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## Effects of Risk Identification Strategy in Supply Chain Operations on the Performance of a National Referral Medical Institution in Nairobi, Kenya

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### **Abstract:**

*A Medical referral institution plays a critical role in the management of health of people in any given country. An interruption in the supply of goods and services to such an institution may lead to inefficiency, ineffectiveness and hence failure to achieve the performance objectives of the medical institution. The objective of the study was to determine the effects of risk identification strategy in supply chain operations on the performance of National Referral Medical Care Institution. The study was carried out at a supply chain management department of the National Referral Hospital in Nairobi County, Kenya. The department deals directly with supply chain operations in the institution. Descriptive research design was adopted while undertaking investigation on the problem. Data was collected using structured questionnaire method. The findings of the study indicated that 90% of the respondents agreed that the institution maintains a risk identification plan while the category of staff involved in risk identification in the supply chain operations was rated at 90% for top management. The types of risks that are most prevalent in the medical institution were rated at 40% for late delivery of medical supplies, 33.3% medical supplies failure, 20% expired medical supplies and 6.7% poor quality of medical supplies. On the factors considered in identification of risks in the supply chain of the institution, desired service delivery and adversity of supply chain risk commanded 40% each. 13.3% indicated frequency of risk occurring and 6.7% showed cost of risk as the factors considered. On the sources of risks in the supply chain for the institution, medical supply stock outs accounted for 30% and expiry of drugs also 30%. Other factors were: high prices, transportation of medical supplies and drug usage all of which scored 40%. On categorization of supply chain risks in the medical institution, the respondents qualified high risk at 43.3%, medium risk level at 36.7% and low risk level at 6.7%. The respondents who did not know accounted for 13.3%. On the frequency of conducting risk identification in the supply chain in the institution, the respondents who were neutral accounted for 33%, those who did know 20%. The respondents who indicated often accounted for 20%, very often were 19% and not often 8%. On the level of risk identification enhancing performance in the institution, 49% of the respondents indicated high performance and 40% were neutral. The study established that risk identification strategy and organizational performance had a positive correlation of 0.141 and 0.458, respectively, on two tail significant level using the Pearson correlation. The researcher recommends that the institution adopts risk identification strategy as basis for risk planning in the supply chain system in order to mitigate both normal and exceptional risks to make supply chain risk management a continuous activity.*

**Keywords:** Performance, risk, risk identification plan, risk identification strategy, supply chain

### **1. Introduction**

A referral medical health institution is a critical center which is considered as a life saver of last resort in handling the human health medical problems. This depends more on the availability of the necessary medical supplies such as drugs, equipment and other related goods as well as adequate number of highly qualified medical staff. The provision of all these requirements other than medical staff is usually facilitated by the Supply Chain Management department. This requires a high degree of efficiency and effectiveness in the supply chain system of a medical institution or any other organization. However, reports have revealed that many Health Care Centers are highly affected by non-provision of the required medical supplies which has led to loss of lives and worsening of medical ailment of patients under their care.

These interruptions have caused headache to management who are constantly seeking ways of addressing the problem (Ebel *et al.*, 2013).

The model for dealing with strategies for mitigating supply chain management risk was propounded by Olson & Wu (2011). They stated that a key purpose in supply chain is prior evaluation of potential partner not only in terms of expected cost but also product failure, bankruptcy and political risk. This understanding makes organizations measure, evaluate and assess risk in the environment which affect the supply chain performance. On the other hand, Levi *et-al.*, (2014) observed that the traditional theory and approach to risk management in supply chain is knowing the likelihood of occurrence of risk and the magnitude of the impact of every potential event that could materially disrupt a firm's operations. They focus essentially on poor supplier performance, forecast errors, transportation breakdowns among other factors which rely on historical data to quantify the level of risk. According to Stauffer (2003), it is necessary to engage top management level of an organization in order for supplier risk management strategies to succeed. Senior procurement leaders must actively show their support for supply risk management within their organizations and communicate the need for it to the chief executive officer and executive peers.

Supply chain management activity plays a critical role in the service delivery of a medical care center. Interruptions in the function occasioned by inherent risks can adversely sabotage the attainment of the objectives of healthcare system of such institutions (Kumar *et al.*, 2011). He further states that supply chain management involves the strategic management of a network of interconnected functions of an enterprise in respect to achieving efficient flow of goods and services required by ultimate consumers or users. It covers all activities involved in the movement and storage of all types of goods from the point of availability to the point of consumption.

Global supply chains are a source of competitive advantage to many organizations (Lyson & Farrington, 2006). An enterprise may have lowest over-all costs in a stable world environment, but may also have the highest level of risk if any one of the multiple gating factors kink up an elongated global supply chain. They further stated that the global configuration of firms provide access to cheap labour and raw materials, better financing opportunities and larger product markets which attract foreign investment. However, coupled with these benefits that entice firms to go global, there are the uncertainties and consequent risks that managers face in global supply chains.

Supply chain risk is considered as the negative deviation from the expected value of a certain performance measure, resulting in negative consequences for the focal firm. Hence risk is equated with the detriment of a supply chain disruption and thus adopted the notion of risk being purely negative as the one that corresponds best to supply chain operation reality (McCormack *et al.*, 2008).

According to Ebel *et al.*, (2013), health care is increasingly facing pressure due to pharmaceutical and medical device production getting more complex as companies expand their portfolio in order to align to the rapidly changing markets. Quality and compliance issues are also on the rise creating further risk in the supply chain. He produced a white paper in 2013 where it observed that the current supply chain model of Industries in the USA for instance, will not be able to meet these changes forever, requiring companies in the sector to develop new capabilities and new ways of working together.

A better supply chain system will not just allow pharmaceutical and medical device companies to tackle the issues they face today, but will also provide significant strategic benefits (Ebel *et al.*, 2013). It can reduce costs by shortening manufacturing cycle, slashing inventory levels across the supply chain and cutting product obsolescence. It also can improve access; reduce drug and device shortages in developed markets and delivering affordable health care to millions more people in emerging markets. Furthermore, the system can transform safety by making it harder for counterfeit products to enter the supply chain, and reduce the human and financial toll of medication errors. He suggests that the healthcare sector can improve patient safety by making supply chain improvements. He proposes that health care can learn much from other industries that have developed their supply chain capabilities into a sustainable source of competitive advantage, delivering superior services and flexibility at dramatically lower costs (Ebel *et al.*, 2013).

Ebel *et al.*, (2013) proposes five capabilities that hold key to such success which include: segmentation to better match supply chain capabilities with the requirements of specific products; markets and customers; agility to reduce costs and increase flexibility through fast; responsive manufacturing and logistics processes and measurement and benchmarking to derive continuous improvement through clear understanding of real supply chain costs and capabilities. The other capabilities are alignment to enable fast, accurate data exchange across the value chain by the use of global standards and collaboration to capture the benefits of high performance in supply chain beyond company borders and across the complete health care value chain.

Ebel *et al.*, (2013), McCormack *et al.*, (2008) and Lyson & Farrington, (2006), stated that an integrated and holistic cross-function effort is needed to transform the supply chain to achieve speed, efficiency, flexibility and reliability across the entire supply chain. The pay-off from investment in the above capabilities is greater and strategic with the potential to give millions of patients' world wide access to safer, more cost-effective healthcare while offering companies significant cost and inventory reduction and enabling new sources of revenue. Greater cross value chain collaboration has the impact of supply chain innovation in health care as demonstrated by other industries.

According to Kanyoma *et al.*, (2013), Malawi health care system was hard hit with drug shortages though private and Christian health care centers were well supplied. This situation raised concerns about the ability of procurement function at public hospitals to ensure steady availability of drugs and other necessary supplies. They carried out a research in Malawi public health care system to assess the impact of procurement operations on health care delivery system. In their study, it was revealed that procurement function derailed health care service delivery through the failure to ensure steady supply and availability of drugs and other essential supplies. They established that this situation resulted in death of

patients, deteriorating of medical conditions of patients, hospital overcrowding and transfer of patients to private health care centers.

Kanyoma *et al.*, (2013) linked this problem to the failure of government instituted suppliers to fill the drug orders, delays by procurement staff to process drug orders, the Government policy which requires public Medical Institutions to apply the single sourcing strategy in acquisition of medical supplies from the Malawi's Medical Supplies Agency, expired drugs due to poor inventory management system and with-holding of funds by donor agencies. They further observe that donor countries have been dumping drugs which are almost being phased out thus transferring the burden to the government agency which has to struggle to ensure that such drugs are exhausted before their expiry dates. This had on several occasions affected the supply chain thus interrupting service delivery in the public hospitals with the associated risks (Kanyoma *et al.*, 2013). The significance of the study highlighted the need for public health care centers to shift from the single sourcing strategy to dual sourcing strategy to avert the persistent stock-outs of drugs in such institutions.

Amemba, (2011) conducted a research to determine the effects of implementing risk management strategies on supply chain performance, a case study of Kenya Medical Supplies Agency (KEMSA). He sought to determine how risk identification strategies affect supply chain performance. His conclusions were that risk identification in the KEMSA affected to a great extent its supply chain performance. He argues that awareness of risks in the supply chain should be regarded as positive trait for any successful supply chain professional. He further states that when a disruption occurs in the supply chain system of a health care institution, that institution should have the ability to bounce back to its normal state and continue its business. Amemba, (2011) recommended that KEMSA implement risk management strategies proactively at the planning stages of the supply chain and also ensure that there is joint participation with all supply chain partners in the implementation of the strategies.

Global supply chains are prone to the risks of interruptions and failure in the flow of goods and services which lead to poor performance in organizations. According to the World Health Organization (WHO) (2013), there had been high mortality cases of new born at the Kenyatta National Hospital as a result of shortages of incubators. This brings about inefficiency and ineffectiveness in achieving the expected customer service level in the operations of the Institution. A public Health care center which is a referral hospital is expected to offer exceptionally high level of service delivery to its customers who are the general public and deal with special referral cases which cannot be handled at lower tier Hospitals. This scenario brings about a mismatch between the expected service delivery target and the current performance index in the Institution in respect of service provision (Nurgney, 2012). Failure to investigate this problem could lead to total collapse of the provision of medical services at the medical Institution with its attendant severe risks that the customers who rely on the Institution would be exposed to (Weiland & Wallenburg, 2012). The objective of the study was to analyze the effects of risk identification strategies in supply chain on the performance of the Institution.

## 2. Methodology

A descriptive research design was used, whereby data was collected by use of questionnaire concerning the current status of the study on "strategies for mitigating supply chain risks and organizational performance". The design dealt with issues of what, how and why of the phenomenon which was the concern of the study (Donald & Pamela, 2006). The research design helped to obtain information concerning risk identification strategy, and how it affected organizational performance from the perspective of staff at the National Referral Hospital.

### 2.1. Area of Study

The research study was conducted at the National Referral Hospital in Nairobi County. The Institution is a major referral Health Care Centre in Kenya that provides high level medical services to the Kenyans. It handles a high number of patients in a year both in-patients and out patients. Due to its status, the Institution handles most referral case in Kenya, the other institutions being Moi Teaching and referral Hospital and County Referral Institutions. However, in providing services to its clients, the area of study experiences frequent failures in its medical supply chain thus impacting negatively on its service delivery and thus poor performance.

### 2.2. Study Population

The study used a target population of 30 employees from the National Referral Institution drawn from the supply chain management department who were likely to deal with supply chain risks in the institution to obtain the desired information and which could answer the research questions (Cooper & Schindler 2008; Mugenda & Mugenda, 2003). The 30 staff in the department who participated in the study included, one supply chain manager, two assistant manager, two Principal procurement officer, two Chief Supply Chain Officer and four senior supply chain officers and six supply chain officers and thirteen Assistants supply chain officers.

### 2.3. Sample and Sampling Techniques

The convenient sampling technique was used during the investigation which include all staff drawn from the supply chain management department of the National Referral Hospital (Bordens, 2008; Mugenda & Mugenda, 2003). The staff have the propensity to understand, experience and deal with risks arising in supply chain management which may adversely affect the performance of the Institution in terms of service delivery to customers and to maintain a competitive edge over other medical institutions in the country. A list of the employees who work in the supply chain management department was obtained from the manager and used to provide the necessary data to the researcher.

### 2.4. Validity and Reliability of Instruments

The research tool was subjected to validity test using the Cronbach's Alpha technique to check internal consistency and the degree to which bias is absent and the level of precision; how closely the sample represents the population. Furthermore, the research instrument was subjected to reliability test to establish its ability to generate the same results or responses when administered to different groups of respondents under the same conditions (Mugenda & Mugenda, 2003).

A list of staff in the supply chain management department was drawn from which five of the staff were picked at random spread in three strata as follows; one from top management that is the assistant manager, one from middle management, the chief supply chain officer, and three from the lower cadre staff, one supply chain officer and two supply chain assistant respectively to test for both validity and reliability of the research instruments. Five copies of the questionnaires were piloted on the targeted respondents and the necessary corrections and adjustments were made depending on the responses received from the field and finally adopted (Mugenda & Mugenda, 2003).

### *2.5. Data Collection Procedure and Instruments*

The data required for the study was collected data from both primary and secondary sources during the investigation. The primary source provided raw data from the area of study which was the National Referral Institution while secondary source provided data from already existing reference materials and relevant publications on supply chain risk management and organizational performance written by authors who were not direct participants in this research (Mugenda & Mugenda, 2003). Primary data was collected using the questionnaires which provided qualitative data (Kombo and Tromp, 2006).

The questionnaires were administered to one supply chain manager, two supply chain assistant manager, two principal supply chain officers and two chief supply chain officers, four senior supply chain officers, six supply chain officers and thirteen supply chain assistants. They were left with the respondents for one week and collected on the expiry of the period

### *2.6. Data Processing and Analysis*

After collecting the required data, it was inspected the data, cleaned and coded in terms of reference question using numeric values. The data was analyzed to answer the research questions and transformed with the aim of discovering useful information for decision making (Judy *et al.*, 1989). Qualitative technique was used to analyze the data using the Statistical Package for Social Scientists (SPSS) program to generate descriptive statistics such as frequencies, percentages and Pearson correlation. Summaries, conclusions and recommendations were then drawn from the presented information.

### *2.7. Ethical Considerations in Research Involving Human Participants*

The respondents were briefed about the research and informed that the research study was meant for academic purposes only (Resnik, 2011). It was made clear that participation in the study was voluntary and that the respondents were free to decline or withdraw from it at any stage or time during the research period. The participants had informed consent letter to make the choice to participate in the study or not. The participants were guaranteed privacy and protection by applying strict standard of anonymity and confidentiality of provided information (Trochim & William, 2006).

## **3. Results and Discussions**

The investigation was conducted between August and September, 2014. The department that was involved in the study was the supply chain management which was conveniently selected as it is directly responsible for acquisition and management of medical supplies requirement and operations in the Institution. The study targeted 30 staff from the department who all positively responded. The response rate was therefore 100% which indicates a high rate of success. The 30 respondents were drawn from the procurement, inventory control and stores sections in the ratio of 8:8:14, respectively.

### *3.1. Agree Risk Identification Strategy*

#### 3.1.1. Agree Risk Identification Was Carried Out

The study sought to establish whether the Institution had a risk identification was carried out in the institution. The results indicated that 10 respondents strongly agreed, 11 respondents agreed, 6 were neutral while 3 disagreed. These results translate to 33.3%, 36.7%, 20% and 10% respectively. This shows that 70% of the respondents are aware that risk identification was carried out by the institution in its medical supply chain operations while 30 %, were not aware (Figure 1).

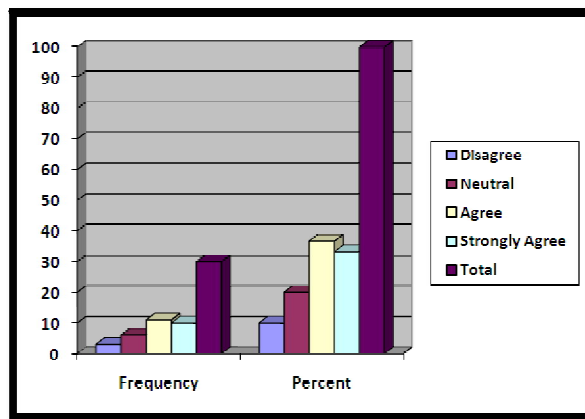


Figure 1: Agree Risk Identification Was Carried Out

These results are in agreement with Stauffer (2003) who stated that it is necessary to engage top management level of an organization in order for supplier risk management strategies to succeed. Senior procurement leaders must actively show their support for supply risk management within their organizations and communicate the need for it to the chief executive officer and executive peers (Stauffer, 2003). Amemba, (2011), also recommended that KEMSA implement risk management strategies proactively at the planning stages of the supply chain and ensure that there is joint participation with all supply chain partners in the implementation of the strategies.

**3.2.2. Those Involved In Risk Identification**

Inquiry on the category of staff involved in risk identification, the results revealed that the supply chain manager has a frequency of 15 respondents, top management 12, supply chain supervisors 2 and all supply chain staff 1. These results translate to 50.0 %, 40 %, 6.7 % and 3.3 %, respectively (Table 1).

Category of Respondents	Frequency	Percent	Valid Percent	Cumulative Percent
Top Management	12	40.0	40.0	40.0
Supply Chain Manager	15	50.0	50.0	90.0
Supply chain Supervisors	2	6.7	6.7	96.7
All staff in Supply chain	1	3.3	3.3	100.0
Total	30	100.0	100.0	

Table 1: Those Involved In Risk Identification

These results confirm that the level of staff involved in risk identification were top management accounting for 90% of the respondents which is in agreement with Ebel *et al.*, (2013) who stated that procurement manager should sell the idea of risk mitigation strategy to the chief executive officers in their organizations and other top peers with only 10% suggesting supervisors and all staff.

**3.2.3. Types of Supply Chain Risks**

On types of risks that occur in the medical supply chain in the Institution, the results of the study indicated that late delivery accounting for 12 respondents, supply failure 10 respondents, expired drugs 6 respondents and poor quality of drugs 2 respondents. These results translate to 40 %, 33.3 %, 20 % and 6.7 % respectively (Figure 2).

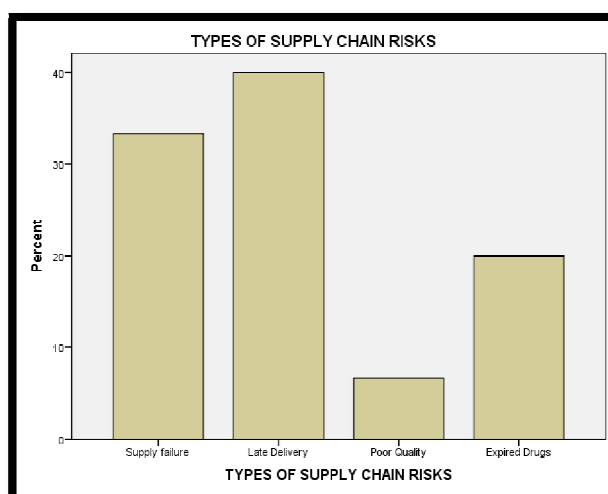


Figure 2: Types of Supply Chain Risks

These results were in agreement with WHO (2013) report which indicated high mortality cases of new born at the Kenyatta National Hospital as a result of shortages of incubators. Kanyoma *et al.*, (2013) linked this problem to the failure of the government instituted suppliers to fill the drug orders, delays by procurement staff to process drug orders, government policy which requires public Medical Institutions to apply the single sourcing strategy in acquisition of medical supplies from the Malawi's Medical Supplies Agency.

### 3.2.4. Factors Considered in Identifying Supply Chain Risks

The results on the factors considered in identifying risks in medical supply chain at the institution revealed that service delivery effects accounted for 12 respondents, adversity of risk 12 respondents, frequency of risk occurring 4 and cost of risk 2. These results translate to the ratio of 40:40:13:7 percent, respectively (Table 3).

Factors Considered in Identifying Supply Chain Risks	Frequency	Percent	Valid Percent	Cumulative Percent
Cost of risk	2	6.7	6.7	6.7
Service Delivery effects	12	40.0	40.0	46.7
Adversity of risk	12	40.0	40.0	86.7
Frequency of risk occurrence	4	13.3	13.3	100.0
Total	30	100.0	100.0	

Table 2: Factors Considered in Identifying Supply Chain Risks

These results concur with Kanyoma *et al.*, (2013) who established that procurement function derailed health care service delivery through the failure to ensure steady supply and availability of drugs and other essential supplies resulting in death of patients, deterioration of patients' medical conditions, overcrowding of patients at medical facility and transfer of patients to private health care centers. Levi *et-al.*, (2014) on the other hand, he observed that the traditional theory and approach to risk management in supply chain is knowing the likelihood of occurrence of risk and the magnitude of the impact of every potential event that could materially disrupt a firm's operations.

### 3.2.5. Sources of Risks in Medical Supply Chain in Institution

The results on the aspect of sources of risks in medical supply chain operations revealed that medical supplies stock-out and expiry of drugs had 9 respondents each, prices of drugs had 6 while drug transportation and drug usage had 4 and 2 respondents respectively. This translates to the ratio of 30: 30: 20: 13:3: 6.7% percent (Figure 2).

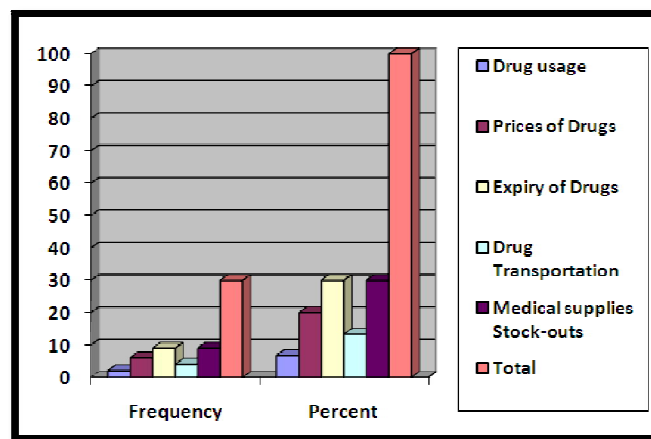


Figure 3: Sources of Risks in Medical Supply Chain in Institution

These results were in agreement with Kanyoma *et al.*, (2013), who observed that Malawi health care system was hard hit with drug shortages though private and Christian health care centers were well supplied. He further confirmed that failure to ensure steady supply and non-availability of drugs and other essential supplies was a source of risk in supply chain management operation in medical health centers. The Government policy which requires public Medical Institutions to apply the single sourcing strategy in acquisition of medical supplies from the Malawi's Medical Supplies Agency and expired drugs due to poor inventory management system were also cited as sources of risks in medical supply chain.

### 3.2.6. Categorization of Risks in Supply Chain Operations

The results of the study on categorization of risk in the medical supply chain in the Institution, 13 respondents rated them as high, 11 respondents rated them as medium 2 respondents rated them as low and 4 respondents did not know. These results translated to 43.3%, 36.7%, 6.7% and 13.3% respectively (Table 3).

Categorization of Risks	Frequency	Percent	Valid Percent	Cumulative Percent
High Risk	13	43.3	43.3	43.3
Medium Risk	11	36.7	36.7	80.0
Low Risk	2	6.7	6.7	86.7
Do not Know	4	13.3	13.3	100.0
Total	30	100.0	100.0	

Table 3: Categorization of Risks in Supply Chain Operations

These results concur with Kanyoma *et al.*, (2013) who indicated that risks in medical supply chain were categorized as high risk. These observations were based on the adverse consequences of the failure in supply chain system of a medical health center such as death of patients, deteriorating of medical conditions of patients, hospital overcrowding and transfer of patients to private health care centers.

### 3.3. Frequency of Risk Identification in the Institution

The study findings on the frequency of conducting risk identification exercise in the Institution, the results showed that 5 respondents indicated very often, 6 respondents confirmed often, 10 respondents were neutral, 2 respondents said it is not often while 7 do not know. These results translate to the ratio of 16.7: 20: 33.3: 6.7: 23.3 percent, respectively (Table 3.4).

Frequency of Risk Identification		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Do Not Know	7	23.3	23.3	23.3
	Not Often	2	6.7	6.7	30.0
	Neutral	10	33.3	33.3	63.3
	Often	6	20.0	20.0	83.3
	Very Often	5	16.7	16.7	100.0
	Total	30	100.0	100.0	

Table 4

### 3.4. Frequency of Risk Identification in the Institution.

These results concur with Ebel *et al.*, (2013) who stated that risk identification in supply chain management is a preserve of top management in an organization and thus being aware of carrying out the exercise.

#### 3.4.1. Level Risk Identification Enhance Institutional Performance

The findings on the level at which risk identification enhances performance in the Institution, the results showed that 8 respondents indicated the level of performance is very high, 7 respondents returned high, 12 respondents were neutral, 2 respondents indicated low and 1 respondent indicated very low. These results translate to the ratio of 26.7: 23.3: 40: 6.7: 3.3 percent, respectively (Figure4).

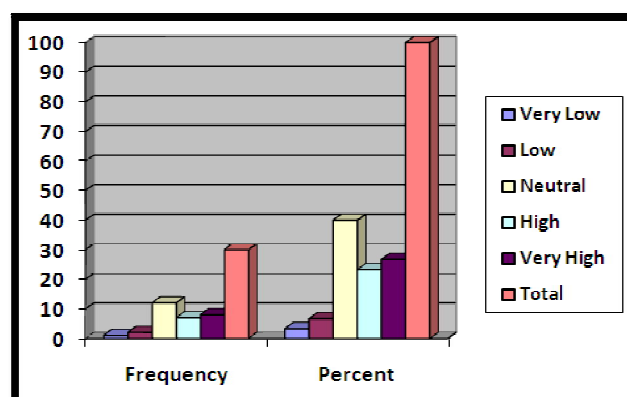


Figure 4: Level Risk Identification Enhance Institutional Performance

These results were in agreement with Levi *et-al* (2014), who observed that the traditional theory and approach to risk management in supply chain is to know the likelihood of occurrence of risk and the magnitude of the impact of every potential event that could materially affect the level of performance in an institution to a certain level.

#### 3.4.2. Correlations between Risk Identification and Performance Enhancement

On applying the Pearson Correlation technique to the two variables, it was revealed that there is positive correlation of 0.141 and 0.458 on two tail significance level between risk identification and performance enhancement (Table 3.5).

### 3.5. Correlations between Risk Identification and Organization Performance.

Correlations Between Risk Identification and Organization Performance		Level Risk Identification Enhance Performance at Nrh	Agree Risk Identification in Place
Level Risk Identification Enhance Performance At Nrh	Pearson Correlation	1	.141
	Sig. (2-tailed)		.458
	N	30	30
Agree Risk Identification In Place	Pearson Correlation	.141	1
	Sig. (2-tailed)	.458	
	N	30	30

Table 5

These results agree with Olson & Wu (2011) who stated that a key purpose in supply chain is prior evaluation of potential partner not only in terms of expected cost but also product failure, bankruptcy and political risk. This understanding makes organizations measure, evaluate and assess risk in the environment which affect the supply chain performance.

#### 4. Conclusions

The investigation concluded that risk identification strategies can mitigate supply chain risks which affect the performance of the National Referral Hospital. This is indicated by conducting regular risk identification and appropriate categorization of risks. The correlation between risk identification and performance enhancement in the Institution was at positive 0.141 and 0.458 on two tail significance.

#### 5. Recommendations

The researcher recommends that the Institution diligent carry out risk identification as a basis for preparing and reviewing the supply chain risk management plan in its operations.

He further recommends that the institution seek more capital allocations from the government to enable it conducting regular risk identification in its Supply Chain Management operations.

Further research is recommended in this field to cover other sectors of the economy in respect of managing risks in their supply chain operations.

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