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DETERMINANT FACTORS FOR ADOPTION OF LOGISTICS INFORMATION SYSTEM IN THE PUBLIC HEALTH LABORATORY IN CHAKECHAKE-ZANZIBAR

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ABSTRACT

Logistics information system constitutes "computer-based information system that supports every aspect of the logistics management process, which involves the coordination of activities, such as scheduling, inventory replenishment, and material flow planning. It is regarded as an essential vehicle in achieving customer service in public entities. Such an information system enhances public institutions to share timely information and facilitate the delivery of products of the right quantity, quality, and at the desired location of the customers. This study examined the existing logistics information system in a bid to know the determinant factors for adoption of logistics information system with perceived benefits in the public health laboratory. The study involved two main theories which included diffusion of innovation and technological acceptance theories. The conceptual framework was developed to reflect the specific objectives mentioned. The study employed a quantitative cross-sectional research design whereby data were drawn from a simple random sampling of 90 respondents through structured questionnaires. Statistical Package for Social Science (SPSS) version 25 was adopted for quantitative analysis. Descriptive statistics, reliability analysis and regression analysis were used to analyze and determine the key factors and association in relation to dependent variables. The regression results show that there are significant and positive determinant factors of Logistics Information System adoption. The technological infrastructure (β=.371, t=5.296, p=.000), management support (β=-0.217, t=-2.092, p=.040), and government environmental support (β=0.990, t=11.911, p=.000) were all found significant and positive effects on Logistics Information System adoption as well as positive and significance between Logistics Information System adoption and perceived benefits. The study recommended that organization should focus on investing proper technological infrastructure.

Keywords: *Factors, logistics Information system, Perceive Benefits, Public health*

INTRODUCTION

Background Information

The influence of the information system in the supply chain is utmost important to promise the upstream side, that is suppliers, focal firms, public medical stores department and downstream (Jafarnejad, 2019). In unindustrialized countries, the information technology is linked with health sector as it concentrates on overall aspects of technology but little investigations were made in the adoptions of logistics information system (Zailani *et al.*, 2015). Logistics Information System is taken as an important aspect of serving customer service in many public entities (Bradley *et al.*, 2018). This enhances to share appropriate information and facilitate delivery of products or services of the right quantity, quality, and at the desired location of the customers or patients, increases productivity, controlling and monitoring products movement as well as medical at national, regional and international levels (Hare & Snow, 2012; Dey *et al.*, 2016; Iadanza *et al.*, 2019).

Also, logistics information system involves the use of technologies such as enterprise resource planning (ERP), warehouse management systems (WMS), transportation management systems (TMS), electronic data interchange (EDI), radiofrequency identification (RI) and bar codes are crucial in many health sectors since it ensures maximum services to the citizens (Oghazi, 2018; Abiona,2012; Ramanathan *et al.*, 2014; Chong *et al.*, 2012). By definition, logistics means a process of managing acquisition, movement and storage of material, parts and finished inventory (and the related information flows) through the organization and its marketing channels, in such a way that current and future profitability

is maximized through the cost-effective fulfillment of orders (Somuyiwa & Adewoye, 2010). Logistics contain the integration of information, transportation, inventory, warehousing, material-handling, and packaging that serves to ensure products or services delivery to the customers (Somuyiwa & Adewoye, 2010).

Furthermore, logistics information system can be viewed as a computer-based information that supports every aspect of the logistics management process. This involves coordination of activities, such as products and/or services scheduling, inventory replenishment, and material flow planning (Barbosa & Musetti, 2010). Through information system; suppliers, manufacturers, and customers are integrated into a logistics network for efficient supply chain management in the public entities (Arunkumar, 2016).

In the context of this study, supply chain in the health sectors are on the side of availability of medicals as it facilitates movement of medical supplies and information from suppliers to the public health laboratory (Jaberidoost *et al.*, 2015). Through supply chain process, logistics information system facilitates the achievement of effective planning, control, management and timely transportation of medical supplies and related assets from central medical store to the peripheral health centers through the integrated system (Liu *et al.*, 2016; Lu *et al.*, 2013). It also helps to reduce transaction errors and costs, improve data accuracy, information quality, and faster application process, better customer services, and improve relationship with business partners as well as communication (Karnali & Kurnia, 2011).
Globally, logistics information system has been researched widely in private sectors and logistics service providers. However, there is still a few studies conducted in public sectors, specifically in the health sectors. Medical and other services is one of the key service sector and most critical in any country (Dirican *et al.*, 2020). In Africa, the adoption of logistics information technologies, in wide-ranging, is at a low speed.

Nevertheless, the studies conducted by Anwer (2019) and Awa and Ojiabo (2016) have identified limited factors for the adoption of logistics information system. These were technological, organizational and environmental factors. Throughout their studies, technological factors such as technological infrastructures, technological complexity, technological compatibility and technological investments are affecting the adoption of logistics information system (Liu *et al.*, 2016). Also, logistics information system was affected by organizational factors such as size of the organization, top management support, willingness and attitude of the management (Tu, 2018). Finally in environmental factors, logistics information system is affected by mimetic, normative and coercive pressures from external partners such as from suppliers, customers, competitors and government (Kung *et al.*, 2015).

Based on above noted significances and challenges that occur through logistics information system, the government of Tanzania as one of the African countries, cannot be omitted as one of the states having little applicable progress in the implementation of logistic information system (Ishabakaki & Kaijage, 2015). For instance, the government has initiated National information, communication and technology policy, ICT security guideline and e-government guideline for the purposes of promoting information system among the public sectors. For example, ICT policy is among the policy that enabled Tanzania to attain successes in the areas of telecommunications, infrastructure development, human capital development and use of ICT in service delivery to citizens (URT, 2016).

Moreover, National Bureau of Statistics has been adopted so as to show how ICT policy is used in many public sectors and its benefits among the users in Tanzania. For instance, the policy has been adopted to support the government functions so as to achieve aspirations of second national five years development plan that reflects Tanzania development vision of 2025 and sustainable development goals of 2030 (URT, 2017). Similarly, the policy addresses business requirements for achieving the return on investment; it supports ICT planning and management as well as insisting the use of strategic and operational management of ICT within the principles of ICT governance. On the one hand, the policy ensures security of data in terms of management, processes and storage, provision of awareness and information security to staff and stakeholders so as to achieve strategic goals and their responsibilities when using ICT security (URT, 2016). Not only that but also, ICT development has been initiated through ICT security guideline for the purpose of improving security of information in the public sectors. However, the initiative provides mechanisms for securing information systems assets and guiding the third party to get better access of using organizational resources, integrate financial management system network security policy hereby creating secured environment that serves to enhance service delivery with the view of protecting organizational resources (URT, 2012)

Also, other initiatives have been adopted in Tanzania to support flow of logistics activities and information in the public health sectors. This include but not limited to ICT Policy for enhancing transparent and efficient service provision in the public sector which is associated with e-transparency and challenges when the implementation of ICT formulation (Lubua & Maharaj , 2012). Similarly, the right to information in Tanzania specifically in the insights on the laws, policies and practices has been initiated principally to contribute a great deal in economic, social and political development (Ashnah *et al*, 2015). Although several initiatives have been addressed, some complications when adopting logistics information system among the users are still not impressive in many public health laboratories. For instance, lack of funds to buy adequate infrastructures, lack of skills, poor network supports, poor organization supports, and power-cut off and alike are among the constraints that hinder the logistics information system in this sector (URT, 2016). This shows that, at the moment technological infrastructures have to be installed to support information flow and logistics information in particular.

Furthermore, the application of information technologies in Tanzania such as that of logistics information system in the health sector is at the infant stage and not widely used in public health sectors (Shidende, 2016). Although, there is development of ICT infrastructures like national fiber optic cables, the spread of internet service providers (ISP) and mobile internet services, logistics information system that serves to facilitate logistics operations are still not sufficient in public health sectors (Wema, 2013). However, regardless of the availability of information and communication technology infrastructures, information and communication technology policies and abundant ICT professional, sideways of organization and partner's willingness is still there and is a critical challenge for the adoption of logistics information system in the public health sectors (Kabanda & Brown, 2017).

Indeed, the existing literatures such as (Yazici, 2014; Bradley *et al.*, 2018; Salema & Buvik ,2016) deemed to talk about contributing factors of logistics information system adoption using the technology, organization and environment framework but had studied on logistics information system in industrial sectors. However, they had forgotten looking on the public health sectors. Thus, the authors of the current study concentrated on the logistics information system in the health sectors which investigated the determinant factors for the adoption of logistics information system and perceived benefits in the health sectors of Zanzibar. This study is a cornerstone as it was providing a better understanding to the practitioners in the medical industry and academicians in order to understand fundamental factors that determine the adoption of logistics information system in the health sector and it allows the policymakers to emanate with an effective plan to ensure full acceptance of technologies associated to logistics information system around health centres.

Objectives of the study

The main objective of the study was to explore the determinant factors for the adoption of logistics information system in public sectors. Specifically, the study examined determinants factors for the adoption of logistics information system and gave light on the perceived benefits for the adoption of logistics information in the public health laboratory.

LITERATURE REVIEW

Theoretical review

This study was guided by two theories; Diffusion of innovation theory and Technological acceptance model.

Diffusion of Innovation can be viewed as the process through which innovation is spread among people when adopting or using it to different tasks. This was first discussed in 1903 by the French sociologist Gabriel Tarde (Toews, 2003) who designed the original S-shaped diffusion curve, followed by Ryan and Gross (1943) who introduced the adopter categories that were later used in the current theory popularized by Everett Rogers (Katz, 1957). The theory is often viewed as a valuable revolution model for guiding technological innovation where the innovation itself is modified and presented in ways that meet the needs across all levels of adopter (Rogers, 2003). It also stresses the importance of communication and peer networking within the adoption process. On the one hand, this is a prevailing theory in the technological adoption spectrum which has been extensively researched by past extant scholars (Tsai & Tang, 2012).

Diffusion is defined as the rate at which innovation is adopted and communicated to the individual members of units over a certain period and innovation is defined as the new ideas, practices or object that organization or individual perceived as new which have never been used or is new inventions (Kaminski, 2011). In such a way, innovation may be considered as something new in terms of its application by the adopting organization, but not necessarily new in its own right based on date of item creation. On the other hand, Rogers (1995) assumed that any new technologies that organization or individual unit intend to adopt is equivalent to innovation which needs to be embedded with diffusion characteristics to

be successful. Not only that but also, the theory hold that the operators of new technology are sometimes adopted to innovators of the technology which is the thumps of this study. Similarly, Raynard (2017) and Rogers (1995) add that, the adopters or innovators of new technology are crucial for the effective implementation of technology diffusion. Accordingly, this theory is in the line with this current study as it relates to the adoption of technology. Also, the theory linked with customer services, technological infrastructure and communication in relation to technological adoption which is the main thumb of logistics information system. Hence, perceived benefits are realized through linking with diffusion of innovation and customer services.

Meanwhile the technological acceptance model (TAM) was originally proposed by Fred Davis in 1985 as a doctoral thesis at the Massachusetts Institute of Technology. Current literature indicates that TAM is a highly cited model (Mugo *et al.,* 2017). The model is one of the prominent theories pioneered by Fishbein and Ajzen (1975) who derived from the theory of reasoned action (TRA). The TRA assumptions rely on the belief and intention to use. The individual behavioral intention to use the new technology example, logistics information system is influenced by the attitude which impacts the actual behaviors for the use of the technology.

TAM posits that the adoption of new technology is not only influenced by the behavioral intention but also determined through the perceived usefulness of the technology to the individual, organization goals and also the perceived easiness of the technology for the users (Scherer *et al.,* 2019). The two elements of TAM have been researched and validated in numerous studies across different fields which emphasize that adoption of new technologies must be influenced by the perceived benefits that the technology performs the intended jobs in friendly ways for the operational users of the system to reduce the resistance to change (Tung et al., 2008; Kamal *et al.,* 2020; Rafique *et al.,* 2020). However, the TAM model has been criticized for not covering the hidden aspect about other factors that affect the two perceived usefulness, perceived easiness and perceived user acceptance. Venkatesh and Davis (2000) extend the TAM theory to TAM2. They add the social and cognitive pillars as part of the subjective norm, job relevance; image, result demonstrability, and output quality were determinants of perceived usefulness in the adoption of new technology. Therefore, TAM model answers part of specific objectives and is incorporated in research framework as the critical determinants to the adoption of LIS which is revealed in several other studies such as Bienstock (2010).

Empirical review

Significant researches have been undertaken in the field of logistics information system, most of them had not been deeply dealing with the determinant factors for the adoption of logistics information system in the public health sectors. Findings from these studies showed that, factors that determine logistics information system with perceived benefits rotated around to technological infrastructures, management support and government supports. Unfortunately, such factors are touching about less adoption of logistics information system in the public health sectors (Awa *et al.,* 2016; Kamal *et al.,* 2020; Wallenburg *et al.,* 2019)

Under technological infrastructures related factors, literature showed that ICT infrastructure such as hardware and software are possessed in the organization to facilitate the adoption of logistics information system (Abiona, 2012). Indeed, present of computer and cable installation as well as budget for computer maintenance and security are facilitating the effective adoption of logistics information system, although many public sectors experience lack of enough fund to handle ICT system (Vanany & Shaharoun, 2008). Another related factor is assurance of internet services for adoption of logistics information system (Eliakimu, 2013). Other studies showed that knowledge of health workers, application of radio frequency identification device in health sector, computerized information system and adoption of electronic data interchange (EDI) and vendor managed inventory (VMI) are only solution to support the access of information and ensure timely delivery of the drugs to the health facilities (Salema & Buvik ,2016;Ishabakaki & Kaijage, 2015)

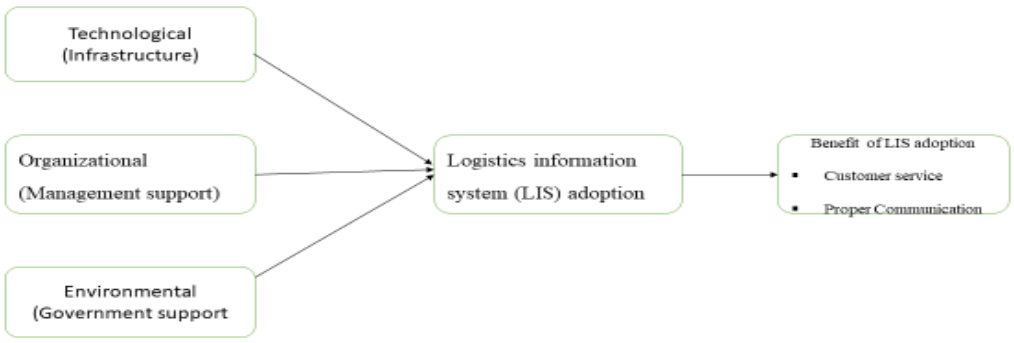
Moreover, organizational support influences the adoption of logistics information system. Thus, direct commitment of top managers may influence the adoption of logistics information system (Costa *et al.*, 2016). On the other hand, managers' attitude in terms of infant help and supports are pushing factors for enriching of LIS (Basu, 2015;Asare *et al.*, 2016; Shao *et al.,* 2016). Beyond that, organizational presence of innovative policies together with enough capital helps the firm in adoption of LIS (Basu, 2015). Similarly, top management awareness helps in building of LIS with perceived benefits of the firm (Jadamba, 2014). The other related factor is organizational and environmental framework and strategies help in adoption of logistics information system (Brown & Russell, 2007; Wema,2013). Literature point out

the readiness of top management to support logistics information system. Also, key players of supply chain are influencing factors for adopting logistics information system (Tsai & Tang 2012; Tung *et al.*,2008). In contrary to that, little support and commitment of top management and poor coordination become the key determinants that face the adoption of LIS (Vanany &Shaharoun, 2008)

Other factors contributing to this context has been rotated around to government support; however, it is suggested that, provision of instant helps such as allocation of budget by the government could be critical factor influencing the adoption of LIS (Ramanathan *et al.*, 2014). Moreover, technological investment by the government is prosperity factor for adoption of LIS (Chong & Chan, 2012). On the other side, embarking of ICT projects such as capacity building is another way of adoption of LIS in the public sectors (Abiona, 2012). Closely related to this is provision of regulatory framework by the government, training staffs and subordinates for using logistics information system technologies through specialized supervisory organs (Zailani*et al.*, 2015).

Accordingly, most researchers did not link totally the adoption of logistics information system in the public health sectors and could not shed adequate light on the factors that determine or even help to implement logistics information system. Furthermore, the studies did not dig into a step further to show which information systems are compulsory and critical to be adopted in the organizations for enriching or envisaging logistics management activities of the firms specifically in public health sectors. On the other hand, the studies had focused on the adoption of LIS in developed countries especially in the private sectors while forgetting to talk about the public health sectors which is the thumb of the current study. Nevertheless, their studies only showed the determinant factors but failed to explain how they were the sources of perceived benefits when adopting logistics information system. This is for the reason that the authors of the current study conducted the determinant factors for adoption of logistics information system in public health laboratory so as to know how this differs from private sectors. Also, the study intended to assess the determinant factors of LIS as the reference by using quantitative approach where most of the studies conducted were qualitative.

Figure 1.1 Conceptual frame work



Source: Field Data, 2020

METHODOLOGY

This research was carried out in Zanzibar and concentrated on the public health laboratory where logistics information system seems to be less effective compared to private sectors. The research employed a quantitative cross-sectional research design. This was an appropriated strategy in social science as it was very quick, in-expensive and reliable to validate hypothesis (Diyamett *et al.*, 2012; Malhotra, 2010). The design acted as a blue print for fulfilling research objectives and answering research questions. Also, it acted as a master plan specifying the methods and procedures for collecting and analyzing the needed information on the determinants factors in relation to adoption of logistics information system and perceived benefits in public health laboratories. A simple random sample size of 90 respondents was employed. In this study, the sample size was obtained through Yamane formula about 124 populations from the

organization. From this population, sample size was made. To select a small portion of a target population for the purpose of making a representativeness as a sample, where sampling was taken as selecting a given number of subjects from a defined population as are preventative of that population (Thornhill *et al.,* 2009). The sample size was determined from the following formula developed by Yamane (1967) that is;

$$n = \frac{N}{1+N(e)^2}$$

Whereby n = Sample size, N = Population while e = Level of precision of sampling of error which is 5%. Then the sample size in this study was 90 respondents from the public health laboratory of the Ivo De Carneri (PHL –IDC)

Table 1. Sample Size Distribution

S/N	Department	Targeted Population	Sample Size	Sample Percentage
1	Internal audit section	5	3	3.33%
2	Accounting Section	6	3	3.33%
3	Procurement section	5	2	2.2%
4	Medical store	20	15	16.66%
5	Inspection Section	10	5	5.55%
6	Human Resource Section	5	2	2.2%
7	ICT section	13	10	11.11%
8	Users Section	60	50	55.55%
	Total	**124**	**90**	**100%**

Source: Field Data, 2020

Moreover, the authors used structured questionnaire. This instrument was relevant as it helped the authors to collect larger amount of data at a low cost per respondents and it became appropriate to the administrators who were difficult to reach in any way. Furthermore, the questionnaire was an appropriate method for data collection as it has provided sufficient time for the respondents to answer the questions and use minimum expense (Saunders *et al.,* 2011). Also, it was an effective data collection instrument when the study falls in a quantitative continuum. List of questions were prepared by the authors (Abowitz *et al.,* 2010). Closed ended questions were prepared considering that they were inexpensive in analysis and control (Adam & Kamuzora 2008; Kothari, 2004). Therefore, chosen sample was supplied with questionnaire to fill in so as to obtain primary data regarding to the determinant factors for adoption of logistics information system in the public health laboratories.

The data was coded, cleaned and prepared for analysis using SPSS version 25. Under this study the authors applied descriptive analysis, regression analysis and multivariate model to analyze data. The descriptive statistics described the essential characteristics of the sample used, which included averages, frequencies, and percentages (Anderson *et al.,* 2016). The authors used descriptive statistics to meet the objective of this study. In addition, regression analysis was adopted owing to the quantitative nature of the study. This technique was employed and assumed the data are normally distributed and there is a linear correlation between constructs (Anderson *et al.,* 2016). Thus, the authors argued that regression analysis was the most appropriate technique to evaluate the relationship of the variables. The overall estimate regression model was;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e_i$$

Where: Y = Adoption of logistics information system, X1 = Technological infrastructure, X2 = Organization management support, X3 = Environmental Government support, β0 = Regression constant and e = Error term. Also, the relationship between determinants of LIS adoption and perceived benefits will be analyzed by using a structural equation model whereby the multivariate analysis was computed through general linear model. The following equation was used to compute the analysis;

$$Y_{a,b} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e_i$$

Where: Y a, b= Perceived benefits ('a' = customer service and 'b' = communication), X1 = Technological infrastructure, X2 = Organization management support, X3 = Environmental Government support, β0 = Regression constant and e = Error term.

To ensure trustfulness of the findings from quantitative studies, authors ensured the reliability of data for yielding consistent results by using Cronbach alpha and composite reliability. The reliability of the data in this study was measured by using Cronbach alpha, in which data quality was measured to determine internal consistency (Abowitz &Toole, 2010; Hair *et al.,* 2009). Data reliability comply as a collection of techniques aimed at ensuring the consistency of scale data (Drost, 2011). Data from this study in terms of validity was calculated using a range of 95% confidence level and 0.05 percentage of picking a choice. Furthermore, the questionnaires in this study were based on the level of knowledge and was distributed according to kind of respondents as the study had normal and key respondents.

FINDINGS AND DISCUSSION

Findings show that a number of factors determine logistics information system. These can be associated with (i) Technological infrastructure (ii) Organizational management support and (iii) Government environmental support. This is in response to the foregoing sections which shows that the adoption of logistics Information System enabled organization to perceive benefits as pointed out in the subsequent paragraph; -

(i) Main determinant factors of Logistics Information System adoption in the Public Health laboratory:

This section explores determinant factors for the adoption of logistics information system in the Public Health Laboratory. It focuses on the three major factors including; technological infrastructure, management and government support (factors). Analysis for the objective of this study employed descriptive statistics and provided description for the descriptive statistics of mean, standard deviation, and standard error of the primary constructs used in the study.

Technological infrastructure

Technological infrastructure is one of the determinants for adoption of logistics Information System. In this category, four items were used to measure the technological infrastructure. In table 2, the mean scores and standard deviation combined were computed. Among the items of technological infrastructure, 200c is highly likely to contribute largely to factor with summed score of highest mean 4.52 and this shows that laboratory has installed all the required ICT infrastructures to facilitate the adoption which is equivalent to standard deviation of 0.908 of technological infrastructure, followed by 201a variable code and this indicated as mean as 4.45 with equal to standard deviation of 0.891 which showed that laboratory possesses enough computers to enhance adoption of logistics information system; whereas 201b variable code indicated that mean score was 4.38 which is the same as standard deviation of 1.019 to indicate that laboratory is connected to internet service 24hrs to enhance adoption of logistics information system; then code 201d illustrated that laboratory set aside enough budget to buy ICT infrastructures to facilitate the adoption of the logistics information system by mean score 4.20 with equivalent to standard deviation of 1.214.

According to findings, overall results implies that technological infrastructure is a significant dimension that public health laboratory need to pay attention when adopting logistics information system (LIS).

Table 2. Descriptive statistics of Technological Infrastructure

code	Description of items	Mean	S.D	S.E	Rank
201a	A laboratory possess enough computers to enhance adoption of LIS	4.45	0.891	0.106	2
201b	A laboratory is connected to internet service 24hrs to enhance adoption of LIS	4.38	1.019	0.121	3
2001c	A laboratory has installed all the required ICT infrastructures to facilitate the adoption of LIS	4.52	0.908	0.108	1
201d	A laboratory set aside enough budget to buy ICT infrastructures to facilitate the adoption of the LIS	4.20	1.214	0.214	4

Source: Field Data, 2020

Organizational Management Support

Another factor assessed in this section was organizational management support. In this section, four items were used to measure the organizational management support. In table 3, the mean scores and standard deviation combined were computed. Among the items of organizational management support, 202d is highly likely to contribute largely to the factor with mean score of 4.52 which is equivalent to standard deviation of 0.969 of the ability of laboratory management to precise innovation strategies to adopt the logistics information system. This is followed by 202c with mean score of 4.52, the same with standard deviation of 0.924 of the ability of laboratory leaders to provide instant help for employees when they face challenges in using the LIS. Then, 202b indicated that mean score was about 4.51 which is equivalent to 0.892 of standard deviation depicted that the laboratory provides supports for employees to adopt logistics information system. Finally, mean score of 4.42, with standard deviation of 0.951 indicates that the laboratory leaders encouraged employees to adopt logistics information system.

Therefore, overall results show that Organizational management support is a significant dimension that public health laboratory need to pay attention when adopting logistics information system

Table 3. Descriptive statistics of Organizational Management Support

code	Description of items	Mean	S.D	S.E	Rank
202a	A laboratory leader encourages employees to adopt a LIS	4.42	0.951	0.113	4
202b	A laboratory provides supports for employees to adopt a LIS	4.51	0.892	0.106	3
202c	A laboratory leaders provide instant help for employees when they face challenges in using the LIS	4.52	0.924	0.110	2
202d	A laboratory management has precise innovation strategies to adopt the logistics information system	4.52	0.969	0.115	1

Source: Field Data, 2020

Government Environment Support

Another factor assessed in this section was government support. In this section, four items were used to measure the government environment support. In table 4, the mean scores and standard deviation combined were computed. Among the items of organizational management support, 203d is highly likely to contribute largely to the factor with summed score of mean 4.63 with standard deviation of 0.815, it implies that the laboratory leaders provide instant help for employees when they face challenges in using the logistics information system, followed by 203c with the mean score of 4.59 and its equivalence to standard deviation of 0.821 implies that laboratory leaders provide instant help for employees when they face challenges in using the logistics information system, whereby the other coded 203b showed that mean score of 4.59 which is equal to standard deviation of 0.803 depicted that the government encourages the laboratory to plan for embarking on projects related to the adoption of the logistics information system and then code 203a mean score of 4.44 which made standard deviation of 0.996 and this shows that the government helps the laboratory staff by providing frequent training on how to use logistics information system. Therefore, overall results indicated that organizational management support is a significant dimension that public health laboratory needs to pay attention when adopting logistics information system.

Table 4. Descriptive statistics of Government Support

code	Description of items	Mean	S.D	S.E	Rank
203a	The government helps the laboratory staff by providing frequent training on how to use a LIS	4.44	0.996	0.118	4
203b	The government encourages the laboratory to plan for embarking the projects related to the adoption of the LIS	4.59	0.803	0.095	3
203c	A laboratory leader provides instant help for employees when they face challenges in using the LIS	4.59	0.821	0.097	2
203d	A laboratory leader provides instant help for employees when they face challenges in using the LIS	4.63	0.815	0.097	1

Source: Field Data 2020

(ii) The Adoption of Logistics Information System (LIS)

Adoption of LIS is the dependent variable in this study. It was measured by using four items adopted from previous and reliable literatures. Table 5 provides the mean scores and standard deviation for all four items as follows. 204d is highly likely to contribute largely to the factor of mean score 4.62 with standard deviation of 0.817, this showed the existing difference between logistics information system and manual system. The remaining items have very similar summed score by ranging of 4.59 with standard deviation of 0.821. This shows that logistics information system has increased the effectiveness of laboratory activities, reduced lead time of ordering medical equipment and received as a party life of the laboratory activities.

According to findings, the implication for the adoption of logistics information system is a significant dimension that public health laboratory needs to pay attention to implement all activities.

Table 5. Descriptive statistics of LIS adoption

code	Description of items	Mean	S.D	S.E	Rank
204a	LIS has increased the effectiveness of laboratory activities	4.59	0.821	0.097	2
204b	A laboratory has reduced a lead time of ordering medical equipment by adopting LIS.	4.59	0.821	0.097	2
204c	LIS has been received as a party life of the laboratory activities.	4.59	0.821	0.097	2
204d	There is a difference between LIS and manual system	4.62	0.817	0.097	1

Source: Field Data, 2020

(iii) Determinant factors of Logistics Information System adoption in the Public Health laboratory

Analyzed objective by Multiple Regression Model: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e_i$

Where: Y = Adoption of logistics information system, X_1 = Technological infrastructure, X_2 = Organization management support, X_3 = Environmental Government support, β_0 = Regression constant ande = Error term

Hence, Hypothesis test for the entire regression of the objective one (F test)

(i) H0: Null Hypothesis

H0: There is no relationship between LIS's determinant factors and LIS adoption

H0: $\beta_1 = \beta_2 = \beta_3 = 0$ [no regression relationship]

This means the independent variables do not contribute information in the prediction of dependent variable

(ii) Hi: Alternative hypothesis

Hi: There is a relationship between LIS's determinant factors and LIS adoption

Hi: $\beta_1 \neq \beta_2 \neq \beta_3 \neq 0$ [no regression relationship]

This means the independent variables contribute information in the prediction of dependent variable

(iii) Test statistics: (F- test) = 79.554, as stipulated in the table 4.7

The study found that alternative hypothesis is accepted by indicating F-test = 79.554 which shows that there is a statistical significance where $\beta_1 \neq \beta_2 \neq \beta_3 \neq 0$, this implies that every increase units of independent variable affects the dependent variable, so the Null hypothesis is rejected. Hence, there is a positive relationship between LIS determinant factors and LIS adoption.

Model Summary

The overall estimation results are supported by the value of the R square value of 77.1%. This implies that three main variables of technological infrastructure, management support and government environmental support explain about 77.1% of the variance to the dependent variable of logistics information system adoption. This implies also that the model results in this study fit the data used in the analysis to a large extent. Only 22.9% are unexplained variation from a total variation.

Table 6: Multiple regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.884[a]	.781	.771	.391

Source: Field Data, 2020

Analysis of Variance

Table 7 indicates the results for ANOVA conducted. The results show that F-statistics is 79.554 at a p-value of 0.000, whereas the sum of squares regression is 36.452 at 3 degrees of freedom. In summary, the model is statistically significant as the p-value is less than the cut off of 0.05. From the ANOVA results, the research can conclude that model results fit the data, and all three predictors of technology infrastructure, organization management support and environment government support are significant positive to the LIS adoption.

Table 7: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.452	3	12.151	79.554	.000[b]
	Residual	10.233	67	.153		
	Total	46.685	70			

Source: Field Data, 2020

Technological infrastructure

Hypothesis test for the individual parameters (t test)

H0: $\beta=0$ [Xi does not contribute information in the prediction of Y]

Hi: $\beta 1 \neq 0$

Test statistics: t = 5.296

Hence, under this study the alternative hypothesis is accepted because technological infrastructure contributes to the adoption of LIS and rejects the Null hypothesis.

The findings indicated that, technological infrastructure is positively related to the Logistic Information System adoption with a coefficient of 0.371 and significant at p = 0.000. This implies that, for every unit increase in technological infrastructure, the LIS adoption will increase by 37.1%.

This is because the adoption of anything in the world of technology depends on the technological infrastructure in order for the adoption to take place. These results were supported by diffusion of innovation theory that, the innovation itself is modified and presented in ways that meet the needs across all levels of adopters. These results are in harmony with those of Salema and Burik (2016) which suggest that the government of Tanzania should provide more resources to build

infrastructures that would facilitate adoption of LIS technologies like Electronic Data Interchange (EDI) and Vendor Managed Inventory (VMI).

Organizational management support

Hypothesis test for the individual parameters (t test)

H0: β=0 [Xi does not contribute information in the prediction of Y]

Hi: β1≠0

Test statistics: t = 2.092

Hence, under this study the alternative hypothesis is accepted because Organizational management support contribute to the adoption of LIS and reject the Null hypothesis.

Organizational management support is positively related with Logistics Information System adoption with a coefficient of 0.217 and significant at p = 0.04. This implies that, for every unit increase in organizational management support, the LIS adoption will increase by 21.7%. Therefore, there was no LIS adoption without an effective organizational management support, because in the management is where it can be found the Logistics Information System. The results were supported by organizational adoption theory which suggests that an organization needs to straddle simultaneously innovation and organization dimensions because the equality of technological superiority and fit with the adopting organization. These results are similar to those of Jadamba (2014) which portray that there is a need for the management to fully support implementation and adoption of Logistics Information Systems by increasing staff's awareness.

Government support

Hypothesis test for the individual parameters (t test)

H0: β=0 [Xi does not contribute information in the prediction of Y]

Hi: β1≠0

Test statistics: t = 11.911

Hence, under this study the alternative hypothesis is accepted because government support contributes to the adoption of LIS and rejected the Null hypothesis. Government support is positively related with LIS adoption with a coefficient of 0.990 and significant at p = 0.000. This implies that, for every unit increase in government support, the LIS adoption will increase by 99%. So, there is a notion of dependence from the subsidies from the government in order for the LIS adoption to take place. These results were supported by Chong and Chan (2012) who suggest that apart from ICT policies, the government allocates budget for ICT infrastructures, technology investment, and capacity building.

Table 8. Multiple regression results

Model	Unstandardized Coefficients		Standardized Coefficients	t	sig.
	B	Std. Error	Beta		
(Constant)	-.573	.407		-1.408	.164
Technology	.371	.070	.322	5.296	.000
Organization	-.217	.104	-.164	-2.092	.040
Government	.990	.083	.893	11.911	.000

Source: Field Data, 2020

(iv) Logistics Information System adoption determinants in relation to perceived benefits in the public health laboratory

Analyzed by Multivariate model: $Y_{a,b} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e_i$

Where: $Y_{a,b}$= Perceived benefits ('a' = customer service and 'b' = communication), X_1 = Technological infrastructure, X_2 = Organization management support, X_3 = Environmental Government support

The perceived benefits from this study through LIS adoption were customer services and communication. Therefore, the following findings present the relationship between LIS determinants and perceived benefits in the public health laboratory.

The multivariate model was presented and it was found that, the coefficient of determination (R square) is 77.1% for customer service against perceived benefit, which is explained from the total variation. This implies that, there is a huge variation of data points that show goodness of fit. Only 22.9% are unexplained variation from a total variation. Also 77.6% coefficient of determination for communication against perceived benefit is explained from the total variation. This implies that, there is a huge variation of data points that show goodness of fit. Only 22.4% are unexplained variation from a total variation.

Table 9: Multivariate model results (n = 71)

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	CS	36.452[a]	3	12.151	79.554	.000
	CN	36.295[b]	3	12.098	81.776	.000
Intercept	CS	.303	1	.303	1.983	.164
	CN	.267	1	.267	1.806	.184
Technology	CS	4.284	1	4.284	28.049	.000
	CN	4.289	1	4.289	28.987	.000
Organizational	CS	.668	1	.668	4.375	.040
	CN	.722	1	.722	4.878	.031
Government	CS	21.667	1	21.667	141.862	.000
	CN	21.758	1	21.758	147.069	.000

a. R Squared = .781 (Adjusted R Squared = .771)
b. R Squared = .785 (Adjusted R Squared = .776)

Source: Field Data, 2020

Technological Infrastructure versus Perceived Benefits

The results found that technological infrastructure is significant with the customer service and communication with p = 0.000. These results imply that, there is a relationship between perceived benefits (customer service and communication) with technological infrastructure. Therefore, there is an impact to the technological infrastructure from the service to the customer and communication. These results were supported by Diffusion Innovation and Technological Acceptance Model which posits that the adoption of new technology is not only influenced by the behavioral intention but is determined through the perceived usefulness of the technology to the individual and organizational goals.

Organizational Management Support versus Perceived Benefits

The perceived benefits which are customer service and communication are significant with organizational management support with p = 0.040 and p = 0.031 respectively. This implies that there is a relationship between perceived benefits and organizational management support. Therefore, at any effect on organizational management support, it may lead to an outcome in perceived benefits and vice versa is true. These results were in harmony with those of Brown and Russell (2007) who found that the key determinants that influence the adoption of logistics information system are perceived benefits and top management.

Government Support versus Perceived Benefits

Government support is significant with perceived benefits such as customer service and communication with p = 0.000. This implies that there is a relationship between government support and perceived benefits. This can be explained for the fact that, the logistics information system function from the government support in such a manner that the servants need to provide customer service and good communication in order to display the development of an institution for the government to give support in presence.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The main objective of this study explored the determinant factors for the adoption of logistics information system and recommend measures for improving logistics information system in public health sectors focused on technological, organizations and government factors for adoption of logistics information system.

Accordingly, descriptive statistics was used to provide description for the descriptive statistics of mean, standard deviation, and standard error of the primary constructs used in the study especially in the objective number one, the result showed that the Mean, S.D and S.E of the items of the variable has statistically significant by having a mean of less 4.

Also, the multiple regression results showed that; technological infrastructure tested was found statistically significant (β=0.371, t=5.296, p, <0.05), 0rganizational management support tested was found statistically significant (β=0.217, t=2.092, p <0.05), Government environmental support tested was found statistically significant (β=0.99, t=11.911, p <0.05).

The multivariate model result showed that; there is a positive relationship between technological infrastructure with perceived benefit of customer services (F=28.049, p <0.05) and perceived benefits of communication (F=28.987, p<0.05). Also, there is statistically significant between Organization support with perceived benefit of customer services (F=4.375, p<0.05) and also perceived benefits of communication (F=4.878, p<0.05). On the other side, there is statistically significant between Government environment support with perceived benefit of customer services (F=141.862, p<0.05) and also perceived benefit of communication (F=147.069, p<0.05). Where; the results revealed that technological infrastructure is positively related to the Logistic Information System adoption with a coefficient of 0.371 and significant at p = 0.000. Also, organizational management support is positively related to Logistics Information System adoption with a coefficient of 0.217 and significant at p = 0.04. And government support is positively related to LIS adoption with a coefficient of 0.99 and significant at p = 0.000. Furthermore, the study found out that, there is a relationship between determinant factors of LIS against perceived benefits such are communication and customer service with p < 0.05.

Recommendations

The foregoing section has highlighted the determinant factors for the adoption of logistics information system in public health sectors and were focused on technological, organizations and government factors. In order to improve the above-mentioned factors, the following recommendations should be considered; -

Firstly, government through the Ministry of health Zanzibar should strive to increase capacity of internet in order to apply full LIS in inventory control in all warehouses and at least to all district hospitals. As these facilities manage relatively large number of products, use of LIS in inventory management will improve the efficiency and effectiveness of inventory management and record tracking resulting to obtain a better perceived benefit. The government should invest a proper technological infrastructure that will be compactable with application of LIS in the organization in order to perceive the benefits such as customer services. Also, the government should have stable electricity power that will support 100% of full adoption of LIS in the organization, poor stable electricity will disturb LIS and the organization for some time will be back for annual system.

Secondly, the policy makers get along with the key factors determinants of LIS adoption hence the policy maker should ensure a genuine policy that will support the organization to go with LIS adoption example warehouse management system (WMS). Therefore, they are required to make sure that all policies made pertaining adoption of LIS should reflect with compatibility of the technology. Indeed, the study provides awareness that can be implemented by policymakers to increase the LIS adoption in Zanzibar especially in a medical industry

Thirdly, the public health laboratory should consider effective human resources and decision making in order to ensure LIS meets the perceived benefits through implementation of its' determinants of adoption. Similarly, training should be provided to all health staffs involved in the organization of pharmaceuticals on the basics of LIS management with due prominence on record keeping and specifically the proper use of store ledgers and bin cards. Furthermore, they should be eager to learn on new trends of technology that will enable to get along with daily world technological changes.

Lastly, future researchers may apply this study as a reference during conducting the research of the same field in the area that this study does not cover. This study comprehensively includes determinant factors of LIS adoption, hence similar study can be conducted to Tanzania as a whole. This is likely to give clear picture of logistics information system especially at this moment where the country struggles to ensure every transaction to be done electronically such as E-Government.

REFERENCES

Abiona, O. (2012), "Adoption possibilities and use of RFID in Nigeria health sector", Vol. 15 No.10.

Abowitz, D. A., and Toole, T. M. (2010), "Mixed method research: Fundamental issues of design, validity, and reliability in construction research". *Journal of Construction Engineering and Management*, Vol. 136 No.1, pp. 108-116.

Adam, J., and Kamuzora, F. (2008), "Research methods for business and social studies", Adam, Jamal, Vol. 138.

Anderson, D. R., Sweeney, D. J., Williams, T. A., Camm, J. D., and Cochran, J. J. (2016). "Statistics for business & economics", *Nelson Education*. 0773172665

Anwer, A. L.-S. M. d. (2019), "Towards better understanding of determinants logistical factors in SMEs for cloud ERP adoption in developing economies", *Business Process Management Journal*, Vol. 25 No.5, pp. 887-907.

Arunkumar, D. (2016). Designing Logistics information System : 4(Iv), 681–686.

Asare, A. K., Brashear-Alejandro, T. G., and Kang, J. (2016), "B2B technology adoption in customer driven supply chains", *Journal of Business & Industrial Marketing*, Vol. 31 No.1, pp. 1-12.

Ashnah, K., Paul, K., Emmanuel, M., Lillian, N., Juliet, N. N., and Wairagala, W., (2015). The Right to Information in Tanzania: Insights on the law, Policies and Practices. Dar es Salaam, Tanzania: *CIPESA ICT Policy Research Series* No. 03|15.

Awa, H. O., and Ojiabo, O. U. (2016), "A model of adoption determinants of ERP within TOE framework". *Information Technology & People*, Vol. 29 No.4, pp. 901-930.

Barbosa, D. H., and Musetti, M. A. (2010), "Logistics information systems adoption: an empirical investigation in Brazil". *Industrial Management & Data Systems*, Vol. 110 No.6, pp. 787-804.

Basu, K. K. (2015), "Organisational culture and leadership in ERP implementation", *International Journal of Strategic Change Management*, Vol. 6 No.3-4, pp. 292-313.

Bienstock Carol, C. (2010), "Technology acceptance and satisfaction with logistics services", *The International Journal of Logistics Management*, Vol. 21 No.2, pp. 271-292.

Bradley, R. V., Esper, T. L., In, J., Lee, K. B., Bichescu, B. C., and Byrd, T. A. (2018), "The joint use of RFID and EDI: Implications for hospital performance", *Production and Operations Management*, Vol. 27 No.11, pp. 2071-2090.

Brown, I., and Russell, J. (2007), "Radio frequency identification technology: An exploratory study on adoption in the South African retail sector", *International Journal of Information Management*, Vol. 27 No.4, pp. 250-265.

Chong, A. Y.-L., and Chan, F. T. (2012), "Structural equation modeling for multi-stage analysis on Radio Frequency Identification (RFID) diffusion in the health care industry", *Expert Systems with Applications*, Vol. 39 No.10, pp. 8645-8654.

Dey, A., Vijayaraman, B., and Choi, J. H. (2016), "RFID in US hospitals: an exploratory investigation of technology adoption", *Management Research Review*, Vol. 39 No.4, pp. 399-424.

Dirican, O., Bozyel, Ö. A., Hülür, Ü., and Öztaş, D. (2020), "Mobbing in the case of primary health care providers", [Birinci basamak sağlık çalışanlarında mobbing], *Anadolu Psikiyatri Dergisi*, Vol. 21 No.1, pp. 5-13.

Diyamett, L. K. and Mlowe F (2012). *Research Methodology and Consultancy Techniques*. National Board of Accounts and Auditors (NBAA).

Drost, E. A. (2011), "Validity and reliability in social science research", Drost, Ellen A, Vol. 38 No.1, pp. 105.

Eliakimu, H. (2013). Pharmaceutical logistics system performance of public health facilities in Pemba. MSc. Pharmaceutical Management Dissertation Muhimbili University of Health and Allied Sciences.

Fishbein, M., and Ajzen, I. (1975). Intention and Behavior: An introduction to theory and research: Addison-Wesley, Reading, MA.

Hair, J., Black, W., Babin, B., and Anderson, R. (2009). Multivariate Data Analysis 7th Edition Pearson Prentice Hall: JOUR.

Hare, L., & Snow, J. (2012). Logistics Management Information Systems (LMIS Definition and function. Report, 1–19.

Iadanza, E., Gonnelli, V., Satta, F., and Gherardelli, M. (2019), "Evidence-based medical equipment management: a convenient implementation", Medical and Biological Engineering and Computing, Vol. 57 No.10, pp. 2215-2230.

Ishabakaki, P., and Kaijage, S. (2015), "RFID-based Drug Management and Monitoring System, Case of Public Hospitals in Tanzania, A Review Paper", *Computer Engineering and Applications Journal*, Vol. 4 No.3, pp. 165-172.

Jaberidoost, M., Olfat, L., Hosseini, A., Kebriaeezadeh, A., Abdollahi, M., Alaeddini, M., and Dinarvand, R. (2015), "Pharmaceutical supply chain risk assessment in Iran using analytic hierarchy process (AHP) and simple additive weighting (SAW) methods", *Journal of pharmaceutical policy and practice*, Vol. 8 No.1, pp. 9.

Jadamba, N.B (2014). Logistics Information Systems and Performance of International Humanitarian Organizations in Kenya By Project Submitted in Partial Fulfilment of the Requirements of the Award of (MBA), School of Business , University of Nairobi, 2014

Jafarnejad, A. (2019), "A dynamic supply chain resilience model for medical equipment's industry", *Journal of Modelling in Management*, Vol. 14 No.3, pp. 816-840.

Kabanda, S., and Brown, I. (2017), "A structuration analysis of Small and Medium Enterprise (SME) adoption of E-Commerce: The case of Tanzania", *Telematics and Informatics*, Vol. 34 No.4, pp. 118-132.

Kamal, S. A., Shafiq, M., and Kakria, P. (2020), "Investigating acceptance of telemedicine services through an extended technology acceptance model (TAM)", *Technology in Society*, Vol. 60, pp. 101212.

Kaminski, J. (2011), "Diffusion of innovation theory", *Canadian Journal of Nursing Informatics*, Vol. 6 No.2, pp. 1-6.

Karnali R & Kurnia S, (2011), The adoption of b2b e-commerce initiatives by

the Indonesian grocery industry (online): retrieved:19/12/2012: http://www.pacis-

net.org/file/2011/PACIS2011-080.pdf

Katz, E. (1957). The Two-Step Flow of Communication: an Up-To Date Report on a Hypothesis. *The Public Opinion Quarterly*, 21 (1). pp. 61-78.

Kothari, C. (2004), "Research methodology: An introduction", Research Methodology: Methods and Techniques, Vol. 9, pp. 418.

Kung, L., Cegielski, C. G., and Kung, H.-J. (2015), "An Integrated Environmental Pressure Perspective on Software as a Service Adoption in Supply Chain Firms", *Journal of information technology*, Vol. 30 No.4, pp. 352.

Liu, Z., Prajogo, D., and Oke, A. (2016), "Supply Chain Technologies: Linking Adoption, Utilization, and Performance", *Journal of Supply Chain Management*, Vol. 52 No.4, pp. 22-41.

Lubua & Maharaj . (2012). ICT Policy and e-Transparency in Tanzania. *IST-Africa 2012 Conference Proceedings* (pp. ISBN: 978-1-905824-34-2). Dar es Salaam, Tanzania: IIMC International Information Management Corporation.

Lu, M.-T., Lin, S.-W., and Tzeng, G.-H. (2013), "Improving RFID adoption in Taiwan's healthcare industry based on a DEMATEL technique with a hybrid MCDM model", *Decision Support Systems*, Vol. 56, pp. 259-269.

Malhotra, N. K. (2010). Marketing research: An applied orientation (Vol. 834): New Jersey: Pearson Education.

Mugo, D., Njagi, K., Chemwei, B., & Motanya, J. (2017). The Technology Acceptance Model (TAM) and its Application to the Utilization of Mobile Learning Technologies. British *Journal of Mathematics & Computer Science*, 20(4), 1–8. https://doi.org/10.9734/bjmcs/2017/29015

Oghazi, P. (2018), "RFID and ERP systems in supply chain management", *European Journal of Management and Business Economics*, Vol. 27 No.2, pp. 171-182.

Rafique, H., Almagrabi, A. O., Shamim, A., Anwar, F., and Bashir, A. K. (2020), "Investigating the Acceptance of Mobile Library Applications with an Extended Technology

Ramanathan, R., Ramanathan, U., and Ko, L. W. L. (2014), "Adoption of RFID technologies in UK logistics: Moderating roles of size, barcode experience and government support", *Expert Systems with Applications*, Vol. 41 No.1, pp. 230-236.

Raynard, M. (2017), "Understanding Academic E-books Through the Diffusion of Innovations Theory as a Basis for Developing Effective Marketing and Educational Strategies", *The Journal of Academic Librarianship*, Vol. 43 No.1, pp. 82-86.

Rogers, E. M. (1995), "Lessons for guidelines from the diffusion of innovations", *Joint Commission Journal on Quality and Patient Safety*, Vol. 21 No.7, pp. 324-328.

Rogers, E. (2003). Diffusion of Innovations. Fifth edition. Free Press: New York.

Ryan & Gross (1943), The Diffusion of Hybrid Seed Corn in Two Iow a Communities, Rural Sociology 8 (March): 15

Salema, G., and Buvik, A. (2016), "The impact of buyer-supplier integration on supplier logistics performance in the hospital sector in Tanzania: The moderation effect of buyers' cross functional integration", *International journal of procurement management*, Vol. 9 No.2, pp. 166-184.

Saunders, M. N. (2011). "Research methods for business students, 5/e", Pearson Education India.

Scherer, R., Siddiq, F., and Tondeur, J. (2019), "The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education", *Computers & Education*, Vol. 128, pp. 13-35.

Shao, Z., Feng, Y., and Hu, Q. (2016), "Effectiveness of top management support in enterprise systems success: a contingency perspective of fit between leadership style and system.

Shidende Nima, H. (2016), "The role of context in the co-evolution of work and tools: A case from the primary health sector in Tanzania", *Information Technology & People*, Vol. 29 No.4, pp. 850-875.

Somuyiwa, A. O., & Adewoye, J. O. (2010). Managing Logistics Information System : Theoretical Underpinning. 2(2), 41–47.

Tanzania, T. U. (2016). National information and communications technology policy. Tanzania.

Toews, D. (2003) The New Tarde: Sociology after the End of the Social Theory Culture & Society 20 (5), 81-98.

Thornhill, A., Saunders, M., and Lewis, P. (2009). "Research methods for business students", Prentice Hall: London.

Tsai, W.-C., and Tang, L.-L. (2012), "A model of the adoption of radio frequency identification technology: The case of logistics service firms", *Journal of Engineering and Technology Management*, Vol. 29 No.1, pp. 131-151.

Tu, M. (2018), "An exploratory study of Internet of Things (IoT) adoption intention in logistics and supply chain management: A mixed research approach", *The International Journal of Logistics Management*, Vol. 29 No.1, pp. 131-151.

Tung, F.-C., Chang, S.-C., and Chou, C.-M. (2008), "An extension of trust and TAM model with IDT in the adoption of the electronic logistics information system in HIS in the medical

United Republic of Tanzania . (2012). *ICT Security Guidelines.* Dar es Salaam: Minisry of Finance

United Republic of Tanzania. (URT, 2016). Dar es Salaam, Tanzania: National Bureau of Statistics.

United Republic of Tanzania.(URT, 2016). National information and communications technology policy. Tanzania.

United Republic of Tanzania. (URT, 2017). Information, communication and technology . Dar es Salaam: National Bureau of Statistics.

Vanany, I., and Shaharoun, A. B. M. (2008). Barriers and critical success factors towards RFID technology adoption in South-East Asian Healthcare Industry. Paper presented at the Proceedings of the 9th Asia Pacific Industrial Engineering & Management Systems Conference, Bali, Indonesia.

Venkatesh, V., and Davis, F. D. (2000), "A theoretical extension of the technology acceptance model: Four longitudinal field studies", *Management Science*, Vol. 46 No.2, pp. 186-204.

Wallenburg, C. M., Johne, D., Cichosz, M., Goldsby, T. J., and Knemeyer, A. M. (2019), "Alignment mechanisms for supplier-initiated innovation: Results from the logistics service industry", *Journal of Purchasing and Supply Management*, Vol. 25 No.5, pp. 100575.

Wema, E. (2013). "Workplace Reflections of Information Literacy Training: The Case of the Agriculture and Health Sectors in Tanzania" Developing People's Information Capabilities: Fostering Information Literacy in Educational, Workplace and Community Contexts (Vol. 8, pp. 179-201): Emerald Group Publishing Limited.

Yamane, T. (1967), "Research Methods: Determination of Sample Size".

Yazici, H. J. (2014), "An exploratory analysis of hospital perspectives on real time information requirements and perceived benefits of RFID technology for future adoption", *International Journal of Information Management*, Vol. 34 No.5, pp. 603-621.

Zailani, S., Iranmanesh, M., Nikbin, D., and Beng, J. K. C. (2015), "Determinants of RFID adoption in Malaysia's healthcare industry: occupational level as a moderator", *Journal of medical systems*, Vol. 39 No.1, pp. 172