Journal of Health Informatics in Developing Countries

http://www.jhidc.org/
Vol. 11 No. 2, 2017

Submitted: May 24th, 2017 Accepted: August 20th, 2017

Assessing Users' Satisfaction with Tanzanians' Public Health Supply Chain Electronic Logistic Management Information System

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ABSTRACT: The Ministry of Health Community Development Gender Elders and Children through Medical Store Department has been implementing electronic Logistic Management Information System (eLMIS) in order to streamline the flow of health commodities in the country. Approximately, there are more than 500 registered district pharmacists who use the system on daily basis. While the acceptance of the system is positive, long-term success depends on its continued use which is determined by users' satisfaction with the system. This study examined factors affecting users' satisfaction with eLMIS through developing a research model from the literature and adopting sequential explanatory mixed research design. A sample of 112 users out of 150 was collected from 4 regions and tested against the research model using regression analysis to identify factors that contribute toward users' satisfaction. Finally, an interview was conducted to 10 users to find more information about these factors. The study found that four of the factors: information quality (β=0.28), system quality (β=-0.21), perceived usefulness (β=0.22, and facilitation conditions (β=0.26) had a significant effect on users' satisfaction with the eLMIS. However, system support did not have a significant effect. Through interviews, many users indicated that they need more training on the system and proposed new features that need to be added. Moreover, Internet access remained to be the main hindrance factor to the use of eLMIS. The strategies on how to enhance users' satisfaction of the system and consequently increase systems' success have been presented and discussed.

Keywords: eLMIS, user satisfaction, health, Health Commodities, Tanzania, Medical Store Department

1. INTRODUCTION

Many organizations have been facing difficulties in managing the flow of information both internally and externally. Consequently, there has been an increasing interest in the application of various supply chain logistics systems in a bid to increase competitiveness and efficiency. Supply chain and logistics management is a set of

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approaches utilized to effectively integrate suppliers, manufacturers, warehouses and stores in order to distribute products and services in the right quantities, to the right locations, and at the right time [1]. The adoption and use of supply chain logistics systems have been able to lower the cost of operations such as reducing labour rates, capital rates as well as tax rates [2]. Cooper et al. [2] added that these systems reduced order cycle time which increases competitive advantage amongst similar firms. They also reduced channel-wide inventory and increasing amount of mutual information sharing and monitoring while satisfying service level requirements [1].

Similarly, many health organizations have adopted various supply chain and logistics systems in order to coordinate the supply and delivery of health commodities to various hospitals and health centres. In fact, there is no strong health system which can function without having a well-designed and well-operated supply chain management system that can ensure an adequate supply of essential health commodities to the clients. In Tanzania, the Medical Store Department (MSD) has been coordinating the logistics of procurement, storage, supply, and delivery of health commodities in various zones, hospitals, and health centres in the country. Kagaruki et al. [3] stated that since the establishment of MSD in 1994, procurement of medicine and other medical supplies have been centralized and determined by the central level.

The Ministry of health Community Development Gender Elders and Children (MOHCDGEC) has organized the flow of health commodities and its information according to various levels from dispensary level to MSD central office which is an upper level. In short, health commodities flow from central MSD to zonal MSD where each zonal MSD serve districts/councils, hospitals, health centres and dispensaries. In order to streamline this flow of health commodities and information through various levels, the Ministry of Health in collaboration with the United States of America International Development (USAID) implemented electronic Logistic Management Information System (eLMIS). The system provides timely reports that help decision makers and managers to make logistic decisions and manage the supply chain. These logistics decisions depend on the information such as stock levels, reduced stock outs, and reporting rate which are produced by the system.

Currently, the system has been adopted and used by district pharmacists in all districts in the country. The district pharmacists use the system to record and provide

various reports from dispensaries, health centres, and hospitals. Approximately, there are about 500 registered users in the system. Given the huge amount of resources that have been used to implement this system, there is an urgent need to assess its effectiveness. Explicitly, to evaluate the success of the eLMIS if it meets its intended objectives.

According to Heeks [4], many implemented information systems in developing countries tend to fail either totally or partially. Heeks [4] pointed out that the total failure is when the system was procured but never implemented or in which the system was implemented but immediately abandoned. On the other hand, partial failure is when the system was implemented but the major goals are unattained or in which there are significant undesirable outcomes. Given the fact that eLMIS is implemented in a context of developing countries, there is a need to evaluate its success.

Studies have adopted various methods to assess the effectiveness of various information systems. These methods include Return on Investment [5, 6], users' satisfaction [7, 8], and information system usage [6, 9]. However, user satisfaction is the most widely used measurement for the success of information system [10, 11, 12, 13] as it involves gathering perceptions and feelings about the system directly from users [8]. User satisfaction is defined as an "effective attitude towards a specific computer application by someone who interacts with the application directly" [14]. Measuring user satisfaction is really important as when the system is perceived poorly by users, regardless of any evaluation results, the system is indeed poor [8]. Moreover, users with high levels of satisfaction will use the system more than dissatisfied ones [15] and are likely to make less complaint [16, 17]. The level of satisfaction of eLMIS in Tanzania have not been evaluated before, hence the study aims to assess the satisfaction by adopting user satisfaction as a measure of eLMIS effectiveness.

2. THEORETICAL REVIEW

The growth of the supply chain concept has required logistics organizations to improve the flow of information both internally and externally. The increased information requirements have facilitated an integration of logistics information systems (LIS) and supply chain information systems in many companies [18]. Recent developments in ICT have highlighted the need for the development of various systems to facilitate the chain flow and logistics management in many organizations. Such application of ICT in logistics

management is called e-logistics.

It should be noted that different researchers came up with different models to explain different factors to measure users' satisfaction of information systems. For instance, Bailey et al. [19] developed a tool for measuring and analysing computer user satisfaction of 39 items. This instrument included information quality, systems performance, personal relationship with staff and top management involvement as main factors to measure users' satisfaction. Limitations of this were to involve small sample size of 29 respondents [13].

Doll et al. [7] developed a model by contrasting traditional data processing environment and end-user computing environment. The model consists of five components: content, accuracy, format, ease of use, and timeliness. The model has been widely used and validated by several studies. Nevertheless, various researchers have shown concerns about the ability of this model to measure user satisfaction in the Internet world.

Early studies developed models for measuring user satisfaction in traditional computing environment [8, 19, 20]. These models were based on the data processing computing environment with emphasis on computing tasks. However, studies have shown that they are no longer appropriate to assess user satisfaction in end-user computing environment [7, 11]. This is because nowadays users interact directly with application software as opposed to the previous environment where users were interacting with programmers or system analysts [7].

DeLone et al. [21] explained factors that lead to the user's satisfaction of the information systems namely system quality, information quality, and system use. According to authors, the user's satisfaction depends on the intention of the user on using the system, the quality of the system being used, the quality of the information obtained in the system, and the service the system provide to users. While, DeLone et al. [9] in their study revealed that IS quality has three major dimensions including; Information quality, system quality and service quality and each should be measured or controlled to see how they will affect "use "and "user satisfaction. The primary differences between the original model and updated DeLone and McLean's (D&M) model [9] included the addition of services quality to reflect the importance of service and support in the successful electronic system. A related model is proposed by Seddon [22] which includes: system quality, information quality, perceived usefulness, user satisfaction, and IS use.

Wang [17] developed a research model that can be used to assess user's satisfaction with Learning Management System. The model incorporates scales from user information satisfaction, end-user computing satisfaction, customer satisfaction, and student satisfaction literature. The model consists of five constructs namely learner interface, community learning, system content, personalization, and learner satisfaction. Similarly, Horvat et al. [23] identified five components: average waiting time for a response, feedback quality, material thoroughness, material clarity, website user-friendliness, cooperation diversity, and material as a measure of user satisfaction with an information system.

Davis [24] through Technology Acceptance Model (TAM) explained the relationships between system design features, perceived usefulness, perceived ease of use, attitudes towards using and actual usage behaviour. The model is mainly used to explain the impact of system characteristics and end user behaviour on the actual system use. TAM provide a more holistic account of why an online assignment submission system, has become successful. Their findings revealed that TAM measures of perceived usefulness and perceived ease of use were effective predictors of IS success [25].

Given these attempts to develop research models to evaluate user's satisfaction in various contexts, relatively few attempts have been made to develop models and instruments to evaluate eLMIS. Therefore the aims of this study was threefold, firstly to derive an IS evaluation criterion that was based on the available studies in addition to some other factors that seem, from this study perspective, to have an influence on users' satisfaction with eLMIS, secondly to identify the factors that will be used to assess the user's satisfaction with the context of eLMIS, and then the factors will develop the research model and finally enable eLMIS to monitor inventory levels, preventing commodities from being out of stock and offer improvement in decision making regarding medicines stock level management in efficiently and effectively manner. Currently, the system has been implemented all over the country and used from National level up to the District level. Pharmacists and public health logisticians are the main users of the system. The system provides the links between health facilities, district/council and zonal medical store to collect data and reports for efficiency and effective distribution of health commodities. However, users' satisfaction to eLMIS has not been previously studied in Tanzania.

3. METHODOLOGY

3.1 Design Approach

The study started by exploring theoretically, a number of possible factors which were used by other researchers to assess users' satisfaction in different contexts. An abstract (theoretical) model with factors to be applied in the context of eLMIS was identified which led to the development of an abstract research model as shown in Figure 1. Abstract factors included: system quality, information quality, system support, perceived usefulness, and facilitation conditions. These abstract factors were analysed and assisted in producing a data collection tool (questionnaire) which was used to test the statistical significance of each factor.

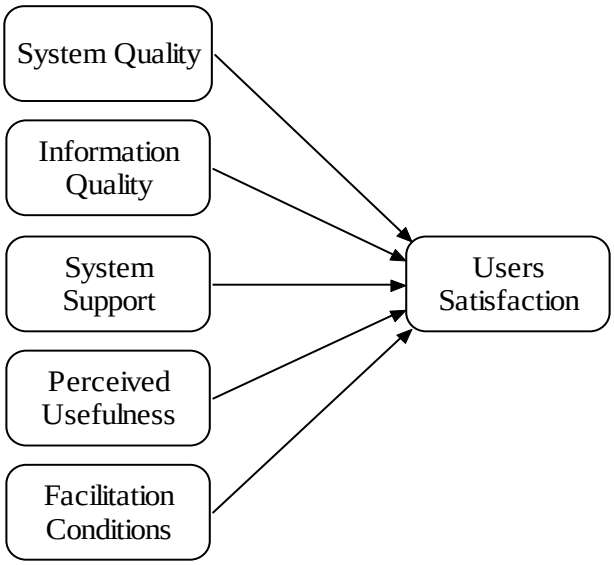

Figure 1: Proposed Abstract Research Model with Factors to Assess Users' Satisfaction with eLMIS

A quantitative approach was used which included the use of numerical methods and statistical tools for collecting and analysing data, followed by qualitative data collection and analysis to explore the existing circumstances. The study used linear regression analysis against identified factors with users' satisfaction using eLMIS to measure the success of the model and the contribution of each factor through testing hypotheses. Statistically, multiple regressions were attempted to determine the importance of each independent variable and its contribution to the proposed model. The qualitative research design was incorporated to find the in-depth understanding of the factors that

contribute toward users' satisfaction with the eLMIS system. Finally, the study came up with the final research model with exact factors that contribute to the user's satisfaction in the context use of eLMIS system in Tanzania.

3.2 Study Area and Sample Size

The study took place in four zonal medical stores/sub plants regions in Tanzania namely Dar es Salaam, Pwani, Morogoro, and Dodoma. The regions zones/sub plants were selected based on how large the zone is in terms of the number of health facilities the zone each region comprises. Moreover, the criteria for selecting a zone region was based the fact that it had at least one regional or referral hospital with a good number of users of the eLMIS. In each region/zone/sub-plant three randomly districts were selected to be included in data collection. The study had a total of 120 respondents obtained by formula proposed by Green [26], that is "N>50+8m" where "m" is the number of independent variables (factors), here referred to six abstract factors.

3.3 Data Collection

Based on the identifying factors, a quantitative questionnaire was prepared and distributed to targeted respondents. A total of 150 questionnaires were distributed to four different regions (Dar es Salaam, Pwani, Morogoro, and Dodoma). Also, a qualitative questionnaire was developed to get the perception and reasons on users on how to improve the satisfaction based on the findings from quantitative data.

A total of 112 usable responses were obtained from a quantitative and 10 respondents were interviewed for qualitative data. According to Bryant et al. [27], every analysis should be based on a minimum of 100 observations regardless of the subjects-to-variables ratio (p. 100). Therefore, the study had adequate sample size. The response rate was 73.3%. The data collection was undertaken between January and February 2017.

3.4 Data Analysis

The study used quantitative and qualitative data analysis methods. In quantitative analysis, data collected from the questionnaire were entered into Statistical Package for Social Sciences (SPSS) for analysis. Linear regression analysis was conducted for independent variables: system quality, information quality, system support, perceived

usefulness and facilitation conditions to determine the causal relationship between each variable on the user's satisfaction. Also, content analysis was done based on conducted interview which involved reading and reviewing each interview transcript for the purpose of content understanding and theme identification from the comments. Finally, the results were interpreted and was made to provide the results.

4. ANALYSIS OF USER SATISFACTION FACTORS FROM ABSTRACT RESEARCH MODEL

The analysis of the identified factors used in an abstract (theoretical) model in Figure 1 show that, System Quality factor was applied by [7], Information Quality factor was adopted by [19], System Quality and Information Quality factors were also used by [9, 22] and in D&M model. Davis [24] and Behrens et al. [25] through TAM used perceived usefulness as one factor among other factors having. In addition to some other factors that seemed to be important in this study are System Support and Facilitation Conditions. Hence, the study proposed six theoretical factors to be used to justify users' satisfaction with eLMIS, these are System Quality, Information Quality, System Support, Perceived Usefulness, Facilitation Conditions, and Users Satisfaction as depended variable. The study is making use of metrics of each, with their hypothesis as given by other researchers to understand the essence of each factor as following:

4.1 System Quality

System Quality is concerned with whether or not there are "bugs" in the system, the consistency of the user interface, and ease of use of the system [28]. The quality of the system has shown to have an impact on user's satisfaction especially those features that have a direct impact on how users use the system. These features include ease of use, ease of learning, the stability of the system, and user friendliness [29]. System quality has been found to have an effect on user satisfaction in many studies such as in [30, 31, 32]. The hypothesis of this factor is:

H1: System Quality has an effect on users' satisfaction with the eLMIS.

Similarly, the proposed instrument to measure the construct is proposed in Table 1

Table 1: Metric for Assessing "*System Quality*" Factor

No.	Construct	Source
SQ1	The eLMIS system is easy to use	[29,31]
SQ2	The eLMIS system is user-friendly	[28,29]
SQ3	The eLMIS is easy to learn	[28, 29]
SQ4	The operation of the system is stable	[29, 30, 33]

4.2 Information Quality

Information Quality is another important factor contributing to user satisfaction [9,34]. In the context of eLMIS, information quality can be described as data, reports, and dashboard obtained in the system. The quality of information is judged by the person who is using the system that meets needs and desire to use the available information [35]. Information quality includes both content richness and update regularity [36]. It is measured in terms of timeliness, accuracy, relevance, understandability, completeness and format of information generated by an information system [28]. Therefore, the better quality of information is claimed to enable the user to improve their use and ultimately obtain better reports. The factor is shown in Table 2 and the hypothesis of this factor is:

H2: Information quality has an effect on users' satisfaction with the eLMIS.

Table 2: Metric for Assessing "*Information Quality*" Factor

No.	Construct	Source
IQ1	The data from eLMIS is timely	[9,28,34]
IQ2	The data and reports from the eLMIS are accurate	[9,28,34]
IQ3	The eLMIS provide sufficient information	[9,28,34]
IQ4	The eLMIS provides information that is easy to understand	[9,28,34]
IQ5	The reports in the eLMIS system is available whenever you want to use	[9,28,34]

4.3 System Support

Ministry of Health Community Development Gender Elders and Children through IT Unit provides support services to users of eLMIS on their daily operations when they face any challenges. It is expected that users with good support services from the IT Unit are likely to continue using the eLMIS and will have positive perception towards it. Likewise, such services will enable users improve their job performance and be satisfied with the system. According to Delone et al. [9], system support service is the measure of

the quality of the support services that users receive from the IS department and IT support personnel. System support has found to have a positive impact on users' satisfaction with the system in studies such as in [16, 37, 38]. Therefore, it was important to include system support as a factor that affects users to use the eLMIS. The metrics are shown in Table 3 and the proposed hypothesis is hereunder stated:

H3: System Support has an effect on users' satisfaction with the eLMIS.

Table 3: Metric for Assessing "*System Support*" Factor

No.	Construct	Source
SS1	The IT technical team provide support through various communication means such as email, telephone, chat etc.	[6,9]
SS2	The training provided by eLMIS team has enhanced my ability to use the system	[6,9, 34]
SS3	eLMIS technical staff are competent with the system	[9, 34]
SS4	eLMIS technical staff have adequate knowledge to help me	[9, 34]
SS5	The eLMIS system is available most of the time	[9, 34]

4.4 Perceived Usefulness

Studies have found that perceived usefulness has an effect on user satisfaction of various information systems [22, 39, 40]. Perceived usefulness is a perceptual indicator of the degree to which the stakeholder believes that using a particular system enhances his or her job performance, or his or her group's or organization performance [22]. In this study, perceived usefulness is related to the degree to which users believe that using the eLMIS will improve their job performances. Prior studies show that perceived usefulness has significant impacts on user satisfaction in various information systems [16, 22, 39, 41]. Therefore, it was worth to include perceived usefulness as a measure of users' satisfaction with the eLMIS. The instrument to measure this factor is as shown in Table 4 and the proposed hypothesis is:

H4: Perceived usefulness has an effect on users' satisfaction with the eLMIS.

Table 4: Metric for Assessing Perceived Usefulness

No.	Construct	Source
PU1	The eLMIS system had improved by work by reducing manual work	[22, 24, 25]
PU2	The eLMIS system has reduced cost in my daily work performance	[39, 41]
PU3	eLMIS system has saved time for traveling from one point to another	[39]
PU4	Efficiency and effectiveness has been improved through the use of eLMIS	[39]

4.5 Facilitation Conditions

According to Ajoye [42], there is a significant effect of technological and facilities issues on users' satisfaction. In the eLMIS context, facilitation issues are like Internet availability, stable power supply, knowledge to use the system which all together have an impact on users' satisfaction with the system.

Facilitation conditions and technological issues are key determinants of satisfaction in the perception of users of information system as revealed in different studies such as in [43, 44, 45]. In an empirical study by Grover [43], IS infrastructure was found to be one of the top predictors of IS success among several factors that were investigated. In a related study, Wixom et al. [40] found that the technology used for development was associated with technical implementation success. These discussions give credence to our finding that technological and infrastructural issues are positively correlated, hence, a good predictor of information system user's satisfaction. The instrument to measure this factor is shown in Table 5 and the proposed hypothesis is hereunder:

H5: Facilitation conditions have an effect on users' satisfaction with the eLMIS.

Table 5: Metric for Assessing Facilitation Conditions

No.	Construct	Source
FC1	I have the resources (e.g. PC, the Internet etc.) necessary to access the eLMIS	[40,43,44]
FC2	I have the knowledge necessary to use the eLMIS	[40]
FC3	The eLMIS is similar to other systems I use in for my day to day activities	[40]
FC4	A help is available when I get problem in the eLMIS	[40]

4.6 User Satisfaction

This is a dependent factor among all the factors in the research model. According to DeLone et al. [9], users who are satisfied with the system will increase usage of the system and eventually lead to the success of the system. Therefore, satisfied users have great chance to continue using the system and are likely to perceive the system as beneficial to their daily operations. The proposed metrics for measuring this construct are in Table 6.

Table 6: Metric for Assessing User's Satisfaction

No.	Construct	Source
US1	I am pleased with the eLMIS	[46,47]
US2	I am very satisfied with the course content I access from eLMIS	[46,47]
US3	Overall my interaction with eLMIS is very satisfying	[46, 47]

Based on the above discussion on the factors that had been used to build the model, the study derived an assessment research model based on the available studies and in addition to some other factors that seemed, from the study perspective, to have an influence on users' satisfaction on eLMIS. These metrics were the base for creating data collection tool for each factor, and at the end of after data collection, linear regression analysis was conducted to test the proposed hypothesis testing and determine the structure of the final proposed research model.

5. FINDINGS

5.1 Demographic characteristics of the respondents

Out of 112 responses, 71 (63.4%) of respondents were males, and 41 (36.6%) were females. The majority of the respondents were from GHSC/LMU (41%) and District Pharmacists (42%), while 9% were from PSU/Programs, 5% from IPs and 3% from MSD. Regional wise 37% were from Dar es Salaam, 30% from Morogoro, 21% from Dodoma and 13% from Coast region.

Means of variables were extracted to enable exploration of the existence and importance of the dependent and independent variables. Making use of the Likert scale from strongly disagree (1) to strongly agree (5), as shown in Table 7, all factors were highly ranked (that is strongly agreed). The measure used a mean value, whereby if obtained factors is more than or equal to 3.5, then the level of agreement with the statements measuring a certain variable is high. If it is between 2.5 and 3.49, then the level of agreement of the statements measuring a certain variable is medium. If the means value of the statement is equal to or less than 2.49, then the level of agreement with the statements measuring a certain variable is low.

Table 7: Mean and Categories of the Study Variables

Study Variable	Mean	Category
System quality	3.993	High
Information quality	3.730	High
System support	4.092	High
Perceived usefulness	4.175	High
Facilitation conditions	3.955	High

5.2 Research Reliability

As stated by Foster [48], reliability is used to ensure the internal consistency of the results for the various items being tested within each component. Cronbach's Alpha was used to measure the reliability of the instruments. Based on SPSS results, the Cronbach's alpha coefficient of 25 items was 0.928. The instrument was reliable as the value of Cronbach's alpha was more than 0.70 as suggested for the basic research [49]. The result of Cronbach's alpha was furthermore evaluated by testing the internal consistency of the items. From the six constructs, the values ranged from 0.684 to 0.873 as shown in Table 8.

Table 8: Cronbach's Alpha Coefficients for Construct Reliability Measurement

S/N	Construct	Cronbach's alpha (α)
1.	System quality	0.838
2.	Information quality	0.738
3.	System support	0.782
4.	Perceived usefulness	0.841
5.	Facilitation conditions	0.684
6.	User satisfaction	0.873

5.3 Sampling Adequacy

The Kaiser-Meyer-Olkin measure of sampling (KMO) was used to measure the sampling adequacy of the data. According to Ardito et al. [30], the KMO below 0.50 is unacceptable and factor analysis should not be performed. In this study, the KMO was 0.912 and confirmed the sampling adequacy. Moreover, Bartlett's test of sphericity $p < 0.001$ indicated that the correlation between items was sufficiently large for performing the Maximum Likelihood Analysis (MLA).

5.4 Identifying the factor structure

Factor analysis (FA) was performed using the Maximum Likelihood Analysis Extraction method on 25 items using Direct Oblimin Rotation with Kaiser Normalization. The aim of the FA was to show whether the related items were clustered under the same factor or not. As shown in Table 10, the loadings per each item show that the research instrument loaded successfully.

Table 10: Factor Loadings on the Construct Items with Oblimin Rotation

Factor	Items in Direct Oblimin Rotation	Loadings
System Quality	SQ1	-0.663
	SQ2	-0.499
	SQ3	-0.814
	SQ4	-0.143
Information quality	IQ1	0.342
	IQ2	0.131
	IQ3	0.337
	IQ4	0.256
	IQ5	0.682
System support	SS1	0.015
	SS2	0.305
	SS3	0.750
	SS4	0.594
	SS5	0.099
Perceived usefulness	PU1	0.696
	PU2	0.861
	PU3	0.638
	PU4	0.351
Facilitation conditions	FC1	0.099
	FC2	0.287
	FC3	0.266
	FC4	0.627
User satisfaction	US1	0.778
	US2	0.708
	US3	0.713

5.5 Refined Research Model

a) Research Model Summary

Linear regression analysis was used to test the proposed model. However, to meet the assumptions of regression analysis, Variance Inflation Factor (VIF) and Tolerance statistics were extracted to ensure the absence of high correlation between independent variables (multicollinearity). Table 11 shows variance inflation and Tolerance for each factor. As it can be seen, VIF value for all independent variables was less than 10 ranging from 1.480 to 1.748 and allowed variation (Tolerance) for each independent variable ranged from 0.572 to 0.675 which indicates the absence of high correlation between independent variables. Therefore, the data met the assumption of linear regression analysis which was used to test the proposed model.

Table 11: VIF and Tolerance Statistics

Independent Factor	VIF	Tolerance
System Quality	1.480	0.675
Information Quality	1.478	0.676
System Support	1.549	0.646
Perceived Usefulness	1.536	0.651
Facilitation Conditions	1.748	0.572

Five factors from the proposed research model were subjected to linear regression analysis to measure the success of the model and predict the causal relationship between the factors and users' satisfaction towards eLMIS. Using enter method, a significant model emerged: $F(5,106) = 33.049$, $p < 0.0005$. The model explains 59.1% of the variance (adjusted R2 = 0.591) in users' satisfaction with the eLMIS system. Table 12 shows a summary of the research model, where SE is the Standard Error of the Estimates.

Table 12: Summary of Research Model

R	R Square	Adjusted R^2	SE
0.781	0.609	0.591	0.603

b) Hypothesis Testing

Linear regression analysis was conducted to test the hypotheses and determine the structure of the proposed research model. The results showed that among the five hypotheses only one hypothesis was not significant. Table 13 shows a summary of predictive factors in terms of beta values for each hypothesis obtained from linear regression analysis.

Table 13: Unstandardized and Standardized Regression Coefficients for the Constructs Entered in the Model

Construct	B	Std.Error	β	ρ
System Quality	-0.212	0.076	-0.211	0.006
Information Quality	0.300	0.080	0.283	0.000
System Support	0.090	0.076	0.087	0.241
Perceived Usefulness	-0.223	0.075	0.219	0.004
Facilitation Conditions	0.274	0.083	0.264	0.001

With reference to Table 13, hypotheses testing and findings can be summarized as in Table 14.

Table 14: Summary of Hypotheses Testing and Findings

Hypothesis	Results	Conclusion
Hypothesis 1: SQ-->US	Yes: Significant (Beta=-0.211, p<0.05)	Supported
Hypothesis 2: IQ--->US	Yes: Significant (Beta=0.283, p<0.05)	Supported
Hypothesis 3: SS--->US	Yes: Significant (Beta=0.087, p<0.241)	Not Supported
Hypothesis 4: PU--->US	Yes: Significant (Beta=0.219, p<0.05)	Supported
Hypothesis 4: FC--->US	Yes: Significant (Beta=0.264, p<0.05)	Supported

c) Final eLMIS Assessment Model

According to hypothesis testing and significant level, the eLMIS proposed model was revised by removing one path which was not significant, this was the relationship between system support and users' satisfaction. All other paths were found significant. The final eLMIS evaluation research model was shown in Figure 2.

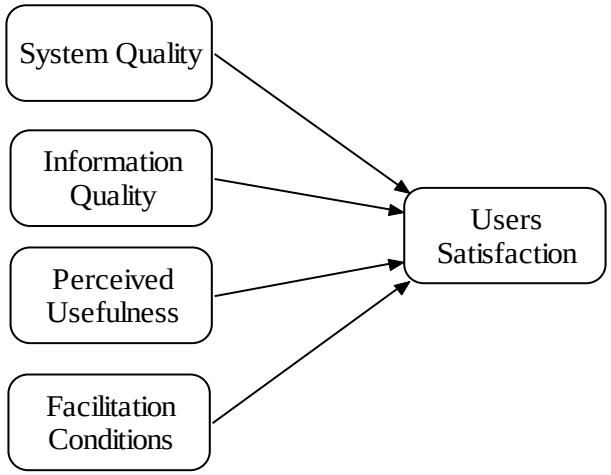

Fig. 2: Final Proposed eLMIS Assessment Model

6. DISCUSSION

Five factors for assessing users' satisfaction with eLMIS were subjected to linear regression analysis and found that model variables statistically significantly predicted users' satisfaction by 59.1% (R square 0.591) of variance. This means 40.9% of the variance in users' satisfaction cannot be explained by variables proposed in this model. Future research can explore more factors that can be included in the research model to be able to explain learners' satisfaction with eLMIS.

The study found that four factors: system quality, information quality, perceived usefulness and facilitation conditions were statistically significant with, information

quality having the strongest predictor. This study do not differ from other researches like DeLone and McLean [9] who revealed that information quality and system quality are significant predictors of users' satisfaction. Seddon [22] as well found: system quality, information quality and perceived usefulness to be significant predictors of users' satisfaction. System support which has p value of 0.241 did not qualify to be a significant predictors of users' satisfaction. This implies that users' satisfaction could not be explained by the quality of support provided by IT Unit at the Ministry. The reason behind this is because the IT technical team do not provide a prompt support when needed, no adequate training is provided by eLMIS team to enhance users' ability to use the system and the eLMIS system is not available most of the time. This is in contrary to studies done by [37,38,16] who found system support to have positive impact on users' satisfaction with the system.

The study found that system quality has the negative effect on users' satisfaction towards the system. This is because the Beta value was -0.211 at p value of 0.006 which is significant and hypothesis was supported. This finding implies that users found that the system is not easy to use, not user-friendly and not easy to learn. These findings validate similar studies which found that system quality had a negative effect on users' satisfactions with the system such as those in [50] .The results provide a good feedback to the eLMIS team and system developers. The system should be redesigned to improve features that have a direct impact on the way users use the system. This is also well observed in the qualitative part as most of the interviewee said that more training on the system features should be conducted and the system should be both online and offline mode due to the reason that the system is not stable so that the offline mode can be a good backup.

Information quality with the p value of 0.000 is within the study acceptable level of significant that is $\alpha \leq 0.05$ meaning the hypothesis is statistically significant having the Beta value of 0.283 which support the hypothesis. MOHCDGEC and all supply chain stakeholders should collaborate to ensure that the information obtained in the eLMIS are of high quality. The data should be timely according to the time each respective group report to the system, the data and reports are accurate as well as the eLMIS provide sufficient information to generate the required reports, the eLMIS provides information that is easy to understand, and the reports in the eLMIS system is available whenever you

want to use so as to improve user's satisfaction with eLMIS. This also was observed in the qualitative analysis as all the interviewee showed the importance on having high data quality due to the reason that the data found in the system is used in making high critical decision making.

Perceived usefulness was also found to have a positive significant effect (β= 0.219) on users' satisfaction eLMIS. It seems therefore that users believe that using a system enhances their job performance. They also believe that the system enables them to accomplish their daily activities faster and more efficiently. DeLone et al. [9] described perceived usefulness as a good proxy for use; therefore, this implies that users are likely going to continue to use the system if the ministry will continue to show the value of the system to the users. Almost all the interviewees showed the importance of the system in their day to day activities thus request more training to be conducted on especially at the facility level where the data is coming. Another interesting finding emerged from this study was that facilitating conditions had a positive significant effect (β= 0.264) on users' satisfaction with eLMIS. The finding implies that users believed they had resources necessary to use the system. These resources include computers and Internet connection to access the system. This was well correlated with the qualitative analysis as for those who requested provision of the computer are only to the newly employed staff and more enough Partners are working together with the Ministry of Health in ensuring that the staff has all the facilitations right away.

7. CONCLUSION

The study proposed and validated a model and relevant metrics that used in evaluating user's satisfaction with eLMIS in Tanzania. The model was an outcome of an intensive literature review of different models proposed by different authors for the assessment of information systems. Five factors were found and used in assessing the model. After a linear regression, all the factors were found significant except system support which was not significant in contributing to users' satisfaction with eLMIS. Therefore, system support was removed from a proposed research model and only remained with four independent factors.

Although the model is expected to be used by Ministry of Health, Supply chain stakeholders and implementing partners in Tanzania but the study is typically representing many situations facing health commodities supply chain in Sub-Saharan countries. The study is requesting future studies to validate the model and its instrument using a cross-sectional survey involving large numbers of eLMIS users from different institutions in different countries. Furthermore, given that the model only explains 59.1% of the factors that contributed to users satisfaction then in the future studies should focus on adding other factors that will explain more (60% and above) of the factors that contributed to users satisfaction.

8. ACKNOWLEDGEMENTS

The study is acknowledging the tireless contribution of Dr. Joel S. Mtebe of the Department of Computer Science and Engineering, College of Information and Communication Technologies of the University of Dar es Salaam.

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