



## Effect of Logistic Information Integration Capability on Performance of Manufacturing Firms: The Moderating Role of Supply Chain Linkages

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### Abstract

Several studies content that firms may improve their performance by integrating their logistic capabilities. But such relationships may be affected by other externalities. Therefore, this study determined the role of supply chain linkages as a moderator on the relationship between logistic information integration capability and firm performance of manufacturing firms. The study adopted explanatory research design of cross-sectional nature. The target population comprised of 750 manufacturing firms registered under Kenya Association of Manufacturers. Sample size of 442 firms was selected using stratified and simple random sampling approaches. The findings of the study demonstrated that logistic information integration capability positively and significantly affects firm performance, subject to moderation effect of supply chain linkages. The implication of the study emphasizes the need for firm managers to understand and find ways to effectively manage the interactions between logistic information integration capability and supply chain linkages in order to improve performance and meet the customer requirements satisfactorily. Therefore, this study provides empirical evidence in manufacturing firms that supply chain moderates the relationship between logistic information integration capability and firm performance.

**Keywords:** Performance; Logistic Information Integration Capability; Supply Chain Linkages; Manufacturing firms, Kenya

### 1. Introduction

In every business organization, better performance through improved profits margins, return on assets (ROA), return on investment (ROI), shareholder returns, market share, customer service, social responsibility, employee stewardship etc remains key concern (Kristjansdottir *et al.*, 2016; Torres *et al.*, 2018; Owens *et al.*, 2019). Most of the research that focus on improving firm performance, lay out numerous strategies that should be deployed by the business managers in attempting to improve the firm's performance (Yang *et al.*, 2011; Painter *et al.*, 2018; Cegarra-Navarro *et al.*, 2019; Kolade *et al.*, 2019). In an endeavor to optimize performance, organizations are increasingly considering the logistics of the firm.

Logistics entails the procedural activities supporting production thrust to build company's effectiveness, and facilitate profitability in the business environment (Durst & Evangelista, 2018). Firms use logistics to help in morbidity from the point of origin to the point of consumption (Zijm & Klumpp, 2016; Fosso Wamba *et al.*, 2018). Meanwhile logistic capability of the firm is a component of the firm's resources (including assets, competencies, processes, firm attributes, information, etc) that permit them to implement plans that improve business efficiency and effectiveness (Najafizadeh & Kazemi, 2019). Logistic capabilities take several forms unique to each organizations including coordinating assets, competencies, organizational processes, information, knowledge among others (Schönsleben, 2018; Zijm *et al.*, 2019). In attempting to improve the logistics

capabilities, the importance of information has long been recognized and advocated in business environment. Accurate flow of information in a business organization ensure proper coordination of activities (Radhakrishnan *et al.*, 2018; Wang *et al.*, 2019). Therefore firms that are able to implement proper logistic information integration capability have been established to have better firm performance (Prajogo *et al.*, 2018; Salehi *et al.*, 2018; Shou *et al.*, 2018). Nevertheless, the operational success of logistic information integration capabilities of firms may be affected by other external factors that merit investigation.

Supply chain linkage allows the explicit and implicit connections that a firm creates with other entities within the supply chain (Morioka *et al.*, 2018; Tokito, 2018; Khan *et al.*, 2019). Firms undertake supply chain linkages by involving connected network of individuals, organizations, resources, and technologies (Nallusamy *et al.*, 2016). The pointers of supply chain linkages encompass trust, adaptation, communication and cooperation between stakeholders actively involved in the supply chain. Although there are a number of studies that have indicated that firms experienced positive outcomes through implementation supply chain linkages (Rungtusanatham *et al.*, 2003; Cagliano *et al.*, 2006; Won Lee *et al.*, 2007; Klassen & Vereecke, 2012), there is less attention and empirical studies on the moderating role of supply chain linkages on logistic information integration capability and firm performance. Therefore, the aim of this paper was to evaluate the role of supply chain linkages as a moderator of logistic information integration capability and performance of manufacturing firms, in the process testing the following hypotheses:

- H<sub>01</sub>: There is an association between firms' logistic information integration capabilities and firm performance
- H<sub>02</sub>: There is a moderating effect of supply chain linkages on the association between the firms' logistic information integration capability and firm performance.

## 2. Literature Review

### 2.1 Firm Performance

There is vast amount of literature on firm performance and the extent to which performance allow firms to achieve their set of targets (Wamba *et al.*, 2017; Erhardt, 2018; Juhn *et al.*, 2018). Firm performance targets vary greatly but are generally categorized as objective (numerical) and subjective (judgmental) metric indicators. Performance can also be construed in the form of quality, flexibility, and time delivery (Lomberg *et al.*, 2017). In some instance, performance may be examined through services and or costs

dimensions (Jayaram & Xu, 2016). Whenever using costs in the trying to understand performance measures, price related to the firm becomes significant while service aspect of the performance focuses on flexibility of service delivery, and timely delivery of services (Jayaram & Xu, 2016). On the basis of cost, performance can also be viewed as financial or non-financial (Oztekin *et al.*, 2015).

Firm performance is measured in terms of effectiveness, efficiency, relevance, and financial practicality (Arena *et al.*, 2015). Effectiveness measures the degree to which the organization is successful in achieving its internal strategy, efficiency refer to how well the organization utilizes its resources to in pursuit of its goals, relevance measure provides information on the degree to which stakeholders believe that the organization is relevant in meeting its needs. Financial viability measures the financial feasibility the organization in the short and long term. Several financial measures are available to the organizations such as calculation of profits, Return on Assets (ROA), Return on Equity (ROE), Return on Investment (ROI), Return on Sales (ROS), Earning before Interest and Tax (EBIT), Economic Value Added (EVA) etc (Pekkola *et al.*, 2016; Strouhal *et al.*, 2018; Aydiner *et al.*, 2019). The financial returns are easily available in every organizations in forms of regular financial reports thus from research perspective, these measures makes it easy to determine performance (Hope *et al.*, 2013; Sunder, 2016). However, most often, organizations are not willing to provide accurate financial performance, while others find it untenable to maintenance transparency in financial reporting and thus will provide reports that are inaccurate, exaggerated or out rightly false (Barth & Schipper, 2008). In recent times, organizations are attempting to evaluate firms performance using non-financial measures such as market share, innovation rate customer service, customer satisfaction, social responsibility, customer retention or loyalty employee stewardship etc (Goel, 2017; Omran *et al.*, 2019), that show some extent of subjectivity as measures (Singh *et al.*, 2016). Other studies have used a combination of both objective and subjective measures (Lomberg *et al.*, 2017). Nevertheless, there is still no consensus among researchers as to which specific variables should be exclusively used as measure of indicators of firm. Regardless of its possible outcome, subjective measures have been widely used to determine performance in business organizations (Singh *et al.*, 2016; Vij & Bedi, 2016). Consequently, this study chose to measure firm performance using customer satisfaction, customer retention or loyalty, profitability and sales growth which combines some form of subjective measurement indicators and objective indicators to derive at a more robust performance indicator.

## 2.2 Logistics Information Integration Capability

Logistics capability encompass part of a firm's resources including assets, competencies, firm attributes, organizational processes, and information that allow for the implementation of strategies intended at improving efficiency and effectiveness (Zawawi *et al.*, 2017; Rajagopal *et al.*, 2018; Wen & Min, 2018). In attempting to achieve effectiveness of the logistics capabilities, firms pay more attention to process capability, learning capability, service reliability capability, flexibility capability and information integration capability (Sandberg & Abrahamsson, 2011; Wilding *et al.*, 2012). Firms are aware that information can be lifeblood when it comes to operational success, thus logistic information integration capabilities remains one of the key dimensions of logistic capabilities.

Logistic information integration capabilities link different levels in the system such as information sources, such as order information, purchasing in order, production information plan, the packaging information schedule, the transport information, distribution information, financial disbursement information etc (Neubert *et al.*, 2018). Logistic information integration capability also foster timely information interchange which is essential in handling changes within the organizational processes to meet up to the customer requirement (Ketikidis *et al.*, 2008; Voronkova *et al.*, 2017). Accordingly, logistic information integration capability plays a crucial role in enhancing morbidity of goods and services, which relies on logistics capability of the firm. Logistics information integration capabilities of a firm ensures that crucial documents that can be used to assess and manage supply chain (Gunasekaran *et al.*, 2017b). For most firms, logistics information integration systems are used to enhance inventory control, track orders and materials and monitor resource utilization (Neubert *et al.*, 2018; Yu *et al.*, 2018). Subsequently, well-articulated logistic information integration capabilities guides the entire organization and help it to coordinate logistics operations process. Therefore, studies on logistics information integration capabilities remain relevant to date.

## 2.3 Supply Chain Linkages

In business environment, there exist system of individuals, organizations, resources, information and resources who perform a crucial role of helping the organization to move their product or service from supplier to customer (Nallusamy *et al.*, 2016). These linkages have therefore received considerable attention in supply management literature to increase firm responsiveness and synchronize their efforts with suppliers (Stevens & Johnson, 2016). These studies indicate that firms are aware of the interdependencies existing between internal operational processes with suppliers and

customers (Prajogo *et al.*, 2018). Firms therefore attempt to coordinate their operations by developing inter-organizational linkages with customers and suppliers. Therefore information that will enhance the quality of the linkages (i.e. supply chain linkages) are important to the firm, suppliers and customers (Prajogo *et al.*, 2018). Since activities that allow for explicit and/or implicit connections between the firm to facilitate flow of inputs from suppliers into the firm and of outputs from the firm to customers are important (Mangan & Lalwani, 2016), supply chain linkages have crucial role to play in the business of manufacturing sector.

## 2.4 Logistic Information Integration Capability and Firm Performance

Many researchers content that timely and accurate information flow is crucial for the firm and can directly affect the overall firm performance (Graca *et al.*, 2017; Kembro *et al.*, 2017; Prajogo *et al.*, 2018) including reducing costs and improving customer service. Logistic information integration capability in an organizational element of satisfying customers' perceived information about order status, product availability, delivery schedule and invoices as well as increase the flexibility with regard to methodologies of resources utilization. As such, there are direct effects of logistic information integration capability and overall performance of the firm (Sabherwal & Jeyaraj, 2015; Gu *et al.*, 2017).

Proper communication of information along the supply chain enables the combination of operational and information flow, which provides transparent, networks for suppliers and customers thus creating effective firm management. According to Zhang *et al.*, (2011), logistic information integration capability increases supply chain visibility through collaboration among supply chain members via real-time data sharing and enhance time-based delivery thus increasing firm performance. With sufficient information and with increased visibility and communication between various logistics operations and shareholders, different parties along the supply chain can promptly make appropriate decisions which in turn improve efficiency in logistics management. In fact, the recent advanced in technology have assisted in improving firm performance through improved accuracy in information management (Inkinen, 2016).

There are several empirical evidences supporting logistic information integration capability in improving firm performance (Maiga *et al.*, 2015; Wong *et al.*, 2015; Singh & Teng, 2016; Gunasekaran *et al.*, 2017a; Kim & Chai, 2017) including when it act as a moderator (Cai *et al.*, 2016) In recent days, a number of researchers had confirmed that improved information exchange could have a substantial impact on overall firm performance (González-Gallego *et al.*, 2015; Inkinen, 2016). A study by Tim (2007) confirmed that through the use of communication

tools, such as the web sites, organizations are capable of enhancing the capacity of their values chains. A study on information technology and logistics management in Finland confirmed that information when applied to logistics/supply chain management was beneficial to firm through customers relations (Hyvönen, 2007).

### 2.6 Moderating Role of Supply Chain Linkages on the Relationship between Logistic Information Integration Capability and Firm Performance

It is clear that logistic information integration capability between the firm and customers brings about a well-coordinated flow of materials from the key suppliers to the production site and eventually distributing the goods to customers (Li *et al.*, 2019). Subsequently firms are developing explicit linkages with suppliers and customers to improve the firm performance (Rungtusanatham *et al.*, 2003; Gimenez *et al.*, 2012; Leuschner *et al.*, 2013; Duarte & Cruz-Machado, 2015; Li *et al.*, 2015; Prajogo *et al.*, 2016; Jajja *et al.*, 2017). Supply chain linkages improve the firm performance due to information improvement in information system (Gunasekaran & Ngai, 2004; Patnayakuni *et al.*, 2006; Prajogo & Olhager, 2012). Better performance of the firm employment supply chain linkage occur due improved consistency, delivery time and volume changes (Handfield *et al.*, 2015). Meanwhile there are also studies relating supply chain linkages with improved the firm's operational performance, through improvement of cost, dependability, flexibility, quality (Lin & Tseng, 2016; Prajogo, 2016) and efficiency (Wu *et al.*, 2006). If properly executed, then supply chain linkages may diminish demand amplification effects along the supply chain, thus reducing inventory-carrying costs and enhance the overall firm performances (Stadtler, 2015; Flynn *et al.*, 2016). These results indicate that supply chain linkages can affect the firms' performance but very few studies have actually

investigated their mediating role on the logistic information integration capability and firm performance. Nevertheless, the role of supply chain linkage as a moderating variable has not been extensively been investigated. In view of the above therefore, this study determined the moderating role of supply chain linkages on the relationship between logistic information integration capability.

### 2.7 Theoretical Perspective

This study used the resource-based view which asserts that firms can gain and sustain competitive advantages by developing and positioning valuable resources and capabilities or through acquiring and controlling the resources (Barney, 2001; Schroeder *et al.*, 2002; Kraaijenbrink *et al.*, 2010). In the context of RBV, organizations are viewed on how their assets, systems and capabilities are used in creating value. In most cases, the firms that gain advantage are those capable of accumulating resources and capabilities that are rare, valuable, non-substitutable and difficult to imitate. Capabilities of the firms take diverse forms such as innovation, organizational learning, and stakeholder integration (Siguaw *et al.*, 2006). Importance of the resources of the form, the original form of RVB predict that competitive advantage results from those resources and capabilities that are possessed and controlled by a single firm. Accordingly, the focus has been on those capabilities and resources contained within the organization. Nevertheless, a firm's resources extending beyond their boundaries, is also capable of creating a competitive advantage and should also be considered. There is a relatively large literature in logistics services reliability capability considering the realm of RBV. The RBV therefore can present a theoretical foundation for this study to examine the relationships between logistic information integration capability, supply chain linkages and firm performance.

### 2.8 Conceptual Model of the study

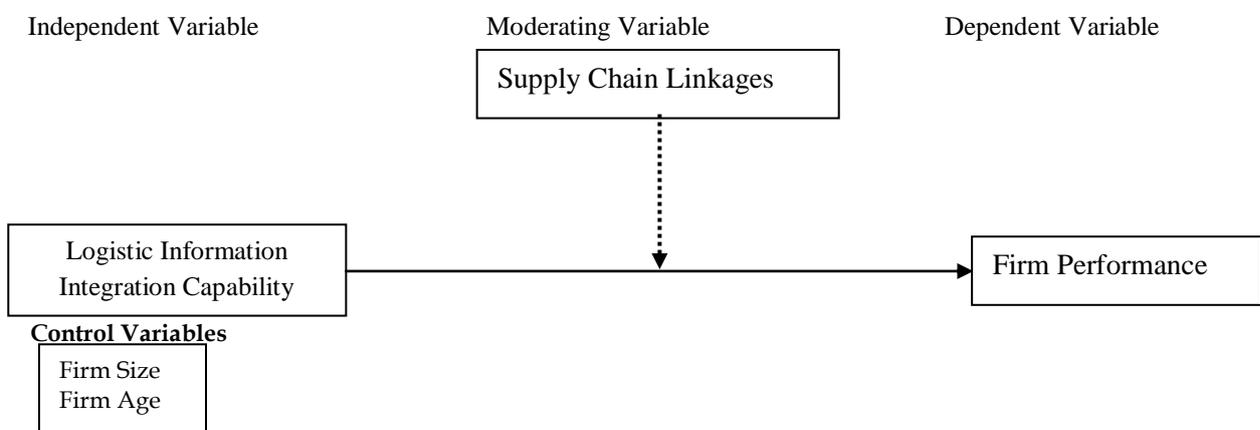


Fig 1: Conceptual Framework

$$FP = \beta_0 + \beta_1 FS + \beta_2 FA + \beta_3 LIIC + \beta_4 (LIIC * SCL) + \varepsilon$$

### 3. Methodology

This study is in line with positivism approach, which seeks to use existing theory to deduce and formulate variables. The study adopted explanatory research design of a cross sectional nature. Explanatory research design analyses the cause-effect relationship between two or more variables (Leavy, 2017; Rahi, 2017). Hence the design was appropriate to the study because the research sought to establish a cause-effect relationship on the three constraints which is logistic information integration capability, supply chain linkages and firm performance. The unit of analysis was 750 manufacturing firms registered with Kenya Association of Manufacturers (KAM, 2018). The targeted respondents were purchasing and logistic managers. Stratified sampling combined with simple random sampling technique was used to select sample size. Structured questionnaires used to collect data for dependent, moderating and independent variables, where each item was subjected to Five-point Likert scale ranging from SD to SA.

The dependent variable was firm performance measured using subjective measures of sales volume, profits, market share, customer satisfaction, customer loyalty and new products over the past three years as described in previous research studies (Farris *et al.*, 2010; Santos & Brito, 2012; Hill & Alexander, 2017). The independent variable was logistic information integration capability was measured based on literature from previously published methods (Lu & Yang, 2010; Wiengarten *et al.*, 2014). The moderating variable, supply chain linkages measurements also followed previous protocols (Shepherd & Günter, 2010; de Souza Miguel & Brito, 2011; Gopal & Thakkar, 2012). To reduce the effects of confounding variables, the study included two control variables vis: firm size quantified by the number of employees and firm age (number of years in operation).

The reliability of the research instrument was tested using the internal consistency technique by employing Cronbach Alpha value of 0.7. Internal and external validity was assessed to establish whether the research instrument truly measures what it is intended to (Patino & Ferreira, 2018). Descriptive statistics used were the mean, standard deviation, frequencies and percentages; inferential statistics was Pearson correlation coefficient to test the relationship and strength between the variables. Multiple regression models were used to test the hypotheses.

#### For Direct effect with Control Variables

$$FP = \beta_0 + \beta_1 FS + \beta_2 FA + \beta_3 LIIC + \varepsilon$$

#### For Moderating Role

## 4. Results/Findings

### 4.1 Socio-Demographic Profiles of the Respondents

The overall results of the socio-demographic background of the respondents are presented in Table 1. There were a higher proportion of the males compared with females suggesting more male employees in the firms with male (53.2%, n = 235) and female (46.8%, n = 207). Most of the employees (45.7%, n = 202) were aged 36 to 55 years followed by 26–35 years. The least but not last is 21.3% (94) are above 18 to 32 years; lastly, 1.4% (6) is above 63 years. In terms of educational status, 43.9% attained Bachelor degree, 27.9% Master degree, 18.3% Diploma, 3.6% (16) of the respondents have Certificate level of education. Majority of firms employed between 50 and 249 employees (46.4%) followed by > 250 employees (24.7%) while 5% had less than 10 employees. Finally, overall age of the firm indicated that most had been operational operation from 10 to 30 years followed by those operating between 51-70 years. 26.2% had operated for a period ranging from 51 to 70 years while 3.6% (16) were in operation for less than 10 years.

### 4.2 Test of Relationships

Results showing correlations between firm performance, Logistic Information Integration Capability, Supply Chain Linkages and control variables are shown in Table 3. Logistic information integration capability had a positive and significantly association with firm performance ( $r = 0.665$ ,  $p < 0.05$ ). Also, the supply chain linkage was positively and significantly correlated with firm performance ( $r = 0.663$ ,  $p < 0.05$ ). The two controls variables were significantly related with firm performance ( $P < 0.05$ ).

### 4.3 Test for the Direct Effect

The regression test for both the control and the independent variables (direct effect) were done. The coefficient of determination explained the extent of the variation change of predictor variables (Independent variables) against the dependent variable (firm performance). The results are shown in Table 4 projected that all the predictors explain 49.6% of the variation on firm performance, where (R-squared = 0.496, Adjusted R-squared = 0.493). The findings also indicated that the coefficient of determination was significant as indicated by  $F = 143.736$  ( $P < 0.05$ ). For the control variables, both firm size ( $\beta = -0.260$  and  $p$ -value  $< 0.05$ ) and firm age ( $\beta = 0.298$  and  $p$ -value  $< 0.05$ ) which significantly influenced the firm performance.

The first hypothesis of this study states that logistic information integration capability has no significant

effect on performance of the firms. The findings reveal that logistic information integration capability

positively affected firm performance ( $R^2 = 0.496$ ,  $\beta = 0.628$ ,  $P = 0.000$ ; Table 4).

**Table 1: Socio-Demographic Information (n = 442)**

Socio-Demographic Attributes	Variable Attributes	Frequency	Percent
Gender (n = 442)	Male	235	53.2
	Female	207	46.8
Age	18-25 years	94	21.3
	26 – 35 years	140	31.7
	36 – 55 years	202	45.7
	< 55 years	6	1.4
Level of Education	Secondary school	5	1.1
	College Certificate	16	3.6
	College Diploma	81	18.3
	Bachelor degree	194	43.9
	Master degree	123	27.8
No. of Employees	PhD degree	23	5.2
	1-10	22	5.0
	11-49	106	24.0
	50-249	205	46.4
Firm Age	> 250	109	24.7
	< 10 years	16	3.6
	10-30 years	136	30.8
	31-50 years	85	19.2
	51-70 years	116	26.2
	> 70 years	89	20.1

**Table 2: Reliability of the Research Variables Measured by the Research Instruments**

Variable	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N
Logistic Information Integration capability	0.802	0.802	7
Supply Chain Linkages	0.819	0.814	11
Firm Performance	0.757	0.757	6

**Table 3: Summary of Correlation Results of Study Variables**

	FP	LIIC	SCL	FS	FA
FP	1				
LIIC	0.665**	1			
SCL	0.663**	0.613**	1		
FS	0.023**	0.141**	0.052**	1	
FA	0.284**	0.249**	0.084**	0.655**	1

\*\* Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed).

*Keywords:* **FP** (Firm Performance); **LIIC** (Logistic Information Integration Capability); **SCL** (Supply Chain Linkages); **FS** (Firm Size); and **FA** (Firm Age).

**Table 4: Multiple Linear Regression Statistics Showing the Relationship between Logistic Information Integration Capability and Performance of Manufacturing Firms**

	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	2.042	0.139	-	14.655	0.000	-	-
<b>Control</b>							
Firm Size	-0.181	0.031	-0.260	-5.791	0.000	0.553	1.808
Firm Age	0.142	0.022	0.298	6.485	0.000	0.525	1.904
<b>Predictors</b>							
LIIC	0.565	0.032	0.628	17.918	0.000	0.443	2.259
<b>Summary statistics</b>							
R	0.704a						
R Square	0.496						
Adjusted R Square	0.493						
Durbin-Watson	1.987						
ANOVA (F stat)	143.736						
ANOVA (F prob)	0.000						

A Dependent Variable: Firm performance

Keyword: **LIIC** (Logistic Information Integration Capability)

During the study, the null hypothesis for the indirect effect predicted that there is no significant moderating effect of supply chain linkages on the relationship between logistic information integration capability on firm performance. The results of the effect are

presented in Table 5. The results indicate a negative relationship of beta coefficient with ( $\beta = -0.1652$ ),  $P$ -value  $= < 0.000$ ). Thus, the null hypothesis was therefore rejected.

**Table 5: Moderating Effect of Supply Chain Linkages on the Relationship between Logistic Information Integration Capability and Performance**

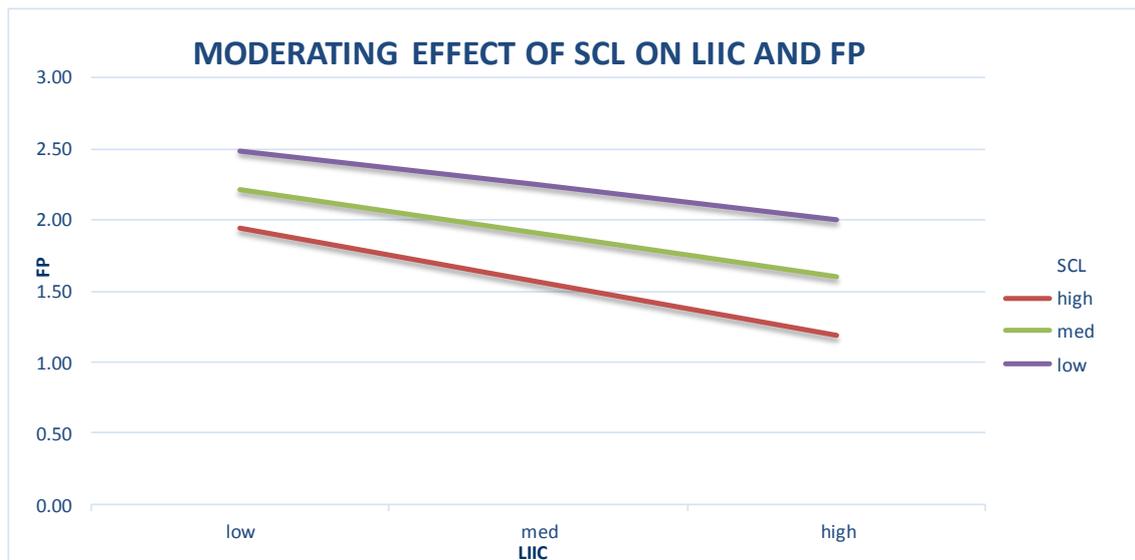
Predictors	Model (FP) b1C'	
	$\beta$	$P$ -value
Firm Size	-0.1417	0.000
Firm Age	0.1227	0.000
LIIC	0.1226	0.000
SCL	0.1663	0.000
LIIC×SCL	-0.1652	0.000
<b>R<sup>2</sup></b>	0.6910	
<b>F</b>	162.1032	0.000

Number of bootstrap samples for percentile bootstrap confidence intervals: 5000

Keywords: **LIIC** (Logistic Information Integration Capability); and **SCL** (Supply Chain Linkages).

Figure 2, predicts the nature of moderating effect of supply chain linkages on the relationship between logistic information integration capability and performance. At the lower levels of logistic information integration capabilities in the mod graph, performance of manufacturing firms with low supply chain linkages is higher than those firms with high supply chain linkages. However, at higher levels of

logistic information integration capability, performance of both firms with high and low supply chain linkages declines slightly. Nevertheless, firm performance of the manufacturing firms with low supply chain linkages declines at a higher rate compared with firms with higher supply chain linkages.



**Fig 2: Moderating Effect of Supply Chain Linkages (SCL) on the Relationship between Logistic Information Integration Capability (LIIC) and Firm Performance (FP)**

## 5. Discussion

Logistic information integration capability significantly affected the firm performance indicating further that each unit increase in logistic integration capability, firm performance increases by 0.628 units. These results concur with several previous studies (Klein & Rai, 2009; Pereira, 2009; Wong, 2013; Huo *et al.*, 2016) most of who observed that logistic information integration capability increases the firms capacity to respond to threats and contingencies hence able to improve the positive attributes of firm performance. It is thus sensible therefore to postulate that logistic information integration enabled the firms to coordinate flow of materials along the value chain hence enabling the supply chain entities to prepare well for contingencies. The positive relationships may also be related to reduced transaction costs (Maiga *et al.*, 2015; de Camargo Fiorini & Jabbour, 2017; Gunasekaran *et al.*, 2017a).

The second hypothesis of the study which postulated that there is no significant moderating effect of supply chain linkages on the relationship between logistic information integration capabilities on firm performance was also rejected implying that supply chain linkage is a significant moderator on the relationship between logistic information integration capabilities on firm performance. This suggests that performance of the firm was affected by logistic information integration capability but supply chain linkage generally dictated the possible outcomes. This implies that, the lower the emphasis on supply chain linkages, the lower the effect of logistic information integration capability on supply chain linkages and firm performance. The present findings concur with those reported by Lee, (2000) who established that supply chain linkage is important for redesigning

decision rights, workflow, and resources between supply chain members to leverage improved performance. Supply chain linkages could also have improved the relationship between logistic information integration capabilities with firm performance through improvement of cost, dependability, flexibility and quality as outlined in previous studies (Lin & Tseng, 2016; Prajogo, 2016) and efficiency (Wu *et al.*, 2006). Similarly, Lee *et al.*, (2007) explicitly established that supplier linkages had a positive effect on the reliability of supply chain partners and cost. The results also conform with that of Simatupang *et al.*, (2004) which indicated that good co-ordination in the supply chain reduces uncertainty in manufacturing networks which in turn translates into improved firm performance. It is also probable that supply chain linkages may diminish demand amplification effects along the supply chain (Stadtler, 2015; Flynn *et al.*, 2016).

## 6. Conclusion

This study tested a null hypothesis that there no significant empirical relationship between Logistic information integration capability and firm performance ( $H_{01}$ : There is no significant association between firms' logistic information integration capability and firm performance). Moreover, we further postulated that the assumed relationship is not moderated by supply chain linkage ( $H_{02}$ : There is no moderation effect of supply chain linkages on the association between the firms' logistic information integration capability and firm performance). Whereas the study provided evidence logistic information integration capability positively and significant affected firm performance, subject to moderation by supply chain linkages. For a long-term development,

manufacturing firms should understand that the interplay between information integration capabilities and supply chain linkages are massively important in determining the performance of a firm.

Moreover, this paper argues that the market characteristics of the firm are determined by the optimal strength of the supply chain linkages amongst partners in the supply chain. In highly competitive markets where differentiation is the key competitive advantage, strong linkages are required to deliver innovative products through proper utilization of logistic capabilities and supply chain linkages models. Manufacturing firms have integrated systems for simplifying a physical flow of the product among warehousing, production, packing and transport department. Looking at the contributions by various scholars based on available information from literature, if the firm is economically linked to suppliers for inputs and to customers for sales, significant events at one firm can influence the firm performance of its directly linked with suppliers and commercial customers.

## 7. Managerial and Theoretical Implications

The study findings established that better performing manufacturing firms exhibit a higher level of logistic information integration capabilities. Therefore, there is need for manufacturing firms to adopt integrated logistic information capabilities to that enables them to benefit from reliable order cycles and reduce various inventory costs. Besides, exhibiting superior performance, they need to collect and process logistic information and share related logistic information with other departments. This will aid firm in planning and dedicating sufficient resources towards attaining firm effectiveness in terms of operations and improve the overall performance. Manufacturing firms should invest only on those capabilities that can create a competitive differentiation strategy for sustainable performance. Firm management must should develop unique capabilities internally, as well as recognizing the additivity of supply chain linkages in the firm performance path to achieve best outcomes.

The research findings of this paper have several implications for academics and other stakeholders involved in theory building. First, this study extends previous logistic capabilities and firm performance frameworks in developing countries by considering different key dimensions of logistic information integration capability practices in Kenyan manufacturing firms and moderating relationship of supply chain linkages and performance respectively. This paper is one of its kind in emerging economies, examining the moderating role of supply chain linkages on the relationship between logistic information integration capability and firm

performance using the highly rigorous method of process macro and mod graph representation.

In emphasizing the importance of Resource Based view theory, firms should evaluate potential factors that can be deployed to confer to firm performance including using available resources to add value to their products. It also encourages firms to produce their products in a way that they cannot be imitated or substituted to increase their performance. Therefore, the contribution of this theory is validated by this study since it encourages the management of manufacturing firms to invest in improving supply chain linkages to develop, nurture and maintain key resources and competencies in order to improve the performance of the firm.

## 8. Recommendation for further Research

The study used a single moderating variable, therefore future studies should look out how other moderating variables could potentially affect the relationship. Secondly future studies should investigate how the moderating variable could be affected by other mediating variables. The study included only one constraints of logistic capabilities, there could be other relevant factors that may be perceived as important constructs by supply chain partners but were excluded from this study. Future researches, therefore, may consider more factors, like, competitive advantage, logistic learning capabilities, logistic process capabilities, logistic flexibility and logistic process capabilities.

## Acknowledgement

I am grateful to Prof. Charles Lagat, Dr. Joel Chepkwony and Dr. Nicole Harggerty for their professional guidance, inspiration, patience, support and advice throughout the entire process of developing this research paper. Our special thanks go to Moi University for their administrative and technical support.

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