EFFECT OF RADIO FREQUENCY IDENTIFICATION SYSTEM ON SUPPLY CHAIN PERFORMANCE OF LOGISTICS SERVICE PROVIDERS IN KENYA: A CASE OF MAERSK KENYA LIMITED

Rossina Mwikali Kovulo
College of Human Resource and Development,
Jomo Kenyatta University of Agriculture and Technology
P. O. Box 62000, 00200 Nairobi, Kenya
Corresponding Author email: osina@spu.ac.ke

Dr. Partrick Mwangangi
College of Human Resource and Development,
Jomo Kenyatta University of Agriculture and Technology
P. O. Box 62000, 00200 Nairobi, Kenya.


ABSTRACT
Logistics service providers face myriad of problems including; poor data management, high insecurity, wild fluctuation of tag reads, poor distribution management and inaccurate demand forecasting leading to poor supply chain performance. The purpose of the study was to assess the effects of Radio Frequency Identification system on supply chain performance of logistics service providers in Kenya. The study focused on 280 employees working in different departments at Maersk Kenya Limited who are directly involved in managing distribution activities in the organization as the target population. The sampling frame was the Human Resource register at Maersk Kenya Limited. The population sample was 74 respondents and stratified sampling technique was used. Structured questionnaires containing both open ended and closed ended questions were used to collect primary data. 66 questionnaires were filled and returned for analysis. The study concluded that; data management, communication management, distribution management and demand management had a positive influence on supply chain performance. Based on the findings, the study recommended that the management of logistics service provider firms should employ RFID system to develop a sushi management system to enable better tracking of materials along the supply chain to produce instantaneous benefits. There is need for management to adopt RFID systems so as to reduce paperwork by providing visibility and tracking of products along the supply chain. To ensure effective distribution management, the management has to embrace active RFID tags to be used to track containers in real-time in yards and docks.

Key words: Data management, Communication management, Distribution management, Demand management
Background of the study

As service industries have grown tremendously over the last several decades, the competition in this sector has become more intense (Wilson, Zeithalm, Bitner&Gremler, 2008). In order to provide tangible business value, many world class service providers strive to deliver their products in both an efficient and an effective manner. The critical components in this effort are the design and condition of the supply chain activities and processes (Sengupta, Heises&Cook, 2009; Tan, 2010). Gunasekavan,lai&Cheng (2008) considered supply chain management to be the most well-known strategy for improving competition. Specifically, a high level of integration between a firm and its suppliers and customer has long been regarded as a major source of competitive advantage (Frohlich&Westbrook, 2010; Kim, 2007; Ragata, Handfield&Scannel, 2009). RFID can potentially increase this level of integration and also add flexibility and personalization in the supply chain (Frohlich&Westbrook, 2008; Hendricks, Singhal&Stratman, 2008; Rai, Patnayakuni& Seth, 2007).

One of the solutions to effective supply chain management is to make the logistics function more efficient in the supply chain. Consequently, the logistics industry plays an important role in the supply chain (Bowersox, Closs& Cooper, 2013). The globalization of supply chain has prompted many firms to develop logistics as a part of their corporate strategy (McGinnis & Kohn, 2015). To deliver products quickly to customers, many companies seek to outsource their logistics activities to logistics service providers. This reflects the trend of using logistics companies to satisfy increasing need for logistics services (Lieb& Miller, 2011)

Statement of the Problem

In America, there has been a relative decline in supply chain performance of the service industry and as a result, its contribution to the total American GDP is less than half what it was two decades ago. This was attributed to high technological costs leading to increased cost of production, resulting to the gross operating profit margin to fall from 10.5% in the year 2012 to 3.6% in the year 2013. Also world bank, (2013) observed that supply chain performance of logistics service provider firm in Nigeria has declined resulting to a decline in GDP from 9.8 % achieved in the year 2009 to 9.6% achieved in the year 2013. This was attributed to consumer privacy concerns, adverse environmental impact and high cost of installation and maintenance of such systems. Similarly world bank 2013 observed that poor supply chain performance of the logistics service provider firms in Kenya contributed to decline in GDP by half what it was one decade ago. This has been attributed to high technological costs spent on information systems hardware, software and telecommunication equipment which amounted to USD 1.8 trillion and a further spend of USD 1.7 trillion on management and service aimed at redesigning firm’s business operations (Landon&Landon, 2013)

The 2013 Kenya overview report from the World Bank confirms that the port of Mombasa offers weak operational services which hinder logistical operations (World Bank, 2013). Even though a
few operations at the port of Mombasa employ RFID, data from the ITD indicates that logistics problems are so prevalent that to transport a 20 tone container from Mombasa to Nairobi costs USD 1,300 while a similar container from Mombasa to Kampala and Kigali costs USD 3,400 and USD 6,500 respectively. This is more than double the USD 1,200 one would incur to ship the same goods from United Kingdom to Mombasa (ITD, 2013). Similarly, MMC (2013) also observed that Maersk limited faces persistent problems of high cost involved in maintenance of RFID systems, high insecurity, wild in fluctuation in tag reads and poor demand management leading to poor supply chain performance. As a result of such challenges, a mismatch between the effects of RFID and supply chain performance is eminent, thus this study proposes to assess the effects of RFID on supply chain performance of logistics service providers with reference to the Maersk Kenya limited.

Objectives of the Study

i. To determine the effect of data management on supply chain performance of logistics service providers in Kenya

ii. To assess the effect of communication management on supply chain performance of logistics service providers in Kenya

iii. To examine the effect of distribution management on supply chain performance of logistics service providers in Kenya.

iv. To establish the effect of demand management on supply chain performance of logistics service providers in Kenya.

LITERATURE REVIEW

Diffusion of Innovation Theory

Diffusion of innovation theory (DOI), developed by E.M Rogers in 1962 is one of the oldest social science theories. It originated in communication to explain how over time, an idea or product gains momentum and diffuses or spreads through a specific population on social system (Vareskaet al, 2009). The end result of this diffusion is that organizations as part of a social system adopt a new idea, behavior or product. The key to adoption is that the organization must perceive the idea, behavior or product as new or innovative. It is through this that diffusion is possible (Rice & Galvin, 2011). Adoption of a new idea, behavior or product which is innovation does not happen simultaneously in a social system; rather it is a process whereby some organizations are more optimistic to adopt the innovation than others (Hagedoom, 2014). This theory has been used successfully in many fields including communication in manufacturing and logistics operations. In logistics, diffusion of innovation theory is used to accelerate the adoption of important supply chain logistics service programs that typically aim to change the behavior of a social system (Utterback, 2010)

Theory of Constraints

The theory of constraints is a management philosophy that seeks to improve system performance by sales through the identification of those processes that are constraining the system (Goldralt, 2013). Kazim (2008) argue that theory of constraints is based on the principle that a chain is only strong as its weakest link, thus to elevate and manage the constraints is deemed necessary. The difficulties in the theory of constraints are very long lead times, larger number of unfulfilled orders, high level of unnecessary inventories or lack of relevant inventories, lack of key customers
engagement and frequent changes or absence of control related priority orders, which implies schedule conflict of resources (Fawcett, 2009). The theory of constraints thus emphasizes on managing effectively the capacity and capability of the constraints if they are to improve the operational performance of their organizations (Umble, 2011).

**Transaction Cost Theory (TCT)**

TCT has become an increasingly important anchor for the analysis of a wide range of strategic and organizational issues of considerable importance to a firm (Williamson, 2012). In particular, TCT has been employed in studying firms boundaries, vertical integration decisions, the rationale for conducting an acquisition, managing the supply chain links, their networks and other hybrid governance forms (Goshen, 2008). TCT is grounded on the assumption that the relationship between human and environmental factors is the reason why transaction costs increase in the economic system (Hart, 2010). This interdependence of factors contributing to transaction costs can contribute to their increase (Giborra, 2010). Attempts to reduce transaction costs should not aim to reduce the effect of a single factor but the effects of the interdependence between factors (Bakos, 2009). A transaction cost is not the sum of the costs generated by the different factors but is influenced by the imbricate interdependence relationship between them (Barney, 2011)

**Resource Based View Theory**

The source of an organization competitive advantage lies mainly in how it exploits its distinctive internal resources and competence by setting strategic objectives based on what they enable it to do (David, 2011). The resource based approach starts with the organizations strengths and seeks an environment that will enable it exploit them by changing environments to suit what it does best rather than changing what it does best to fit the environment (Kincoro, 2009). One of the key insights of the resource based view is that not all organizational resources are a potential source of competitive advantage (Hitt, 2011). However, in order to be competitive, resources must be valuable by being capable of creating customers value allowing the firms to implement strategies that will enable it to meet customers’ needs more efficiently and effectively, rare and in high demand, difficult for competitors to imitate and difficult for competitors to substitute (Sampurno, 2010)
Conceptual Framework

**Data Management**
- Minimization of duplication
- Better tracking of materials
- Optimal allocation of resources
- Information management
- Strategic product delivery location

**Communication Management**
- Security of material and information flow
- Reliable information channel
- Improving accessibility and convenience
- Reduction of paperwork
- Improving operational efficiency

**Distribution Management**
- Good distribution planning
- Effectiveness in customer satisfaction
- Reduction of distribution cost
- Accelerate speed of delivery
- Accurate identification of containers

**Demand Management**
- Accuracy of demand forecasting
- Order fulfillment
- Distribution of goods to their final destination
- Standardization
- Close collaborative relationships

**Supply chain performance**
- Customer satisfaction
- Cost minimization
- Timely delivery
- Competitive advantage
- Reliability

**Independent variable**

**Dependent variable**

**Figure 1: Conceptual framework**

**RESEARCH METHODOLOGY**

This study adopted descriptive research design. The study’s population was employees working in various logistics firms in Kenya and focused on 280 employees working at different departments at Maersk Kenya limited who are directly involved in managing distribution activities in the organization. The population sample was 74 respondents and stratified sampling technique was used. The sample size is determined by Nasirrma (2000) formula. This is because the formulae
gives a leeway of an error made within the desired level of confidence of at 95%, hence obtaining reliable results. It is expressed as follows.

\[ n=\frac{N \cdot C \cdot V^2}{C \cdot V^2 + (N-1) \epsilon^2} \]

Where:
- \( n \) – is the sample size
- \( N \) – is the target population (280)
- \( C \cdot V \) – is the coefficient of variation (take 0.5)
- \( \epsilon \) – is the tolerance of desired level of confidence, at 95% level (take 0.05)

\[ n=\frac{N \cdot C \cdot V^2}{C \cdot V^2 + (N-1) \epsilon^2} \]
\[ = \frac{280 \times 0.5^2}{0.5^2 + (280 - 1)0.05^2} \]
\[ = 70/0.9475 \]
\[ =74 \text{ respondents} \]

The study sample was 74 respondents. Structured questionnaires containing both open-ended and close-ended questions were used to collect primary data. Data from closed and open-ended questions in the questionnaire was coded and entered into the computer using statistical package for social science (SPSS) version 20. The study also used correlation to establish the relationship between the variables. The study used regression analysis, as it is able to relate dependent variable with multiple variables as shown in the equation below.

\[ y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon \]

Where:-
- \( y \) = Dependent variable (Supply chain performance)
- \( X_1 \) = Independent variable (Data management)
- \( X_2 \) = Independent variable (Communication management)
- \( X_3 \) = Independent variable (Distribution advantage)
- \( X_4 \) = Independent variable (Demand management)
- \( \beta_1 - \beta_4 \) = Regression coefficient for each independent variable,
- \( \epsilon \) – Random or stochastic term

**DATA ANALYSIS AND INTERPRETATIONS**

**Response Rate**

The study targeted a sample size of 74 respondents where 66 filled in and returned the questionnaires making a response rate of 89%. This response rate was satisfactory to make conclusions for the study. The response rate was representative. According to Ghauri (2008), a response rate of 50% is adequate for analysis and reporting, a response rate of 60% is good and a response rate of 70% and over is excellent. Based on the assertion, the response rate was considered to be excellent. It is shown in table 1.
Table 1: Response Rate

<table>
<thead>
<tr>
<th>Questionnaires Administered</th>
<th>Questionnaires filled &amp; Returned</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
<td>74</td>
<td>66</td>
</tr>
</tbody>
</table>

**Demographic Information**

**Level of Education**

The study requested the respondents to indicate their highest level of education. It was established that 45.8% of the respondent indicated their highest level of education as undergraduate degree, 39.2% of the respondents indicated their highest level of education as diploma whereas 15% of the respondents indicated their highest level of education as master’s degree. This is an indication that most of the respondents had undergraduate degree thus able to give accurate and reliable responses for this research in relation to effects of Radio Frequency Identification on supply chain performance of logistics service providers in Kenya. This is shown in figure 2.

![Figure 2: Level of education](image)

**Respondent’s current position in the organization**

Respondents were requested to indicate their current position in the organization. From the research findings, the study established that most of the respondents as shown by 48.2% held positions of logistics officers, 24.6% of the respondents held position of supply chain officers, 12.9% of the respondents held position of ICT officers, 10.4% of the respondents held the position of head of departments whereas 3.9% of the respondents held position of directors. This implied that respondents were fairly drawn from supply chain organizational workgroups who are directly involved in managing logistics operations thus useful in the study in explaining the effects of Radio Frequency Identification system on supply chain performance of logistics service providers in Kenya. This is shown in figure 3.
Figure 3: Respondent’s current position in the organization

Duration of service

On duration of service, the study found that 34.6% of the respondents had served the organization for 15 - 20 years, 29.4% of the respondents indicated that they had served the organization for 0 - 5 years, 26.2% of the respondents indicated that they had served the organization for a period of 5 to 10 years whereas 9.8% of the respondents indicated that they had served the organization for a period of 10 to 15 years. This implied that majority of the respondents had served the company for duration of 15 to 20 years which was a considerable period of time and thus were in a position to give accurate and reliable information relating to this research. This is shown in figure 4.

Figure 4: Duration of service

Data Management

Influence of data management on supply chain performance

The study sought to determine whether data management influence supply chain performance, from the research findings, majority of the respondents as shown by 87.8% agreed that, data management influence supply chain performance whereas 12.2% of the respondents were of the contrary opinion. The study also established that proper data management supports organizational efficiencies by keeping track of inventories while in transit from one location to another. The above findings are in line with the findings by Cheng (2007) who posited that RFID has been used to
develop a sushi management system through better tracking of the materials along the supply chain to produce instantaneous benefits. This is shown in table 2.

**Table 2: Influence of data management on supply chain performance**

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>58</td>
<td>87.8</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>12.2</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>

**Elements relating to data management in the organization**

The study also sought to establish the extent to which respondents agreed with the below elements relating to data management in the organization, from the research findings, majority of the respondents strongly agreed that; the organization ensured that each item has a unique reference so that duplication does not occur as shown by a mean of 4.86 and a standard deviation of 0.64, the organization ensured better tracking of the materials along the supply chain to produce instantaneous benefits as shown by a mean of 4.71 and a standard deviation of 0.46, the organization properly allocated resources optimally through ensuring visibility and tracking of products along the supply chain as shown by a mean of 4.47 and a standard deviation of 0.51, the organization endeavored to improve information management concerning cargo flow as shown by a mean of 4.40 and a standard deviation of 0.63 and that the organization strived to ensure strategic planning of product locations while on transit as shown by a mean of 4.65 and a standard deviation of 0.64. The above findings are in line with the findings by Langer (2007) who opined that RFID system ensures that each item has a unique reference so that duplication does not occur and that when an item is deleted the number is not used again. Similarly, findings by Sampurna (2010) indicated that keeping track of the large number of cartons is a very complex as well as time and labor consuming process, however, RFID can be implemented to ease the situation as it can improve information management concerning cargo flow. This is as shown in table 3.

**Table 3: Elements relating to data management in the organization**

<table>
<thead>
<tr>
<th>Elements</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimization of duplication</td>
<td>4.86</td>
<td>0.64</td>
</tr>
<tr>
<td>Better tracking of materials</td>
<td>4.71</td>
<td>0.46</td>
</tr>
<tr>
<td>Optimal allocation of resources</td>
<td>4.47</td>
<td>0.51</td>
</tr>
<tr>
<td>Information Management</td>
<td>4.40</td>
<td>0.63</td>
</tr>
<tr>
<td>Strategic product delivery locations</td>
<td>4.65</td>
<td>0.64</td>
</tr>
</tbody>
</table>

**Communication Management**

**Influence of communication management on supply chain performance**

The study sought to determine whether communication management influences supply chain performance, from the research findings, majority of the respondents as shown by 83.7% agreed that, communication management influence supply chain performance whereas 16.3% of the respondents were of the contrary opinion. The study also established that proper communication
management enabled the firm to reduce paperwork and cut down on costs as information in regards to the products could be easily stored and retrieved when needed in an accurate and reliable manner. The above findings are in line with the findings by Attaran (2010) who posited that RFID systems enable firms to reduce paperwork by providing the visibility and tracking of products along the supply chain, improving the accuracy of data forecasting. This is shown in table 4.

Table 4: Influence of communication management on supply chain performance

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>55</td>
<td>83.7</td>
</tr>
<tr>
<td>No</td>
<td>11</td>
<td>16.3</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>

Elements relating to communication management in the organization

The study also sought to establish the extent to which respondents agreed with the below elements relating to communication management in the organization. From the research findings, majority of the respondents strongly agreed that; the organization ensured optimal provision of security of material and information flow throughout the supply chain network as shown by a mean of 4.93 and a standard deviation of 0.61, the organization invested heavily on reliable information channels as shown by a mean of 4.88 and a standard deviation of 0.74, the organization improved accessibility, convenience and productivity by employing effective methods of service delivery as shown by a mean of 4.44 and a standard deviation of 0.32, the organization greatly reduced paperwork by providing electronic documents as shown by a mean of 4.26 and a standard deviation of 0.48 and that the organization improved operational efficiency of the transaction process through which economic exchange take place as shown by a mean of 4.18 and a standard deviation of 0.42. The above findings are in line with the findings by Wilson (2008) who opined that IT based services enable these firms to be more accessible, convenient and productive by employing effective methods of service delivery. Similarly, findings by Cannon, Reyes, Frazier & Prater (2007); Lee, Feng& Tat (2008) indicated that the primary benefits of an RFID system include; improvement in efficiency, accuracy and security of material as well as information flows throughout the supply chain network. This is as shown in table 5.

Table 5: Elements relating to communication management in the organization

<table>
<thead>
<tr>
<th>Elements</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security of material and information flow</td>
<td>4.93</td>
<td>0.61</td>
</tr>
<tr>
<td>Reliable information channels</td>
<td>4.88</td>
<td>0.74</td>
</tr>
<tr>
<td>Improving accessibility and convenience</td>
<td>4.44</td>
<td>0.32</td>
</tr>
<tr>
<td>Reduction of paperwork</td>
<td>4.26</td>
<td>0.48</td>
</tr>
<tr>
<td>Improving operational efficiency</td>
<td>4.18</td>
<td>0.42</td>
</tr>
</tbody>
</table>
Distribution Management

Influence of distribution management on supply chain performance

The study sought to determine whether distribution management influences supply chain performance, from the research findings, majority of the respondents as shown by 90.9% agreed that, distribution management influence supply chain performance whereas 9.1% of the respondents were of the contrary opinion. The study also established that distribution management enabled the organization to effectively track shipping containers while in transit from point of departure to the point of destination. The above findings are in line with the findings by Premkumar & Roberts (2008) who suggested that logistics firms that use RFID in tracking and managing shipping containers are able to track containers in each link of the supply chain. Similarly, findings by Son (2009) indicated that active RFID tags can be used to track containers in real-time in yards and docks. Ultra-high frequency RFID technology has long identification distance and speed up identification. This is shown in table 6.

Table 6: Influence of distribution management on supply chain performance

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>60</td>
<td>90.9</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>9.1</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>

Elements relating to distribution management in the organization

The study also sought to establish the extent to which respondents agreed with the below elements relating to distribution management in the organization, from the research findings, majority of the respondents strongly agreed that; the organization ensured good distribution planning process for timely delivery of products as shown by a mean of 4.81 and a standard deviation of 0.59, the organization strived to improve efficiency in the distribution process as shown by a mean of 4.73 and a standard deviation of 0.46, the organization showed significant strides in reducing distribution costs along the supply chain as shown by a mean of 4.50 and a standard deviation of 0.42, the organization greatly accelerated the speed of delivery of products as shown by a mean of 4.51 and a standard deviation of 0.29 and that the organization showed increased accuracy in identification of containers as shown by a mean of 4.17 and a standard deviation of 0.44.

The above findings are in line with the findings by Wilson (2008) who opined that IT based services enable these firms to be more accessible, convenient and productive by employing effective methods of service delivery. Similarly, findings by Cannon, Reyes, Frazier & Prater (2007); Lee, Feng& Tat (2008) indicated that the primary benefits of an RFID system include; improvement in efficiency, accuracy and security of material as well as information flows throughout the supply chain network. The above findings are in line with the findings by Lindau (2007) who opined that implementation of RFID technology can add advantages to distribution processes. Usage of RFID will greatly accelerate the speed of delivery management, improve efficiency and increase accuracy in selection and distribution processes. Similarly, findings by Premkumar& Roberts (2008) indicated that Implementation of RFID technology also reduces distribution cost along the supply chain. This is as shown in table 7.

Table 7: Elements relating to distribution management in the organization
Elements

<table>
<thead>
<tr>
<th>Elements</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good distribution planning</td>
<td>4.81</td>
<td>0.59</td>
</tr>
<tr>
<td>Effectiveness in customer satisfaction</td>
<td>4.73</td>
<td>0.46</td>
</tr>
<tr>
<td>Reduction of distribution cost</td>
<td>4.50</td>
<td>0.42</td>
</tr>
<tr>
<td>Accelerate speed of delivery</td>
<td>4.51</td>
<td>0.29</td>
</tr>
<tr>
<td>Accurate identification of containers</td>
<td>4.17</td>
<td>0.44</td>
</tr>
</tbody>
</table>

Demand Management

Influence of demand management on supply chain performance

The study sought to determine whether demand management influences supply chain performance, from the research findings, majority of the respondents as shown by 86.3% agreed that, demand management influence supply chain performance whereas 13.7% of the respondents were of the contrary opinion. The study also established that accurate demand management enabled the organization to be more proactive to anticipated demand and more reactive to unanticipated demand by finding ways to reduce demand variability and improve operational inflexibility thus improving organizational performance. The above findings are in line with the findings by Ogbo (2011) who posited that in today’s competitive world, logistics firms have resulted to employ demand management through RFID system in their operations based on accurate information on how frequently orders should be placed at any given time to ensure order fulfillment. This is shown in table 8.

Table 8: Influence of demand management on supply chain performance

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>57</td>
<td>86.3</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>13.7</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>

Elements relating to demand management in the organization

The study also sought to establish the extent to which respondents agreed with the below elements relating to demand management in the organization, from the research findings, majority of the respondents strongly agreed that; the organization ensured accuracy in demand forecasting as shown by a mean of 4.75 and a standard deviation of 0.49, the organization strived to ensure order fulfillment of customers by accurately prioritizing on demand at any given point in time as shown by a mean of 4.59 and a standard deviation of 0.28, the organization ensured proper distribution of goods to their final destination without delays as shown by a mean of 4.49 and a standard deviation of 0.47, the organization ensured accurate standardization of consignment by properly assorting products based on their size, nature among other attributes to be distributed as shown by a mean of 4.86 and a standard deviation of 0.47 and that the organization ensured close collaborative relationships among parties in the adoption and implementation of RFID systems as shown by a mean of 4.81 and a standard deviation of 0.38. The above findings are in line with the findings by Ballou (2010) who opined that in employment of RFID system, demand management is crucial in ensuring the required supplies from one firm to another are available in time and at
the required quantity to ensure smooth operation thus improve performance. This is as shown in table 9.

**Table 9: Elements relating to demand management in the organization**

<table>
<thead>
<tr>
<th>Elements</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy of demand forecasting</td>
<td>4.75</td>
<td>0.49</td>
</tr>
<tr>
<td>Order fulfillment</td>
<td>4.59</td>
<td>0.28</td>
</tr>
<tr>
<td>Distribution of goods to their final destination</td>
<td>4.49</td>
<td>0.47</td>
</tr>
<tr>
<td>Standardization</td>
<td>4.86</td>
<td>0.47</td>
</tr>
<tr>
<td>Close collaborative relationship</td>
<td>4.81</td>
<td>0.38</td>
</tr>
</tbody>
</table>

**Supply Chain Performance**

**Whether supply chain performance was adequately measured in the organization**

The study sought to determine whether performance was adequately measured in the organization, from the research findings, majority of the respondents as shown by 92.4% agreed that, performance was adequately measured in the organization whereas 7.6% of the respondents were of the contrary opinion. The study also established that performance is measured on KPI’s such as on-time-in-full and sales forecast accuracy which are set annually and reviewed biannually and the whole organization is appraised online at the end of the year. The above findings are in line with the findings by Cai (2009) who posited that the development of metrics for evaluating performance is often followed by the identification of KPI’s.

**Table 10: Whether supply chain performance was adequately measured in the organization**

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>61</td>
<td>92.4</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>7.6</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>

**Elements relating to supply chain performance in the organization**

The study also sought to establish the extent to which respondents agreed with the below elements relating to performance in the organization, from the research findings, majority of the respondents strongly agreed that; the organization strived to address customer concerns on delays in shipment through ensuring proper distribution management thus improving supply chain performance in terms of customer satisfaction as shown by a mean of 4.48 and a standard deviation of 0.62, the organization identified and eliminated processes that are constraining the system thus improving supply chain performance in terms of cost minimization as shown by a mean of 4.34 and a standard deviation of 0.56, the organization allocated resources optimally through ensuring visibility thus bolstering supply chain performance in terms of timely delivery as shown by a mean of 4.29 and a standard deviation of 0.45, the organization showed improvement in communication management which in turn bolsters supply chain performance in terms of competitive advantage as shown by a mean of 4.23 and a standard deviation of 0.58 and that the organization endeavored to achieve demand management through adoption of RFID system which improves supply chain
performance in terms of reliability as shown by a mean of 4.19 and a standard deviation of 0.42. The above findings are in line with the findings by Neely (2009) who opined that supply chain performance refers to the overall output across the supply chain link which is aligned to the objectives of a firm in terms of timely delivery, cost minimization, customer satisfaction, competitive advantage and reliability. This is as shown in table 11.

Table 11: Elements relating to supply chain performance in the organization

<table>
<thead>
<tr>
<th>Elements</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer satisfaction</td>
<td>4.34</td>
<td>0.56</td>
</tr>
<tr>
<td>Cost minimization</td>
<td>4.29</td>
<td>0.45</td>
</tr>
<tr>
<td>Timely delivery</td>
<td>4.48</td>
<td>0.62</td>
</tr>
<tr>
<td>Competitive advantage</td>
<td>4.23</td>
<td>0.58</td>
</tr>
<tr>
<td>Reliability</td>
<td>4.19</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Analysis of Variance

From the ANOVA statistics, the processed data which is the population parameters had a significance level of 0.02% which shows that the data is reliable enough for making a conclusion on the population parameters as the value of significance (p-value) is less than 5%. The calculated value was greater than the critical value (3.135>1.984) an indication that there were significant difference between supply chain performance and data management, communication management, distribution management and demand management respectively. The significance value was less than 0.05 indicating that the model was significant. This is shown in table 12.

Table 12: Analysis of Variance

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>1.488</td>
<td>4</td>
<td>0.378</td>
<td>3.135</td>
<td>.027b</td>
</tr>
<tr>
<td>Residual</td>
<td>34.8</td>
<td>43</td>
<td>0.356</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>36.288</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Regression Analysis

Adjusted R squared is coefficient of determination which tells us the variation in the dependent variable due to changes in the independent variable. From the findings in the table below the value of adjusted R squared was 0.774 an indication that there was variation of 77.4% on supply chain performance due to changes in data management, communication management, distribution management and demand management at 95% level of confidence. This shows that 77.4% changes in supply chain performance could be accounted to changes in data management, communication management, distribution management and demand management. R is the correlation coefficient which shows the relationship between the study variables. This is shown in table 13.
Table 13: Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Standard Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.862a</td>
<td>.729</td>
<td>.774</td>
<td>.12229</td>
</tr>
</tbody>
</table>

Regression coefficients

From table 14 below, the findings revealed that holding data management, communication management, distribution management and demand management to a constant zero, supply chain performance would stand at 0.868; a unit increase in data management would lead to an increase in supply chain performance by a factor of 0.386. A unit increase in communication management would lead to an increase in supply chain performance by a factor of 0.329. A unit increase in distribution management would lead to an increase in supply chain performance by a factor of 0.424 and unit increase in demand management would lead to an increase in supply chain performance by a factor of 0.441. The study further revealed that data management, communication management, distribution management and demand management were statistically significant to influence supply chain performance, as all the p value (significance) were less than 0.05%. The study also found that there was a positive relationship between supply chain performance and data management, communication management, distribution management and demand management. The above findings are in line with David (2007) assertion that regression analysis is able to relate dependent variable with multiple independent variables and provide meaningful and accurate conclusions of the phenomenon under study.

Table 14: Regression Coefficient

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Standard Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Constant)</td>
<td>.868</td>
<td>.359</td>
<td>2.447</td>
</tr>
<tr>
<td></td>
<td>Data management</td>
<td>.386</td>
<td>.087</td>
<td>.211</td>
</tr>
<tr>
<td></td>
<td>Communication management</td>
<td>.329</td>
<td>.142</td>
<td>.236</td>
</tr>
<tr>
<td></td>
<td>Distribution Management</td>
<td>.424</td>
<td>.136</td>
<td>.314</td>
</tr>
<tr>
<td></td>
<td>Demand management</td>
<td>.441</td>
<td>.091</td>
<td>.369</td>
</tr>
</tbody>
</table>

\[ Y = 0.868 + 0.386X_1 + 0.329X_2 + 0.424X_3 + 0.441X_4 \]

Where: Y was the predicted dependent variable which was supply chain performance, while \(X_1\) was data management, \(X_2\) was communication management, \(X_3\) was distribution management and \(X_4\) was demand management.

Conclusions
From the research findings, the study established that the organization ensured proper data management that supports organizational efficiencies in terms of keeping track of inventories while in transit from one location to another. Therefore the study concluded that data management had a positive influence on supply chain performance of logistics service providers in Kenya. Similarly, the study established that proper communication management enabled the firm to reduce paper work and cut down on costs as information in regards to the products could be easily stored and retrieved when needed in an accurate and reliable manner. Therefore the study concluded that communication management had a positive influence on supply chain performance of logistics service providers in Kenya.

The study also revealed that distribution management enabled the organization to effectively track shipping containers while in transit from point of departure to the point of destination. Therefore the study concluded that distribution management had a positive influence on supply chain performance of logistics firms in Kenya. In addition, the study established that accurate demand management enabled the organization to be more proactive to anticipated demand and more reactive to unanticipated demand by finding ways to reduce demand variability and improve operational inflexibility thus improving organizational performance. Therefore the study concluded that demand management had a positive influence on supply chain performance of logistics firms in Kenya.

**Recommendations**

Based on the findings, the study recommends that the management of logistics service provider firms should employ RFID system to develop a sushi management system to enable better tracking of materials along the supply chain to produce instantaneous benefits. There is need for management to adopt RFID systems so as to reduce paperwork by providing visibility and tracking of products along the supply chain. To ensure effective distribution management, the management has to embrace active RFID tags to be used to track containers in real-time in yards and docks. Ultra-high frequency RFID technology has long identification distance and speed up identification. The study also recommends that the management should accurately manage various degrees demand based on how well to prioritize orders that need to be delivered to various destinations without delays whatsoever.

**ACKNOWLEDGEMENT**

I would like to acknowledge and offer my appreciation to my supervisor, Dr. Patrick Mwangangi for offering his valuable time, expertise and advice and for his patience in ensuring the completion and success of this project.

**REFERENCES**


Langer, N. (2007). "Assessing the impact of RFID on return center logistics". In Interfaces, vol. 37, No. 6 (pp. 501-14).


