

Impact of Logistics Information Technology on Organisational Performance: Mediating Role of Supply Chain Integration and Customer Satisfaction

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ABSTRACT

The current market setting breeds stern competition among business organisations. This has made firms that rely on only in-house core competencies to reengineer their strategies and approaches to look beyond their boundaries to tap into the supply chain capabilities and benefits. This has ignited our interest to conduct this study to investigate how logistics information technology can enhance supply chain integration and improve firms' ability to increase customer satisfaction to achieve high organisational performance in the distribution industry in Ghana. We use survey data we collected from 179 managers at least 5 years' experience in procurement, supply chain, distribution, information and logistics. All the hypotheses we tested using SmartPLS-3 were supported and accepted. We have discovered that firms that adopt logistics information technology have a great chance of influencing their performance through customer satisfaction, and both internal and external integration with customers and suppliers. Limitations are explained in conclusion.

Keywords: Logistics Information Technology, Supply Chain Integration, Organisational Performance, Customer Satisfaction

INTRODUCTION

The rapid technological evolution offers current organisations, both opportunities and threats through the changing demands of governments, policymakers, customers and suppliers. This has influenced the strategic paths of firms, which seek competitive positions in the market and change their performance through customer satisfaction. Many scholarships recognise information technology as a critical influencer of firm performance that can help firms remain relevant to their customers and retain competitiveness in a dynamic and unstable market. Information technology has been applied in many facets of firms, including supply chain and logistics management, financial management, manufacturing and human resource management, which engendered the improvement in operational effectiveness and efficiency.

Particularly, information technology has been given the recognition of being a solution to the problems of today's difficult-to-create-and-maintain competitive advantage.

Information technology involves the use of technological tools to plan, organise, direct and control firm activities and processes to enhance organisational performance through the development of competitive capabilities. Since firms adopted the supply chain management philosophy, information technology is identified and used to effectively and efficiently manage supply chain activities and processes within firms and among supply chain partners. These technological tools are potent in managing and controlling logistics activities.

Xuhua (2008) argues that the prime source of creating and maintaining competitive advantage available to firms has shifted from saving raw and finished inputs (first profit source) and improving labour productivity (second profit source) to building effective logistics and supply chain system (third profit source). According to the dynamic capabilities theory, firms need to configure, integrate and share resources, skills, information and technologies with their supply chain partners to create competitive advantage and improve performance. It is also argued that

firms which possess unique resources only create little competitive impact unless it partners with its supply chain actors (Lambert and Cooper, 2000; Carter et al., 2015; Gligor and Holcomb, 2012). This is an indication that firms can develop competitive capabilities and improve performance through effective management of the supply chain by adopting supply chain integration practices.

Many scholars argue that for a firm to obtain and sustain a competitive position in a market, it is pertinent for it to build strategic business connections with their supply chain partners (Min et al., 2005; Wang and Chan, 2009). It is posited that firms may lose their customers to competitors who are capable of providing customers with quality goods and services at a relatively lower cost. Integration with a firm's suppliers and customers can influence performance.

According to Kang and Moon (2016), internal and external integration of supply chain enhances sharing of information, skills, knowledge and performance of the supply chain in important processing activities. Supply chain integration is a concept that has gain notoriety among scholars and supply chain practitioners due to its relevance in creating a competitive performance. Any firm that effectively integrates its processes and activities with supply chain partners improves customer satisfaction, which leads to an enhancement in firm performance.

Customer satisfaction is key to the survival of a firm. Firms who seek continues relevance in today's market need to adjust to the rapidly changing demands of customers. Customers are satisfied when their needs are addressed to their expectations. However, the opportunistic and impulsive nature of the current market possesses plenty of challenges to firms in meeting daily customer requirements of product quality, flexibility, low cost and quick responsiveness. It is posited that firms may lose their customers to the competitors who are capable of providing customers with quality goods and services at a relatively lower cost. This has triggered the need to look for approaches to enhance customer satisfaction through cost reduction, less lead-time, product differentiation and quick response. Hence, the adoption of logistics information technology.

Several studies have been conducted into the adoption of information technology, supply chain integration, customer satisfaction and firm performance. However, the existing literature has failed to thoroughly explore

the intermediary roles supply chain integration and customer satisfaction instantaneously play between organisational performance and logistics information technology in distribution firms, particularly, in Ghana. Again, today's distribution firms are faced with the challenge of meeting the irregular and frequent changing customer needs of quick response, low cost of products and product differentiation. This requires the urgent need to pay attention to their strategies and tools used to control activities and processes and their interactions with supply chain partners to improve performance. This has necessitated the need for us to conduct a study in this area that is critical to the survival of distribution firms in the current uncertain business environment.

The primary purpose of this work is to explore the intermediary roles supply chain integration and customer satisfaction play between organisational performance and logistics information technology. We start by exploring the direct correlation between logistics information technology, supply chain integration, customer satisfaction and organisational performance. Again, we investigate the indirect combined impacts of logistics information technology and both customer satisfaction and supply chain integration on the performance of organisations. This study answers the following questions:

Que 1. What relations exist between logistics information technology, supply chain integration, customer satisfaction and organisational performance?

Que 2. Do supply chain integration and customer satisfaction mediate the connection between logistics information technology and performance of organisations?

The first section of the work details the introduction. The following sections contain a literature review on logistics information technology, firm performance, supply chain integration and customer satisfaction, theoretical background and development of hypotheses, methodology, data analysis, results and discussion, and, finally, conclusions which discuss the implication and the limitations of the work.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Theoretical Background

There are three theories that form the foundation of this study. These theories include relational theory, resource-based theory and extended resource-based approach.

The findings of Hunt and Lambe (2000) assert that the resource-based view theory suggests that firms create and maintain competitive advantage because they have either acquired or/and developed heterogeneous rare, uncommon, not natural to imitate and substitutable resources, and immovable capabilities. In-house resources are the overall assets, capabilities, processes and attributes, information, and skills that firms control to improve effectiveness and efficiency (Kim, 2017). The resource-based view theory posits that there is a need for firms who want to create and sustain a competitive advantage to develop unique information technology capabilities and resources. According to Leuschner et al. (2013) and Kim (2017), the resource-based view theory highlights internal integration.

The findings of Dyer and Singh (1998) state that valuable resources of organisations transcend their boundaries because some unique resources are encapsulated in the connections existing among firms. This is what we call the relational view. The scholars of this theory argue that firms' relationships with partners primarily drives their ability to create and sustain competitive advantage (Kim 2017). Hence, there is a need for firms to forge good relationships with their supply chain partners for them to create competitive positions and improve their performances.

Kim (2017) and other studies in relational theory argue that competitive advantage is created and maintained through assets, capabilities and complementary resources created

through relationship and effective governance. Teece et al. (1997) posit that assets built through relationships stem from the link between the firm and its institutional partners. It is worth noting that firms that strive to achieve competitive advantage and continue to remain relevant in our internationalised market must integrate with both their suppliers and customers. Hence, the relational view theory backs external supply chain integration.

The extended resource-based view serves as the trade-off between relational view and the resource-based view (Lavie 2006). The resource-based view assets that firms should possess and have total control over their unique resources. However, Hunt and Davis (2012) argue that extended resource-based view proposes a concept, which states that firm's access to, right to use, and authority to enjoy resources include the organisation's sustained competitive advantage. Kim (2017) posits that organisations should tap into the resources of their supply chain members to create a sustainable competitive advantage to improve performance. This is an indication that the extended resource-based view suggests that firms can create sustainable competitive advantage through interdepartmental integration, customer integration and supplier integration.

The relationships between the logistics information technology, customer satisfaction and supply chain integration have been theoretically explained using the above theories.

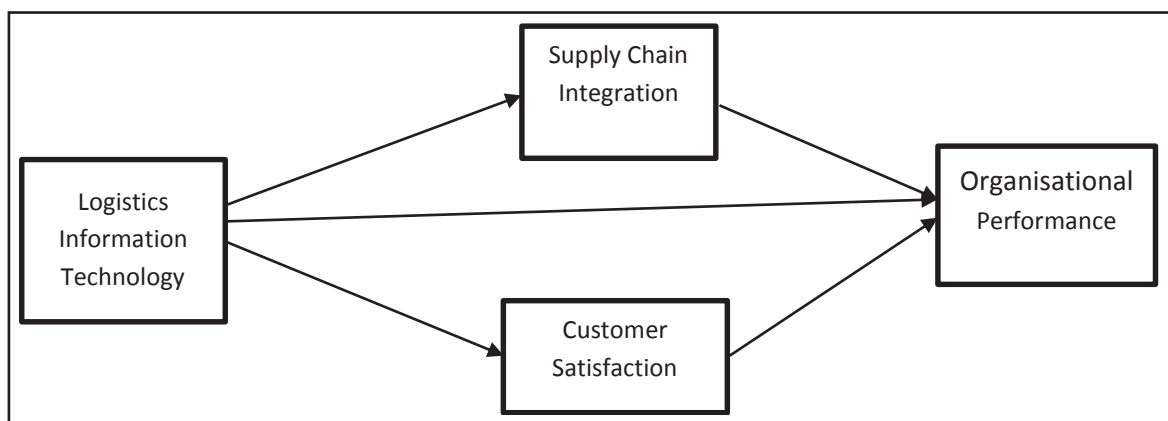


Fig. 1: Conceptual Model

Hypotheses Development

Logistics Information Technology and Supply Chain Integration

Logistics is one of the core areas of supply chain

management that influence supply chain efficiency and effectiveness. Logistics management involves the practice of planning and handling the movement of products (raw materials and services) to the customer at the right time, right quantity, right quality, and the right place and right

price. Due to the significant role performed by logistics in firms' ability to create competitive advantage and improve performance, technological systems have been designed to enhance the effectiveness and efficiency of implementing policies and using logistics facilities.

According to Franklin (2018), the capacity of information technology to change and interrupt the activities of firms, coupled with the support to international firms in controlling the activities in their supply chains has gotten to the level where we can say that the technological age has arrived. Logistics information technology is a technological tool used to influence and improve logistics activities and processes to enhance customer satisfaction and increase firms' performance. Again, logistics information technology is a system that is adopted and used by firms to manage the embodiment of their supply chain activities through sharing of information leading to the creation of value and competitive capabilities and achievement of organisational goals through customer satisfaction. Logistics information technology is employed in areas of document handling, transportation, strategic planning, warehousing, inventory, supplier and customer management (Turek, 2013).

Franklin (2018) established that logistics information technology settles issues relating to identifying and locating suppliers who are dependable, (strategic sourcing), forecasting demand and converting demand into requirements of supply chain, management of distribution, fulfilling customer order, management of warehouse, inventory control, management of transportation, generation of import-export documents and monitoring, tracking and tracing of goods in transit, and management of risks. These logistics information technologies comprise electronic data interchange (EDI), radio frequency identification (RFID), distribution management systems, enterprise resource planning, (ERP), customer relationship management systems and transport management systems (Lyytinen and Damsgaard, 2011; Frank 2019).

Logistics information technology is an essential capability that firms use for controlling firm-to-firm partnerships (Thomas and Griffin, 1996; Pereira, 2009). According to Manheim, (1999), Bechtel and Jayaram (1997), and Anderson and Lee (1999), utilising suitable information technology enhances effectiveness and generates flexibility through collaboration, which creates value.

Feng et al. (2018) posit that right information technology tends to strengthen the efficiency of distribution, ease the integration of logistics and advance the improvement of the supply chain, which is recognised as a panacea to supply chain management failure.

Logistics information technology enhances sharing of information among partners of supply chain and improves flexibility and responsiveness of firms, which result in reduction of inventory cost and effective management of risk (Krause, Handfield, and Tyler, 2007; Hartono, Li, Na, and Simpson, 2010; Vickery et al., 2003). Barut et al. (2002) found that information science and technology have provided tools for the enterprises and strategic partners to interact and communicate with each other. The use of logistics information systems influences the interaction of firms with their supply chain members. These systems also ensure effective coordination among departments in a firm. This helps us build the hypothesis;

H1: Logistics Information Technology has a Positive Influence on Supply Chain Integration.

Logistics Information Technology and Customer Satisfaction

Customer satisfaction in today's volatile business environment is a challenge to many firms due to the globalisation of the market. Customer satisfaction is fundamental to the survival of every individual firm. Customer satisfaction is the level at which firms can meet the expectation of customers through their goods and services. Customer satisfaction could also be defined as the reaction of a customer to the variance of the product the firm offers and perceived expectation of the customer (Mark, 2004).

In a larger perspective, customers are critical stakeholders of firms who influence their survival and continuity (Post et al., 2002). Customers are the institutions or individuals who form the reason for firms' existence. This is to say that, without customers, the existence of firms is irrelevant. It is argued that firms who are not able to satisfy the needs of their customers are bound to die since they will run into losses. Firms' ability to satisfy customers starts from the supplier and goes through to the customer. Since the supply chain has become a critical competitive channel, firms need to employ the requisite information technology tools and strategies that develop capabilities to exploit the potentials in the supply chain to meet customer needs.

Logistics information technology tends to influence customer satisfaction. Logistics information technologies lead to cost reduction and adoption of diversification in strategy (Balkan, 2018), which aim at ensuring customer satisfaction. Logistics information improves the interaction between customers and firms. This results in quick responsiveness, which improves customer satisfaction. According to Balkan (2018), there is a positive relationship between the use of logistics information technology and customer satisfaction.

Furthermore, Balkan (2018) argues that logistics information technology benefits customers and increases customer satisfaction through the offering of assistance to produce value-added service. Hence, we develop the following hypothesis:

H2: Logistics Information Technology Influences Customer Satisfaction Positively.

Logistics Information Technology and Organisational Performance

Organisational performance is the measure of the outcome of the organisations' activities and processes. Organisational performance could be either financial or nonfinancial. Financial performance of a firm is the outcome that is quantified in monetary terms. Financial performance measures include profitability, earning per share, return on investment, return on assets and gross marginal profit; whereas nonfinancial measures include market growth, customer retention and market size. Again, organisational performance could be measured from environmental, reputational, supply chain, logistics, competitive and market perspectives.

Firm performance is dependent on factors from within and outside the firm. Nonetheless, the ability to achieve superior performance to an industry average is hinged on the rare, valuable, heterogeneous, hard-to-copy, substitute and unique resources that firms possess internally (Barney, 1991). Despite the many intangible benefits logistics information technology creates, scholars in this field have obtained several contradictory results regarding the impact of logistics information technology on firm performance. The findings of Rai et al. (1997) establish a positive relationship between organisational performance and logistics information technology.

According to Dehning et al. (2005), information technology has a positive impact on market performance. Some scholars also argue that increased in the use of logistics information technology could increase the market worth of an organisation (Anderson et al., 2001; Bharadwaj et al., 1999; Krishnan and Sriram, 2000). Logistics information technology creates supply chain capabilities and improves firm performance (Teekasap, 2016). These technologies or systems of the firms create and sustain competitive advantage and ensures superior performance when they are designed to support business strategy (e.g., Simons, 1987, 1990; Dent, 1990).

Other scholarships have argued that investing in logistics information technology drives organisational performance in a positive direction (Dos Santos et al., 1993; Subramani and Walden, 2001; Hayes et al., 2001). According to Stratopoulos and Dehning (2000), firms which use information technology, like logistics information technology, obtain significant profitability ratios and, finally, conclude that firms' productivity falls when they wrongly apply information technology. Thus, we develop our next hypothesis as follows:

H3: Logistics Information System have a Positive Connection with Organisational Performance.

Supply Chain Integration and Organisational Performance

Supply chain integration practices have received massive attention in recent years. This is a result of firms' desire to remain relevant in the contemporary market, which is characterised with instability and uncertainty. Every firm in our current globalised market faces the challenge of stern competition where competitive capabilities created in-house are not enough to keep them floating. Firms' quest to develop new capabilities and tap into existing ones in their supply chain to acquire competitive positions in the market has resulted in supply chain integration. Supply chain integration is the level at which firms share information and resources with their supply chain partners to develop competitive advantage and improve performance.

Many supply chain integration concepts acknowledge the movement of goods and the sharing of information (Fisher, 1997; Huang et al., 2002; Pagell, 2004; Power, 2005). Some scholars have also considered supply chain

integration from only the information-sharing perspective (Kulp et al., 2004; Cai et al., 2010). Again, supply chain integration has been investigated from the process integration point of view (Angeles, 2009; Rai et al., 2006; Rajesh and Matanda, 2019). Further, internal, customer and supplier integrations have been the study directions of some supply chain scholars.

However, many scholars argue that the findings of studies into supply chain integration become more reliable when the study combines both internal and external perspectives. According to Stock et al. (2000), firms that have achieved a high degree of integration with their supply chain partners develop the capability to coordinate their logistics processes, activities and facilities effectively. Many pieces of literature have established that supply chain integration is a critical driver of inter-firm relationships (Barki and Pinsonneault, 2005; Glouberman and Mintzberg, 2001; Chandra and Kumar, 2001). This study focuses on complete integration.

Internal integration is when an organisation connects all its departments to share resources, information, skills and expertise to improve firm performance. Customer integration is when a company shares resources with its customers to improve efficiency and satisfies the demands of the customer. However, supplier integration occurs when a firm integrates, configures and merges its processes and systems with suppliers to enhance interactions and communication to develop a strategic relationship and share information and resources to the benefits of both parties. Supply chain integration influences organisational performance.

According to Hu (2012), firms that have built in-house distinctive competence can have a little competitive impact in today's market. Many research works have discovered that supply chain integration has a remarkable effect on the performance of organisations (Zhao et al., 2013; Prajogo and Olhager 2012; Huang et al., 2014; Turkulainen and Ketokivi 2012; Ebrahimi 2015). Integrative efforts among partners help to improve overall supply chain efficiency (Holweg et al., 2005; Matopoulos et al., 2007; Singh and Power, 2009), which is reflected in organisational performance. External and internal integrations have positive links with the performance of organisations (Devaraj et al., 2007; Gimenez et al., 2012; Sousa et al., 2012). Firms use the sharing of information and collaborative planning as approaches to improving performance (Kulp et al., 2004; Saraf et al., 2007;

Wong et al., 2015). Therefore, we develop the following hypothesis:

H4: Supply Chain Integration has a Positive Impact on the Performance of the Organisation.

Customer Satisfaction and Organisational Performance

Any firm which seeks to improve its performance considers customer satisfaction as the priority among its strategic goals. Firms which seek competitive advantage and improved performance employ strategies that aim at satisfying customer needs. Though the findings of many related scholarships have found an insignificant influence of customer satisfaction on financial performance, several studies observe that customer satisfaction has a significant positive impact on organisational performance (Rust and Zahorik, 1993; Capon et al., 1990; Simon et al., 2009). Some scholars also argue that firms' inability to satisfy the requirements of their customers, consequently result in a reduction in firm performance through market dwindling of market size.

Customer satisfaction leads to retention of existing customers and attraction of the potential customer, which improve market performance. Thus, an increase in market performance reflects positively in the total organisational performance. Hence, we develop the following hypothesis:

H5: Customer Satisfaction has a Positive Correlation with Organisational Performance.

Logistics Information Technology, Supply Chain Integration and Organisational Performance

Logistics information technology such as enterprise resource planning, transport management systems and electronic data interface ensures effective sharing of information and resources among supply chain partners to improve performance. Information technology has become an essential means for supply chains members to share information and resources to enhance their competitive positions to improve performance (Kalkan, 2018). Sanders and Premus (2005) confirmed that internal and external integration mediates the connection between information technology and firm performance.

Shang and Marlow (2005) found that the utilisation of information technology enhances integration and financial

performances. Therefore, we develop the following hypothesis:

H6: Supply Chain Integration Mediates the Relationship between Logistics Information Technology and Organisational Performance.

Logistics Information Technology, Customer Satisfaction and Organisational Performance

Found that logistics information technology has a positive influence on business performance through customer satisfaction. Rathnam et al. (1995) show the impact of logistics information technology on customer satisfaction. When customers are satisfied, firm performance is improved. Similarly, Karimi et al. (2001) established that organisations that use suitable technologies enhance their relationship with customers and enhance customer service, which ensures high market performance of an organisation. Besides, information shared among supply chain partners caused a reduction in customer demand interruptions which enhances the ability of firms to reduce the cost of transaction and inventory (Kulp et al., 2004; Saraf et al., 2007; Wang, Tai, and Grover, 2013).

Through the use of appropriate technologies, firms develop the right capabilities to exchange information with distributors, suppliers and customers, leading to performance efficiency. The active and efficient communication between supplier and organisation is achieved through the adoption of adequate and appropriate technologies that ensure the higher performance of organisations.

Thus, we develop the following hypothesis:

H7: Customer Satisfaction Mediates the Relationship between Organisational Performance and Logistics Information Technology.

METHODOLOGY

Questionnaire Development

In our quest to develop suitable questionnaires for our study, we adhered to the four-stage procedures of Creswell (2009), Sudman and Bradburn (1982) and Yan et al. (2015). Firstly, our team carried out an initial interview with supply chain managers and executives through the employment of unstructured, open-ended questions. This stage shed light on the basic knowledge

in logistics information technology, supply chain integration, firm performance and customer satisfaction. Consequently, the outcome of the interview helped us to build a draft of the questionnaire with many measurement items.

Secondly, we made clarity and relevance assessment of the questionnaires through a pretest by distributing the questionnaires to 16 managers and eight scholars in the respective relevant fields. Considering the responses, we received from the managers and the scholars; we eliminated individual irrelevant scales to enhance suitability and accuracy. The questionnaires were again tested with 20 managers from the distribution industry. The recommendations received from each of the managers were considered and changes duly effected in the final set of questionnaires. We asked three questions to capture all the indicators used in the study.

Data Collection and Sample Size

We arbitrarily selected a sample size of 500 distribution firms from the database of Registrars Department of Ghana, made up of approximately 1500 entries. After analysing the data, we sent e-mail to 400 managers and executives with not less than 6 years of work experience in logistics, procurement and information systems functions. To increase the participation and response rate, we assured the respondents of their anonymity and the confidentiality of the data (Agyabeng-Mensah et al., 2019). Our research team members personally distributed the questionnaires to the respondents. We gave them 4 weeks to complete the filling of questionnaires.

We received 200 (50%) of which 179 (89.5%) of what we received were suitable for usage. This leads to 44.75% of an effective response. Three-day interval reminders were sent to respondents to remind them of the questionnaires. This was done to ensure increased participation and avoid late respondents from becoming non-respondents (Fowler, 2009).

MEASUREMENT VARIABLES

The research team followed the procedures of Gerbing and Anderson (1988), Anderson and Gerbing (1988), and Yan et al. (2015) to choose the measurement items suitable for our study. The indicators for measuring the exogenous latent variable EDI, logistics information technology (EDI,

RFID, distribution management systems and transport management systems) were adapted from Franklin (2018) and Xuhua (2006). The measured items for supply chain integration (supplier integration, internal integration, and customer integration) were adopted from (Rosenzweig et al., 2003; Marquez et al., 2004; Stanley and Wisner 2001; Pagell 2004; Petersen et al., 2005; Narasimhan and Kim 2002; Droge et al., 2004; Campbell and Sankaran 2005; Koufteros et al., 2007; Vickery et al., 2003).

We adapted the indicators for organisational performance (market performance, operational performance, competitive performance and financial performance) from Agyabeng-Mensah et al. (2019). The indicators used to measure customer satisfaction include price, service quality, responsiveness and reliability. All the indicators were measured using five-point Likert format scale with anchors 1 = strongly disagree and 5 = strongly agree, except customer satisfaction which was measured using a five-point Likert format scale with anchor 1 = highly dissatisfied and 5 = highly satisfied.

ANALYSIS AND RESULTS

According to Naway and Rahmat (2018), Hair et al. (2014) and Agyabeng-Mensah et al. (2019), the best technique used in social science to test diverse hypotheses is the structural equation modelling. Peng and Lai (2012) and Dubey (2018) argue that SmartPLS-3 is a prediction tool which permits scholars to examine the predictive validity of independent variables. Pen and Lai (2012) further posit that SmartPLS is the most appropriate tool for giving a detailed explanation for the complex link between variables because it eliminates enormous challenges: inadmissible solutions and factor indeterminacy (Henseler et al., 2014; Moshtari, 2016; Pratono, 2016; Akter et al., 2017; Martí-Ballester and Simon, 2017; Dubey, Gunasekaran, Childe and Papadopoulos, 2018).

We organised the analysis into two major divisions. The first section assesses the outer model, where we examined the validity and reliability of the model. We further tested the validity of the hypotheses (Hamid et al., 2017). This study, like any other mail survey research, is bias inherent. We followed the recommendation of Kock (2015) to test

the common method bias of the constructs in this study by using the collinearity statistics (VIF).

Again, we adhered to the recommendation of Armstrong and Overton (1977) to test the nonresponse bias of the sample. The results of our test of nonresponse bias between the first 125 samples and the late 54 samples using the *t*-test showed that nonresponse bias should not be a problem since the two samples are not substantially different at the 5% significance level.

The outcome of our test, shown in Table 1, indicates that there is no bias. Table 1 contains the measurement criteria thresholds for reliability and validity of the constructs.

Table 1: Inner VIF

	Customer Satisfaction	Organisational Performance	Supply Chain Integration
Customer Satisfaction		2.033	
Logistics Information Technology	1.000	2.944	1.000
Organisational Performance			
Supply Chain Integration		2.144	

Assessment of Outer Model

We analyse the convergent validity by using factor loadings, average variance extracted (AVE), internal consistency using composite reliability and Cronbach's Alpha. Some scholars argue that the values for individual factor loadings should not be less than 0.70 (Hair et al., 1998). We systematically and carefully eliminated all the factor loadings, which could not meet the threshold after running the algorithm several times.

We further assessed the discriminant validity by using Fornell-Lacker criterion and Heterotrait-Monotrait Ratio (HTMT) ratio, where all the constructs meet the less than 0.850 thresholds recommended by (Henseler et al., 2015). Table 2 shows the measurement criteria thresholds for reliability and validity constructs, hypothesis and common method bias.

Table 2: Measurement Criteria Thresholds

Measurement Criteria	Recommended Threshold
Factor loading (Hair et al., 1998)	≥ 0.70
Composite reliability (Bagozzi and Yi, 1988)	≥ 0.60
Average Variance Extracted (Rodgers and Pavlou, 2003)	>0.50
Cronbach's Alpha (Henseler et al., 2009)	≥ 0.70
HTMT Ratio (Hair et al., 1998, Henseler et al., 2015)	<0.85
P value	<0.05
Inner VIF (Kock, 2015)	≤ 3.3

Source: Adapted from Hair et al. (1998), Henseler et al. (2009), and Rodgers and Pavlou (2003)

Construct Reliability and Validity

The reliability and validity of the constructs are examined by using factor loadings, Cronbach's Alpha, composite reliability and AVE. The factor loadings and AVEs and the Cronbach's alpha are used to examine the internal consistency and convergent validity, respectively. The values for factor loadings, AVEs, Cronbach's Alpha and composite reliability for each of the constructs in Tables 3 and 4 meet the thresholds set out in Table 2. This shows that the constructs: logistics information technology, supply chain integration, customer satisfaction, and organisational performance are valid and reliable.

Table 3: Construct Reliability and Validity

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Customer Satisfaction	0.806	0.872	0.631
Logistics Information Technology	0.753	0.837	0.562
Organisational Performance	0.873	0.912	0.721
Supply Chain Integration	0.824	0.896	0.743

Table 4: Factor Loadings

Factors	Customer Satisfaction	Logistics Information Technology	Organisational Performance	Supply Chain Integration
CS2	0.830			
CS3	0.830			
CS6	0.746			
CS9	0.768			
LIT 7		0.743		
LIT2		0.798		
LIT3		0.712		
LIT6		0.743		
OP1			0.919	
OP3			0.860	
OP5			0.751	
OP7			0.860	
SCI1				0.915
SCI3				0.746
SCI5				0.915

Source: Field data

Discriminant Validity

We examined the discriminant validity of the constructs by using the Fornell-Larcker criteria (1971) and HTMT shown in Tables 5 and 6, respectively. The values for the HTMT ratios obtained for the individual constructs

confirm the discriminant validities of customer satisfaction, logistics information technology, supply chain integration and organisational performance because they meet the threshold of not more than 0.85 set out in Table 1.

Table 5: Fornell-Larcker Criteria

Constructs	Customer Satisfaction	Logistics Information Technology	Organisational Performance	Supply Chain Integration
Customer Satisfaction	0.794			
Logistics Information Technology	0.709	0.750		
Organisational Performance	0.616	0.696	0.849	
Supply Chain Integration	0.564	0.727	0.693	0.862

Table 6: Heterotrait-Monotrait Ratio (HTMT)

Constructs	Customer Satisfaction	Logistics Information Technology	Organisational Performance
Customer Satisfaction			
Logistics Information Technology	0.814		
Organisational Performance	0.667	0.786	
Supply Chain Integration	0.662	0.858	0.764

Source: Field data

Assessment of Inner Model

After we had finished examining the outer model, we further assessed the inner model, which consists of direct and indirect effects. This forms the second section of the analysis. We tested the validity of the relationship between logistics information technology and supply chain integration, logistics information technology and customer satisfaction, logistics information technology and organisational performance as well as the link between organisational performance and both

supply chain integration and customer satisfaction individually.

The validities of the hypotheses were tested using SmartPLS-3 applying a threshold of p -value not more than 0.05 (Hameed et al., 2018, 2019; Hamid et al., 2017). The values in Table 7 indicate that all the hypotheses are supported and accepted since all the p -values are less than 0.05. This is an indication that there are positive relationships between logistics information technology, supply chain integration, customer satisfaction and organisational performance.

Table 7: Direct Effect

Construct	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	Hypothesis
Customer Satisfaction -> Organisational Performance	0.209	0.209	0.051	4.071	0.000	H5: Supported
Logistics Information Technology -> Customer Satisfaction	0.709	0.712	0.028	25.009	0.000	H2: Supported
Logistics Information Technology -> Organizational Performance	0.276	0.275	0.065	4.235	0.000	H3: Supported
Logistics Information Technology -> Supply Chain Integration	0.727	0.728	0.019	39.050	0.000	H1: Supported
Supply Chain Integration -> Organizational Performance	0.375	0.376	0.056	6.705	0.000	H4: Supported

Source: Field data

The *p*-values shown in Table 8 indicate that the intermediary roles played between logistics information technology and organisational performance by customer

satisfaction and supply chain integration are positive. The indirect relationships existing between information technology and organisational performance are valid.

Table 8: Indirect Specific Effect

Constructs	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	Hypothesis
Logistics Information Technology -> Customer Satisfaction -> Organisational Performance	0.148	0.149	0.038	3.857	0.000	H6: Supported
Logistics Information Technology -> Supply Chain Integration -> Organisational Performance	0.273	0.274	0.043	6.297	0.000	H7: Supported

Source: Field data.

The variance explained by figures in Table 8 shows that the exogenous variable logistics information technology predicts or explains supply chain integration and customer satisfaction by 52.9% and 50.3%, respectively; whereas, the combined effects of logistics information technology, supply chain integration and customer satisfaction predict or explain organisational performance by 58%.

Table 9: Variance Explained

Dependent/Endogenous Variable	Variance Explained
Customer Satisfaction	0.503
Organisational Performance	0.580
Supply Chain Integration	0.529

Source: Field data

Besides, the paper concurrently tests the mediating roles played by customer satisfaction and supply chain integration between logistics information technology and organisational performance.

The results indicated in Table 9 implies that information technology has a moderate impact on customer satisfaction and supply chain integration while supply chain integration, customer satisfaction and logistics information technology jointly have moderate predictive effect on organisational performance. The 58% predictive effect on organisational performance explains that logistics information technology, customer satisfaction and supply chain integration jointly predict organisational performance little above average.

This implies that firms that adopt logistics information technology can satisfy customer needs, which will finally drive performance positively. Again, logistics information technology facilitates and enhances supply chain integration, which results in the creation of competitive advantage and improves organisational performance. Sanders and Premus (2005) confirmed that internal and external integration mediates the connection between information technology and firm performance. Kalkan (2018) posits that customer satisfaction mediates the relationship between logistics information technology and organisational performance.

The findings of this paper assert that the adoption of logistics information technology facilitates the extent to which organisation can share and distribute resources among its departments and with its supply chain partners to enhance its competitive standing in today's complex and unstable globalised market. For instance, departments of companies which adopt logistics information can

DISCUSSION AND IMPLICATIONS

The primary subject matter of this paper is to assess the impact of logistics information technology, supply chain integration and customer satisfaction on organisational performance. We further investigated the mediating roles of supply chain integration and customer satisfaction between logistics information technology and organisational performance in the distribution industry. The results of our analysis using SmartPLS-3 support the hypotheses. This means that all the hypotheses were accepted.

The results establish positive relationships between supply chain integration, customer satisfaction, logistics information technology and organisational performance. This is the first time such a research has been conducted, which simultaneously tests the relationship between logistics information technology, customer satisfaction, supply chain integration and organisational performance.

easily share resources among themselves to enhance effectiveness and efficiency in organisational processes and activities to develop in-house strategic capabilities. It can also enhance their interactions with supply chain members to improve their strategic relationships with them. Hence, managers of distribution companies need to adopt logistics information technology to increase organisational performance.

Again, the results of this work show that logistics information technology is essential in satisfying the needs of customers. It was discovered that logistics information technology improves firms' capability to highly satisfy the expectations of their customers. Logistics information technology increases the ability of firms to reduce lead-time, cut down transportation cost, optimise warehouse capacity, provide add-on services and respond quickly to customers' complaint, which causes customer satisfaction. This consequently reflects in increased organisational performance.

Finally, the positive relationship established between logistics information technology and organisational performance implies that when logistics information technology is adopted and effectively deployed by firms, it helps improve their performance. It is valid to say that technological systems that are used to manage logistics activities ensure that information and resources are shared among supply chain partners to ensure operational efficiency and effectiveness, which reflect in the prices and service quality provided to customers.

According to the results of our analysis, information technology enhances supply chain integration and customer satisfaction, which facilitates collaboration among them and they work together to meet the needs of their markets and thus improve profitability. Organisations which adopt logistics information technology will facilitate supply chain integration, increase customer satisfaction and improve organisational performance. This connotes that improvement in logistics information technology usage, supply chain integration and customer satisfaction will result in an increase in organisational performance.

The adoption of supply chain practices, such as supply chain integration, and the deployment of information technology help firms to manage their supply chain effectively to exploit the competitive benefits in the supply chain in addition to in-house core competencies. We,

therefore, recommend firms to adopt logistics information technology to facilitate supply chain integration and increase firms' chances of meeting the dynamic, changing and irregular demands of customers to advance their performances.

The findings of this study cannot be generalised because it was conducted in the distribution industry in Ghana. The sample size is also a limitation. Though common method bias was tested, the study may still be vulnerable to bias since it's a survey study. Further researches can be done to replicate the conceptual model in other industries and locations. Larger sample size could be picked to test the variables used in this work. Scholars may undertake a study to discover other mediating factors between logistics information technology and organisational performance.

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