access control as security practice on performance of supermarkets in the following subsections.

4.6.1 Method used to track visitors

The study first evaluated methods that were used in tracking all the visitors in the supermarkets. The findings shows that half of respondents agreed that the supermarket mostly used both register and CCTV in tracking, followed by those who indicated the use of CCTV only (45%) with only 5% indicating the use of registers. This is a clear indication that CCTV and a combination of both CCTV and register were more popular in security checks. Access of people to the premises, carriers and cargo has to be restricted. Access controls and identification

mechanisms have to be enacted for preserving security. Keys and cards should be issued to personnel who make the navigation in the building much easier and reliable (Knight, 2003).

Procedural Security

The findings of the study indicated that majority of the respondents (97.5%), agreed that procedural security assured recorded and verifiable introduction and removal of goods into the supply chain. However 2.5 % of the respondents indicated that procedural security does not assure recorded and verifiable introduction and removal of goods into the supply chain. According to Knight, (2003), contingency procedures should be included within the scope of procedural security. Since the process reduces losses it leads to improvement on the performance. A further evaluation on procedural security indicated that respondents agreed that procedures in place ensure integrity and security of processes relevant to supply chain management which subsequently result to improved performance.

Physical Security

The study findings indicated that majority of the respondents strongly agreed that Physical security should focus on the security of the cargo with amean of 4.03, that Supply chain should resist, fend off or withsand unauthorised acts that are designed to cause intentional harm or damage (4.08), that the firm should carry out periodic inspection and repair to ensure intergrity of security measures (4.50), that The premises should be equiped with alarms (4.25) and lastly that Sufficient lighting deters criminals from accessing the premises (4.39). This is in tandem with Knight (2003), that the firm should carry out periodic inspection and repair to assure intergrity of security measures. That premises with locking devises on external and internal doors, windows, gates and fences should be equipped with alarms.

Performance of Supermarket

The study findings indicated that majority of the respondents strongly agreed that Supply chain security ensures custormer satisfaction (4.64), and just agreed that: Supply chain security ensures growth and expansion (4.42), Supply chain security enhances cost reduction (4.04) and Supply chain security increases supermarkets profitability (3.97).

Inferential Statistics

Correlation analysis was used to measure the strength of the relationship between the independent variables: Access control, procedural security, physical security and trading partner security and dependent variable; supply chain performance of the supermarket. This relationship was further modelled using regression analysis which established the relative significance of each of the independent variables on supermarket's performance.

Correlation Analysis

The Pearson product-moment correlation coefficient (or Pearson correlation coefficient for short) is a measure of the strength of a linear association between two variables and is denoted by *r*. The Pearson correlation coefficient, *r*, can take a range of values from +1 to -1. A value of 0 indicates that there is no association between the two variables. A value greater than 0 indicates a positive association, that is, as the value of one variable increases so does the value of the other variable. A value less than 0 indicates a negative association, that is, as the value of one variable increases the value of the other variable decreases.

Correlation Coefficient

The table below shows the correlation coefficient matrix of the predictor variables.

Table 1: Correlation Coefficient

	Trading partner security	Access Control	Procedural security	Physical security	Performance
Supermarket Performance	0.6612	0.8163	0.7568	0.7123	1

Table 1 clearly shows there was strong positive relationship between the supermarket's supply chain performance and: access control measures instituted (correlation coefficient= 0.8163), procedural security measures taken (correlation coefficient= 0.7568), physical security (correlation coefficient=0.7123) and trading partner security (correlation coefficient=0.6612). This implies that all the variables considered in the study influenced the supply chain performance due to the strong relationships as indicated by Pearson correlation coefficients.

Regression Analysis

Multiple regression analysis was used to express the relationship between the independent and dependent variables. The dependent variable was the supermarket supply chain performance while the independent variables were Access control, procedural security, physical security and trading partner security measures.

Model Summary

The coefficient of determination (R^2) was used to measure the percentage variation in the dependent variable that results from the changes in the independent variables. The results were as illustrated by Table 2;

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.918(a)	.843	.805	.51038	.843	1.242	4	96	.000

Predictors: (Constant), Access Control, Procedural Security, Physical Security and Trading Partner Security

Dependent Variable: Supply chain performance

From table 2, the independent variables explained 80.5% of variations in the dependent variable as shown by the adjusted R-square (0.805). Therefore 19.5% of the variations in the dependent variable were due to other factors not considered by the model. This is because performance is a multi-dimensional factor and may be due to actions taken by other departments or latent factors within the supply chain departments. The significance of the model was further established by carrying out ANOVA test as shown by Table 3.

Table 3: Analysis of Variance (ANOVA)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	16.979	4	4.245	20.265	.000[b]
	Residual	22.99	110	.209		
	Total	39.969	114			

Predictors: (Constant), Access Control, Procedural Security, Physical Security and Trading Partner Security

Dependent Variable: Supply chain Performance

Table 3 show that the variables of regression are statistically significantly different, they therefore measure different attributes. The p-value=0.000 is less than 0.05 therefore we confirm the significance of the model with 95% confidence level.

Regression Coefficients

In order to construct the regression equation, regression co-efficient were obtained and presented as shown by Table 4

Table 4: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-.420	.593		-.708	.487
Trading Partner security	.072	.159	.058	.452	.656
Access Control	.698	.128	.715	5.444	.000
Procedural security	.411	.135	.336	3.039	.007
Physical security	.059	.089	.073	.670	.041

From table 4, the constant of the model was -0.42 which was statistically insignificant (p-value= 0.487). The highest statistically significant standardized coefficient under 95% confidence level was 0.715 which belonged to access control variable (P.value = 0.000< 0.05). This was followed by procedural security coefficient; 0.336 (p-value=0.007). The least significant coefficient was for physical security variable (0.073, p-value= 0.041). The coefficient for trading partner security variable was 0.058, however not statistically significant (P-value= 0.656>0.05).

We can thus conclude that from the sample results the supply chain security practices that significantly influenced the supermarket's supply chain performance were: Access control, procedural security and physical security measures. Partner security measures were found to insignificantly influence supermarket supply chain performance; this could be as a result of minimal efforts curtailed towards improving partner security. From the Regression results, the multiple linear regression model finally appear as:

$$y = -0.42 + 0.698\,x_1 + 0.411x_2 + 0.072x_3 + 0.059x_4 + E$$

y= Supply chain performance

x_1 = Access control x_2= procedural security x_3= Partner security x_4= physical security

E= error

Summary of the Study

Trading partner security was found to insignificantly influence supply chain performance in Nakumatt supermarket as evidenced in the findings of the study. This might have resulted from lack of collaboration among the supply chain partners, which should enhance sharing of information whenever an unexpected event takes place in the supply chain. In order to protect supermarket activities throughout the supply chain, the supermarket requires institution of trading partner security measures. Trading partner related incidents could impact firm performance and cause tangible and intangible damage to an organization.

The findings of the study indicated that majority of the respondents strongly agreed that Access of people to the premises, carriers and cargo has to be restricted, that Access controls and identification mechanisms have to be enacted for preserving security, that Key cards make navigation in the building much easier and reliable and lastly that Access of information by unauthorised persons affect the performannce of the supply chain. Improper management of information may lead to irreparable damage to organization. Access control security was found to positively influence supermarket's performance with a great magnitude.

The study findings indicated that Manifest documents provide valuable information regarding the delivery time, content and dimensions of the cargo and the responsible actors. Also that Counting, measuring weight, checks and documenting of the cargo and cargo related equipment should be encountered with a reference to manifested documents, that Firms have to incorporate procedures for affixing, replacing, recoerding, Tracking and verifying seals and searealized tapes. Firms have to incorporate procedures for affixing, replacing, recording, Tracking and

verifying seals and searealized tapes and lastly that Responsible bodies have to sign and authenticate the procedures undertaken under their jurisdiction. One of the most benefits of supply chain security is the enhanced visibility of the assets/cargo. Improved security by enabling the capability of tracking and verifying seals on cargo in warehouses or moved in transport conveyances directly allow supermarkets access the location and status of a product in real time. Hence procedural security has a positive impact on supermarkets performance as supported by regression model.

Physical security is also significantly related to the supermarkets performance. This study found that the storage areas of the cargo and premises with security guards, CCTV monitoring, physical obstacles to avoid theft, proper identification of entry and exit areas, periodic inspection to ensure integrity of security measures, will improve supermarkets performance. Among the security efforts firms can obtain through physical security initiatives are better visibility of cargo arrival timeline and cargo monitoring. Hence physical security positively contributes to supermarket performance.

Conclusions

As supply chain become increasingly global, firms will be forced to adopt strategies for the secure flow of goods from raw material to end consumer. Furthermore, security-related issues are frequently uppermost in the minds of many end consumers, and will require all supply chain members to take a fresh look at the security measures. The findings of the study suggest that: access control, procedural security and physical security practices have a significant impact on supermarket performance through customer satisfaction, cost reduction and they also enhances competition advantage.

Another fact worth mentioning is that supermarkets underestimated the importance of security awareness and training partners in enhancing security. This is the area where the most effort should be put, as the awareness of security issues helps to create supply chain security culture.

Contribution to Knowledge

This study illustrates many implications for the supply chain managers and policy makers, which, if adopted, will enable supply chain firms to manage and deliver their respective customer's products to the final destination without any disruption. The significance of physical security, procedural security, access control and trading partners' security suggests that businesses should be encouraged to adopt supply chain security practices. When properly designed, these measures can encourage firms to innovate and create new solutions to become safer and directly affect the security operational performance.

Not all Kenyan supermarkets have embraced supply chain security. These findings will help supermarkets managers to better appreciate the role of supply chain security practices in the growth of their businesses. It will also help avoid phishing, leakages of blueprints to competition, and safeguarding integrity of information while making it available for quick retrieval.

Recommendations

The study thus recommends: the management of the supermarkets should provide security awareness and training to its trading partners on supply chain security as this will help to create supply chain security culture. Total Security Management is another philosophy that can be introduced for enhancing supply chain security. It originates from Total Quality Management (TQM) and allows achieving higher security at lower costs due to the fact that security is built in the processes.

Suggestions for Further Study

The result from the "trading partner security" variable in this study shows less significance in the perceived performance of the supermarket. This surprising result should be explored in more detail to determine the overall impact of trading partners' security as a practice of supply chain

security on performance. On the other hand, access control was regarded most significant to the performance of supermarkets as far as this study is concern. Additional research could evaluate the impact of access control on supply chain security effectiveness. Lastly, the study was only limited to the effects of supply chain security on supermarkets performance therefore other studies should be carried to assess the impact of supply chain security practices on performance among logistics service providers.

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