

The Impact of ICT on the Performance of Logistics Firms in Accra, Ghana

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Abstract— The study examines the impact of Information and communication technology (ICT) on the performance of logistics firms in Accra, Ghana. The main objective of the study was to gain a better insight into how the level and use of ICT in the firm's security and tracking, customer service delivery and also how the information integration of systems affects the firms' performance. Twenty-one (21) logistics firms in Accra consisted the research sample. The sample population included the managers, directors, supervisors and staff that are in direct contact with ICT usage. In order to achieve the objective, 147 questionnaires were distributed, and 129 questionnaires were filled and retrieved for analysis. This represented a response rate of 87.8% of the sampled population. The researcher analysed the data obtained using SPSS version 26. Descriptive statistics methods were employed to present and summarize the findings of the result. The researcher further analyzed the data using inferential statistics and multiple regression.

The study showed that ICT has an impact on the performance of the logistics firms in Accra, Ghana. The findings revealed that three out of the four ICT indicators used as the independent variables of the research were found to be statistically significant, which were enough to influence the performance of the logistics firms. The researcher recommends that management should continue to motivate and increase ICT usage within the firms and even to the sectorial level that are yet to be computerized to achieve a higher level of optimum operation and profitability.

I. INTRODUCTION

The world today is undergoing rapid changes due to the advancement in science and technology. It is becoming a challenge each day to do away with technology. Most individuals and corporations admire the many technological devices they use in their daily lives and businesses. A recent example of technological change dynamics and economic growth is the proliferation of new technologies of e-business and Information and Communication Technology (ICT) among companies (Koellinger, 2006). It is without a doubt that new ICT tools

are emerging each day, giving organisations that employ them to gain competitive advantage.

In May 2019, the launch of a new digital roadmap was announced by the government of Ghana. This is part of a wider strategy to develop the country as a leading ICT innovation center in sub-Saharan Africa. (Oxford Business Group, 2020). It confirms that Ghana is fast embracing these new emerging technologies into its various sectors of operations, of which the logistics sector is of no exception. In recent years, businesses active in the logistics and transport industries have made considerable improvement

in embracing modern technologies, especially those connected to the e-business sectors and the internet (Koellinger, 2006). ICT tools help to speed up the execution of activities, encourage automated decision-making procedures and processes, and allow distributive operations. (Huang & Nof, 1999).

In recent times, innovation is considered to be the key to business success (Analytics-Insight, 2019). As new technologies evolve, logistics firms tend to seek innovations that will help retain and expand their customer base. These new techs increase the efficiency and effectiveness of the firms to better serve their customers and also achieve a competitive edge over competitors. The introduction and use of ICT are helping logistic firms live a dream come true since it helps foster better customer relations and satisfaction, reduce cost, improves communication, reduce transactional time, provide security, and enhance their overall effectiveness and performance. A report on the logistic performance index (LPI) by the (World-Bank-Group, 2016), Ghana had an improvement in its logistics performance, recording an index of 2.66 instead of 2.63 in 2014 and this improvement was a result of the Ghana National Single Window (GNSW) programme. The Single Automated System model, an ICT tool for the integration of existing systems and the construction of new facilities where necessary, was adopted by this programme. However, in 2018 the report on LPI by the World Bank showed a decline in Ghana's logistics performance from an index of 2.66 in 2016 to 2.57 in 2018.

Despite ICT adoption in logistic sectors with its numerous benefits, studies have shown that users have not completely realized its benefits. It has been realised that some of several firms do not operate to the required standard bringing additional damage instead of good to investors, customers, and other users. Logistics firms do suffer from wrong technology choices, insecurity, inefficiency, and inadequate information sharing. For the functional areas of logistics firms to work effectively, the right technology and personnel must be selected to avoid inefficiencies. Logistic firms must use the right infrastructural facilities to smoothen the pace of operation. Adequate information sharing is of the essence to foster transparency and better customer relation between all the parties involved in a transaction.

Critically looking at the introduction of ICT owing to its objectives, there is no much focus on the worth of technology provided but how best it serves the needs of the potential users. This study, therefore, seeks to evaluate the impact ICT has on the performance of the logistics firms' in Accra, Ghana to realize its relevant

effect on their activities and operations to assure their potentiality of growth. The study seeks to find answers to the following questions: What impact do ICT usage levels have on the firm's performance? What impact does the usage of ICT insecurity and tracking system have on the firm's performance? What impact does the usage of ICT on the customer service delivery system have on the firm's performance? What impact does the information integration system have on the firm's performance? The findings of this research will be helpful to owners and managers of logistics firms since it gives better insight into the impact of ICT on logistics performance that will help them make a strategic business decision for business growth. It will also be an eye-opener for investors to start making investments into the logistics firms hence improve economic growth. The findings will also be helpful to the government as it will well inform them on the way forward in ICT services within the country.

II. LITERATURE REVIEW

2.1 Technology Acceptance Model

This Technology Acceptance Model is the theoretical starting point of this study (TAM) propounded by (Davis, Bagozzi, & Warshaw, 1989). TAM focus on the adoption and use of ICT, with two concepts of theory, thus Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that affect the motive to use technology. It is aimed at predicting and clarifying ICT usage behavior and finding out why potential users or adopters do accept or reject the usage of information technology. In Ghana, Technology is still being phased in gradually. Manually, most processes, operations, and associated tasks are performed. This theory illustrates readiness within a user community to use ICT for the purposes that it is meant to serve. Several studies have used TAM as their theoretical background to explain the adoption and use of ICT. Most researchers have affirmed that PU's relationship with adoption intention is positive (Davis et al., 1989) and continuance intention (Ritu Agarwal & Karahanna, 2000; V. Venkatesh, 2000). In furtherance, post-adoption studies have realised that PU influences satisfaction (Bhattacharjee, 2001; Limayem, Hirt, & Cheung, 2007) and attitude toward technology (Bhattacharjee & Hikmet, 2008). PEOU was found to affect both PU and adoption intention (Davis et al., 1989). Also, PEOU was found to affect satisfaction (Thong, Hong, & Tam, 2011), continuance intention (V. Venkatesh & Davis, 1996; V. Venkatesh & Davis, 2000), and actual continuance usage (R. Agarwal, 2000; Lippert, 2007).

2.2 Innovation Diffusion Theory

Innovation Diffusion Theory (IDT) proposed by (Everett Rogers, 2003) has had much research that has used the IDT to be their theoretical framework or combined other theories with IDT and models to explain the adoption and use of ICT. The theory posits five main constructs that affect the diffusion of innovation, thus relative advantage (the level to which technology provides enhancements over the tools available presently), compatibility (its conformity with users social values, practices, and norms), complexity (its ease of usage or difficulty), trainability (a chance to try out innovation to enable committing or opposing to using it), and observability (the level to which the results of the technology and its benefits are evident). These constructs are capable of being determinants of the rate or degree of diffusion on their own but diffusion studies have shown that innovations producing merits, compatibility with current beliefs practices, and values, low level of complexity, possible trainability, and observability would be quickly diffused as compared to innovation with the opposite cluster features. (E. Rogers, 1995).

With this theory, the researcher gets to understand how ICT is been used at the various logistic firms to enhance operations thus if it adopted at all and its conformity with organizational norms and practices. It will also help answer research questions that seek to finds out the tangible impact ICT has on the performance of firms if they are adopted.

2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

This theory was propounded by (V. Venkatesh, Morris, Davis, & Davis, 2003). UTAUT offers a detailed description of how determinants of intention and behaviour change over time. The theory posits four concepts as important indicators of user acceptance and usage behaviour thus performance expectancy, social influence, effort expectancy, and facilitating conditions. These construct relationships are being moderated by age, gender, experience, and voluntariness of use (V. Venkatesh et al., 2003).

The theory provides a framework for managers, directors, supervisors to evaluate the probability of technology introductions being successful and to understand and consider acceptance drivers for implementing intervention strategies that involve training or marketing. UTAUT undergoing empirical testing proves that social influence, performance expectancy, and effort expectancy have a positive relationship with technology use intentions (V. Venkatesh et al., 2003). Perceived usefulness and perceived ease of use have been shown in

subsequent studies to be affected by social influence.(Hong & Tam, 2006; Lu, Yao, & Yu, 2005).

2.4 Empirical Study

(Maizs & Toroitich, 2016), researched “Effect of Information and Communication Technology on Organizational Performance in Unga Limited Eldoret, Kenya” to assess the effect ICT has on the company performance. Questionnaires were used as the guide to collect data from 65 staff including the management team, department heads, and employees of the company. Descriptive and quantitative methods and techniques were used to interpret the data after which the results were presented in tables. The study’s findings showed that the use of ICT in the company promoted the quality-of-service delivery, enhanced the company’s production efficiency, strengthened the organization's infrastructure, increased employee efficiency, and ensured that all systems were working effectively and efficiently. The research also found out that ICT was an essential aspect that enabled the company to enjoy a competitive advantage over other companies since it fastened the transfer of goods and hence improve the company’s supply chain. The research concluded that ICT is a vital aspect of a company’s performance.

(Choy et al., 2017), researched “Impact of information technology on the performance of the logistics industry: the case of Hong Kong and Pearl Delta region”. They sought to evaluate the present state of IT use and its influence on logistics service performance. The study surveyed two-hundred and ten (210) logistics companies across Hong Kong and the Pearl Delta region. The study proposed a hypothetical model that used the resource-based and the market-based view theories to link the implication of IT abilities with logistics performance. The structural equation model was used in testing the hypothetical model. The research findings were that, (i) the implementation of IT directly improved the efficiency of service of the companies, (ii) the impact of the IT implementation also brought about competitiveness since the efficiency of service in the companies were improved.

(Gera & Gu, 2004) researched “The Effect of Organizational Innovation and Information and Communications Technology on Firm Performance” to determine whether ICT and organisational innovation are connected with higher performance in Canadian companies. The data used for the study was obtained from the 1999 workplace and employee survey (WES) which were analysed descriptively (mean, percentages) and inferentially (correlation, regression) statistics. The research findings showed that the correlation between ICT and firm performance was dependent upon the

circumstances in which the ICT's were been used. The result indicated that ICT use correlates with the skills of workers and suggest that human capital and ICT are complementary in the dynamic and distribution service industries hence companies that combine a higher level of ICT with a higher level of human capital tend to achieve a higher rate of innovation and product quality in the area. The research pointed out that ICT correlated with organisational innovation in efficient and production activities, HRM activities, and product quality-related activities which confirms that organisational innovation and ICT are compliments.

(Wilson, Iravo, Ondabu, & Ombui, 2015) researched "Effects of Information Technology on Performance of Logistics Firms in Nairobi County". Questionnaires were how data were collected from 10 Nairobi County logistics companies. The researchers developed and aggregated collective items based on the research model into four scales to measure IT use within the firms and three scales to measure the firm's performance. The data collected were subjected to an SPSS analysis and the findings were summarized in tables and charts. The ANOVA result showed a high significance level ($F = 2.729$ and $P = 0.000$) and this implies there was a strong relationship between the four variables and the firm performance of the logistics companies in Nairobi County.

2.5 Criticism of the theories relevant to this study

Theories over the decades have received much attention as well as critics, the theories used in this paper are of no exception. (Bagozzi, 2007) argues that the technology acceptance model has five shortcomings of which include the neglect of the collective, social, and cultural factors of decision making. It is considered to look out for the shared values of firms in determining their technology adaptability. It is easy for firms to adopt something when it is in line and appreciates the norms and values of what it stands for, moreover firm base decisions are more of collective intentions.

2.6 Research Gap

ICT is mostly seen as a force that drives superior performance of businesses; however, studies show that there have been very few studies done on the impact ICT has on the logistics firm's performance in Ghana. Most researchers do tend to examine the ICT impact on firm performance in general. This research study tends to examine the direct effect ICT has on firm performance in areas of security and tracking system, customer service delivery, information integration system, and their level of ICT usage.

III. METHODOLOGY

This research study involved the use of a descriptive research design. (Mugenda & Mugenda, 2003), posits that a descriptive research design allows a researcher to collect, summarize, present, and analyze information for clarification purposes. The researcher used both primary and secondary data for realizing the objective of the study. The secondary data was obtained from published articles, journals, reports, past research papers, as well as other relevant and credible sources. The primary data was obtained using a well-structured and developed questionnaire, a Likert scale starting from 1 to 5 was used as a measure of the questionnaire items, with 1 representing a strongly disagree, 2 - disagree 3 - uncertain, 4 - agree and 5 - strongly agree. Twenty-one (21) logistics firms in Accra, Ghana consisted of the research sample. The sample population included the managers, directors, supervisors, officers, and employees that are in direct contact with ICT usage of the freight forwarding or distribution logistics firms in Accra, Ghana. 147 questionnaires were distributed, this involved 21 companies however 129 questionnaires were filled and retrieved for analysis. This represented an 87.8% response rate of the sampled population. The Statistical Program for Social Sciences (SPSS) version 26 was adopted by the researcher for the analysis of the obtained data. Descriptive statistics methods thus percentages and frequencies were employed to present and summarize the findings of the result following the research objectives. The researcher further analysed the data using inferential statistics, specifically stepwise and multiple regression to find out the relationship between the ICT usage levels, security and tracking system, customer service delivery system, information integration system, and the performance of the firms.

3.1 Conceptual Framework

A conceptual framework is a written or visual product that explains the key items to be examined, concepts or variables, and the supposed relationship between them, either in narrative form or graphically (Miles M & A., 1994). This study, therefore, deemed it necessary to explain the various terms and concepts that form the foundation of the research work. A conceptual framework that illustrated the relationship between variables thus an independent and a dependent variable was adopted by this study. The dependent variable was the logistics firm's performance and the independent variables thus the ICT indicators were the level of ICT usage, security and tracking system, information integration system, and customer service delivery.

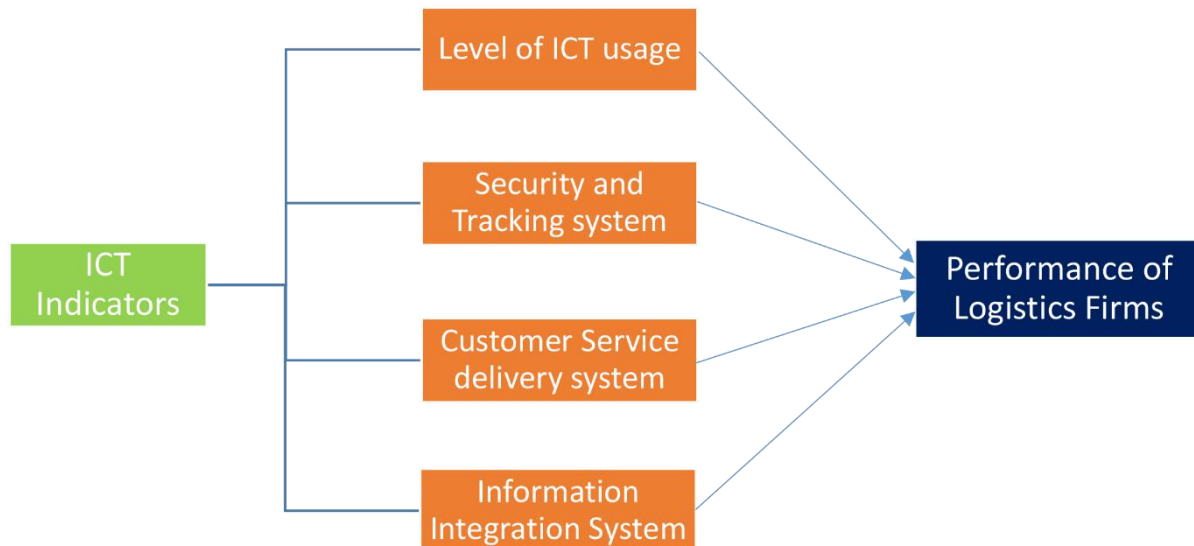


Fig. 1: Proposed Conceptual Framework of the Study

Source: [Modified (Wilson et al., 2015)]

3.2 Variables

3.2.2 Independent Variables

ICT Usage Level:

Over the past years, in some businesses and nations, ICT has always been a catalyst for transformation and innovation. Companies and firms that employ them are reaping from the various benefit it comes with. (Sanjeev, James, & Mona, 2019) posits that innovative companies are most likely to experience success and growth. The level of investment into ICT related infrastructure is also a determinant of the growth percentage experienced. The Organization for economic co-operation and development (OCED, 2004) data published indicated that countries that have increased their investment in ICT infrastructures experienced a growth in GDP and Labour productivity of which the United States, the Netherlands, Canada, and Australia enjoyed the largest boost.

Security and Tracking system:

How self-belief and confident it is for logistics service providers and customers to realize their goods in transit are safe and at the precise locations they ought to be. This has been made possible through the introduction of ICT tools like bar codes and Radiofrequency identification (RFID) devices which help you to identify, gain precise information and also track stocks in transit. The researcher tends to evaluate the impact this has on the logistics firm's performance.

Customer Service Delivering System:

Most businesses tend to thrive more based on their customer base as customers are the world's most important resource for any business category, it is, therefore, essential for every business to maintain their current customers as they attract new ones. Globalization today has brought about rapid changes in customers demand however customers continue to place more emphasis on low-cost goods, delivery date certainty, on-time delivery, or receiving a personalized product as posited by (Simchi-Levi, Kaminsky, & Simchi-Levi, 2003), it is with this that logistics firms have to add more value to their products and customers service delivery to achieve customer satisfaction and competitive advantage. Companies must therefore see innovation as part of business management, which will help implement new and creative processes, products, and services to quickly respond to the demands and requirements of customers. (Sullivan, 2005).

Information Integration System:

Information integration is a means by which data from diverse sources becomes unified and accessed by users for their various benefits. Information integration is key and essential for business growth as it encourages information sharing. Information sharing plays an important approach in an enterprise's survival and enables the integration of the supply chain (Lotfi, Mukhtar, Sahran, & Zadeh, 2013). Most businesses today are using information integration systems like Customer Relationship Management (CRM), Enterprise resource

planning (ERP), Electronic Data Interchange (EDI) to enhance cross-departmental, customer, and supplier collaborations to plan and make better business strategies and decisions to enhance overall operational efficiency. The researcher tends to evaluate the impact this has on the logistics firm's performance.

3.2.3 Dependent Variable

Logistics Performance:

Every business has the goal of performance growth been it financial or non-financial, the ICT impact on logistics performance has been a topic of research by a lot of researchers to find their relation. Some researchers do agree to a positive relationship between ICT and performance and some do object depending on how they were measured and analyzed. There is much evidence that

investment in ICT brings about innovation and innovative firms are most likely to experience growth. A positive influence of investment in information technology was found in one study on productivity, but there was no impact on profits (Brynjolfsson & Hitt, 1996). Another study found no positive influence of information technology capital on productivity while information technology labor contributed positively to profitability and output(Prasad & Harker, 1997). Ghana’s Logistic Performance Index witnessed a decline from an index of 2.66 in 2016 to 2.57 in 2018 even though a Single Automated System model was implemented in 2016 to improve operational performance. These ambiguities are the cause of the researcher to make an inquiry and establish the relationship between ICT and Performance of the logistics firms in Accra, Ghana.

Table.1: Application of ICT in different sectors of logistics

Activities	ICT Application area	Merits
Warehouse Management	Management of warehouse to – <ul style="list-style-type: none"> • Receive goods • Identify goods received • Deploy goods for storage • Locate and pick goods • Deploy shipment 	<ul style="list-style-type: none"> • Paperwork is reduced • Real-time deployment • Time saved in inventory locating • Processing time is reduced • Goods safety and security increased • Human error is reduced • Consolidation of cargo
Transportation Management	<ul style="list-style-type: none"> • Fleet management and vehicle tracking • Fuel, safety, and health management of fleet • Vehicle speed management • Driver and route management 	<ul style="list-style-type: none"> • Increase in safety and security of personals • Helps recover stolen vehicles easily • Customer satisfaction is increased • Insurance cost is reduced • Help reduce overtime
Cargo and Security Management	<ul style="list-style-type: none"> • Cargo lease • Cargo safety and security • load and offload of cargo 	<ul style="list-style-type: none"> • Cargo safety and security is improved • Easy to track the location of cargo • Easy documentation of cargo
Customs Duty and Clearance	<ul style="list-style-type: none"> • Custom receipt and payment of duty • Documentations • Inspections 	<ul style="list-style-type: none"> • Fast receipt and payment of duties • Customer satisfaction is increased • Paperless transaction increase the speed of clearance • Reduction in administrative cost
Communication Management	Management of communication and information flow with <ul style="list-style-type: none"> • Customers • Suppliers • Manufacturers 	<ul style="list-style-type: none"> • Increased customer satisfaction • Transparency encouraged • Reliable to and fro of information • Increased on-time resolution

Source: [Modified (Bhandari, 2014; Wilson et al., 2015)]

The Table 1 above shows some of the activities engaged in by logistics firms, ICT application areas, and the merit of using ICT in the respective areas. The following ICT systems have been provided in the various aspects of logistics firms to aid their operation: GPS satellites, GSM/GPRS network, Web-Based Tracking, GIS and fuel management systems to help the ease of locating and managing fleets and cargos, the management of warehouses also involve the use systems such as the Information Directed System (IDS), Automated Inventory Tracking System (AITS), Automated Guided Vehicle System (AGVS) and Automatic Identification Technology like barcoding, Radio Frequency Identification (RFID) devices which helps in the easy identification and movement of goods. Information and communication systems like Enterprise Resource Planning (ERP) and Electronic Data Interchange (EDI) also help speedup transaction processes, information flow and documentation.

With the advancement in technology, these innovations have come to stay to help logistics firms that embrace them better and increase their efficiency of operation, satisfying customers' requirements, and also increasing profit. Logistics forwarding is currently gaining much attention and undergoing immense change due to the increase in multilateral trade between countries. Some logistics firms are fast embracing ICT in their various aspects of the operation, gaining a competitive edge over other firms, and reducing cost. (Sullivan, 2005) posits that as businesses immensely use information technology to explore competitive benefits and advantages, improve productivity and effectiveness to raise their profitability, market share, and customer loyalty, the emphasis on cost minimization will become severe. Logistics firms, managers, shareholders, and other parties should therefore realize the need to inculcate ICT in their operations and business strategies looking at its numerous benefits to boost work efficiency and effectiveness.

3.3 Reliability and Validity

The study's research instruments (questionnaire) was constructed carefully to ensure that it was reliable and valid in achieving the objectives of the study.

3.3.2 Validity

(Middleton, 2020) posits that validity is the accurateness of what a process measures and if the study has a validity that is high, it then means it produces results that correlate to real properties, characteristics, and variations in the physical or social environment. The research instrument was thoroughly checked by my supervisor to seek her opinion on the adequacy, representativeness, and accuracy, of the instrument to ensure that it covers all the measurable variables. A pilot study was also conducted using three supervisors from three different logistics firms, to determine the accuracy hence validity of the research instrument was the basic objective of the pilot test before adopted and applied in the actual study and this helped the researcher to modify the research instrument making it more transparent for understanding and removing ambiguous items hence enhancing the quality and validity of the instrument.

3.3.3 Reliability

(Crossman, 2020) defines reliability as the level of degree to which a measuring instrument produces consistent results every time is been used, with the assumption that it does not alter the underlying thing being measured. Cronbach's Alpha was used as the means to measure reliability and internal consistency. The testing was carried to validate the consistency in responses given by respondents. (Chelsea, 2015), Cronbach's alpha is determined by correlating the score with the total score for each observation for each scale item and then comparing it to the variance for all individual item scores. He further posits that the resulting reliability of the coefficient ranges from 0 to 1. However, a minimum coefficient of 0.7 to 0.8 (or higher) is suggested and adopted by many methodologists, and coefficients 0.5 or less is generally are unacceptable.

Table.2: Reliability Statistics

Variables	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Level of ICT Usage	.944	.945	5
Security and Tracking System	.949	.948	5
Customer Service Delivery	.965	.965	5
Information Integration System	.906	.903	5
Performance (Before the adoption of ICT)	.865	.870	6
Performance (After the adoption of ICT)	.969	.971	6

From Table 2 above, the reliability results shown in all variable items exceeded $\alpha=0.7$. This indicates that the questions used in each variable of the study were reliable hence consistency was proven in the responses of the respondents.

IV. RESULTS AND DISCUSSIONS

The descriptive statistics of the respondents in regards to the Impact of ICT on the performance of logistics firms in Accra, Ghana are presented below.

4.1 Respondent’s profile

Response rate:

This study expected the distributed questionnaires to be filled by 147 respondents but 129 questionnaires were retrieved. This accounts for an 87.8% response rate and according to Field (2013) for a study to be statistically significant, it must have a response rate be at least 50%. The response rate can therefore be said to be excellent and statistically significant.

Gender:

The study’s findings showed that 77.5% of the respondents were males and 22.5% were females. This indicates that males were the predominant workforce at the logistics firms.

Age:

The study revealed that most of the respondents were

between 31 - 40 years constituting 60.5% of the respondents, 25.6% were between 18 – 30 years, and 14% were between 41 – 50 years. These findings showed how youthful the workforce of the logistics firms was.

Level of Education:

Out of the 129 respondents in the research, 7% had a WASSCE/SSCE certificate, a majority of the respondents 62.8% had First Degrees, 22.5% had Masters Degrees and 7.8% had PhD.

Period of Work:

The findings of the research established that 5.4% of the respondents had worked for Less than a year, 17.1% had worked from 1-3 years, and 40.3% constituting the majority had worked from 3 - 5 years, 24% had worked for 5 - 10 years and lastly, 13.2% had worked for 10 years and above.

Job Role:

On the respondent’s job roles, the findings of the study showed that 41.1% constituting the majority were in the Managerial roles of the logistics firms been the firm managers and officers of the various sectors of operations, 32.6% were in Supervisory roles and 26.4% were clerical staff with direct contact with ICT usage in the firm.

4.2 Level of ICT Usage

Finding out the level and extent of ICT usage in the logistics firms in Accra, Ghana was one of the objectives of the study. The results are tabulated below;

Table.3: Level of ICT Usage

	Strongly disagree Percentage (%)	Disagree Percentage (%)	Uncertain Percentage (%)	Agree Percentage (%)	Strongly agree Percentage (%)
The management motivates the use of ICT within the firm	13.2	19.4	1.6	38.0	27.9
The firm has a low-level ICT usage.	26.4	38.0	6.2	18.6	10.9
Employees oppose the use of ICT within the firm.	30.2	33.3	5.4	17.8	13.2
The ICT tools within the firm are defective	26.4	36.4	10.1	20.9	6.2
Most of the operations are computerized within the firm.	14.0	20.2	4.7	33.3	27.9

The findings from the Table 3 above shows that a greater percentage of the respondents representing 38.0% agreed to the fact that management motivates the use of ICT within the firm, 27.9% also strongly agreed to the same statement and 19.4% disagreed with it. With the level of ICT usage within the firms, 26.4% strongly disagreed and 38.0% disagreed with them having a low level of ICT use while 18.6% agreed. Employees within the firm also play a role in supporting ICT use within the firm, 30.2% strongly disagreed and 33.3% disagreed with employees opposing the use of ICT within the firm, however, only 17.8% agreed.

Moreover, how can ICT use be encouraged if the ICT tools within the firms are defective? Therefore 36.4%

and 26.4% of the respondents disagreed and strongly disagreed respectively with the statement that the ICT tools within the firms are defective. Finally, 27.9% strongly agreed and 33.3% also agreed with the statement that most of the operations within the firms are computerized but 20.2% disagreed and 14% strongly disagreed, and this confirms that as technology is still being phased in gradually in Ghana it is been rapidly adopted by these firms for their operational activities.

4.3 Security and Tracking System

The study pointed out in Table 4 below the level of agreement or disagreement of the respondents with the use of ICT in the security and tracking system of the firms.

Table.4: Security and Tracking System

	Strongly disagree Percentage (%)	Disagree Percentage (%)	Uncertain Percentage (%)	Agree Percentage (%)	Strongly agree Percentage (%)
The cost of digital monitoring and tracking cargo reduces the cost of security hence higher profit	12.4	18.6	6.2	27.1	35.7
The tracking system increases the customer’s confidence and leads to increased sales.	7.8	16.3	9.3	31.8	34.9
Digital monitoring, tracking, and cargo management is safer than the manual management system	11.6	17.1	7.8	27.1	36.4
Computerized freight clearing and forwarding is faster and quicker than the manual system	1.6	20.9	10.9	29.5	37.2
The Digital monitoring and tracking system can be easily exploited as compared with the manual system	12.4	17.8	5.4	27.9	36.4

Using ICT in security and tracking by the firms had a remarkable positive response, a majority of 35.7% strongly agree and 27.1% agree with the statement that digital monitoring and tracking cost reduces the cost of security leading to higher profits. This throws light on the fact that ICT helps reduce the cost of operations within firms. A majority of the respondents also strongly agreed 34.9% and 31.8% agreed that the tracking system help

boosts customers' confidence which eventually leads to an increase in sales.

The respondents further strongly agreed 36.4% and agreed 27.1% that digital monitoring, tracking, and cargo management is safer than the manual management system. Also, the majority responded positively to the statement computerized freight clearing and forwarding is faster and quicker than the manual system with the

percentages of 37.2% for strongly agreed and 29.5% for agreed. This posits that automation of business processes makes work faster and simpler, however, 36.4% strongly agreed and 27.9% agreed that though digital monitoring and tracking help it can be easily exploited as compared to the manual system, and this confirms that at a point in time ICT tools may encounter technical challenges and

inefficiencies which may expose them to threats and become insecure.

4.4 Customer Service Delivery

The study sought to point out in Table 5 below the level of agreement or disagreement of the respondents to how ICT makes the serving of customers better.

Table.5: Customer Service Delivery

	Strongly disagree Percentage (%)	Disagree Percentage (%)	Uncertain Percentage (%)	Agree Percentage (%)	Strongly agree Percentage (%)
Through the integration of ICT systems, customers can initiate complaints and get services online	10.9	14.0	5.4	43.4	26.4
Through the integration of ICT systems, customer's complaints and grievances are resolved faster and quicker online.	10.1	14.7	4.7	41.9	28.7
Customers prefer to be served manually compared with online services.	28.7	36.4	5.4	20.2	9.3
Through the integration of ICT systems, the time required to serve a customer has reduced significantly	2.3	14.7	10.1	42.6	30.2
The cost of hiring customer service attendance while serving online has decreased.	8.5	22.5	6.2	34.9	27.9

The findings on using ICT to serve customers from Table 5 showed that a majority of the respondents agreed 43.4% and strongly agreed 26.4% that customers can initiate complaints and get services online and this possible because of the customer service integration systems by the firms. The respondents further agreed 41.9% and strongly agreed 28.7% that not only can customers initiate complaints online but their grievances are also attended to quickly and faster.

Responding to customers preference to be served manually as compared to the online service, 36.4% disagreed and 28.7% strongly disagreed however 20.2% agreed and 9.3% strongly agreed and this implies that as ICT is still been adopted not all customers are used to or conversant with this online services or technological changes going on in the firms as well as the nation. Moreover, a greater percentage of the respondent agreed 42.6% and strongly agreed 30.2% that through integration the time required to

serve a customer has reduced significantly. Finally, respondents also strongly agreed 34.9% and 27.9% agreed with the statement that the cost of hiring customer service attendance while serving online has decreased but 22.5% disagreed and 8.5% strongly disagreed and this can imply that although customers are served online, some firms still maintain their number of customer service attendees to double efficiency and is most common in larger firms

since customers are an important resource for businesses and need special attention.

4.5 Information Integration System

The study sought to point out in Table 6 below the level of agreement or disagreement of respondents on how information integration affects performance and efficiency within the firm.

Table.6: Information Integration System

	Strongly disagree Percentage (%)	Disagree Percentage (%)	Uncertain Percentage (%)	Agree Percentage (%)	Strongly agree Percentage (%)
Integration ensures communication effectiveness, accuracy, and adequacy among customers, suppliers, and the firm	8.5	8.5	3.1	51.2	28.7
Integration allows easy to and fro payments among customers, suppliers, and the firm.	10.1	13.2	4.7	33.3	38.8
Integration improves and ensures an effective internal and external control system of the firm.	7.0	15.5	6.2	33.3	38.0
Serving integrated suppliers and customers become easier and simple.	0	14.7	9.3	38.8	37.2
Integration improves the quality and efficiency of customer service delivery.	10.9	13.2	4.7	29.5	41.9

From the findings of information integration systems, the majority of the respondents were in agreement with all the statements under the integration of systems thus integration plays an essential role in the operational efficiency of the firms. They strongly agreed 28.7% and agreed 51.2% that integration ensures communication effectiveness, accuracy, and adequacy among customers, suppliers, and the firms, communication is known to be key in the success of businesses. Respondents also agreed 33.3% and strongly agreed 38.8% that the to and fro payments among customers, suppliers, and the firms have been made easy because of integration.

Moreover, firms need to have absolute control over their systems to enhance maximum and efficient operation. It is

with this that integration of systems sets in to improve and ensure an effective internal and external control system of a firm, majority of the respondents strongly agreed 38.0% and 33.3% agreed to this statement and function of an integrated system. Respondents also agreed that suppliers and customers that are already integrated into the firms' systems can easily be served and finally, integration was seen to improve the quality and efficiency of the customer service delivery by respondents, 41.9% strongly agreed and 29.5% agreed.

4.6 Performance (Before the adoption of ICT)

The study sought to point out in Table 7 below the level of agreement or disagreement of respondents with the performance of the firm before the adoption of ICT.

Table.7: Performance (Before the adoption of ICT)

	Strongly disagree Percentage (%)	Disagree Percentage (%)	Uncertain Percentage (%)	Agree Percentage (%)	Strongly agree Percentage (%)
Our company's reputation improved in the eyes of the Customers.	8.5	19.4	14.0	34.9	23.3
Employees' productivity was above the industry average.	10.9	17.1	16.3	33.3	22.5
Relations with suppliers and customers were stable and excellent.	30.2	33.3	16.3	10.9	9.3
Our company's return on assets (ROA, %) was above the industry average.	27.9	32.6	19.4	12.4	7.8
Sales growth in our company was at a faster rate.	24.8	38.0	19.4	14.0	3.9
Our Company's liquidity ratio was above the industry average.	27.1	37.2	20.2	10.1	5.4

From the findings, it was realized that the respondents strongly agreed 23.3%, and agreed 34.9% to the statement our company's reputation improved in the eyes of the customers but 19.4% disagreed and 14% were uncertain, this can imply that even before the adoption of ICT some among the firms undertook activities that helped them gain customers reputation. Also, the respondents strongly agreed 22.5%, and agreed 33.3% to the statement employees' productivity was above the industry average however 17.1% disagreed and this can be as a result that some firms even before the adoption of ICT engaged their employees in training and other activities that made them more productive.

Moreover, the respondents strongly disagreed 33.3% and disagreed 30.2% with the statement that relations with suppliers and customers was stable and excellent but 10.9% agreed and 16.3% were uncertain. Before ICT adoption, much work was done manually,

involved more paperwork, and communication devices were inadequate and this can result in an unstable relationship with suppliers and customers. 27.9% strongly disagreed, and 32.6% of the respondent disagreed with the assertion our company's return on assets (ROA, %) was above the industry average. Also, a significant number of the respondents strongly disagreed 27.1% and disagreed 37.2% that their companies' liquidity ratio was above the industry average but 20.2% were uncertain, 10.1% agreed and 5.4% strongly agreed. Finally, a greater number of the respondents disagreed 38.0% and strongly disagreed 24.8% with the assertion sales growth in our company was at a faster rate however 19.4% uncertain and 14% disagreed.

4.7 Performance (After the adoption of ICT)

The study sought to point out in Table 8 below the level of agreement or disagreement of respondents with the performance of the firm after the adoption of ICT.

Table.8: Performance (After the adoption of ICT)

	Strongly disagree Percentage (%)	Disagree Percentage (%)	Uncertain Percentage (%)	Agree Percentage (%)	Strongly agree Percentage (%)
Our company's reputation improved in the eyes of the Customers	8.5	9.3	0	44.2	38.0
Employees' productivity is above the industry average.	9.3	10.9	3.9	38.8	37.2
Relations with suppliers and customers is stable and excellent.	0	10.1	11.6	40.3	38.0
Our company's return on assets (ROA, %) is above the industry average.	8.5	10.1	4.7	40.3	36.4
Sales growth in our company is at a faster rate.	0	9.3	7.0	45.0	38.8
Our Company's liquidity ratio is above the industry average.	6.2	10.9	7.8	37.2	38.0

From the study, after the adoption of ICT by logistics firms in Accra, Ghana realized a significant positive response from the majority of the respondents. 38.0% strongly agreed and 44.2% agreed that their company's reputation improved in the eyes of their customers, as well as the statement that employees' productivity is above the industry average, also witnessed a significant response with 37.2% strongly agreeing and 38.8% agreeing. This stands to reason that although the respondents agreed to these statements before ICT adoption however the rate of agreement response after ICT adoption surpasses and this proves that the use of ICT does play a role in this achievement.

Moreover, the respondents, 38.0% strongly agreed and 40.3% agreed that relations with suppliers and customers after ICT adoption is stable and excellent, ICT today, have aided in providing technological gadgets that integrate suppliers and customers to the firms' systems and eased communication. Also, respondents, 36.4% strongly agreed and 40.3% agreed that their company's return on assets (ROA, %) is now above the industry average, as well, 38.0% strongly agreed and 37.2% agreed to the

assertion that their company's liquidity ratio is above the industry average. This implies that ICT does not only make operational activities quicker and faster but increases the financial performance of firms too.

Finally, the sales growth within the firms was 38.8% strongly agreed and 45.0% agreed to be at a faster rate by respondents after the adoption of ICT. It is with no doubt that the firms though witness somewhat growth in sales before ICT adoption however the aftermath is a boost.

V. REGRESSION ANALYSIS

The regression analysis was computed for further analyses into the impact of ICT on the performance of the firms. A stepwise and multiple linear regression methods of analysis was then performed on the dependent and independent variables. A p -value less than 0.05 of a regression analysis (≤ 0.05) is said to be statistically significant while a p -value greater or higher than 0.05 (> 0.05) is said not to be statistically significant (Grabowski, 2016). The findings are tabulated below

Table.9: Stepwise Regression Analysis Excluded Variables^a

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	LEVEL OF ICT USAGE	.108 ^b	1.090	.278	.097	.269
	INFORMATION INTEGRATION	.314 ^b	4.225	.000	.352	.425
	SECURITY AND TRACKING	.117 ^b	1.784	.077	.157	.614
2	LEVEL OF ICT USAGE	.205 ^c	2.173	.032	.191	.256
	SECURITY AND TRACKING	.039 ^c	.592	.555	.053	.554
3	SECURITY AND TRACKING	.054 ^d	.830	.408	.074	.548

- a. Dependent Variable: PERFORMANCE (AFTER ADOPTION OF ICT)
- b. Predictors in the Model: (Constant), CUSTOMER SERVICE DELIVERY
- c. Predictors in the Model: (Constant), CUSTOMER SERVICE DELIVERY, INFORMATION INTEGRATION
- d. Predictors in the Model: (Constant), CUSTOMER SERVICE DELIVERY, INFORMATION INTEGRATION, LEVEL OF ICT USAGE

From the stepwise regression analysis above, it was found that all the independent variables were able to meet the criteria of a *p*-value less than 0.05 and therefore included in each step of the analysis to determine their

significance level on the dependent variable except security and tracking which was excluded due to the fact that it did not meet the criteria hence not significant enough to predict the dependent variable.

Table.10: Multiple Regression Analysis Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	99.0% Confidence Interval for B		
	B	Std. Error	Beta			Lower Bound	Upper Bound	
	(Constant)	.750	.202					
1	LEVEL OF ICT USAGE	.184	.082	.213	2.244	.027	-.030	.398
	CUSTOMER SERVICE DELIVERY	.310	.110	.347	2.822	.006	.023	.598
	INFORMATION INTEGRATION	.331	.078	.331	4.220	.000	.126	.536
	SECURITY AND TRACKING	.046	.056	.054	.830	.408	-.099	.192

- a. Dependent Variable: PERFORMANCE (AFTER ADOPTION OF ICT)

From Table 10 above, it was found out that the level of ICT usage on performance realized a ($\beta = .213, p = 0.027$). This implies that the level of ICT usage was statistically significant and can positively influence performance by 21.3% if improved. Also, the usage of ICT in serving customers was found to be statistically significant at $\beta = .347$ and $p = 0.006$ which means serving customers with

the aid of ICT tools has the potential of increasing performance by 34.7%. It was also realized that the information integration of systems by the firms had a ($\beta = .331, p = 0.000$) which was highly significant. The firms' ability to integrate their systems can influence performance positively by 33.1%. Lastly, the security and tracking system realized a ($\beta = .054$) which implies that a

marginal increase in the security and tracking system by the logistics firms can improve performance by 5.4% however this is statistically insignificant given a ($p = 0.408$).

The above results therefore indicate that the ICT indicators used as the independent variables of the research thus level of ICT usage, customer service delivery, information integration system except security and tracking system generated from this study had a significant part to play on the performance of the logistics firms in Accra, Ghana.

VI. LIMITATIONS AND AREAS FOR FURTHER STUDY

Given that the impact of ICT has always been a topic of research in diverse fields and still under study, the findings from this research confirms a positive impact on the performance of the logistics firms in Accra, Ghana. This study was limited only to the logistics firms in Accra, Ghana, however, some firms declined to participate in this research survey. Also, this study made use of only four ICT variables thus the level of ICT effectiveness, ICT usage in Security and Tracking System, Customer Service Delivery, and Information Integration System but there is a relatively long list of other variables that could have been used in this study.

It is with this that the researcher recommends the following fields for further study, first, an in-depth analysis of the effect of ICT on the transportation service of logistics firms. Secondly the impact of ICT on the warehouse management of logistics service providers and lastly, the adoption and impact of ICT on the performance of Small and Medium-scale enterprises (SME's) in Ghana. Notwithstanding the above limitations, the research is fit for academic and industrial purposes.

VII. CONCLUSION & RECOMMENDATION

The objective of this research was to analyze the impact of ICT on the performance of the logistics companies in Accra, Ghana. Our findings largely confirms previous academic literatures that ICT helps improve firm performance. Our findings showed a high relationship between ICT use within the firms and their performances. The firms had a high level of ICT usage because management motivated its use and ensured all tools are effective and in good condition hence increase performance. The use of ICT in the security and tracking system was found out to enhance security and also help the firm save cost and gain customers' confidence but was not statistically significant. Through the customer service

delivery system, customers and suppliers were been served easily thus increasing customer satisfaction as well as helping the firm save time and cost hence improve firm performance. Also, information exchange is key to the success of businesses and the information integration systems helped serve that purpose better by ensuring communication effectiveness, accuracy, and adequacy between the firms and their corresponding parties.

To conclude, three out of the four independent ICT variables generated from this research were found to be statistically significant to influence performance and that is sufficient enough to conclude that ICT does influence performance hence making work faster, effective, and efficient giving firms that employ them reap its numerous benefits over others.

On the basis of the results and findings the researcher recommends that management should continue to motivate and increase the level of ICT usage within the firms even to sectors that are yet to be computerized since the higher the level of usage the better it helps achieve a higher level of optimum operation. Also, management should be abreast with the rapid technological changes in order to keep an update on their ICT tools to enjoy better services and also avoid security breaches. The researcher also recommends that the firms should continue to use and expand their customer service delivery and information integration systems to keep serving their customers better and with ease hence increase customer satisfaction. Finally, the researcher recommends that for the logistics firms in Accra, Ghana to achieve success, they need to adopt ICT as part of a "system" or "cluster" of mutually reinforcing organisational approaches as posited by (Milgrom & Roberts, 1990).

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APPENDIX B

ENLISTED LOGISTICS FIRMS OF THE SURVEY

1. DHL GHANA (EXPRESS)
2. ARAMEX GHANA LTD.
3. IAS/FEDEX GHANA LTD.
4. ZERO TH LOGISTICS LIMITED.
5. OVERCOMERS TRADING (OVERCOMERS SHIPPING COMPANY)
6. IMPRESSIVE SOLUTIONS GHANA LIMITED
7. GBH LOGISTICS
8. TRIPSTAR SERVICES
9. LIKEL CLEARING AND FORWARDING AGENCY
10. HOLLY CARGO COMPANY
11. M&E LOGISTICS
12. CHRISATH LOGISTICS
13. AMOOKSCO VENTURES (AMOOKSCO LOGISTICS)
14. CANDOR GHANA LTD.
15. ZF1 GARDEN LOGISTICS
16. LOGICAL MARITIME SERVICE
17. XLM SHIPPING COMPANY
18. AKT SHIPMENT AND LOGISTICS LTD
19. PLG LOGISTICS
20. MODERN WORLD LOGISTICS LTD
21. ALS GLOBAL LOGISTIC AND SHIPPING