RISK MANAGEMENT PRACTICES AND SUPPLY CHAIN PERFORMANCE IN COUNTY GOVERNMENTS OF WESTERN KENYA

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A THESIS SUBMITTED TO THE DEPARTMENT OF BUSINESS ADMINISTRATION AND MANAGEMENT SCIENCES IN THE SCHOOL OF BUSINESS AND ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION(LOGISTICS AND SUPPLY CHAIN MANAGEMNT) OF KAIMOSI FRIENDS UNIVERSITY

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DECLARATION

I declare that this thesis is my original work and has not been submitted to any other college, institution, or university for academic credit.

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DGS/MBA/G/0012/2019

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DEDICATION

This work is dedicated to my father Patrick Wakoli,my mother Florence Naswa,, my wife Lilian Konzolo Okumu and my children whose prayers, love and encouragement were a source of my inspiration.

ABSTRACT

Risk management has drawn attention to procurement entities globally due to continuous changes in the supply chain function. Poor risk management strategies may attract issues such as lack of risk decision-making, accountability, risk identification, risk assessment, mitigation, and monitoring. Many studies conducted on risk management practices on supply chain performance produced conflicting results, since some had positive. In contrast, others had a negative influence and, therefore, the need for conducting the current study. The purpose of the study was to establish the influence of risk management practices on the supply chain performance of County governments of western Kenya. The study specifically determined the influence of risk identification on supply chain performance, to establish the influence of risk assessment on supply chain performance, to examine the influence of risk mitigation on supply chain performance, and to assess the influence of risk monitoring on supply chain performance in County governments of western Kenya. The study was guided by the economic theory of agency, resource-based and institution theory. The study used a descriptive research design. The target population was 150 employees comprising procurement officers, logistics managers, and directors of audit service, quality assurance, and finance officers from Vihiga, Kakamega, Bungoma and Busia Counties. The study used a census sample strategy, focusing on all 150 employees. Primary data were gathered for the study utilizing closed-ended questionnaires. Secondary data was obtained by analyzing auditors' reports. Both descriptive and inferential statistics were used to analyze the data. Inferential statistics were examined using the Pearson product moment correlation and the linear regression model. The correlational results showed that risk assessment, identification and mitigation had a significant positive association since their p-values were less than 0.05. In contrast, risk monitoring had an insignificant positive association with supply chain performance. The regression model results of the study showed that risk identification had a coefficient of 0.191, and a p-value of 0.010, risk assessment had a coefficient of 0.214, with a p-value of 0.003 and risk mitigation had a coefficient value of 0.162, with a p-value of 0.011, meaning that risk identification, assessment and mitigation had a significant positive influence on supply chain performance. On the other hand, risk monitoring showed an insignificant positive influence on supply chain performance with a Beta coefficient of 0.131 and p- value of 0.246 which was greater than 0.05 significant level, meaning monitoring risks doesn’t influence the supply chain performance significantly. It was recommended that county governments should perform a thorough screening of suppliers, integrate their procurement processes, conduct a review of compliance to ensure compliance risks are reduced and risk management strategies be implemented.

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ABBREVIATIONS AND ACRONYMS

IRM	Institute of Risk Management
KAFU	Kaimosi Friends University
KEMSA	Kenya Medical Supplies Authority
NACOSTI	National Commission for Science, Technology, and Innovation
PMI	Project Management Institute
RBV	Resource-Based View
SCM	Supply Chain Management
SUVs	Sport Utility Vehicle

OPERATIONAL DEFINITIONS OF TERMS

Risk Assessment: Is the process of figuring out the management environment and examining the hazards found in earlier processes (Faizal & Palaniappan, 2014).

Risk Identification It is the procedure of identifying risks that can hinder the program, business, or investment from accomplishing its objectives (Mburu , 2015).

Risk Management It's the process of recognizing, observing, and managing potential risks in order to prevent any negative effects that they might have on the business and to take measures to bring risk down to a manageable level. Examples are security breaches, data loss, cyberattacks, system failure, and natural disasters (Garvey, 2008)

Risk Mitigation: It is actions made to lessen risk's potential impact or possibility. It is also the process of coming up with solutions and guidelines to improve chances and lower risks for a project's goal (Alquier & Lagasse, 2015).

Risk Monitoring: Is the procedure used by county governments to monitor, assess, and manage risk levels (Chapman, 2019).

Stock replenishment This is the number of times a warehouse (inventory) must be restocked throughout the course of a period of time, which is typically one year (Madhusudhana, 2012).

Supply chain performance	Is the actions performed by the extended supply chain to satisfy end-customer demands, including ensuring that supplies are provided and delivered on time and that the supply chain has all essential inventory and capacity to do so in a timely manner (Tian, 2018)
Western Kenya,	This is one of former Kenya's seven administrative regions that covers the counties of Bungoma,Busia,Kakamega and Vihiga..

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Risk management has drawn attention to the procurement entities globally due to continuous changes in the supply chain function. Poor risk management strategies may attract issues such as lack of risk decision-making, accountability, risk identification, risk assessment, mitigation, and monitoring (World Economic Report, 2020). Therefore, a more comprehensive approach is needed to mitigate the challenges that arise from disruption and uncertainties.

Due to the current global economic crisis, firms must maintain effective risk management procedures. Risk is present in all the organization's functions (Felea & Albastroiu, 2013). Risks have the potential to disrupt supply chains. Supply chain risk management guarantees that there are few breakdowns and that supply chains run smoothly. (Christopher, Martin, & Hau Lee, 2014).

Supply chain performance is the efforts made by the extended supply chain to quickly satisfy end-customer needs. These initiatives include making certain that goods are accessible, delivery is made on schedule, and the supply chain is equipped with all required capacity and inventories (Tian, 2018). However, businesses would be significantly impacted by disruptive factors, such as stock out frequency, production halt, and backorder rate, due to insufficient buffering inventory, while dealing with supply disruptions brought on by delivery issues or supply shortages (Simchi & Snyder, 2013). Risk management practices are mechanisms that ensure supply chain challenges are handled.

Construction projects frequently execute risk monitoring and control ineffectively because recognized hazards are not managed and monitored (Chapman, 2019). Risk monitoring and control are routinely utilized in construction projects with disappointing results since hazards that have been identified are not managed and monitored (PMI, 2017). Monitoring and controlling project risks entails keeping track of known hazards and monitoring the implementation of risk response strategies, identifying emerging risks, and evaluating the efficiency of a project's overall risk management procedures (PMI, 2017). Risk in organization arises during the course of a construction project, which will lower project performance (Obondi, 2020)

Risk reduction is a top priority for all businesses (Alquier & Lagasse, 2015). Risk management, according to Ntlhane (1995), is the fundamental idea that entrepreneurs and management should concentrate on when they recognize future uncertainty, consider risks, consider potential exhibitions and effects, and create deals to deal with these risks and lessen or eliminate their impact on enterprises. Uncertainty may result from a particular state of affairs' effects on a company, an industry, or the overall business climate (Kirytopoulos & Malandrakis, 2012)

Concerns for controlling supply chain risks include the following: business environment, clients, goods or services, and suppliers. (Cucchiella & Gastaldi, 2016) list the following as the primary hazards associated with certain sources of environmental uncertainty: capacity limitations, information delays, customs laws, competitor activity, internal organizational issues, pricing swings, and supplier quality. In an enterprise, the supply chain often entails duties that facilitate the flow

of information and commodities to the end user. According to the example of the main causes of supply chain risks, the objective of providing clients with friendly service is in danger because risk sources and drivers tend to overwhelm risk-mitigating procedures (Judge 2015).

In June 2008, Volvo Cars reported a 28% decline in sales from the previous year, with its SUV sales suffering the greatest decline (of roughly 50%). The 2006 Taiwan earthquake serves as another example and slowed internet speed due to subsea cable failure. Since information technology is used at every step of the claim process, the result was extended container waiting times at China's Shanghai harbor. The most recent occurrence, the 2011 Thailand floods, Sendai earthquake, and Arab Spring demonstrations, showed how such interruptions can negatively impact even the most reliable supply systems. Risk concerns are increasingly being seen in supply chain operations, as seen by the growing body of research on supply chain disruptions brought on by tumultuous market dynamics, political and economic instability, natural disasters, or human behavior (Christopher, Martin, & Hau Lee, 2014).

The Institute of Risk Management (2020) states that risk management is examined by recognizing, assessing, and controlling risks while considering potential countermeasures. It also accepts that companies who recognize their risks are in a good position to effectively and efficiently manage them.

The manufacturing industry in Mexico engages in routine risk management procedures. The manufacturing industry enables analyzing risky behaviors that have a detrimental effect on the supply chain's performance, according to risk factors in

supply chain performance observations (Sosa, Alcaraz, & Torres, 2014). Pharco Pharmaceuticals' risk management for the supply chain. External hazards were judged to be more severe than internal ones by an Egyptian pharmaceutical business. As a result, businesses struggle to reduce the majority of their supply chain risks (Mohamed, 2015).

Agorzie, Monday, and Adermi (2017) investigated how important it was for the Nigerian pharmaceutical industry to prioritize supply chain risk practices evaluation. The business climate in many sectors, including the pharmaceutical industry, has undergone a significant transformation, especially as a result of greater market globalization and competitive pressure (Wagner & Bode, 2010). Organizations are forced to address supply chain risks in the same way they do other business risks as a result of the world's relative unpredictability and the supply chain's heightened vulnerability to disruptions (Elkins, 2011). In Kenya, supply chain risks have a substantial impact on many companies in both the public and private sectors, and counties face a number of management risks that pose a danger to the effectiveness of their supply chains (Cherono & Wagoki, 2014)

Risk management tactics have been investigated in Kenya, for example, the extent to which the KEMSA uses risk management measures (Amemba, 2013). Because supply chain risks have an influence on an organization's performance if they materialize, the firm had to pinpoint risk exposures, evaluate those exposures, and implement procedures to control the risks found in its supply chain (Munyuko, 2015). As a result, the study built supply chain performance and risk management procedures in the County government of Western Kenya.

In Kenya, the 2010 proclaimed constitution resulted in the establishment of county governments, with the former Western provinces of Kakamega County, Bungoma County, Vihiga County, and Busia County becoming some of Kenya's 47 counties. Concurrently, this resulted in the creation of the devolved functions, such as supply chain management, whose effectiveness is crucial to county administration. Risk management procedures are useful metrics for assessing supply chain performance.

1.2 Statement of the Problem.

The Public Finance Management Act (2012) stipulates that management in a procurement entity shall put mechanisms for monitoring risks, including identifying risk management strategies, to prevent fraud. The Public Procurement Regulations (2020) also provide for continuous monitoring of risks in a procurement entity. According to the Institute of risk management (2020), an organization improves performance and reduces losses when implementing a proper risk management measure. An examination of financial statements prepared by the Western Kenya county governments and audited by the auditor general office shows the county governments have put in place risk management mechanisms. However, despite these mechanisms being in place, county governments do not still have accurate forecasting and unreliable suppliers that have reduced the level of stock replenishment. This has made it difficult for this county government to account for Kshs. 500 million every financial year as per the auditor general report (The Auditor General Report, 2020). The world economic report (2020) also recorded an increasing concern regarding approaches in supply chain risk management. Supply chain performance in government agencies and county governments studies on the association between risk management and execution have produced varied results.

A study done by Mburu (2015) found risk management strategies had a significant positive effect on supply chain performance, while a study done by Kisia (2017) found risk management had an insignificant negative impact on supply chain performance. A study done by Hariharan (2018) found a relationship between risk management and supply chain performance was positive, while another similar study conducted by Ganiyu (2020) found a negative relationship between risk management and supply chain performance. The variation in the above studies and the auditor reports have brought a gap in risk management that needs to be addressed and this study is addressing that gap.

1.3 Research Objectives

1.3.1 General Objective

The main objective of this research was to establish the effects of risk management practices on supply chain performance in county governments of Western Kenya.

1.3.2 Specific Objectives

i) To determine the effect of supply chain risk identification on supply chain performance in county governments of Western Kenya

ii) To establish the effect of risk assessment on supply chain performance in county governments of Western Kenya

iii) To examine the effect of risk mitigation on supply chain performance in county governments of Western Kenya

iv) To ascertain the effect of risk monitoring on supply chain performance in county governments of Western Kenya

1.4 Research Hypothesis

i. $H0_1$: Risk identification has no significant effect on supply chain performance in county governments of Western Kenya

ii. $H0_2$: Risk assessment has no significant effect on supply chain performance in county governments of Western Kenya

iii. $H0_3$: Risk mitigation has no significant effect on supply chain performance in county governments of Western Kenya

iv. $H0_4$: Risk monitoring has no significant effect on supply chain performance in county governments of Western Kenya

1.5 Significance of the Study

Policy makers will benefit as the study offers a thorough theoretical framework for investigating risk management techniques. Additionally, it is anticipated that it will support decision-makers' efforts to enhance public County governments' risk management methods.

The findings of this study were important to academics and researchers since they served as a foundation for more research. This study may serve as a beginning point for scholarly discussions on risk management strategies and supply chain effectiveness. The academicians will be able to get empirical studies to employ in their research. By addressing supply chain performance gaps, the study will present researchers' findings and recommendations for risk management techniques.

1.6 Scope of the Study

The study's scope focused on Kakamega County, Bungoma County, Vihiga County, and Busia County because, according to the auditor general’s report (2020), losses have been recorded in the county governments due to failure to use effective risk

management practices. This also represents other counties, and results can be replicated. The study covered the operation of county government for the period of 2020/2021.

1.7 Limitations of the Study

The respondents took more time to return the questionnaires which were not as expected. Though, the respondents had plenty of time to complete the surveys, some didn't return on time which led to delay of the research process. In addition, the study targeted respondents who were busy handling issues outside the office, which also delayed the data collection process.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter entails empirical theories and literature review, conceptual framework, critique and research gaps.

2.2 Theoretical Review

This study was guided by the economic theory of agency, resource-based, and institutional theory.

2.2.1 Economic Theory of Agency

This theory was propounded by Ross (1973). He established that when two or more parties have an agency connection and one of the parties is an agent and the other the principal. This theory provides mechanisms for handling risks and sharing risks that may occur. It explains agency problems and how to solve them. It explains why supply chain risks should be identified, monitoring and reviewing risks once ascertained, and risk management responses should be involved. The assessment of risk will verify the agency's problem, while risk review, monitoring, and response is a solution-centered approach to the problem. When parties involved in a transaction have differing perspectives on risk, an issue with risk-sharing occurs (Eisenhardt , 1989)

General risks associated with procurements include incomplete internal needs analyses, poor vendor selection, chaotic vendor management, non-compliance, straightforward contract management procedures, labor shortages, and delays in the procurement procedure. Risk management is crucial, and it is thought that agency

concerns have an impact on managers' attitudes toward risk management (Smith & Stulz 1985).

The disconnection between agent and principal expectations and how they result in hazards is explained by this theory. The economic theory of agency suggests that policies of risk hedging have influenced organizational value because county employees are the county government's agents and their actions or decisions may lead to counties taking on too much risk or working on projects that have a negative net value (Fide & Pfleiderer, 1995).

Therefore, agency theory is the main theory and is important to this study because of the risks that occur between the County Government's management and the public, who are the owners of the resources they manage, based on risk assessment, risk monitoring, and the response that results.

2.2.2 Resource-Based View Theory

This theory was introduced by (Wernerfelt, 1984). The relationship between business resources, capabilities, and competitive advantages was explained by this theory. Instead of looking for a competitive environment, it was suggested that businesses should seek within their own organizations for sources of competitive advantage. Through supply chain risk assessment exercises, the county governments create a competitive advantage by being at the forefront in ascertaining the risk that could affect resources generated by an organization. The Resource-Based View (RBV) is an economic method used to assess the strategic resources available to a company, and it recommends that potential risk mitigation strategies be used to

protect the resources. According to RBV, firms are heterogeneous because they have diverse resources that ought to be risk-free.

Resource-based view theory explains how an organization can use its wealth while minimizing risks. Minimizing risks is pegged on proper risk assessment and quick response in risk management. This theory is relevant as it clearly articulates the supply chain risk assessment and risk management response as study variables.

2.2.3 Institutional Theory

John Meyer and Brian Rowan (1970) developed institutional theory that focuses on how social and cultural constraints placed on companies can affect their practices and organizational structures. It is concerned with how external influences might affect corporate decision-making. The element of practices incorporates risk management practices that the county monitors to help mitigate risks. Risk monitoring and review is an important element of supply chain performance. The institution must ascertain the critical controls, environmental monitoring, and sources of risks while incorporating the key drivers of supply chain risks. The external forces of the organization may emanate from a lean supply chain, single sourcing, and outsourcing which are basic drivers of supply chain risks.

According to Kraft and Scott (2007), policy-making that stresses the formal and legal facets of governmental systems falls under the institutional approach. According to Krell, Matook, and Rodhe (2009), regulatory pressure happens when governmental organizations force businesses to alter their monitoring and review strategy. Therefore, institutional theory directly influences government policies on risk management strategies and supply chain performance. According to Glover,

Champion, and Daniels (2014), the institutional theory's strength lies in the reasons it provides for why particular practices are adopted despite the absence of a clear economic benefit. The primary drivers of supply chain hazards and risk monitoring make this theory pertinent.

2.3 Conceptual Framework

The association between risk identification, assessment, mitigation, and monitoring with performance of supply chain is as shown in figure 2.1.

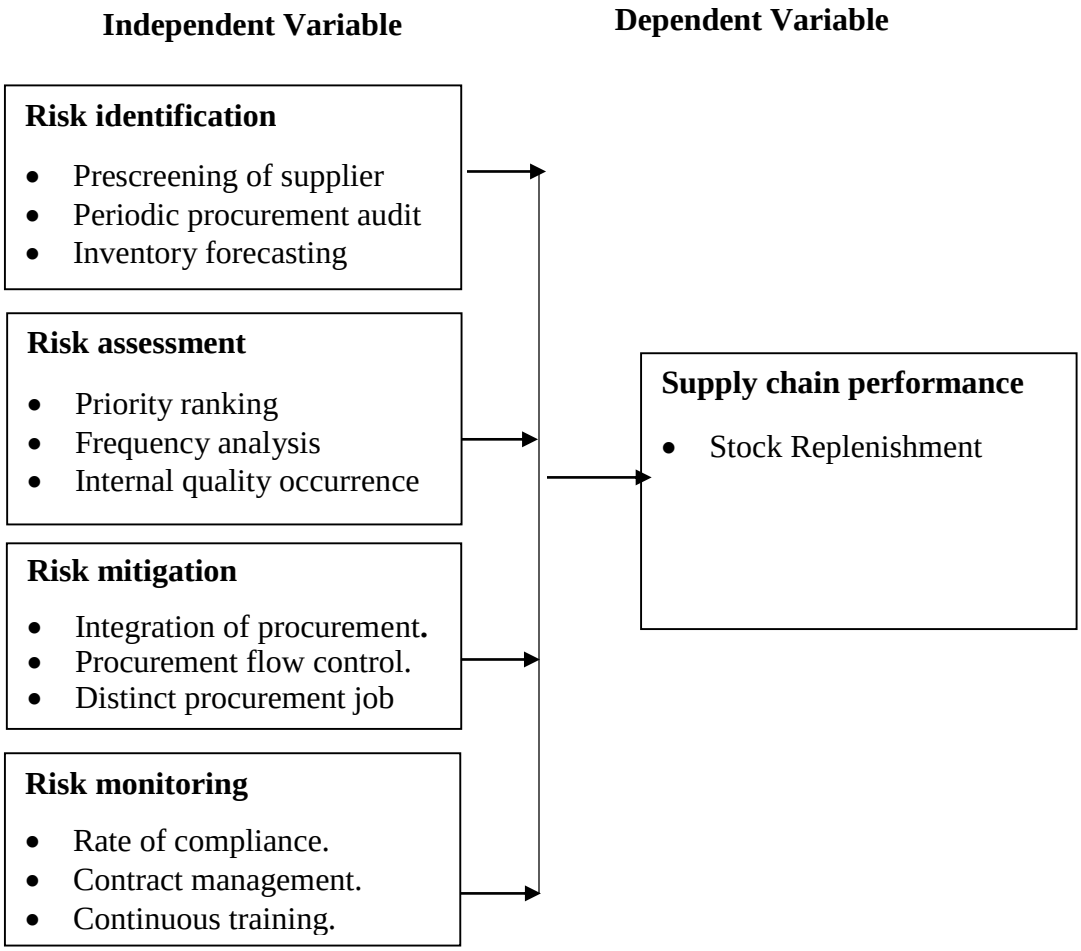

Figure 2. 1: Conceptual Framework (Author, 2022)

2.3.1 Risk Identification

It is the procedure of identifying risks that can hinder the program, business, or investment from accomplishing its objectives (Mburu , 2015). This variable was measured using prescreening of suppliers in order to establish whether county governments prescreen suppliers before awarding tenders and whether they did periodic procurement audit in order to ensure procurement department comply with all the legal issues. It was also measured using inventory forecasting in order to predict the levels of future inventory.

2.3.2 Risk Assessment

Is the process of figuring out the management environment and examining the hazards found in earlier processes (Faizal & Palaniappan, 2014). This variable was measured using priority ranking, frequency analysis and inventory forecasting. This measure helped examine the hazards in the management process.

2.3.3 Risk Mitigation

It is actions made to lessen the risk's potential impact or possibility. It is also the process of coming up with solutions and guidelines to improve chances and lower risks for a project's goal. (Alquier & Lagasse, 2015). The variable was measured using integration of procurement, procurement flow control and distinct procurement job description. This measure helped in identifying if county governments have risk mitigation measures.

2.3.4 Risk Monitoring

Is the procedure used by county governments to monitor, assess, and manage risk levels (Chapman, 2019). Risk monitoring was measured using the rate of compliance in order to establish if the procurement department complied with all legal issues. Another measure was contract and continuous training which was used to identify existence of risk management.

2.3.5 Supply Chain Performance

Is the actions performed by the extended supply chain to satisfy end-customer demands, including ensuring that supplies are provided and delivered on time and that the supply chain has all essential inventory and capacity to do so in a timely manner (Tian, 2018). This variable was measured using stock replenishment which is the number of times warehouse (inventory) must be restocked throughout the course of a period of time, which is typically one year.

2.4 Empirical Literature Review

2.4.1. Risk Identification and Supply Chain Performance

Risk identification is the practice of listing prospective project risks and their characteristics. A risk register, which contains a list of recognized risks along with their sources, potential risk responses, and risk categories, is frequently used to document the outcomes of risk identification.

Mburu (2015) conducted a study on how Kenyan manufacturing companies' supply chains performed after implementing a risk identification and management method. The study focused on 153 Kenyan manufacturing businesses and Kenya Association of Manufacturers members in the Nairobi industrial district (KAM, 2011).

No sampling technique was used because a census approach was used to gather data from all 153 respondents. The results of this study showed that supply chain performance was greatly improved by risk identification management measures.

Mburu, Ngugi and Ogolla (2017) researched supply chain performance and risk management tactics among Kenyan industrial firms. The study used a cross-section survey that was descriptive in nature, and the 412 manufacturing enterprises in Nairobi County that were registered members of KAM made up the target group. Using the formula developed by Fisher et al., the sample size was 199. The outcomes of the study showed that performance of supply chain was greatly improved by risk detection tactics

Munyuko (2015) studied on the impact of supply chain risk management on organizational performance in terms of their profits. They worked as a case study in Andy Forwarders Services Limited. Questionnaires were employed to collect data. The results showed that risk identification had a significant positive effect on organization performance. This study contradicts that of Sukdeo 2017 on the impact of risk management practices on procurement performance in beverage manufacturing organizations in South Africa, revealing that supplier identification had a positive and insignificant effect on supply chain performance.

Valinejad and Rahmani (2018) conducted a study on telecom companies' supply chains to identify sustainability risks. Then the study used the conventional sustainable development approach, which is a three-dimensional triangular model made up of the economic, social, and environmental elements of development. There were 14 companies chosen, both public and private. Investigative research

was used. The study's findings reveal that sustainability risk identification is positively and significantly related with the supply chain of telecommunication.

2.4.2 Risk Assessment and Supply Chain Performance

Risk assessment finds potential dangers to a business's ability. These assessments help to recognize these inherent organizational risks and provide countermeasures, protocols, and controls to decrease their detrimental effects on corporate operations Faizal and Palaniappan (2014) study on risk assessment and Supply Chain performance in companies in the USA. Secondary data and interviews were used on 200 respondents. The study findings indicated a significant positive relationship between supply chain risk assessment measured through risk events and issues and supply chain performance measured by revenue, risk investment, and customer satisfaction.

Sukdeo (2017) studied the effect of risk management on supply chain efficiency. Quantitative and qualitative research techniques were applied to 70 respondents using an exploratory case study in a South African manufacturing firm. The study's findings demonstrated that supply chain risk assessment had an insignificant effect on supply chain performance as assessed by customer satisfaction.

Ganiyu (2020) evaluated the effect of supply chain risk management techniques and supply chain risk assessment on Ghanaian business performance. The study used a descriptive survey design, using 210 Ghanaian businesses as its target population. The results showed a negative association between supply chain risks and supply chain performance.

Cousins , Lawson and Petersen (2019) conducted a study on supply chain management practices and supply chain performance. A random sample of 2,000 UK manufacturing companies was chosen from a commercial database for the survey. Factors were extracted using exploratory factor analysis with principal axis factoring and oblimin rotation. The various hypotheses were tested using hierarchical regression with ordinary least squares moderating. The results demonstrated a positive and significant relationship between supply chain performance and risk assessment.

2.4.3 Risk Mitigation and Supply Chain Performance

Is described as lowering risk exposure and reducing the possibility of an occurrence. It requires consistently taking care of your top dangers and worries to make sure your company is completely safeguarded. Controls, rules, and procedures that regulate and direct an organization are common forms of mitigation

Hariharan (2018) studied the performance of supply chain risk mitigation strategies of SMEs. The target population of 6250 textile units in Tiruppur was employed and a stratified random sampling was used to sample 60 textile units. Data was collected through a questionnaire. The findings recorded risk mitigation had a significant positive effect on supply chain performance.

Njeri (2014) studied the effects of risk mitigation strategies on the supply chain performance of manufacturing firms in Kenya. The study used a sample population of 46 large manufacturing companies in Nairobi. Primary data, self-administered questionnaires that consisted of both open and closed-ended questions. The study's

findings indicated that risk mitigation significantly positively affected supply chain performance.

According to StadLtler (2015) study on the effect of risk management factors and performance of supply chain in manufacturing firms in India, primary data was used on 100 respondents. The findings indicated a significant negative effect of risk mitigation on supply chain performance.

Kisia (2017) conducted on the Kisumu county government's performance and supply chain risk management. The County Government of Kisumu was the case study for the research design used in the study. An interviewing guide served as the data gathering tool. Interviews with respondents and secondary data from the Kisumu County Government were used to gather qualitative data, which was then analyzed using content analysis. The study showed a positive and significant between an organization's performance and supply chain risk management procedures.

2.4.4 Risk Monitoring and Supply Chain Performance

Risk monitoring is the procedure used to monitor and assess the various degrees of risk inside an organization. The results of risk monitoring procedures can be utilized to update outdated tactics that may have failed as well as develop new ones.

Gachuru (2020) conducted a study in Kenya's Nakuru County on the impact of risk monitoring on fraud prevention. The study used a quantitative technique and a survey research design. As previously noted, a sample of 64 risk assessment officers employed by insurance companies was chosen using a stratified random sampling

method. The study's findings showed a great positive and significant association between supply chain performance and risk monitoring.

Nehari and Louay (2017) conducted research on risk management in Jordan using improved knowledge-based risk management techniques. The results of the quantitative research method using questionnaires and the responses of 135 employees from ten IT companies in Jordan suggested that knowledge-based risk identification and monitoring did not have a positive impact on supply chain performance, and that there was a lack of such an impact.

Lagat (2017) examined how risk monitoring affected the supply chain efficiency of Kenyan financial institutions. The study's sample of 239 respondents was chosen using stratified random sampling. The study's findings demonstrated a significant beneficial association between risk monitoring and financial institution performance.

Obondi (2022) research on how project risk monitoring and control strategies are used and how that affects project success in US construction projects. Data were gathered from a sample of 50 construction project managers in the Dallas-Fort Worth region of Texas using an electronic survey instrument. The findings of this study showed that supply chain performance is significantly and negatively to risk monitoring.

Alfayo (2014) examined the impact of project monitoring, appraisal, and risk management on the success of Kenyan telecommunications companies. Purposive sampling was used in the study, and 14 telecommunications companies were chosen.

The study's conclusions showed that supply chain performance was positively and significantly related to risk monitoring.

Muthoni (2021) researched on how Kenyan cybersecurity companies' supply chains performed when risk management measures were used. Cross-sectional survey was used in the study. 571 respondents from Kenyan cybersecurity companies' top, middle, and operational management levels made up the target demographic of this survey. The exact sample size for each study stratum was determined using a stratified random sampling procedure. Through questionnaires, data was gathered. The examined data were displayed in the form of tables after being analyzed using SPSS Version 24. Risk management and the performance of the Kenyan Cyber security industries supply chain had a positive and significant relationship.

2.5 Summary of Literature and Literature Review

Table 2. 1: Summary of Literature and Literature Review

Author	Title and Focus of study	Target population and sampling	Data analysis	Research gap
Mburu (2015)	assessment of the effect of risk identification management approach for improving supply chain efficiency in Kenyan manufacturing firms	152 manufacturing companies in Kenya. Census sampling was employed	Descriptive and regression analyses were used.	The study was carried out on manufacturing firms hence a need for a similar study in Kenyan County governments
Mburu, Ngug and Ogolla, (2017)	Risk management strategy and supply chain performance among manufacturing companies in Kenya	412 manufacturing companies within Nairobi and registered by KAMS	The research design was cross-sectional	The study needs to focus on manufacturing firms not registered by KAMS. It also needs to focus on other sectors other than manufacturing firms.
Munyuko (2015)	supply chain risk management on organizational performance in terms of their profits	Targeted manufacturing firms in south Africa	Quantitative and regression analysis	There was a need for the same study to be done in Kenyan Manufacturing firms. Also, a similar study is supposed to be done in Kenyan county governments.
Valinejad & Rahmani (2018)	Sustainability risk identification and supply chain of telecommunication companies	14 public and private companies	SPSS was used to analyze data	There was a need to carry out a similar research but in different sectors
Faizal and Palaniapp (2014)	risk assessment and Supply Chain performance in companies in the USA	The study targeted 200 respondents from the procurement office	To examine the data, descriptive and inferential statistics were employed	A similar study need to be done in Kenya especially in county governments
Sukdeo (2017)	researched on how the risk management process affects supply chain effectiveness	70 respondents were targeted	Qualitative and quantitative research methods were used.	The study was done outside Kenya hence the need for a similar study in Kenya.
Ganiyu (2020)	assessed how supply chain risk assessment	210 enterprises in Ghana.	Descriptive survey design was employed	There was a need for a similar study to focus on Kenyan county governments.

	and supply chain risk management techniques affected Ghanaian business performance			
Cousins, Lawson, Petersen, & Fug (2019)	Supply chain performance in UK manufacturing firms and how its impacted by supply chain management strategies.	The study targeted over 2,000 UK manufacturing firms	Exploratory factor analysis.	A similar study to focus on non-governmental organizations is required.
Hariharan (2018)	supply chain risk mitigation strategies and supply chain performance of SMEs	6350 textile units in Tiruppur. Stratified random sampling was used	Descriptive and inferential statistics	There is also a need for a similar study in county governments in Kenya.
Njeri (2014)	Risk mitigation strategies on the supply chain performance of manufacturing firms in Kenya	The study targeted 46 manufacturing firms in Kenya.	Descriptive verification was used.	The study was done on manufacturing firms therefore the need for the same research in county governments in Kenya.
StadLtler (2015)	study on the effect of risk management factors and supply chain performance in manufacturing firms in India	100 respondents in Indian Manufacturing firms.	Regression analysis was done with the help of SPSS	The study was done outside Kenya hence the need for a similar research in Kenyan County governments.
Kisia (2017)	performance of Kisumu County Government's supply chain risk management	County government officials were targeted	Case study research design was used	Similar studies need to be done in other county governments especially in western Kenya
Gachuru (2020)	Risk monitoring and fraud prevention in Nakuru County	The target population consisted of 64 officers working in insurance firms. Stratified random sampling was used.	Survey research and quantitative approach was employed	There is a need for secondary data to complement primary data. Similar studies need to be done in other county governments
Nehari and Louay (2017)	Jordanian study on risk management through	135 people employed in 10 IT companies in Jordan. Stratified	Data were analyzed by use of SPSS.	The study was done outside Kenya hence need for a similar research in Kenya's county governments

	improved knowledge-based risk procedures	random sampling was used.		
Obondi (2022) Koskei and	study on the utilization of project risk monitoring and control practices in the USA projects	The study targeted 50 construction project managers in the state of texas	statistics were examined using both descriptive and inferential methods	Similar study is supposed to be done in western Kenya county governments.
Muthoni (2021)	Risk management strategies on supply chain performance of cybersecurity firms in Kenya	571 respondents from professional employees working in the management of cybersecurity. Stratified random sampling	The study used a cross-sectional research survey. Data analysis was done through SPSS	Similar study is needed in other sectors like county governments

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers procedures, research design, target population, sample size and sampling strategy, research instruments, instrument validity, instrument reliability, pilot study, data processing, and presentation. It also discusses ethical considerations.

3.2 Research Philosophy

A research philosophy is a set of presumptions and convictions towards the creation of knowledge. This study followed the positivist school of thought, which is associated with the natural scientist's philosophical perspective and encourages the use of visible social reality to aid in the production of generalizations that resemble laws (Crotty, 2008). This attitude also ensures accurate and clear understanding. It draws attention to the positivist emphasis on a wholly scientific empiricist process designed to deliver objectively true data and facts. This philosophy has been adopted since the bulk of the study's counties are seen as real in the same way that physical objects and natural occurrences are real.

3.3 Research Design

The study adopted descriptive analytical research design because it is suitable for educational fact-finding and delivers a good portion of information that is quite accurate (Mugenda & Mugenda, 2009). This design also offers fantastic statistical data for a study. The survey's methodology was appropriate since it allowed the

researcher to learn more about the county governments in western Kenya's risk management procedures and supply chain performance.

3.4 Target Population

According to Mugenda and Mugenda (2009), population targeted is a predetermined group of people or things from whom study findings can be extrapolated. The study targeted 150 respondents, as shown in Table 3.1, obtained from the four counties in the Western Kenya. The respondents were procurement practitioners, logistics managers, directors of audit service, quality assurance, and finance practitioners. The respondents were the most appropriate because they were found to be having knowledge on procurement skills hence giving objective responses.

Table 3.1: Target Population

Category	Number	Percentage
Procurement	118	78.6
Logistics	12	8
Director of audit services	4	2.7
Finance	12	8
Quality assurance	4	2.7
Total	**150**	**100**

Source: County Government 2022

3.5 Sample Size and Sampling Technique

The study adopted the census sampling technique since a target population of 150 respondents is a small number, hence cannot be further divided. The Census sampling technique allows the collection of data from each participant of the target population (Kothari, 2014).

3.6 Research Instruments

Closed ended questionnaires were employed to collect primary data under this study. This is because they are regarded as being affordable and simple to create and analyze. Additionally, questionnaires elicit a lot of information and provide more in-depth responses. The study adopted Likert scale to rate the questions developed. Secondary data was collected from the audited financial information where the level of stock replenishment was identified.

3.7 Pilot Study

This was conducted in Kisumu County to prelude to the main study. Kisumu County was adopted for piloting since it has similar characteristics to the targeted counties. Hence, the respondents used for pretesting were similar to the sample under study using procedures identical to those of the actual study. The goal of the pilot project is to evaluate the efficiency of the data gathering methods and the viability of conducting the survey. The researcher received more guidance from the pilot study on how to conduct a larger examination later on (Sampson, 2014). The pilot study's findings were used to identify anomalies that could occur during the actual study.

3.7.1 Validity

This describes how an item measures what it is supposed or intended to measure. It also shows the degree to which tools used to gather data measure what it purports (Hair and Lukas, 2014). Data from the pilot study was tested for both contents and validity construct. Content validity was ascertained using research experts assigned to the researcher in the form of research supervisors who guided the researcher in conducting the research and ensure the study's content was at par with existing

scholarly trends and knowledge. Further, the study used the KMO and Bartlett's test to ascertain construct validity. The test evaluated the data for sufficiency of data for generalization by estimating identity matrices and partial correlations between variables under study. The results were as shown in Table 3.2.

Table 3.2: KMO and Bartlett's Test

				Bartlett's test		
Variable	**No of Items**	**AVE**	**KMO**	χ^2	**df**	**P-value**
Risk Identification	6	0.530	0.915	43.186	15	0.000
Risk Assessment	6	0.601	0.803	58.016	15	0.000
Risk Mitigation	6	0.524	0.945	42.510	15	0.000
Risk Monitoring	6	0.590	0.871	53.003	15	0.000
Supply Chain Performance	3	0.618	0.860	67.432	15	0.000

From Table 3.2 the Average Variance Extract and the KMO value extracted indicated that the strength of partial correlations between the variables was adequate to collect reliable data. This is because the AVE values were more than 0.5 and the KMO values were closer to 1, deemed satisfactory. For the Bartlett's test showed that all the variables had a p-value of 0.000 that is significant at 5% significance level hence the correlational matrices present were not identity matrices. Given the results, the questionnaires were an appropriate instrument for collecting primary data since all the values met the required criteria.

3.7.2 Reliability

This is defined by the precision and relevance of inferences (Mugenda & Mugenda, 2009). The information from the 15 respondents (or 10% of the sample size) in Kisumu County was collected to assess the reliability of the results. Cronbach's alpha, the most reliable technique to test internal consistency, was employed. Reliability was done to assist in ascertaining the consistency of the questionnaires.

The yardstick for the test is alpha value of 0.7 with a value above it is seen as satisfactory and the value below it being unsatisfactory (Bardhoshi & Erford, 2017). The results were as shown in Table 3.3.

Table 3.3: Reliability Test

Construct	Number of Items	Cronbach alpha
Risk Identification	6	0.801
Risk Assessment	6	0.769
Risk Mitigation	6	0.720
Risk Monitoring	6	0.835
Supply Chain Performance	3	0.941

From Table 3.3, the test shows that the alpha values for Risk Identification, Risk Assessment, Risk Mitigation, Risk Monitoring and supply chain performance were 0.801, 0.769, 0.720, 0.835 and 0.941, respectively. Thus, the questionnaire was deemed reliable and could give consistent results even after repeated trials.

3.8 Data Collection Procedure

A research permit was obtained from graduate school and NACOSTI for carrying out data collection. Research assistant liaised with county government management before data collection process started. Questionnaires were divided into sections as outlined in the object, where data was collected from the county procurement practitioners, logistics managers, the director of the audit service, quality assurance, and the finance practitioner of the counties. Questionnaires were distributed to the respondents by the research assistants and picked after two weeks.

3.9 Data Analysis and Presentation

The data collected was edited, cleaned, and evaluated to ensure they are accurate, comprehensive, consistent, and valuable. Data analysis procedures were used to arrange the data in order to draw conclusions and make assumptions about the data

in order to come up with the best answers possible (Barasa, 2015). Data were statistically examined in this study using a linear regression model. The study's findings were presented using percentages and tables since they are simple to understand. Since the variables are continuous, a binary logistic regression model was employed to determine the relationship between risk management techniques and supply chain performance in County governments of Western Kenya.

$$\mathbf{Y = \alpha + \beta_1 RI_1 + \beta_2 RA_2 + \beta_3 RM_3 + \beta_4 RT_4 + \varepsilon} \qquad \mathbf{(3.1)}$$

Where:

Y = supply chain performance

α = Constant Term

ε = error term

$\beta_i, i = 1,2,3,4$ Beta coefficients

$\mathbf{RI_1}$ = Risk identification

$\mathbf{RA_2}$ = Risk assessment

$\mathbf{RM_3}$ = Risk mitigation

$\mathbf{RT_4}$ = Risk monitoring

3.10 Ethical Considerations

The information collected was protected and with complete confidentiality. Authorization to carry out the study was obtained from the Kaimosi Friends University (KAFU), post-graduate studies School and the research permit from NACOSTI, permission from the respective county government administrative, while consent from respondents was obtained through an informed consent letter. The individuals' rights and personal integrity were safeguarded. Hence, the information given by the respondents was not disclosed but treated with confidentiality.

CHAPTER 4

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

The study findings and discussion are covered in this chapter in accordance with the study's objectives.

4.2 Response Rate

Questionnaires were issued by the researcher to 150 respondents and 121 questionnaires were successfully responded, leading to a response rate of 80.70% as shown in Table 4.1. This response is adequate as it is above the 60% rate recommended for the generalization of the findings to a larger population as stated by Kothari, (2014).

Table 4.1: Response Rate

Targeted Respondents	Returned Questionnaires	Response rate
150	**121**	**80.70%**

4.3 General Information

4.3.1 County Government Consider Risk Management Practices

A question on whether county governments in Western Kenya Consider risk management practices was posted to the selected respondents. The results were as shown in Table 4.2.

Table 4.2: Does the County Government Consider Risk Management Practices?

	Response	Frequency	Percent	Cumulative Percent
Valid	Yes	84	69.4	69.4
	No	37	30.6	100.0
	Total	**121**	**100.0**	

From Table 4.2, a great number of the respondents, 84 (69.4%) said Yes while 37 (30.6%) indicated No. The majority of the respondents indicated that many county governments in western Kenya consider risk management practices and are likely to record better supply chain performance due to the majority of them embracing risk management practices in prevention of risks. These findings are similar to those of Mburu, Ngugi and Ogolla (2017) who established that management of manufacturing companies have a risk department that practices risk management. In a few county governments, risk management practices are not considered. This will likely reduce the county government's performance as the risks may not have been identified at an early stage.

4.3.2 Risk Management Practice that is frequently practised

The participants were also asked to identify the type of practices of risk management that were practiced frequently. The results are summarized in Table 4.3. :

Table 4.3: Frequency of risk management analysis

Response		**Frequency**	**Percent**
Valid	Risk Identification	39	32.2
	Risk Assessment	54	44.6
	Risk Mitigation	28	23.2
	Risk Monitoring	0	00.00
	Total	**121**	**100.0**

From the results in Table 4.3, it was found that 54 (44.6%), 39 (32.2%) 28 (23.2%), 0 (0.0%) of the respondents indicated risk assessment, identification, mitigation and monitoring respectively were more practiced. The results showed that based on majority and minority responses, risk assessment was mostly practiced while monitoring is not practiced in the County governments in Western Kenya. It was revealed that the most of the participants, 54 (36.4%) showed that risk assessment

was the most practiced, while few respondents recorded that risk mitigation was the least practiced 28 (14.9%). The few respondents who recorded that risk mitigation was practiced at a lower rate implies that there are no plans in place to mitigate the supply chain performance, therefore some cost-benefit analysis is not an essential factor in those specific counties and this might lead to poor supply chain performance due to failure to mitigations risks and uncertainties. The findings also indicated that risk monitoring is not practiced in western Kenya county governments. Most respondents who agreed that supply chain risk assessment is practiced implied that most counties in western Kenya assess risks and are likely to foster cost benefit through prevention of future risks and thus improve supply chain performance.

4.4 Descriptive Statistics

4.4.1 Risk Identification and Supply Chain performance

The study required to identifying the risks which influenced the supply chain performance. Five questions were asked to the respondents, which included prescreening of suppliers by county government, prescreening of supplier effects, periodic audit and inventory turnout.

Table 4. 4: Risk Identification and Supply Chain Performance

Statements	SA	A	N	D	SD
County governments conduct pre-screening of suppliers	9 7.4%	44 36.4%	27 22.3%	23 19.00%	18 14.9%
Pre-screening of suppliers affects supply chain performance	25 20.7%	53 43.8%	22 18.2%	14 11.%	7 5.8%
County governments conduct a periodic audit of the Supply chain	20 16.5%	54 44.6%	20 16.5%	10 8.3%	15 12.4%
Periodic audits of the supply chain affect performance	18 14.9%	58 47.9%	15 12.4%	19 15.7%	11 9.1%
The county government conducts inventory forecasting	21 17.4%	36 29.8%	20 16.5%	25 20.7%	19 15.6%
Inventory forecasting affects supply chain performance	30 24.8%	50 41.3%	21 17.4%	12 9.9%	8 6.7%

4.4.1.1 Prescreening of Suppliers

From Table 4.4, 9(7.4%) strongly agreed, 44(36.4%) agreed, 27(22.3%) were neutral, 23(19.00%) disagreed and 18(6.6%) strongly disagreed that the county government conduct prescreening of suppliers. A large number of the respondents were neutral that county governments conduct prescreening of suppliers. This suggests that the majority of county governments do not scrutinize their vendors before presenting them with a tender. This could result in stock replenishment losses as a result of unreliable suppliers.

In a few county governments, 43.8% of respondents at 43.8% indicated that there was prescreening of suppliers. This will reduce the risks of the county government being defrauded by the suppliers or being supplied with goods and services of low quality. The county government supply chain network may likely suffer losses due to decreased stock replenishment along the supply chain as more inventory will be held, leading to risks of inventory loss. These findings are similar to those of a study carried out by Mburu, Ngugi and Ogolla (2017) who identified that the management of manufacturing firms have a clear procedure for awarding a tender to the suppliers.

4.4.1.2 Pre-screening of Suppliers and Supply Chain Performance

The findings recorded that 25 (20.7%) strongly agreed, 53 (43.8%) agreed, 22 (18.2%) neutral, 14 (11.1%) disagreed while 7 (5.8%) strongly agreed that prescreening of suppliers has an effect on performance of the supply chain. From the findings, most of the participants in many county governments, 78 (64.5%) agreed and strongly agreed that prescreening of suppliers affects supply chain performance. This suggests that prescreening suppliers is a risk management strategy by procurement organizations to reduce suppliers' related risks, such as failure to deliver supplies on time, health and safety requirements, litigation costs due to failure or cancellation of tender, suppliers' insolvency, technical competences, and resource capabilities.

In a few county governments 7 (5.8%) strongly disagreed that supplier prescreening did not affect performance of supply chain. This may be due to poor screening of suppliers which increases risk in the management that may reduce supply chain performance. These outcomes were similar to those of with a research done by Kisia (2015) who established that efficiency in screening suppliers impacts on the performance of supply chain of the county government in Kisumu.

4.4.1.3 Periodic Audit of the Supply Chain

The results indicated that 20 (16.5%) strongly agreed, 54 (44.6%) agreed, 20 (16.5%) neutral, 19 (15.7%) disagreed while 11 (9.1%) strongly disagreed that there is periodic audit of the supply chain. From the findings majority, 54 (43.8%), and 20 (16.5%) of the respondents strongly agreed and agreed that county governments conduct a periodic supply chain audit. This implies that county governments carry out periodic procurement audits for inventory forecasts to ensure controls are

appropriately exercised, processes are followed, effective reporting, and inventory-related risks are mitigated to increase the stock replenishment. Few (5.8%) respondents strongly disagreed that counties in western Kenya do not conduct a periodic supply chain audit, implying that their county governments are likely to experience ineffective risk reporting and inventory forecasts that will affect supply chain performance. These results concur with a study done by Cherono and Juma (2014) who established that the management of county the governments conducted audits of procurement departments and other departments annually.

4.4.1.4 Periodic Audits of the Supply Chain Affect Performance

Results in Table 4.4 Indicates that 18 (14.9%) strongly agreed, 54 (47.9%) agreed, 15 (12.4%) were found to be neutral, 19 (15.7%) were in disagreement while 11 (9.1%) strongly disagreed that periodic audit affects supply chain performance. The results indicated that most of the respondents, 58 (47.9%) were in agreement that periodic audits of the procurement function affect performance supply chain. This implies that conducting periodic audits helps predict market demand, enabling planning processes to link production and demand forces in the market, thus leading to balanced stock replenishment rates. This also helps in controlling inventory or stock replenishment levels. These findings collaborated with those by Cherono and Juma (2014) who established that when there is an annual audit annually the supply chain performance is improved.

4.3.2.5 The County Government Conducts Inventory Forecasting

The results indicated that 21 (17.4%) strongly agreed, 36 (29.8%) agreed, 20 (16.5%) neutral, 25 (20.7%) disagreed while 19 (15.6%) disagreed that the county government conducts inventory audits. The majority of respondents, 54(52.8%)

were neutral that their county government conducts inventory forecasting. This indicates that their county government does not conduct inventory forecasting, leading to low stock replenishment and ineffective inventory management. In a few county governments, (43.8%) of the participants strongly agreed and agreed that there is the conduct of inventory forecasting in their county governments. This shows that their supply chain is likely to improve their stock replenishment, which might lead to stock replenishment at a higher rate. These findings are in line with a study Munyuko (2015) who revealed that inventory forecasting was being undertaken by the management.

4.3.2.6 Inventory Forecasting Affects Supply Chain Performance

The findings in Table 4.4 proved that 30 (24.8%) strongly agreed, 50 (41.3%) agreed, 21(17.4%) neutral, 12 (9.9%) disagreed while 8 (6.7%) strongly disagreed that inventory forecasting affects supply chain performance. Most of the respondents, 50 (41.3%) indicated that inventory forecasting affects the supply chain performance of most of the county government. This implies that Inventory forecasting saves the supply chain from unnecessary spending on inventory. It permits ordering inventory at the appropriate time and in the proper quantity. This conclusion is in line with a study by Munyuko (2015) who also established that when the company is involved in inventory forecasting, this will probably affect an organization's performance.

4.4.2 Risk Assessment and Supply Chain Performance

The section describes risk assessments and performance of the supply chain. Five questions were asked to the respondents and feedback were as follows in Table 4.5.

Table 4.5: Risk Assessment and Supply Chain Performance

Statements	SA	A	N	D	SD
County governments conduct priority ranking during risk assessment	30 24.8%	60 49.8%	16 13.2%	11 9.1%	4 3.3%
Decisions made by the county government add value to the supply chain	40 33.1%	46 38.0%	19 15.7%	10 8.3%	6 5.0%
County governments conduct a systematic analysis of the supply chain	19 15.7%	37 30.6%	24 19.8%	22 18.2%	19 15.7%
Systematic analysis of the supply chain affects supply chain performance	25 20.7%	50 41.3%	21 17.4%	18 14.9%	7 5.8%
Internal quality occurrence adds value to the supply chain operations of the county government	19 15.7%	50 41.3%	23 19.0%	18 14.9%	11 9.1%

4.4.2.1 County Governments Conduct Priority Ranking During Risk Assessment

The findings revealed that 30 (24.8%) strongly agreed, 60 (49.8%) agreed, 16 (13.2%) neutral, 11 (9.1%) disagreed while 4 (3.3%) strongly disagreed that county government conducts priority ranking during risk assessment. From the results, most respondents (49.88%) agreed that their counties conduct priority ranking during risk assessment. This suggests that categorizing risks according to their criticality or importance can help project managers determine where resources might be needed to manage or reduce high probability issues. Few respondents (3.3%) strongly disagreed that their counties do not conduct priority ranking during risk assessment. This may be an indication that some county governments in western Kenya have not embraced priority ranking of risks, therefore, they are likely to have a high-risk appetite that is costly as compared to counties that have a minimum risk appetite and maximum risk tolerance. A county government with a great risk tolerance but minimum risk appetite will prioritize risk responses by concentrating on reducing the likelihood that a risk event will occur and less on limiting its effects.

4.4.2.2 Decisions Made by the County Government Adds Value to the Supply Chain

The outcomes revealed that 40 (33.1%) strongly agreed, 46 (38.0%) agreed, 19 (15.7%) neutral, 10 (8.3%) disagreed while 6 (5.0%) strongly disagreed with the statement that the decision made by the county government adds value to the supply chain. From the findings, many respondents were found to be in agreement (71.1%) that decisions made by their county government add value to the supply chain. This shows that county governments may choose, create, and put into practice the best risk management strategies to sustain the achievement of desired results and control risks to an acceptable level. The few respondents who disagreed (5.0%) indicated that their county government is not in a position to implement appropriate risk management measures. This might lead to poor supply chain performance due to failure to plan on how to assess uncertainties that the organization's inventory might be exposed to. These findings are similar to a study done by Munyuko (2015) who revealed that the value of the supply chain improved due to the effective and efficient decisions made by the management.

4.3.2.3 County Government Conduct Analysis of the Supply Chain Risks

The findings show that 19(15.7%) strongly agreed, 37(30.6%) agreed, 24(19.8%) neutral, 22(18.2%) were in disagreement while 19(15.7%) strongly disagreed with the fact that the county government conducts an analysis of supply chain risks. From the findings, most of the respondents (53.7%) were neutral that their county government conducted a systematic supply chain analysis. This implies that most counties are not in a position to maintain higher stock replenishment since risk analysis is not conducted on identifying risks to comprehend risk's existence, its features, including, if appropriate, its intensity, and risk. This process is important

for deciding whether to treat the risks and the most appropriate risk treatment options. Few respondents strongly agreed and agreed (46.3%) that their county government conducts a systematic analysis of their supply chains. This means that some county governments can understand the nature of risks and thus may make the right decisions on the treatment of risks. These results are related to the results of a study done by Mburu, Ngugi and Ogolla (2017) who established that all supply chain-related management analyzes risks.

4.4.2.4 Systematic Analysis of Risks Supply Chain Risks Affects Supply Chain Performance

From the results in Table 4.5, 25 (20.7%) respondents strongly agreed, 50 (41.3%) agreed, 21 (17.4%) neutral, 18 (14.9%) disagreed, while 7 (5.8%) strongly disagreed that systematic analysis of the supply chain influences supply chain risks affects supply chain. According to a great number of respondents, supply chain risk assessment helps management identify potential risk hotspots and prioritizing resources for risk management and risk mitigation. Risk valuations will involve expounding the type of risk to which assets may be exposed, comprehending the circumstances that could trigger the occurrence of risk. It also aids considering the possible effects of such occurrences on the overall performance of the supply chain in terms of stock replenishment.

4.4.2.5 Internal Quality Assurance Adds Value to the Supply Chain Operations of the County Government

From the findings in Table 4.5, it was recorded that, 19 (15.7%) strongly agreed, 50 (41.3%) agreed, 23 (19.0%) neutral, 18 (14.9%) disagreed while 11 (9.1%) strongly disagreed that quality assurance does not add value to the supply chain operation of the county governments. The majority who agreed that internal quality occurrence

adds value to the supply chain operations of the county government implied that internal quality assurance ensures the identification of areas of risk management that requires improvement. For instance, quality improvement means there will be more sales hence higher stock replenishment recorded. This will ensure the supply chain network is efficient and effective. The elements of internal audit quality assurance control are Examples of internal quality assurance control measures include internal auditing, written record verification, policy analysis, logic and procedural completeness evaluation, interior services, and personnel. These are used to confirm the effectiveness and appropriateness of recommendations made by firms to improve supply chain performance. Few respondents who disagreed indicated that some county governments do not ensure value addition and that quality is not enhanced internally it will result to the poor overall performance of the organization's supply chain. The results are similar with the study by Ganiyu (2020), who established that the existence of quality assurance within the organization positively impacts the performance of the organization.

4.4.3 Risk Mitigation and Supply Chain Performance

The section illustrates the risk mitigation and supply chain performance in county governments in western Kenya. Table 4.6 shows five questions on how the county government mitigates risks in ensuring a sound supply chain performance.

Table 4.6:Risk Mitigation and Supply Chain performance

Statements	SA	A	N	D	SD	Total
County governments have integrated their procurement processes	20 16.5%	27 22.3%	27 22.3%	26 21.5%	21 17.4%	121 100%
Integration of the procurement process affects supply chain performance	13 10.7%	60 49.6%	25 20.7%	16 13.2%	7 5.8%	121 100%
The county government has a distinct procurement job description	19 15.7%	61 50.4%	11 9.1%	10 8.3%	20 16.5%	121 100%
Distinct procurement description affects supply chain performance	22 18.2%	52 43.0%	15 12.4%	13 10.7%	19 15.7%	121 100%
Segregation of responsibilities affects supply chain performance	33 27.3%	48 39.7%	17 14.0%	9 7.4%	14 11.6%	121 100%
Only some workers are permitted to create requisitions in accordance with the county government's job description in order to start the procurement process	12 9.9%	30 24.8%	27 22.3%	27 22.3%	25 20.7%	121 100%

4.4.3.1 County Governments Have Integrated Its Procurement Processes

The results revealed that 20(16.5%) strongly agreed, 27(22.3%) agreed, 27(22.3%) neutral, 26(21.5%) disagreed while 21(17.4%) strongly disagreed 47 (38.8%) that county governments had integrated their procurement processes. Most respondents were neutral, implying that most county governments had not integrated the procurement process. This may make inventory replenishment slow, hence lowering the stock replenishment in county governments. In a few county governments, respondents agreed that procurement processes have been integrated. This implies that integrating procurement processes improves processes used to replenish inventory, increasing the level of stock replenishment in county governments. These results were in line with the study by Munyuko (2015), who showed that many respondents agreed that there was the integration of procurement processes.

4.4.3.2 Integration of the Procurement Process Affects Supply Chain Performance

As presented in Table 4.6, 13 (10.7%) strongly agreed, 60 (49.6%) agreed, 25 (20.7%) neutral, 16 (13.2%) disagreed while 7 (5.8%) strongly disagreed that integration of the procurement processes affects supply chain performance. Most of the respondents who agreed that integrating the procurement processes affects supply chain performance, implies that different teams within an integrated supply chain in some county governments are able to cooperate to group shipments, discover new efficiencies, and identify waste and redundancies to increase stock replenishment.

4.4.3.3 The County Government has a distinct Procurement Job Description

The findings in Table 4.6 revealed that 19 (15.7%) strongly agreed, 61 (50.4%) agreed, 11 (9.1%) neutral, 10 (8.3%) disagreed while 20(16.5%) strongly disagreed that their county government has a distinct procurement job description. 10 (8.3%) respondents disagreed that their county government does not have a distinct procurement job description. Based on the response of the majority, this implies an efficient procurement department aids in process streamlining prices and costs of raw material, and identifying better sources of supply, boosting supply chain performance. The few respondents who disagreed on distinct procurement job descriptions indicated that some county governments in western Kenya do not monitor closely contracts to ensure suppliers awarded contracts perform to their best in terms of delivery of goods and pricing thus experience late delivery of materials from suppliers and this affects the complete production chain.

4.4.3.4 Distinct Procurement Description Affects Supply Chain Performance

As depicted in Table 4.6, 22 (18.2%) strongly agreed, 52 (43.0%) agreed, 15 (12.4%) neutral, 13 (10.7%) disagreed, while 19 (15.7%) strongly disagreed that distinct procurement description affects supply chain performance The majority who agreed implies that some county government maintains good inventory record and control hence leading to improved performance through making more sales that lead to an increase in stock replenishment. These findings are similar with a study done by Sukdeo (2017) who in his research, identified that supply chain performance was positively affected by procurement description.

4.4.3.5 Segregation of Responsibilities Affects Supply Chain Performance

The findings revealed that 33 (27.3%) strongly agreed, 48 (39.7%) agreed, 17 (14.0%) neutral, 9 (7.4%) disagreed while 14 (11.6%) strongly disagreed. The findings recorded that most of the participants (39.7%) were in agreement that segregation of responsibilities affects supply chain performance, while 13 (10.7%) disagreed that segregation of responsibilities does not affect performance supply chain. Most of the respondents who agreed that segregation of responsibilities affects supply chain performance implies effective and superior supply chain management is directly related to a highly integrated supply chain. As a result, division of duties concentrates on how internal and external business activities can be linked and coordinated throughout the SC to improve each SC's performance through better inventory control methods. Better inventory control techniques lead to no shortages where the stock replenishment is maintained at a reasonable rate to cater for demand. These results are in agreement with a study done by Ganiyu (2020)

who on his study identified that supply chain performance is improved when the company segregates the duties of the staffs.

4.4.3.6 The County Governments Job Description Allow Only Specified Employees to Generate Requisition to Initiate the Procurement Process

The research findings show that 12 (9.9%) strongly agreed, 30(24.8%) agreed, 27(22.3%) neutral, 27(22.3%) disagreed while 25(20.7%) strongly disagreed. The results showed that most respondents (65.3%) were neutral about the fact that their county government's job description only permits specific employees to create requisitions to start the procurement process. This implies not only specified employees generate requisitions required to initiate procurement process. This may increase the chances of unplanned purchases and increased organizational spending that may lower organizational stock replenishment. In a few county governments, respondents agreed that specific employees are allowed to initiate the procurement processes. This implies that to maximize value in every purchase and keep stock replenishment rates balanced, county governments need to regulate the expenditures associated with direct and indirect procurement.

4.4.4 Risk Monitoring and Supply Chain Performance

Respondents were also asked questions on risk monitoring and performance of the supply chain. The results were displayed in the below Table 4.7

Table 4. 7: Risk Monitoring and Supply Chain Performance

Statements	SA	A	N	D	SD	Total
County governments conduct a review of the rate of compliance	3 2.5%	7 5.8%	13 10.7%	68 56.2%	30 24.8%	121 100%
A review of the rate of compliance affects supply chain performance	18 14.9%	45 37.2%	21 17.4%	27 22.3%	10 8.3%	121 100%
The county government has put in place a mechanism for contract management	11 9.1%	19 15.7%	17 14.0%	41 33.9%	33 27.3%	121 100%
Preparation of contract management reports for management decisions affects supply chain performance	26 21.5%	47 38.8%	21 17.4%	18 14.9%	12 9.9%	121 100%
The county government conducts management training on the supply chain	10 8.3%	9 9.9%	18 14.9%	27 22.3%	54 44.6%	121 100%
Management training affects supply chain performance	12 9.9%	46 38.0%	16 13.2%	22 18.2%	20 16.5%	121 100%

4.4.4.1 County Governments Conducts Review on the Rate of Compliance

The research findings indicated that 3 (2.5%) strongly agreed, 7 (5.8%) agreed, 13 (10.7%) neutral, 68 (18.2%) disagreed while 15 (56.2%) strongly disagreed. The results showed that the most of the respondents opposed having local county governments assess the level of compliance. This implies that most county governments are exposed to compliance risk and fail to comply with applicable laws and regulations, which is likely to affect their revenue and lead to loss of reputation, business opportunities, valuation and poor performance along the supply chain. The few respondents who were in agreement implies that, in order to avoid lower inventory replenishment, routine policy and procedure reviews ensure that the county government supply chain is both compliant with the most recent laws and regulations as well as with industry best practices. The findings were similar with a study done by Njeri (2014) who established that the management of most manufacturing firms does not review the rate of compliance.

4.4.4.2 Reviewing of Compliance Risk Affects Supply Chain Performance

Based on the findings 18 (14.9%) strongly agreed, 45 (37.2%) agreed, 21 (17.4%) neutral 27 (22.3%) disagreed, 10 (8.3%) strongly disagreed. The results revealed that 45 (37.2%) agreed while 10 (8.3%) strongly disagreed that reviewing of compliance certificates affects supply chain performance. It was evident that most of the participants agreed that reviewing compliance certificates affects supply chain performance. This suggests that management practices are meant to support firms in maintaining adherence to numerous laws and regulations. The majority of county governments have compliance risk management policies and processes, which are tools they use to reduce compliance risk and promote supply chain development. Those who strongly disagreed implied that some county government supply chains are likely to experience poor performance due to failure proper management of compliance risk.

4.4.4.3 Preparation of Contact Management Reports for Management Decisions Affects Supply Chain Performance

The research findings prove that 11 (9.1%) strongly agreed, 19 (15.7%) agreed, 17 (14.0%) neutral, 41 (33.9%) disagreed while 33 (23.3%) strongly disagreed. It is evident that most of the participants (32.2%) agreed strongly, while a few respondents (8.0%) strongly disagreed that the preparation of contact management reports for management decisions affects supply chain performance. The majority who strongly agreed implies that contract management reports for most of the county government are prepared for the purpose of timely deliveries, required specifications, and standards and are completed within the agreed price, this increases stock replenishment ratio and enhances supply chain performance in terms

of units sold. The few who strongly disagreed implies that some county governments fail in making effective decisions on contract management reports for management decisions on risk. This might lead to exposure to risks and uncertainties beyond management's control. These findings are similar to a study by Gachuru (2020), who found that supply chain performance significantly affected management reports.

4.4.4.4 The County Government has put in place a Mechanism for Contract Management

The research findings show that 26 (21.5%) strongly agreed, 47(38.8%) agreed, 21 (17.4%) neutral, 18 (14.9%) disagreed while 12 (9.9%) strongly disagreed. The findings proved that most respondents disagreed that the county government has put in place a mechanism for contract management. The majority who disagreed that their counties have not put in place contract management mechanisms implies that most county governments are likely not to achieve efficient contract administration to ensure successful contract execution and that deliveries are made in accordance with the contract, while the few (9.1%) who agreed that their county government has put in place mechanisms for contract management suggests that choosing the right contract type and terms as part of contract management activities will help supply chain performance. This is done by taking into account the activity's nature, risk, and complexity, fit-for-purpose factors, the best way to allocate risk and liabilities, and the roles and responsibilities of the contracting parties.

4.4.4.5 County Government Conduct Management Training on Risk Management

The research findings show that 54 (44.6%) strongly agreed, 9 (9.9%) agreed, 27 (22.3%) neutral, 22 (18.2%) disagreed while 10 (8.3%) strongly disagreed. The findings revealed that most respondents agreed that their county government conducts management training on risk management. This implies that most of the management staff can analyze and judge problems according to their knowledge and experience and plays a significant part in the process of decision-making while dealing with problems affecting inventory movement and supply and demand forces along the supply chain network. 12 (9.9%) respondents strongly disagreed that their county government does not offer risk management training, this is an implication that some counties experience lower stock replenishment rates due to poor decision making, lack of practical knowledge and experience in risk management. The outcomes agree with a study by Lagat (2017) who revealed that in most financial institutions in Kenya, management had not conducted risk training on their staff.

4.4.4.6 Management Training on Risk Management and Supply Chain Performance

Findings in Table 4.7 recorded that 12 (9.9%) agreed while 46 (38.0%) strongly agreed 16 (13.2%), 22(18.2%) disagreed while 20 (16.5%) strongly disagreed that management training on risk management does not affect performance supply chain**.** The majority (44.6%) who strongly disagreed that management training on risk management has little impact on the effectiveness of the supply chain was an implication that county government supply chain networks are likely to be exposed to extremely lower stock replenishment rates risks due to accidents, failure of

acquisition of skills and knowledge required for healthy and safe ways of managing and controlling inventory.

4.5 Inferential Statistics

This section covers the correlational analysis, model summary and the regression model. On the other hand, diagnostic tests were performed to understand whether the data was fit for the model, and regression model.

4.5.1 Correlational Analysis

Correlation analysis is a statistical method that identifies the relationships between variables and assess how strongly they are linearly related. Correlation analysis, to put it simply, assesses how much a change in one variable influences a change in another. The study used the Pearson product moment to ascertain the level of association between the model variables. The technique derives the correlation coefficients together with p values which are used to show the significance of the association between variables. The association between risk identification (RI), risk assessment (RA), risk mitigation (RM) and risk monitoring (RT) on supply chain performance (stock replenishment) was presented as shown below. Table 4.8 shows the results of the analysis.

Table 4. 8: Pearson Correlation

	RI	RA	RM	RT	Stock replenishment
RI	1				
RA	0.310	1			
	(0.437)				
RM	0.291	0.170	1		
	(0.231)	(0.176)			
RT	0.116	0.319	0.271	1	
	(0.310)	(0.117)	(0.420)		
Stock replenishment	0.640*	0.439*	0.581*	0.369	1
	(0.028)	(0.001)	(0.034)	(0.072)	

From the findings in Table 4.8, Risk identification and supply chain performance are positively correlated. Risk identification and performance of the supply chain were significantly associated at a 5% significance level as shown by the variable's coefficient of r = 0.640 and p-value of 0.028, which is less than the 0.05. This means that an increased risk identification by one unit increases supplier chain performance (Stock replenishment) by 0.640.

Further, it is also evident that risk assessment and performance of supply chain are positively correlated. The association between risk assessment and supply chain performance is significant at 5% significance level as shown by the variable's coefficient of r = 0.439 and p-value of 0.001, which is less than the 0.05. This means that increasing risk assessment by one unit increases supply chain performance (Stock replenishment) by 0.439.

Risk mitigation and supply chain performance were also found to be positively correlated. There was a significant association between risk mitigation and supply chain performance at 5% significance level as shown by the variable's coefficient of r = 0.581 and p-value of 0.034, which is less than the 0.05. This depicts that increasing risk mitigation by one unit increases the performance supply chain by 0.581.

Risk monitoring and supply chain performance are positively correlated. However, the association was insignificant at 95% confidence interval given the variable's coefficient of r = 0.369 and p-value of 0.072, which was more than 0.05. This indicates that an increase in unit increases by 0.369, but it was not significant.

4.5.2 Diagnostic Tests

The study carried out diagnostic tests to assess the assumptions of regression analysis to gauge whether the estimated model and the presumptions made about the data and the model are consistent with the data that have been collected. The tests included normality, autocorrelation, multicollinearity and heteroscedasticity.

4.4.2.1 Normality

A normality test done on a data set to ascertain if the variable data were taken from a regularly distributed population. The study employed the Shapiro Wilk test to test whether the data set was normality distributed. This test was suitable since the study had a small sample size which was less than 2000. The null hypothesis for the test is that the data set is normally distributed and if the $p < 0.05$ the null hypothesis is rejected. Table 4.9 shows normality results.

Table 4. 9: Shapiro Wilk Test

Variables	Shapiro-Wilk		
	Statistic	Df	Sig.
RI	.937	121	.050
RA	.949	121	.074
RM	.915	121	.053
RT	.960	121	.091
Stock replenishment	.952	121	.080

From Table 4.9, it can be seen that the significance levels of all the variables were more than 0.05 hence the null hypothesis failed to be rejected and proved that the data set for the variables were normally distributed.

4.4.2.2 Autocorrelation

Autocorrelation is the degree of correlation between error terms in different observations. It gauges the relationship between a variable's lagged value and its

original value in a time series. The Durbin Watson test was used to test for autocorrelation in the model since it is an appropriate technique used to examine autocorrelation in the statistical regression analysis' residuals. If there is autocorrelation, this could cause us to overstate the standard error and convince us that predictors are significant when they are not. The Durbin Watson statistic ranges from 0 to 4 with values below 2 indicate positive autocorrelation while those above 2 show negative autocorrelation. However, a value of 2 indicates no autocorrelation (Salamon, Hansen &Abbott, 2019). The results were as illustrated in Table 4.10.

Table 4. 10: Durbin Watson Test

Lower Limit	Durbin-Watson	Upper Limit
1.835	2.049	2.296

From Table 4.10 above, the lower limit was 1.835, and the upper limit was at 2.296, indicating that any value lower than the lower limit, or above the upper limit indicates the presence of autocorrelation. For the above Durbin Watson value shows 2.049, which was within the range of 2, hence the study confirmed that there was no serial correlation in the data. Therefore, the data was fit for a regression model.

4.4.2.3 Multicollinearity

Multicollinearity describes a condition in which the independent variables are associated. This occurrence is troubling because independent variables ought to be independent. This is due to the possibility of difficulty in fitting the model and understanding the results if there is a strong enough correlation between the variables. Variance inflation factor (VIF) was used to determine the degree of multicollinearity in the model. A VIF > 10 implies that there is an issue with multicollinearity and that the variables are highly linked, according to Vittinghoff,

Glidden, Shiboski, and McCulloch (2012). These results were as shown in Table 4.11.

Table 4. 11 Variance Inflation Factor

Variable	Tolerance	VIF
RI	.966	1.035
RA	.901	1.110
RM	.954	1.049
RT	.890	1.123

From Table 4.11, both risk identification, risk assessment, risk mitigation and risk monitoring had VIF values of 1.035, 1.110, 1.049 and 1.123 respectively. Hence the study proved that the four variables were not highly correlated.

4.4.2.4 Heteroscedasticity

Linear regression assumes that the residuals in a model are homoscedastic, or distributed equally across all levels of the predictor variable. Heteroscedastic data refers to data that deviates from the assumption. To check the data for heteroscedasticity and see if the variances in the model are distributed equally, the Breusch Pagan test was performed. The test's null hypothesis is that the variance of the residuals is constant. If the test's p-value is smaller than 0.05 at the 5% significance level (i.e., =.05), we conclude that heteroscedasticity exists in the regression model and we reject the null hypothesis. Table 4.12 shows the results obtained.

Table 4. 12: Breusch Pagan Test

Model	chi2(1)	Prob > chi2
BP test	3.17	0.271

Table 4.12 shows clearly that the Breusch Pagan test has a probability of 0.271 that is more than 0.05, hence the residuals in the model are homoscedastic

4.5.3 Model Summary

The model summary proportionates the aggregate relationship strength between an independent and dependent variable. Multiple correlations (R) denotes the multiple correlations or overall association between the independent and dependent variables while coefficient of determination (R square) summarizes the change or variations in the overall model. Table 4. 13 contains R, R square and adjusted R square results.

Table 4. 13: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.751[a]	.564	.046	1.046	1.921

a. Predictors: (Constant), RI, RA, RM, RT
b. Dependent Variable: Procurement Performance

Table 4.13 shows an R of .751 and an R^2 of .564. This indicates that risk management practices and performance of supply chain were positively associated hence enhanced risk management practices improve the performance of supply chain. An R^2 of 0.564 denotes that 56.4% of the variations in performance of the supply chain are explained by changes in risk management practices.

4.5.4 ANOVA

ANOVA stands for the Analysis of Variance and gives the joint effect of the study variables in the model. It derives the f statistic and the significance level which gives the significance of the overall relationship between the variables as shown in Table 4.14.

Table 4. 14: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	13.308	4	3.327	3.041	.031[b]
	Residual	126.848	116	1.094		
	Total	**140.156**	**120**			

a. Predictors: (Constant), RI, RA, RM, RT
b. Dependent Variable: Procurement Performance

As seen in Table 4.14 the regression analysis gave an F statistic of 3.041 and a p-value of 0.031. The results portray that risk management practices significantly influenced supply chain performance at 95% confidence interval given the probability value of 0.031 which is smaller than the significance level of 0.05. Further, the f statistics is more than the calculated f value of 2.46, affirming the significance of the influence of risk management practices on performance of supply chain.

4.5.5 Regression Coefficients

Coefficient of regression was conducted whereby the influence of the risk management practices variables, which include risk identification (RI), risk assessment (RA), risk mitigation (RM) and risk monitoring (RT) on performance of supply chain variable (stock replenishment) was determined. The results were shown in Table 4.15.

Table 4. 15: Coefficients

Model		Unstandardized Coefficients		T	Sig.
		B	Std. Error		
1	(Constant)	1.946	.615	3.165	.002
	RI	.191	.092	2.074	.010
	RA	.214	.099	2.163	.003
	RM	.162	.081	2.005	.011
	RT	.131	.112	1.165	.246

a. Predictors: (Constant), RI, RA, RM, RT
b. Dependent Variable: Procurement Performance

The results of the multiple regression produced the following regression equation

$$Y = 1.946 + 0.191\ RI + 0.214\ RA + 0.162\ RM + 0.131\ RT \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.1)$$

A regression constant of 1.946 is significant at a confidence interval of 95%, with its probability value of 0.002 that is smaller than 0.05. The constant indicates in the absence of supply risk management practices in the County Government of Western Kenya, the supply chain performance (stock replenishment) remains at 1.946. The regression analysis also produced four regression coefficients which are discussed under each objective

4.5 Discussion

4.5.1 Risk Identification and Supply Chain Performance

The study's first objective was to determine the effect of supply chain risk identification on performance of supply chain. The objective led to the study focus on testing a null hypothesis that risk identification had no significant effect on performance of supply chain. As seen in Table 4.15, a regression analysis resulted in a coefficient regression of 0.191 with a probability value of 0.010 and a t statistic of 2.074. The coefficient shows that a unit increase in risk identification increases the stock replenishment of county governments in Western Kenya by 0.191 units.

A p-value of 0.010 portrays that supply chain risk identification has a significant effect on the supply chain performance of county governments in Western Kenya at 5% significance level given that it is less than 0.05. The t statistic of 2.074 is more than a t calculated of 1.984 hence supports the significance of the effect of risk identification on performance of supply chain. The null hypothesis was ultimately

rejected, and the study established that supply chain risk identification significantly affects the supply chain performance of county governments in Western Kenya. The results agree with the descriptive statistics which clearly showed that county governments carried out prescreening of suppliers, periodic audits of the supply chain, and forecasting of inventory and hence most respondents agreed that all these elements affect the supply chain performance of county governments.

The inferential statistics also reflect the findings of Mburu (2015) who found that supply chain performance was significantly influenced by risk identification in manufacturing companies in Kenya. These study findings indicated that risk identification management strategies significantly positively affected supply chain performance. Another study that found a similar result was conducted by Munyuko (2015) who established that supply chain risk management was positively related on organizational performance measured in terms of profitability. The case study on Andy Forwarders Services Limited showed that significant risk identification positively affected organization performance.

4.5.2 Risk Assessment and Supply Chain Performance

The study's second objective was to establish how risk assessment affects the performance of the supply chain. The second null hypothesis was that risk assessment has no significant effect on the performance of the supply chain. Regression results showed a t statistic of 2.163 and a coefficient of 0.214 with a probability value of 0.032. The coefficient reflects that a unit increase in risk assessment causes the supply chain performance of county governments in Western Kenya to improve by 0.214 units of stock replenishment.

A p-value of 0.032 shows that supply chain risk assessment significantly affects supply chain performance of county governments in Western Kenya at a 5% significance level given that it is less than 0.05. The t statistic of 2.163 is more than a t calculated of 1.984 hence also indicates that the effect of supply chain risk identification on performance of supply chain is significant. The study rejected the null hypothesis and held that supply chain risk assessment significantly affects the supply chain performance of county governments. The results are in line with the descriptive statistics on a risk assessment which showed that most of the respondents agreed and strongly agreed that county governments conduct priority ranking, systematic analysis, and internal quality occurrences on their supply chain. It was also evident that all the elements of risk assessment affect supply chain performance. The results of inferential statistics echo the findings of (Faizal and Palaniappan, 2014) who indicated a significant positive relationship between supply chain risk assessment measured through risk events and issues and supply chain performance measured by revenue, risk investment, and customer satisfaction.

4.5.3 Risk Mitigation and Supply Chain Performance

Examining the effect of risk mitigation on supply chain performance in Western Kenyan County governments was the third study objective. Therefore, the third null hypothesis was that risk mitigation in County governments of Western Kenya had no significant on supply chain performance. According to the findings of the regression analysis, the coefficient was 0.162, the p-value was 0.011, and the t statistic was 2.005. The coefficient indicates that a unit increase in supply chain risk mitigation causes the supply chain performance of county governments in Western Kenya to improve by 0.162 units.

A p-value of 0.011 portrays that supply chain risk mitigation has a significant effect on the supply chain performance of county governments in Western Kenya at 5% significance level given that it is less than 0.05. The t statistic of 2.005 is more than a t calculated of 1.984 hence supports the significance of the effect of risk mitigation on supply chain performance. Therefore, the study rejected the null hypothesis and concluded that supply chain risk mitigation significantly affects the supply chain performance of county governments in Western Kenya. This results reflect those of the descriptive statistics which indicated that most county governments had integrated their procurement processes, distinct procurement job descriptions, and the job descriptions have mandated only specified employees to generate acquisitions to initiate the procurement. The respondents also agreed that the integration of procurement processes, inbuilt procurement and distinct procurement job descriptions have an effect on the supply chain performance of county governments in Western Kenya.

The inferential statistics agree with the findings of Hariharan (2018) who found that risk mitigation had a significant positive effect on supply chain performance.

Njeri (2014) also studied on the effects of risk mitigation strategies on the supply chain performance of manufacturing firms in Kenya. The study used a sample population of 46 large manufacturing companies in Nairobi. Primary data, were self-administered questionnaires that consisted of both open and closed-ended questions. The study's findings indicated that risk mitigation significantly positively affected supply chain performance.

4.5.4 Risk Monitoring and Supply Chain Performance

Ascertaining the impact of risk monitoring on supply chain performance in Western Kenyan county governments was the fourth study objective. The fourth null hypothesis was that risk monitoring had no significant effect on supply chain performance. Regression analysis had a coefficient of 0.131, a probability value of 0.246, and a t statistic of 1.165. A probability value of 0.246 was insignificant at 95% confidence interval given that it was above the 0.05 significance level; hence, supply chain risk monitoring had an insignificant effect on the supply chain performance of county governments in Western Kenya. Thus, the study failed to reject the null hypothesis.

The inferential statistics also reflects the findings of descriptive statistics that show most of the county governments do not conduct a review on the rate of compliance. County governments have not put in place a mechanism for contract management and they do not conduct management training. The findings also mirror the findings of Alfayo (2014) who carried out a survey on the effects of monitoring, evaluation and risk management of projects on the performance of firms in the telecommunication sector in Kenya. The study used purposive sampling, selecting 14 telecommunication companies. The study results indicated that risk monitoring had an insignificant positive effect of the performance of supply chain. Table 4.16 shows the summary of the tested hypotheses.

Table 4. 16: Summary of Tested Hypotheses

No.	Hypothesis	P-value	Results
Ho_1	Risk identification has no significant effect on supply chain performance in county governments of western Kenya.	0.018<0.05	Rejected
Ho_2	Risk assessment has no significant effect on supply chain performance in county governments of western Kenya.	0.021<0.05	Rejected
$H0_3$	Risk mitigation has no significant effect on supply chain performance in county governments of western Kenya.	0.00<0.05	Rejected
Ho_4	Risk monitoring has no significant effect on supply chain performance in county governments of western Kenya.	0.031<0.05	Accepted

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The summary, conclusion, suggestions, and areas for additional research are presented in this chapter

5.2 Summary of the Findings

The purpose of the study was to establish the influence of risk management practices on performance of the supply chain in county governments in western Kenya. To determine the effect of supply chain risk identification, establish the effect of risk assessment, examine the effect of risk mitigation, ascertain the effect of risk monitoring on supply chain performance in County governments of Western Kenya. The hypotheses were null; risk identification, assessment, mitigation, and monitoring has0 no significant effect on supply chain performance. Descriptive and Inferential data analysis techniques were used.

5.2.1 Risk Identification and Supply Chain Performance

From the descriptive statistics, most respondents agreed and strongly agreed that risk identification affects supply chain performance measured by stock replenishment. In inferential statistics, the correlation results indicated that there was a significant association between risk identification and supply chain performance at 5% significance level as shown by the variable's coefficient of r = 0.640 and probability value of 0.028, that is less than the 0.05.

The regression results indicated risk identification had a coefficient regression of 0.191 and a probability value of 0.010, smaller than 0.05. This implies that a unit increase in risk identification improves supply chain performance by 0.191 units of stock replenishment. Therefore, the null hypothesis was rejected at 0.05 significance level. This indicated that risk identification significantly affects supply chain performance at a 5% significance level. Risk identification and supply chain performance are positively correlated.

5.2.2 Risk Assessment and Supply Chain Performance

Descriptive statistics indicated that most respondents agreed that risk assessment affects the performance of the supply chain. Correlation results showed existence of a significant positive correlation between risk assessment and supply chain performance with a variable coefficient of r = 0.439 and p-value of 0.001.

Risk assessment had a beta coefficient of 0.214 and a p-value of 0.032 which was smaller than 0.05 implying that risk assessment had a significant positive effect on performance of supply chain at a 5% significance level. Therefore, a unit increase in risk assessment improves supply chain performance by 0.214 units.

5.2.3 Risk Mitigation and Supply Chain Performance

Descriptive statistics proved that a larger percentage of respondents agreed that risk mitigation had an effect on performance of supply chain. Findings on correlation recorded a significant positive correlation between risk mitigation and supply chain performance with a variable coefficient of r = 0.0581and p-value of 0.034. Risk mitigation had a coefficient of 0.162 and probability value of 0.011 that was smaller than 0.05. This indicates that risk mitigation had a positive and significant effect on supply chain performance at 5% significance thus the null hypothesis was rejected.

That is a unit increase in the numbers of risk mitigation practices improves procurement performance by 0.162 units.

5.2.4 Risk Monitoring and Supply Chain Performance

The descriptive statistics indicated that most respondents disagreed that risk monitoring has no effect on performance of supply chain since in most of the counties, it was not practiced hence no effect on stock replenishment. Risk monitoring and supply chain performance were positively correlated though, the association was not significant at 95% confidence interval given the variable's coefficient of r = 0.369 and probability value of 0.072, which was more than 0.05. Risk monitoring had a coefficient of 0.131 with a p-value of 0.246 being greater than 0.05 and this implies that risk mitigation had an insignificant positive effect on supply chain performance measured through stock replenishment.

5.3 Conclusions

The study conclusion was based on both descriptive and inferential statistics.

5.3.1 Risk Identification and Supply Chain Performance

Most of the respondents from the descriptive statistics agreed that risk identification increases supply chain performance through pre-screening of suppliers, periodic audits of the supply chain and inventory forecasting. From the inferential statistics, it was established that there is a significant relationship between risk identification and performance of supply chain (r=0.191, p-value=0.010). Therefore, it was concluded that risk assessment positively and significantly affects supply chain performance of western Kenya county governments.

5.3.2 Risk Assessment and Supply Chain Performance

From the descriptive statistics, most respondents agreed that risk assessment influences supply chain performance through the right decisions made by county governments and systematic supply chain analysis. Also inferential statistics show a significant relationship between risk assessment and performance of supply chain (r=0.214, p-value=0.003). Therefore, it was concluded that risk assessment positively and significantly affects the supply chain performance of county governments of western Kenya.

5.3.3 Risk Mitigation and Supply Chain Performance

From the descriptive statistics, it was established that most of the respondents agreed that risk mitigation influences supply chain performance through the integration of procurement process and distinct procurement description. Inferential statistics show that risk mitigation had a significant relationship with supply chain performance (r=0.162, p-value=0.011). Therefore, it was concluded that risk mitigation has a positive and significant effect on supply chain performance of county governments of western Kenya.

5.3.4 Risk Monitoring and Supply Chain Performance

Descriptive statistics show that the majority of the respondents agreed that risk monitoring does not influence supply chain performance through conducting a review rate of compliance and training of supply chain performance. The inferential statistics established that there is no significant relationship between risk monitoring and supply chain performance (r=0.131, p-value=0.246). It was therefore concluded

that risk monitoring had an insignificant effect on supply chain performance in county governments of western Kenya.

5.3.5 Risk Management and Supply Chain Performance

Table 5.1 shows that some risk management strategies have a positive and significant effect as some of the null hypotheses were rejected and others accepted.

5.4 Recommendations

The following recommendations were derived from the findings of the study.

5.4.1 Risk Identification and Supply Chain Performance

From the inferential statistics, it was found that risk identification had a significant influence on supply chain performance in western Kenya county governments. Under the descriptive statistics, the majority of the respondents were neutral that county governments do not conduct pre-screening of suppliers. Therefore, it was recommended that county governments' management should perform a thorough screening of suppliers before awarding tenders. This will help avoid selecting unreliable suppliers who cannot consistently supply inventory to the county government warehouse, reducing the level of stock replenishment.

The great number of the respondents also were neutral that county governments conduct inventory forecasting. Therefore, it was recommended that the management of county governments should conduct inventory forecasting. This will enable the procurement department to replenish the inventory before the stock out level is reached, increasing the supply chain performance.

It was also recommended that county governments embrace risk identification practices such as supplier pre-screening to ensure prevention of the occurrence of supplier-related risk for better supply chain performance.

5.4.2 Risk Assessment and Supply Chain Performance

The inferential statistics found that risk assessment significantly affected financial accountability in western Kenya county governments. Descriptive statistics show that most respondents agreed that county governments do not conduct a systematic analysis of the supply chain. Therefore, it was recommended that the county government's management should incorporate systematic analysis of supply chain in the procurement department. This will help ensure that all the supply chain procedures are keenly analysed and incorporated into procurement processes.

There was also a need for county governments' supply chains to conduct risk assessments to minimize the probability of risk and put more effort in controlling risk impact to improve on supply chain performance of respective counties.

5.4.3 Risk Mitigation and Supply Chain Performance

Inferential statistics show a positive and significant effect of risk mitigation on supply chain performance. From the inferential statistics, it was established that the majority of the respondents agreed that county governments had not integrated its procurement processes. It was therefore recommended that county governments should integrate their procurement processes. This will help ensure the process of replenishing inventory is efficient and done on a timely basis to increase supply chain performance through an increase in the level of stock replenishment.

Most respondents also were neutral that county governments' job descriptions allowed only specified employees to generate requisitions to initiate the

procurement processes. Therefore, it was recommended that the county government should ensure only specified employees should initiate procurement processes. This will ensure the process of initiating any replenishment of inventory is only done by the authorized people.

In view of the risks that affect county government supply chains, the county government should develop risk mitigation strategies for improving the supply chain through stock replenishment rates.

5.4.4 Risk Monitoring and Supply Chain Performance

From the descriptive statistics, it was established that the majority of the respondents agreed that county governments do not conduct a review on the rate of compliance. Therefore, it was recommended that county governments should conduct a review of the rate of compliance in order to ensure compliance risks are reduced. It will also ensure that all the laws and regulations are complied with.

The majority of the respondents also agreed that county governments did not conduct training on supply chain. It was therefore recommended that county governments should conduct management training. This will aid the employees in county government to gain knowledge and skills on how to deal with problems affecting inventory replenishment, supply and demand forces along the supply chain network.

5.4.5 Risk Identification and Supply chain Performance

It was recommended that risk management strategies be implemented as they have a positive impact on performance of the supply chain.

5.5 Areas for Further Studies

i. Future researchers need to conduct research on the influence of risk management practices and procurement performance in other counties not covered in this study.

ii. The study variables explained only approximately 56% of the variation in supply chain performance, hence more studies should be done on other factors that affect supply chain performance.

iii. Future studies should be carried out in other sectors for example manufacturing firms as the current study was limited to county governments in western Kenya.

iv. Also it was noted that risk monitoring is not being practiced in county governments and as such, further study be done to find out why and what can be done.

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APPENDICES

Appendix 1: Introductory Letter

Kaimosi Friends University

PO BOX 385-50309,

Kaimosi, Kenya

To: The Chief of Staff County Government,

Dear Respondent

RE: Request for collection data

I am Wawire Cyrus, a Masters student at Kaimosi Friends University undertaking business administration (supply chain management option), Reg. No. DGS/MBA/G/012/2019. As partial fulfillment of the requirement of the degree award, I am conducting academic research on ***Risk Management Practices and Supply Chain Performance in County governments of Western Kenya.*** Therefore, I am seeking your permission to participate in this study. I assure you that the information you will share in this booklet will be kept confidential, and neither the name of your institution will not be revealed. This work is for academic purposes only. As a confirmation of participating in this study, kindly append your signature and the date below.

Sincerely.

Cyrus Okumu Wawire

Appendix 2: Study Questionnaires

Kindly respond to the questions below by ticking where appropriately. Your privacy will be carefully protected.

SECTION A: RISK MANAGEMENT PRACTICE

(Tick where appropriate)

1. Does the county government consider risk management practices?

   Yes ☐ No ☐

2. If it does, which one is the most practiced? (**Tick more than once**)

   Risk identification ☐

   Risk assessment ☐

   Risk mitigation ☐

   Risk monitoring ☐

SECTION B: **RISK IDENTIFICATION**

On a scale of 1-5, where 5 = Strongly Agree, 4= Agree, 3=Neutral Agree, 2= Disagree, and 1=strongly Disagree, indicate how you agree or disagree with the following statements.

Statement	**5**	**4**	**3**	**2**	**1**
County governments conduct prescreening of suppliers.					
Prescreening of suppliers affects performance.					
The county government conducts a periodic audit of the supply chain.					
Periodic audits of the supply chain affect supply chain performance.					
The county government conducts inventory forecasting.					
Inventory forecasting affects supply chain performance.					
County management is provided with timely information on inventory forecasting for decision-making.					

SECTION C: RISK ASSESSMENT

On a scale of 1-5, where 5 = Strongly Agree, 4= Agree, 3=Neutral Agree, 2= Disagree, and 1=strongly Disagree, indicate how you agree or disagree the following statements.

Statement	**5**	**4**	**3**	**2**	**1**
The county government conducts priority ranking during risk assessment.					
Decision made by the county government adds value to the county government.					
County governments conduct a systematic analysis of the county government.					
Systematic analysis of the supply chain affects supply chain performance.					
Internal quality occurrence adds value to the supply chain operations of the county governments.					
The county governments conduct internal quality occurrences on the supply chain.					

SECTION D: **RISK MITIGATION.**

On a scale of 1-5, where 5 = Strongly Agree, 4= Agree, 3=Neutral, Agree, 2= Disagree, and 1=strongly Disagree, indicate how you agree or disagree with the following statements.

Statement	**5**	**4**	**3**	**2**	**1**
The county government has integrated its procurement processes.					
Integration of the procurement process affects supply chain performance.					
Inbuilt procurement flow affects supply chain performance.					
The county government has a distinct procurement job description.					
Distinct procurement description affects supply chain performance.					
Segregation of responsibilities affects supply chain performance.					
The county government's job descriptions allow only specified employees are mandated to generate requisitions to initiate the procurement process.					

SECTION E: RISK MONITORING

On a scale of 1-5, where 5 = Strongly Agree, 4= Agree, 3=Neutral Agree, 2= Disagree, and 1=strongly Disagree, indicate how you agree or disagree with the following statements.

Statement	**5**	**4**	**3**	**2**	**1**
The county government conducts a review on the rate of compliance.					
A review of the rate of compliance affects supply chain performance.					
The county government has seen an improvement in the rate of compliance.					
The county government rate of compliance informs the management decision.					
The county government has put in place a mechanism for contract management.					
Preparation of contract management reports for management decisions affects supply chain performance.					
County governments conduct management training on the supply chain.					
Management training affects supply chain performance.					

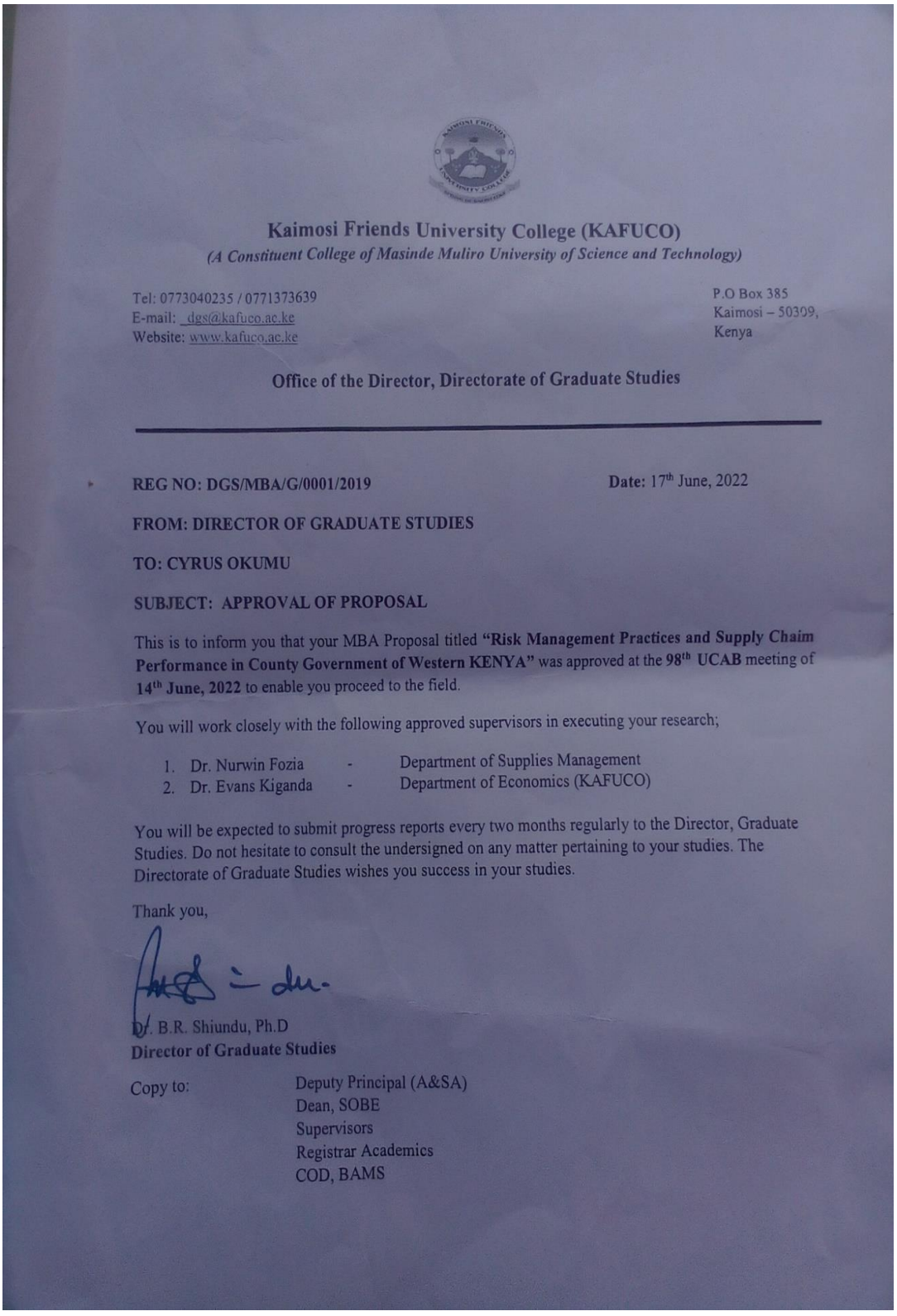
SECTION F: SUPPLY CHAIN PERFORMANCE

On a scale of 1-5, where 5 = Strongly Agree, 4= Agree, 3= Neutral Agree, 2= Disagree, and 1=strongly Disagree, indicate how you agree or disagree with the following statements.

Statements	**5**	**4**	**3**	**2**	**1**
The stock replenishment has led to efficiency in the supply chain.					
Periodic audit stock replenishment improves supply chain performance.					
Risk management practices affect supply chain performance.					

Thank you for your time

Appendix 3: Approval Letter



Kaimosi Friends University College (KAFUCO)

(A Constituent College of Masinde Muliro University of Science and Technology)

Tel: 0773040235 / 0771373639
E-mail: dgs@kafuco.ac.ke
Website: www.kafuco.ac.ke

P.O Box 385
Kaimosi – 50309,
Kenya

Office of the Director, Directorate of Graduate Studies

REG NO: DGS/MBA/G/0001/2019 **Date:** 17th June, 2022

FROM: DIRECTOR OF GRADUATE STUDIES

TO: CYRUS OKUMU

SUBJECT: APPROVAL OF PROPOSAL

This is to inform you that your MBA Proposal titled **"Risk Management Practices and Supply Chaim Performance in County Government of Western KENYA"** was approved at the **98th UCAB** meeting of **14th June, 2022** to enable you proceed to the field.

You will work closely with the following approved supervisors in executing your research;

1. Dr. Nurwin Fozia - Department of Supplies Management
2. Dr. Evans Kiganda - Department of Economics (KAFUCO)

You will be expected to submit progress reports every two months regularly to the Director, Graduate Studies. Do not hesitate to consult the undersigned on any matter pertaining to your studies. The Directorate of Graduate Studies wishes you success in your studies.

Thank you,

Dr. B.R. Shiundu, Ph.D
Director of Graduate Studies

Copy to: Deputy Principal (A&SA)
Dean, SOBE
Supervisors
Registrar Academics
COD, BAMS

Appendix 4: NACOSTI Certificate

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **179747**

Date of Issue: **01/July/2022**

RESEARCH LICENSE

This is to Certify that Mr.. Cyrus Okumu Wawire Okumu of Masinde Muliro University of Science and Technology, has been licensed to conduct research in Bungoma, Busia, Kakamega, Vihiga on the topic: RISK MANAGEMENT PRACTICES AND SUPPLY CHAIN PERFORMANCE IN COUNTY GOVERNMENT OF WESTERN KENYA for the period ending : 01/July/2023.

License No: **NACOSTI/P/22/18553**

179747

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix 5: t table

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
Z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

t-table.xls 7/14/2007

Appendix 6: f table

Degrees of freedom in denominator (df2)			Degrees of freedom in numerator (df1)										
		p	1	2	3	4	5	6	7	8	12	24	1000
	10	0.100	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.28	2.18	2.06
		0.050	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	2.91	2.74	2.54
		0.025	6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.62	3.37	3.09
		0.010	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.71	4.33	3.92
		0.001	21.04	14.90	12.55	11.28	10.48	9.93	9.52	9.20	8.45	7.64	6.78
	12	0.100	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.15	2.04	1.91
		0.050	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.69	2.51	2.30
		0.025	6.55	5.10	4.47	4.12	3.89	3.73	3.61	3.51	3.28	3.02	2.73
		0.010	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.16	3.78	3.37
		0.001	18.64	12.97	10.80	9.63	8.89	8.38	8.00	7.71	7.00	6.25	5.44
	14	0.100	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.05	1.94	1.80
		0.050	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.53	2.35	2.14
		0.025	6.30	4.86	4.24	3.89	3.66	3.50	3.38	3.29	3.05	2.79	2.50
		0.010	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	3.80	3.43	3.02
		0.001	17.14	11.78	9.73	8.62	7.92	7.44	7.08	6.80	6.13	5.41	4.62
	16	0.100	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	1.99	1.87	1.72
		0.050	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.42	2.24	2.02
		0.025	6.12	4.69	4.08	3.73	3.50	3.34	3.22	3.12	2.89	2.63	2.32
		0.010	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.55	3.18	2.76
		0.001	16.12	10.97	9.01	7.94	7.27	6.80	6.46	6.20	5.55	4.85	4.08
	18	0.100	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04	1.93	1.81	1.66
		0.050	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.34	2.15	1.92
		0.025	5.98	4.56	3.95	3.61	3.38	3.22	3.10	3.01	2.77	2.50	2.20
		0.010	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.37	3.00	2.58
		0.001	15.38	10.39	8.49	7.46	6.81	6.35	6.02	5.76	5.13	4.45	3.69
	20	0.100	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.89	1.77	1.61
		0.050	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.28	2.08	1.85
		0.025	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91	2.68	2.41	2.09
		0.010	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.23	2.86	2.43
		0.001	14.82	9.95	8.10	7.10	6.46	6.02	5.69	5.44	4.82	4.15	3.40
	30	0.100	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.77	1.64	1.46
		0.050	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.09	1.89	1.63
		0.025	5.57	4.18	3.59	3.25	3.03	2.87	2.75	2.65	2.41	2.14	1.80
		0.010	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	2.84	2.47	2.02
		0.001	13.29	8.77	7.05	6.12	5.53	5.12	4.82	4.58	4.00	3.36	2.61
	50	0.100	2.81	2.41	2.20	2.06	1.97	1.90	1.84	1.80	1.68	1.54	1.33
		0.050	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	1.95	1.74	1.45
		0.025	5.34	3.97	3.39	3.05	2.83	2.67	2.55	2.46	2.22	1.93	1.56
		0.010	7.17	5.06	4.20	3.72	3.41	3.19	3.02	2.89	2.56	2.18	1.70
		0.001	12.22	7.96	6.34	5.46	4.90	4.51	4.22	4.00	3.44	2.82	2.05
	100	0.100	2.76	2.36	2.14	2.00	1.91	1.83	1.78	1.73	1.61	1.46	1.22
		0.050	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.85	1.63	1.30
		0.025	5.18	3.83	3.25	2.92	2.70	2.54	2.42	2.32	2.08	1.78	1.36
		0.010	6.90	4.82	3.98	3.51	3.21	2.99	2.82	2.69	2.37	1.98	1.45
		0.001	11.50	7.41	5.86	5.02	4.48	4.11	3.83	3.61	3.07	2.46	1.64
	1000	0.100	2.71	2.31	2.09	1.95	1.85	1.78	1.72	1.68	1.55	1.39	1.08
		0.050	3.85	3.00	2.61	2.38	2.22	2.11	2.02	1.95	1.76	1.53	1.11
		0.025	5.04	3.70	3.13	2.80	2.58	2.42	2.30	2.20	1.96	1.65	1.13
		0.010	6.66	4.63	3.80	3.34	3.04	2.82	2.66	2.53	2.20	1.81	1.16
		0.001	10.89	6.96	5.46	4.65	4.14	3.78	3.51	3.30	2.77	2.16	1.22

Use StaTable, WinPepi > WhatIs, or other reliable software to determine specific *p* values