

**MODERATING EFFECT OF ICT ON ORGANIZATION
CHARACTERISTIC RISK AND PERFORMANCE OF
MANUFACTURING FIRMS IN KENYA**

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Abstract

The manufacturing firms in Kenya contribute enormously to the development of an economy. Developments in ICT are creating possibilities for moderating risks along the supply chain by creating platforms for effective decision support tools. Organization characteristics risks have however hampered the manufacturing firms' ability to contribute to the Gross Domestic Product (GDP) and attainment of Kenya's vision 2030. This study sought to investigate the moderating effect of ICT on organization characteristic risk and performance among manufacturing firms in Kenya. Cross-sectional survey design was adopted as the research design for this study using both qualitative and quantitative approaches. The target population was 94 firms in Kiambu County who were both members and potential members of the Kenya Association of Manufacturers (KAM). The study used stratified random sampling to pick a sample size of 76 manufacturing firms which represented 12 industrial sectors in manufacturing firms. Data was collected using questionnaires. Descriptive statistics was used aided by Statistical Packages for Social Sciences version 21 to compute percentages of respondents' answers. Inferential statistics using linear regression and correlation analysis was applied to assist examining relationship between the research variables. It was established that ICT used moderated the relationship between organizational characteristic risks although the moderating effect was not statistically significant. Therefore, the study recommends that manufacturing firms should leverage on ICT use to enhance performance of their firms.

Keywords: organization, manufacturing firms, kenya

1.1 Introduction

Supply chains that are dynamic believe in continuous performance improvements. This is particularly critical for the suppliers, manufacturers and retailers who are focused on achieving and sustaining competitiveness. The volatile supply chain environment requires a deep understanding of the supply chain ecosystem and the resilience of the organizations to respond to such risks (Global Finance, 2012). Therefore, there is need to formulate support systems that will allow the adoption of measure to mitigate risks along the supply chain (Allen, 2011). As supply chains are increasingly exposed to vulnerabilities, it is important to manage these risks proactively (Kalawsky, 2013). The process of acquiring raw materials passes through political

and geographical regions, ownership of the goods also changes and various modes of transports are also used before the goods reach the end customer in the form of finished goods. The various processes involved as the raw materials are transformed into finished goods expose various stages where the supply chains may be vulnerable to disruptions (Handfield & Earnest, 2002).

Supply chain risk management is driven by the need to reduce risks not only at the organization level but the entire supply chain. According to Chaudhuri, Mohanty and Singh, (2013), supply chain risk management should begin from new product development because of the increasing uncertainty in the supply chains. A study carried out by Price water house and Coopers, (2008), reports that risk assessment in an industry setting is primarily based on past experience and forward thinking which results in effective strategies in mitigating risks. Proactive risk assessment and execution is paramount for a robust supply chain management (Sodhi& Tang, 2012).

Supply chain risks exists when the behavior of the supply market and an organizations dealings with its suppliers results in outcomes that harm the reputation of the company, capability, integrity of its operations as well as financial viability (Russill, 2008). These supply chain risks are identified by Accenture (2010) as materials flow risk, financial flow risk and information flow risks.

1.2 Statement of the Problem

A report by the African Economic Outlook, (2015) indicates that the manufacturing sector in Kenya is the third leading contributor in terms of the Gross Domestic Product (GDP) after agriculture and horticultural industry. According to the Kenya association of Manufacturers' (KAM, 2013), the manufacturing sector in Kenya growth declined to 4.4% in 2011 as compared to a growth of 5.8% in 2010 and it has been experiencing mixed performance over the last five years, that is, 5.8% in 2010, 4.4% in 2011, 3.1% in 2012, 5.6% in 2013, 3.4% in 2014 (Omondi, 2011; Loice and Ronald, 2011; KAM, 2013; Waiguru, 2015; East African Community Fact and Figures, 2010). The sector recorded a growth 3.4% in 2014 compared to a 5.6 per cent growth in 2013 (Waiguru, 2015). The decline in growth was highly attributed to an increase in inflation (5.7% in 2013 compared to 6.9% in 2014) and high fuel cost in 2014 compared to 2013. The sectors contribution to the total wage employment has worsened from 13.8% in 2008 to 12.9% in 2012 (Kenya economic Report 2013).

1.3 Objectives of the Study

1.3.1 General Objective

The main objective of this study is to examine the moderating effect of ICT on organization characteristic risk and firm performance among the manufacturing firms in Kenya

1.3.2 Specific Objectives

The specific objectives of this study are:

1. To explore the moderating effect of ICT on organization characteristic risk and firm performance among the manufacturing firms in Kenya.

1.4 Research Questions

1. What is the moderating effect of ICT on material flow risk and firm performance among the manufacturing firms in Kenya?

1.5 Research Hypothesis

3. H₀₃: ICT use does not moderate the relationship between organization characteristic risk and firm performance among the manufacturing firms in Kenya.

2.1 Literature Review

This chapter will discuss the literature review of the study. The main aim of the literature review is to explore the available and existing information which has been covered by the various researchers. The literature will be reviewed from, journals, the internet, reference books, working papers, reports and periodicals.

The literature will review the following areas: the conceptual framework, review of variables research gaps and a summary of the chapter.

2.2 organization characteristic risk

Organization characteristic risks are defined as the specific traits exhibited by the manufacturing firms that increase their uncertainties in achieving supply chain and the firms' objectives (Harvie, Narjoko&Oum, 2010). They also refer to the specific traits that distinguishes one firm form another and therefore determine probability of supply chain risks (Summer, 2014)

Employee Size

Employee size (number of employees) that a company employs depends on the resources (financial and technological resources). Therefore, firms with these resources tend to employ more people than those which do not (Kumar, Rajan&Zingales, 2001). Many large companies that tend to have a larger control over their supply chains tends to manage supply chain risks effectively since they act as the 'channel captain' (Juttner&Ziegenbein, 2009). Firms with a high number of employees are also able to attract a large pool of labor force which is skilled in risk management and have high technological skills (Sinha, 2015). This is because these firms have experience in supply chain risk management and implementation of supply risk management. These firms also have the financial resources to mitigate to put in structures to mitigate supply chain risks (Norman & Janson, 2004). For Small and Medium sized Enterprises (SMEs)which also are engaged in global sourcing and therefore are exposed to similar risks as the large firms, managing risks tends to be more difficult since they lack the necessary structures, processes and resources (Summer, 2014).SMEs are affected disproportionately to supply chain risk since in most cases, they are either second or third tier suppliers along the supply chains and therefore have to

shoulder significant burden of risks which are pushed upstream by other partners in the supply chains (Juttner&Ziegenbein, 2009).

Organization Location Choice

It's important to locate a firm in areas that are not prone to risks such as floods, earthquakes and natural disasters (Davis, 2016). This increases the firms vulnerabilities to such risks. Challenges and risks of poor utilities, poor infrastructure, unstable political and economic environment should be critically analyzed (Amimo, 2013). The choice of the location chosen should also allow access by the customers, workers, transportation and the materials into the organization (Supply Chain Risk Leadership Council, 2011).

Firms whose supply chains are global are more likely to face additional risks as compared to firms which source locally. This is because the size of the supply networks increases risks of the supply chain due to currency exchanges risks, legal risks, communication risks and increased led times (Summer, 2014). Today, many firms are shifting from local suppliers to low cost distant suppliers without putting into consideration the full cost associated with this changes (Culp, 2012).

Organization Ownership

Results of a study carried out by Hillary and Hui (2007) on the influence of ownership religion on corporate decision making shows that religion highly influences the decision that a firm makes. Firms that have been in operation for a long period of time also have experience in managing supply chain risks as compared to those that have been operating for a short period of time (Juttner&Ziegenbein, 2009). A study by Jiang et al (2015) carried out on Family-firm risk taking: Does religion matter? Also shows that family firms whose founders were religious have less risk than other family firms. The study also found out that firms that were founded by entrepreneurs who were religious had lower leverages and had invested less in fixed and intangible assets compared to firms that had been founded by entrepreneurs who were non-religious.

2.4.5 Information Communication Technology (ICT)

Information and communication Technology (ICT) is an umbrella term that involves communication device or application such as radios, cellular phones, televisions, computer software and hardware, software satellite systems and their various applications such as wireless communication and video conferencing (Campton, 2007). ICT are all those electronic technologies that accept data in text form, graphics, videos or voice for purposes of processing information to be used in decision making (Baily, 2007). ICT provides new solutions that enable the developments in businesses thus supporting their growth and competitiveness. ICT and e-business applications improve information sharing and knowledge management within and outside the business processes, reduce transactional costs while increasing the speed and reliability of businesses (Osodo, 2012).

Proper ICT adoption along the supply chain enables accuracy of data that is shared along the chain due to the reliability management information system which in turn promotes confidence of the procurement business relationships (Hernandez, Galindo & Colin, 2015). Proper inventory control through the use of ICT, good forecast systems and better computer material control status improves the competitive advantage of business and enhances better performance (Calantone et al, 2003). Results of a study carried out by Hernandez, Galindo & Colin, (2015) shows that the use of ICT in the operation of a business does not guarantee performance since it depends on the type of technology used and the degree of adoption of the said technology as well as the ability to use the technology correctly. ICT today is a key enabler in the management of supply chains (Sweeney, 2005). ICT improves the performance of the supply chain through improved information sharing and collaboration by using specific computer to computer linkages (Zhang, Donk & Vaart, 2011). ICT facilitates the delay avoidance, handling of information resources which reduces costs and increases the customer reliance thereby improving the competitiveness of the organization (Hernandez, Galindo & Colin, 2015)

ICT Infrastructure

According to Porter (2005), ICT comprises of the hardware, software and communication that captures, transforms, stores, transfers and applies information. Organizations which deploy ICT according to Christiansen and Bryan (2015), experience a reduction in costs, have high productivity and have a competitive advantage. ICT is a major component of supply chain management as it leads to growth in revenues, reduces costs and promotes the utilization of assets in an organization (Cooper & Lambert, 1997). ICT in supply chain acts as a mechanism for sharing and exchange of information, integrates the supply chain members business activities (inter -and intra-organizations) and also connects the supply chains. This in turn leads to better collaboration, integration of processes and connectivity.

ICT infrastructures that are used to enable integration of processes along the supply chain are referred to as software (Christiansen & Bryan, 2015). Process driven applications have planning systems that facilitate in forecasting thereby enabling the firm to be more profitable through better inventory and revenue management (Christiansen & Bryan, 2015). Procurement systems support the buying processes of a firm from the identification of a need to payment (Council of Supply Chain Management Professionals, 2013). Supply Chain Relationship (SRM) systems on the hand help in the management of the interaction between the firm and the numerous suppliers in an effort to improve the processes of buying as well as reduce costs.

Manufacturing Information Systems such as Materials Requirement Planning (MRP 1) and Manufacturing Resource Planning (MRP 11) helps the manufacturing and production functions to meet stock demands, specialized orders as well as decisions on product and quality (Council of Supply Chain Management Professionals, 2013). Global Positioning Systems (GPS) enhance the efficiency of deliveries to the customers by navigating and routing of deliveries along the supply chain. Distribution solutions such as inventory management systems monitors the life cycle of inventories from purchase-production-sales. Warehouse management systems (WMS)

support warehouse activities such as goods receipt, storage and picking. Transportation Management Systems (TMS) on the other hand optimize transport activities such as shipping management, shipment scheduling, third party logistics as well as documentation (Council of Supply Chain Management Professionals, 2013).

ICT Training

ICT solutions along the supply chain require adequate training to enable the users to view the e-supply chain platforms as the most preferred means to buy goods and services in an organization (KPMG, 2001). Beth et al. (2003) point out that the competence of employees is a challenge in the adoption of technology in the procurement process. In their study, they affirm that procurement staffs must be competent to use application software that enables the organization to manage activities such as distribution and value chain activities. Findings of a research carried out by Christianse and Bryan (2015) shows that highly trained employees in ICT have deeper understanding and are able to evaluate ICT platforms that are suitable for their firms. According to Sharma and Yetton (2007), training is one of the interventions that lead to system success and acceptance by the users.

2.4.6 Firm performance

According to Florian and Constangioara (2014), firms that are exposed to supply chain risk experience lower performance as opposed to those whose level of supply chain risk is lower. The higher the levels of risks, the higher the consequences which are manifested in terms of customer complaints, quality problems, mismatch of supply and demand as well as delays (Silanpaa, 2010). Today's volatile business environment requires firms to reduce the negative effects of risk by developing appropriate supply chain management strategies and communication of the priorities of the company so as to enhance organizational performance (Wagner and Bode, 2008). According to Solakivi (2014), cost reduction is the key driver of financial performance. Grosse-Ruyken, (2012) as cited by Solakivi (2014) point out that Return on Investment (ROI) is a measure the effectiveness of a firm in utilizing its assets to generate profits. Measuring performance helps to determine the effectiveness of the strategies that are adopted by the management and helps in directing the attention of the managers, revising the goals of a company and re-engineering business processes (Silanpaa, 2010). Measuring performance is vital in supply chain improvement (Chan, 2003).

The performance of the corporate continues to grow according to Hervani, Helms and Sarkis, (2005) includes both qualitative and quantitative measures which mostly depend of the goals of the business. Firms should consider financial measures on a more competitive and strategic levels such as: Return on Investments (ROI), profitability, market share and revenue growth. Other financial measures such as customer satisfaction and the performance of the inventory are more focused on the operations of the organization but also require to be linked to the measures and issues at the strategic level (Hervani, Helms &Sarkis, 2005). Financial measures of performance are available after some period of time when production has been carried out. The problem of using financial measures is that they are not relevant to the day to day operations of

an organization and therefore, they are more useful at the top management level where strategic decisions are made (Silanpaa, 2010). Operational measures such as customer satisfaction are more useful to the managers at the lower level since they are involved in the day to day running of an organization (Morgan, 2004). It is important to develop more non-financial metrics as they present more information than the basic financial metrics (Sillanpaa, 2010). Increased risks along the supply chain affect the performance of the firm in terms of inventory costs, responsiveness and lead times (Florian &Constangioara, (2014). Leaders in supply chain performance are also leaders in financial performance (Johnson &Templer, 2007). Disruptions along the supply chain decrease the value of the shareholders both in the short run and in the long run (Hendricks &Singhal, 2003).

3.1 Research methodology

The study applied Cross-sectional survey design was adopted as the research design for this study using both qualitative and quantitative approaches. The target population was 94 firms in Kiambu County who were both members and potential members of the Kenya Association of Manufacturers (KAM). The study used stratified random sampling to pick a sample size of 76 manufacturing firms which represented 12 industrial sectors in manufacturing firms. Data was collected using questionnaires. Descriptive statistics was used aided by Statistical Packages for Social Sciences version 21 to compute percentages of respondents' answers.

4.1 Study Results

4.2 Descriptive Analysis of Material Flow Risk

The study sought to determine the moderating effect of ICT on organizational characteristics and performance of manufacturing firms in Kenya using the following indicators Employee size, location choice, firm ownership. Respondents were asked to indicate the extent to which they agreed with the opinion statements given in regard to the rating of organizational characteristic in their manufacturing firms. This was on a likert scale of strongly disagree, disagree, neutral, agree and strongly agree. In this study the scale of strongly disagree and disagree meant disagree while agree and strongly agree meant agreed.

a) Employee size

Majority of the respondents (40.8%) disagreed and strongly disagreed that their companied had too many employees unnecessarily, 9.9% were neutral, 5.6% agreed while the minority 2.8% strongly agreed (Mean = 1.89, SD =0.994) . Likewise, 40.9% of the respondents strongly disagreed that their current expenditures are high due to too many employees, 36.4% disagreed, 13.6% were neutral while 9.1% agreed (Mean = 1.91, SD =0.956) . When asked if they had a lot of logistical challenges due to too many employees, 46.4% strongly disagreed, 42.9% disagreed, 7.1% were neutral and 3.6% agreed (Mean = 1.68, SD =0.765) as shown in the table 4.34.

Table 4.34: Measurement of employee size

	SD %	D %	N %	A %	SA %	M	SD
a) In this company, we have too many employees unnecessarily	40.8	40.8	9.9	5.6	2.8	1.89	.994
b) Our recurrent expenditure is high due to too many employees	40.9	36.4	13.6	9.1		1.91	.956
c) We have a lot of logistical challenges due to too many employees	46.4	42.9	7.1	3.6		1.68	.765

From the study findings, it was noted that manufacturing firms in Kenya do not have unnecessary employees and the current expenditure of the firms in Kenya is not high due to too many employees. The firms also do not have logistical challenges due to too many employees. These are in agreement with Norman & Janson, (2004) that such firms are more efficient and have the financial resources to mitigate and put in structures to mitigate supply chain risks. Manufacturing firms in Kenya should therefore avoid unnecessary employees as this will affect their financial expenditures and tie up money which would have otherwise being used in supply chain risk management and improve the performance of the firms.

b) Location choice

Majority of the manufacturing firms in Kenya (46.2%) strongly disagreed that most of their company's' branches are located in areas that have poor road networks, 33.8% disagreed, 17.6% were neutral, 4.4% agreed while the minority (1.5%) strongly agreed (Mean = 1.88, SD =0.955) . In addition, 31.8% of the respondents, who were the majority disagreed that their firms often experience delays because some of the materials are shipped from global companies, 30.3% were neutral, 24.2% strongly disagreed, 12.1% agreed while 1.5% who were the minority strongly agreed (Mean = 2.35, SD =1.030) as shown in table 4.35.

Table 4.35: Measurement of location choice

	SD %	D %	N %	A %	SA %	M	SD
d) Most of our company branches are located in areas that have poor road networks	42.6	33.8	17.6	4.4	1.5	1.88	.955
e) We often experience delays because some of our materials are shipped from our global companies	24.2	31.8	30.3	12.1	1.5	2.35	1.030

From the study findings, it is evident that manufacturing firms in Kenya are not located in areas that have poor road networks and they also do not experience delays because some of the materials are shipped from their global companies. This confirms the findings of Davis, (2016) that It's important to locate a firm in areas that are not prone to risks such as floods, earthquakes and natural disasters (Davis, 2016). This increases the firms' vulnerabilities to such risks. Manufacturing firms in Kenya should also critically analyze challenges and risks of poor utilities, poor infrastructure, unstable political and economic environment (Amimo, 2013). The choice of the location chosen should also allow access by the customers, workers, transportation and the materials into the organization (Supply Chain Risk Leadership Council, 2011). On the other hand, firms whose supply chains are global are more likely to face additional risks as compared to firms which source locally. This is because the size of the supply networks increases risks of the supply chain due to currency exchanges risks, legal risks, communication risks and increased led times (Summer, 2014).

c) Firm ownership

A high percentage of respondents (43.5%) disagreed that decisions in their firms are often made after consultation by the board of management, 39.1% strongly disagreed, 7.2% were neutral, 5.8% agreed while a small percentage (4.3%) strongly agreed (Mean = 1.93, SD =1.048) . When the respondents were asked whether their companies were jointly owned with foreign investors who were involved when making decisions, 35.8% strongly disagreed, 25.4% disagreed, 22.4% agreed, 10.4% strongly agreed while 6.0% were neutral (Mean = 2.46, SD =1.439) as shown in table 4.36.

Table 4.36: Measurement of firm ownership

	SD %	D %	N %1	A %	SA %	M	SD
f) Decisions are often made after consultation by the board of the management	39.1	43.5	7.2	5.8	4.3	1.93	1.048
g) Our company is jointly owned with foreign investors who are involved when making decisions	35.8	25.4	6.0	22.4	10.4	2.46	1.439

From the study findings, it is clear that decisions made by the Kenyan manufacturing firms are not consultative especially by the board of management. This confirms the findings of a research carried out by McKinsey and Company (2011) showed that 31-40% of the respondents indicated that the company executives rarely meet with the sales representatives to discuss supply chain tensions. The study also indicated that the sales and marketing department has difficulties collaborating with other functions such as manufacturing and planning. Supply chains constantly

struggle with volatile demand because a rise in order volumes increases labor and distribution costs.

Inaccurately forecasting sales can similarly lead to stock outs, loss of sales or increased inventories which are sold at a discount to move it off the shelf. There is need therefore to develop proper planning and forecasting processes in order to enable and predict volatility in demand (McKinsey & Company, 2011).

4.5.2 Inferential analysis of organization characteristic risk

a) Relationship between Organization characteristic risk and firm performance

Regression analysis was conducted to determine the extent to which firm performance can be determined by organization characteristic risk. The linear regression model shows $R^2 = 0.149$ which means that 14.9 percent change of performance of the manufacturing firms in Kenya, can be explained by an increase in organization characteristic risk. However, the model failed to explain 85.1% of the variations in firm performance. This means that there are other factors associated with firm performance which are not explained by the model. The result is shown in Table 4.37.

Table 4. 37: Model Summary of organization characteristic risk

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.386 ^a	.149	.137	.510

ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3.098	1	3.098	11.917	.001 ^b
Residual	17.678	68	.260		
Total	20.776	69			

Coefficients

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	T	Sig.
(Constant)	4.148	.204	.000	20.331	.000
Organization Characteristics	-.344	.100	.001	-3.452	.001

The regression results in Table 4.42 further revealed that the overall model was significant. The overall model was found to be significant { $F(1, 68) = 11.917, p < 0.001$ }. The study further determined the beta coefficient of organization characteristic risk. The results revealed that organization characteristic risk is statistically significant in explaining performance among the manufacturing firms in Kenya. This is supported by $\beta = -0.344$ with a $t\text{-value} = -3.452$ ($p\text{-value} < 0.001$). This implies that a unit increase in organizational characteristic led to a negative change in firm performance by -0.344 .

The model equation is therefore:

$Y = 4.418 - 0.344X_4$, where Y is firm performance and X_4 is organization characteristic

It was therefore concluded that organizational characteristic risk had a negative and significant influence on the performance of manufacturing firms in Kenya. This implies that the more the organizational characteristic risk, the less the performance of the manufacturing firms in Kenya

This result agrees Juttner and Ziegenbein, (2009) that many large companies that tend to have a larger control over their supply chains tends to manage supply chain risks effectively since they act as the 'channel captain' as opposed to smaller firms. This makes smaller firms susceptible to supply chain risk and this reduces their performance.

The findings also agree with Amimo, (2013) that location challenges that may pose risks of poor utilities, poor infrastructure, and unstable political and economic environment should be critically analyzed as they affect the firm performance. The choice of the location chosen should also allow access by the customers, workers, transportation and the materials into the organization (Supply Chain Risk Leadership Council, 2011). These findings agree with this study that organization characteristic risks affect the firm performance.

b) Moderating effect of ICT use on organization characteristic risk and firm performance

The fourth specific objective of this study was to establish the moderating effect of ICT on organization characteristic risk and performance among manufacturing firms in Kenya.

The hypothesis tested for this specific objective was:

H_{04} – ICT use has no significant moderating effect on the relationship between organization characteristic risk and firm performance among manufacturing firms in Kenya.

The study performed regression analysis to test the moderating effect of ICT use on the relationship between organization characteristic risks. Using Moderated Multiple Regression (MMR) analysis in this study, the moderating effect of the variable (interaction term) was analysed by interpreting the R^2 change and the regression coefficient for the interaction term. The study tested the null hypothesis H_{04} – ICT use has no significant moderating effect on the relationship between organization characteristic risk and firm performance among manufacturing firms in Kenya.

To test the hypothesis, the following models were fitted;

$$\text{Model 1: } Y = \beta_0 + \beta_4 X_4 + \varepsilon;$$

$$\text{Model 2: } Y = \beta_0 + \beta_4 X_4 + \beta_m M + \varepsilon;$$

$$\text{Model 3: } Y = \beta_0 + \beta_4 X_4 + \beta_2 M + \beta_3 X_4 M + \varepsilon;$$

Where Y is service delivery, X_4 is organization characteristic risk, M is ICT use and $X_4 * M$ is the interaction term between organizational characteristic risk and ICT use.

In model 1 in Table 4.43, X_4 is used as a predictor {F (1, 67) = 10.778, p=0.002. The R² for model 1 was 0.139. This means that model one was significant since p was less than 0.005. The model equation for organization characteristic risk is

$$Y = 3.486 - 0.332X_4$$

Model 2 in Table 4.43 the results present the independent variable (organization characteristic risk) and the moderator (ICT use) as predictors; the moderator as a predictor was significant in the model. The relationship between organization characteristic risk and firm performance with ICT use as a predictor was significant {F(1,66)=1.731, p= 0.193}. The value of R² was 0.161 which indicates that 16.1% of the variance in firm performance can be accounted by ICT use and organization characteristic risk (see table 4.42). The results indicate that the percentage of the variation accounted for by the model increased from 14.9% to 16.1%. This implies therefore that the moderator as a predictor explained 1.2% variations in firm performance.

The results in Table 4.43 shows that Model 2 beta coefficient for organization characteristic risk was statistically significant ($\beta = -0.315$, t= -3.107, p=0.003). The result revealed that for one unit increase in organization characteristic risk, the firm performance is predicted to decrease by -0.003 given that ICT use is held constant. As shown in model 2, the beta coefficient for ICT use as a predictor was not significant ($\beta = 0.169$, t= 1.316, p=0.193), meaning that for one unit increase in ICT use, firm performance increases by about 0.169 given that organization characteristic risk is held constant. The findings confirm that ICT use is a significant variable in the relationship between organizational characteristic risk and firm performance. The model equation for organizational characteristic and ICT use as a predictor is

$$Y = 3.378 - 0.315X_4 + 0.169M$$

Where Y is firm performance, X_4 organization characteristic risk, M is ICT use.

Model 3 in Table 4.43 shows the results after the interaction term (organization characteristic risk* ICT use) was added into the model. The results indicated that the inclusion of the interaction term resulted into an increase of R² by 0.001% (F (1, 65)=0.655, p=0.421) showing no significant moderating effect of ICT use on the relationship between organization characteristic risk and firm performance.

Further, the results for coefficient in Table 4.43 in model 3 confirmed that the interaction effect of ICT use on the relationship between organization characteristic risk and firm performance was not significant ($\beta = -0.165$, $t = -0.809$, $p = 0.421$). This implies that the interaction term did not add any predictive power to the model ($p = 0.421 > 0.05$). Therefore, the study failed to reject the null hypothesis H_{04} : ICT use has no significant moderating effect on the relationship between organization characteristic risk and firm performance among manufacturing firms in Kenya. It was concluded that there is no significant moderating effect of ICT use on the relationship between organization characteristic risk and performance among the manufacturing firms in Kenya. The findings revealed that ICT use does not moderate the relationship between organizational characteristic risk and firm performance.

The model equation for the moderating effect is:

$$Y = 3.369 - 0.255X_4 + 0.174M - 0.165X_4M$$

Where Y is firm performance, X_4 is organization characteristic risk, M is ICT use and $X_4 * M$ is the interaction between organization characteristic and ICT use. The findings in Table 4.43 indicates that the percentage of variation accounted for by the model went up from 14.9% to 16.9%. This means that the introduction of ICT use as a predictor, the model improved by 2% in explaining the variations in firm performance as shown in Table 4.38.

Table 4. 38: Moderated Regression for organization characteristic risk

Model Summary										
Model	R	R Square	Adjusted R Square	R	Std. Error of the Estimate	Change Statistics		Change Statistics		
						R Square Change	F Change	df1	df2	Sig. F Change
1	.372 ^a	.139	.126		.512	.139	10.778	1	67	.002
2	.401 ^b	.161	.135		.509	.022	1.731	1	66	.193
3	.411 ^c	.169	.131		.510	.008	.655	1	65	.421

ANOVA^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.821	1	2.821	10.778	.002 ^b
	Residual	17.536	67	.262		
	Total	20.357	68			

	Regression	3.269	2	1.635	6.314	.003 ^c
2	Residual	17.087	66	.259		
	Total	20.357	68			
	Regression	3.440	3	1.147	4.405	.007 ^d
3	Residual	16.917	65	.260		
	Total	20.357	68			

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Collinearity Statistics	
		B	Std. Error				Tolerance	VIF
1	(Constant)	3.486	.062		56.604	.000		
	Organization characteristic	-.332	.101	-.372	-3.283	.002	1.000	1.000
2	(Constant)	3.378	.102		33.018	.000		
	Organization characteristic	-.315	.101	-.353	-3.107	.003	.984	1.016
3	ICT use	.169	.128	.150	1.316	.193	.984	1.016
	(Constant)	3.369	.103		32.632	.000		

Orgarnizati on characteristi c	-.225	.150	-.253	-1.498	.139	.449	2.225
ICT use	.174	.129	.154	1.351	.181	.981	1.019
Org Characterist ics*ICT use	-.165	.204	-.136	-.809	.421	.455	2.197

Although the models were significant, that is, there was a relationship but the change in firm performance was not significant in the relationship. This moderation was further explained by the scatter graph as shown in the Figure 4.5.

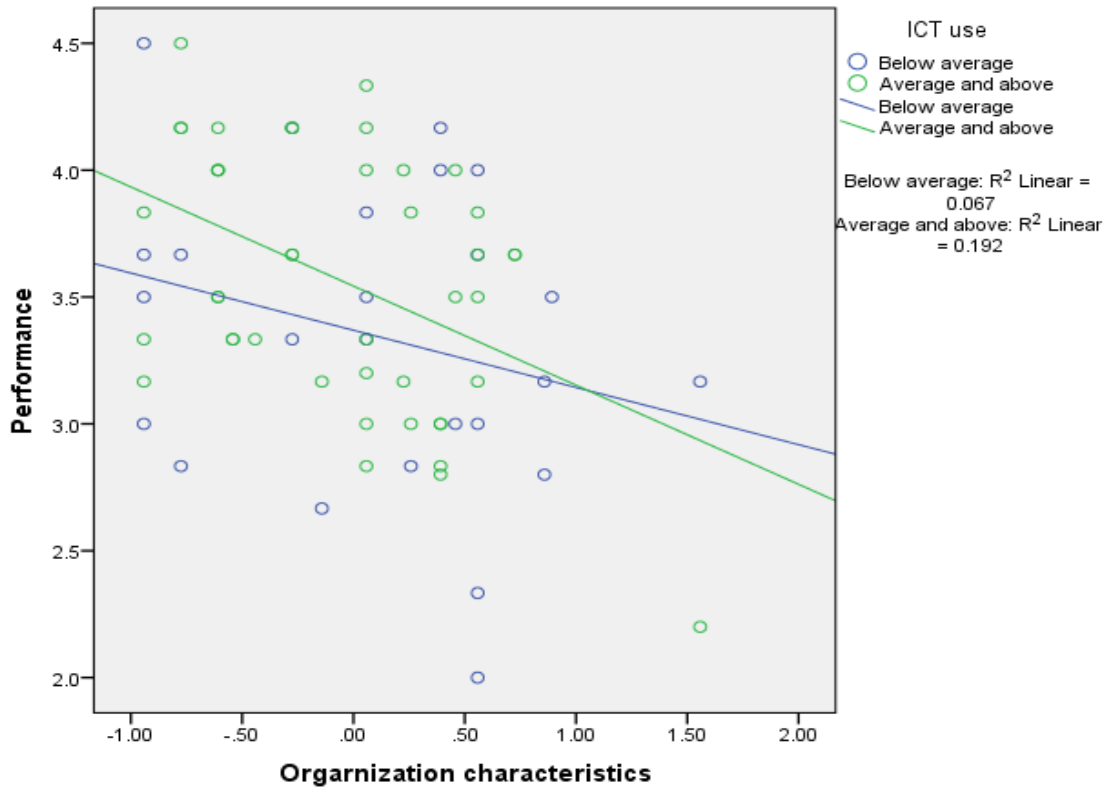


Figure 4. 1: Slope of moderated organizational characteristic

The scatter plot above suggests the moderating effect of ICT use on organizational characteristic risks and firm performance among the manufacturing firms in Kenya. Firms which have leveraged on ICT use have high performance as they are not affected by the organizational

characteristic risk. On the other hand firms which have not leveraged on ICT are not able to hedge themselves against organization characteristic risk and this is reflected in terms of reduced performance of their firms.

4.5.3 Discussion

Results from the qualitative analysis shows that manufacturing firms in Kenya do not consult their board of management when making supply chain decisions. These subjects their supply chain to risks because supply chains decisions such as make or buy require the in put of the top management to approve the commitment of resources (Hillary and Hui, 2007). Quantitative analysis also show a linear relationship between organizational characteristic risk and firm performance among the manufacturing firms in Kenya. This findings are in agreement with Juttner and Ziegenbien (2009); Amino (2013) that location challenges threatens the performance of the firms in terms of poor infrastructure which pose a risk to materials flow.

On moderation, ICT use moderated the relationship between organization characteristic and firm performance. This means that manufacturing firms that had leveraged on ICT use recorded an improved performance compared to those which had not because they were better able to deal with the threat of organization characteristic risk.

5.1 Summary, Conclusion and Recommendations

5.2.4 Moderating effect of ICT on organization characteristic risk and firm performance among the manufacturing firms in Kenya

Organization characteristic is defined as the traits that differentiates one firm from another and therefore determines the supply chain risk probability. This study operationalized the organization characteristic risk using employee size, employee location and firm ownership. The study established that manufacturing firms in Kenya do not have unnecessary employees and the current expenditure of the firms in Kenya is not high due to too many employees. The firms also do not have logistical challenges due to too many employees. The study also found out that manufacturing firms in Kenya are not located in areas that have poor road networks and they also do not experience delays because some of the materials are shipped from their global companies.

The board of management in the Kenyan manufacturing firms do not consult when making decisions. Manufacturing firms in Kenya are also not owned jointly with foreign investors who are involved in decision making. In addition, organization characteristic risk was statistically significant in explaining the performance of manufacturing firms in Kenya. A unit increase in organizational characteristic risk, led to a decrease in performance. This results agree with Juttner and Ziegenbein, (2009) that organization characteristics such as firm size can affect the performance of a firm since smaller firms lack the financial resources to employ competent human resource to manage those risks. Also, there was no significant moderating effect of ICT use on the relationship between organization characteristic risk and performance index of the manufacturing firms in Kenya. However, further investigation using the scatter plot revealed that

ICT moderates the relationship between organization characteristic risks and performance of manufacturing firms in Kenya.

Conclusion

5.3.4 Moderating effect of ICT use on the relationship between organization characteristic risk and performance of manufacturing firms in Kenya.

The findings of this study confirm that organizational characteristic risk is significantly influences the performance of the manufacturing firms in Kenya. It was possible to infer from the study that the relationship between organizational characteristic risk and the performance of the manufacturing firms in Kenya was negative and significant. We can therefore conclude that as organizational characteristic risk increases, the performance of the manufacturing firms in Kenya decreases. This is true because, results from the manufacturing firms demographics indicated that majority (35%) of the manufacturing firms in Kenya are owned by individuals. This increases the supply chain risks of this firms because the individuals do not consult when making strategic supply chain decisions. This affects the performance of their firms. Also, majority of the firms have been in operation for a short period of time (1-20 years). This means that the firms lack the experience in supply chain risk management and therefore are not able to adequately manage supply chain risks (Sinha, 2015).

ICT use moderates the relationship between organization characteristic risk although the moderation is not statistically significant. This can be explained by the fact that firms that have a high employee size are able to put up necessary structures and processes to manage the supply chain risks and therefore hedge themselves against the impact of the risks. Majority of the firms also located nearer Thika town (59%). This means that they have proper internet to timely mitigate risks along their supply chains.

Recommendations

5.5.4 Moderating effect of ICT use on the relationship between organization characteristic risk and firm performance among the manufacturing firms in Kenya

This study recommends that manufacturing firms in Kenya should consult prior to making supply chain decisions. This is because supply chain decisions such as make or buy have a strategic impact on the competitiveness of a firm. Consulting widely with supply chain professionals who have the relevant skills will reduce the risks associated with such decisions. Consultations should involve all the departments in a firm. Making the wrong supply chain decisions can lead to risks of poor quality products and procurement of highly priced products (Butchers, Lalwani & Mangan, 2008).

Manufacturing firms in Kenya should also adopt and invest more in ICT use. This is because from the study findings, firms that have proper ICT infrastructure and training are able to reduce the risk of organizational characteristic and this leads to improved performance. Firms should

therefore invest more human resource who are skilled in ICT use and who can use this skills to reduce the risks along their supply chains.

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