

Integrated Pharmaceutical Logistics System (IPLS), User Satisfaction, and Logistics Performance: Evidence from Ethiopian Hospitals

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ABSTRACT

This study assessed the effect of IPLS on user satisfaction and logistics performance of HIV/AIDS commodities. Data were collected from 155 respondents in 13 public and private hospitals using questionnaires. The study employed explanatory design with quantitative research approach. The findings indicated that IPLS enhances user satisfaction, which improves job performance. IPLS resulted in big improvements in the accuracy of logistics, by enhancing planning, decision making, and logistics objectives. The regression analysis indicated that all independent variables, except system quality, had a strong and positive effect on user satisfaction, and thereby on logistics performance of HIV/AIDS commodities. System quality did not have a strong and positive effect due to factors specific to the Ethiopian environment, such as turnover of trained staff, lack of training, and other factors identified indirectly. Future research may be conducted by incorporating other variables that affect IPLS, covering a wider geographic area (incorporating hospitals in the regions).

Keywords: System Quality, Information Quality, Service Quality, User Satisfaction, Cultural Factors, HIV/AIDS Commodities

INTRODUCTION

Information technology (IT) and the information system developed using IT is changing the way business is being conducted. Bogale et al. (2015) stated that senior management and business managers have concerns about computer-based information systems (ISs), because in the contemporary business environment, such systems are the lifeblood of any large business. However, Kim and Hu (2019) stated that the current survey-based research does not pay sufficient attention to the complexities and interrelationships between different aspects of supply-chain (SC) integration and the role of ICT in improving different elements of SC performance. Nguyen et al. (2019) stated that in the context of market globalisation, intensified competition and technological breakthrough, businesses have long recognised the critical role of effective IT-supported supply-chain management in achieving a competitive advantage. This is rare in relation to the health sector and supply chain of medicines.

Health is one of the crucial elements for the development of any country, and the well-being, as well as productivity, of its citizens, which is one of the

sectors transformed by information systems. To achieve the Millennium Development Goals successfully, the Government of Ethiopia has developed various programmes and strategies in the health sector, one of which is the integrated pharmaceutical logistics system (MOH, 2010). Berhane (2017) argued that Ethiopia has a number of health programmes that require efficient pharmaceuticals supply-chain system for their effective and efficient implementation. Integrated pharmaceutical logistics system (IPLS) is the system that can ensure access to quality, safe, affordable, and uninterrupted supply of vital and essential medicines (Nigussie, 2017). The author further stated that IPLS is the term applied to the single pharmaceuticals reporting and distribution system. Its aims are to ensure that patients always get the pharmaceuticals that they need.

IPLS integrates the management of essential pharmaceuticals, including pharmaceuticals that were used, to be managed vertically; it is the primary mechanism through which all public health facilities obtain essential and vital pharmaceuticals (FMOH, 2010). IPLS integrates the supply-chain management of all types of pharmaceuticals (medicines, medical supplies

and equipment, and laboratory chemicals and reagents) in the public health sector. Well-designed and practical IPLS is essential for the supply management cycle of HIV/AIDS commodities to function effectively and efficiently (Tadesse, 2015).

Evaluation of the Health Sector Development Program (HSDP) I and II of Ethiopia indicated that the pharmaceuticals supply management system of the country has been suffering from several problems, including non-availability, un-affordability, poor storage and stock management, and irrational use of pharmaceuticals (Berhane, 2017). To solve the problems in public health facilities, the Ethiopian Federal Ministry of Health (FMOH) initiated a comprehensive supply-chain strategic planning process, emphasising the integration of all products into one supply chain (Pharmaceuticals Fund and Supply Agency-PFSA, 2014). In late 2006, the ministry approved the Pharmaceutical Logistics Master Plan (PLMP) through which Pharmaceuticals Fund and Supply Agency was established in 2007 by Proclamation No. 553/2007. To execute this mandate, PFSA, in collaboration with different partners who were working in the health sector, developed and began implementing the Integrated Pharmaceuticals Logistics System (IPLS) in 2009.

Prior studies tried to assess only the IPLS implementation process, as well as challenges and opportunities, without indicating what factors influence the performance of IPLS. No prior studies were conducted to observe the factors that explain IPLS performance. This study has also introduced the culture of the organisation and its effect on the performance of IPLS, in addition to other factors identified as influencing an information system's performance. Lastly, many studies in the past used only either quantitative or qualitative research approaches. However, in this study the mixed research approach was adopted to take advantage of both the methods.

Hence, this research was conducted to assess the effect of IPLS on user satisfaction and the logistics performance of HIV/AIDS commodities in private and public hospitals in Addis Ababa. The study was, therefore, conducted to address the following research questions.

RQ1: What is the effect of IPLS quality, information quality, service quality, and cultural factors on user satisfaction?

RQ2: What is the effect of IPLS user satisfaction on the logistics performance of HIV/AIDS commodities?

The results of the study will be useful for administrators of HIV/AIDS commodities in Ethiopian hospitals in

Addis Ababa and different stakeholders involved in the performance of IPLS. It will have academic contribution, by adding empirical evidence to the existing body of knowledge on IPLS for Ethiopian hospitals. Furthermore, it will give an insight into any individual who has an interest to further research pharmaceutical logistics systems.

The study focused on assessing the effect of IPLS on the logistics performance of HIV/AIDS commodities in private and public hospitals in Addis Ababa, the capital city, only as the hospitals are managed in a homogeneous manner under the supervision of the same health bureau of the city or federal-level ministerial organisation (MOH, 2010). In addition, to make the research work more manageable, the research was limited to HIV/AIDS commodities only. This is because such medicines are critical and their supply cannot be interrupted; there are a large number of patients treated in the hospitals. This study did have some limitations. Firstly, the respondents were too busy to complete questionnaires. Close follow-up was needed to maximise collection of questionnaires and minimise this limitation. Another limitation could be respondent bias, where the respondents might have given the socially desirable answers. The large dataset would help to minimise this part of the limitation. The remaining part of the paper is organised as follows: first, a review of the extant literature on the topic; followed by the research methods used; and then the results and discussions of the data collected. Finally, contributions and direction for future research were provided.

REVIEW OF RELATED LITERATURE

Real-time tracing and supply-chain management of all drugs in a hospital are challenges in healthcare, which require further developments in information and communication technologies. Berhanemeskel et al. (2016) stated that supply-chain management of essential health commodities, including high-value medicines like Antiretroviral (ARV) medicines, involves a series of activities to guarantee the continuous flow of products from the manufacturer to the consumers. Tilahun (2014) asserted that an accurate quantification based on reliable data is essential for all health commodities, but more so for HIV/AIDS related commodities because uninterrupted access for patients must be ensured. Shortage of critical medicines and supplies in health facilities may compromise appropriate clinical management. Mudzteba (2014) stated that pharmaceutical logistics data are collected, processed, and reported through IPLS, increasing the likelihood of an adequate supply of HIV/AIDS commodities.

To contribute to the objectives of an organisation, an information system should fulfil some key requirements. Information system effectiveness is the extent to which a specific information system actually contributes to achieving organisational goals, that is, its effect on organisational performance (Hamilton & Chervany, 1981). The influence of IPLS effectiveness is factored under information system factors and supply-chain management factors. According to Sirsat and Sirsat

(2016), the information system produces information that is, afterwards, communicated to the recipient, who is subsequently influenced by the information. On level of information transfer, Sirsat and Sirsat (2016) cited the work of DeLone and McLean, and concluded that there are six distinct categories or aspects of information systems: (a) system quality, (b) information quality, (c) service quality, (d) usage, (e) user satisfaction, and (f) net benefit, as shown in Fig. 1.

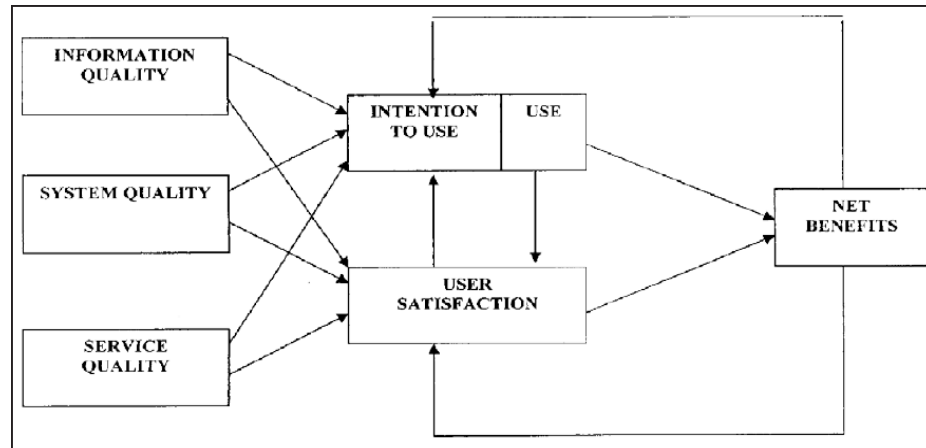


Fig. 1: The DeLone and McLean Model of System Success (from Sirsat & Sirsat, 2016)

Prior studies on IPLS emphasised system implementation predominantly. Those that relate to organisational performance assess only one case study or very limited number of hospitals. Most of the studies were also descriptive by design. Lastly, almost all studies were limited to public hospitals only. In this study, explanatory factors that influence IPLS performance and its effect on logistics performance of HIV/AIDS commodities in 13

public and private hospitals was assessed. The study is believed to bridge the gap in previous studies. In addition, culture is believed to influence user satisfaction and system implementation, which is a new construct obtained from other studies and incorporated in this study. Fig. 2 shows the research model used in this study (adapted from Sirsat & Sirsat 2016).

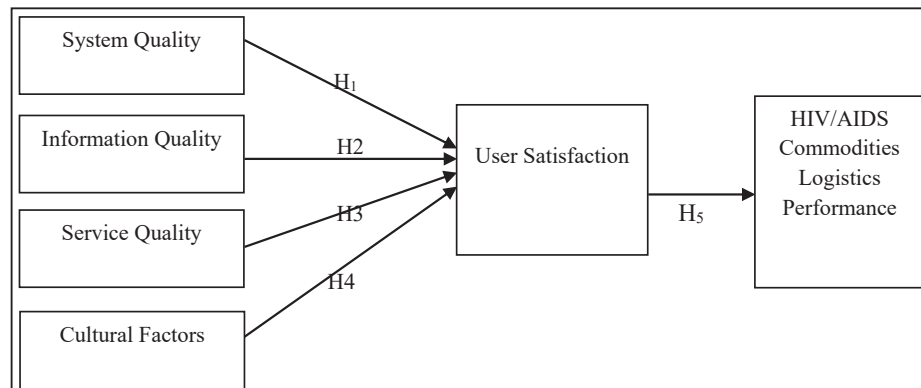


Fig. 2: The Conceptual Framework (based on Sirsat & Sirsat, 2016)

The conceptual framework illustrates how the independent variables (aspects of IPLS performance, which include system quality, information quality, service quality, and team culture) and the mediating variable (user satisfaction on IPLS) influence logistics performance of

HIV/AIDS commodities (the dependent variable). Intention to use in the original model was assumed to be reflected in user satisfaction in this model. The detailed description of each construct and hypotheses of the study is as follows.

System Quality

According to Halawi et al. (2007), Dreheeb, Basir and Fabil (2016), and Sirsat and Sirsat (2016), the term system quality reflects excellence, value, and conformity to specification and quality meeting customers' expectations. The value of information system can be realised by improving profit margins for the organisation, providing easy-to-use and meaningful applications, and designing easily maintainable system. Thus, system quality is an important aspect in IS success. Measures of system quality, which have been used in the literature, are flexibility, stability, reliability, usefulness, user-friendly interface, ease of use, and response time. Access and retrieval of information when needed, to meet work demands and to return requests quickly, have been noted to be inherent to system quality. Hence, according to Halawi et al. (2007), Dreheeb, Basir and Fabil (2016), and Sirsat and Sirsat (2016), system quality positively correlates to user satisfaction and better benefit realisation in any organisation. The same applies to IPLS and it can be hypothesised as follows.

H1: IPLS system quality significantly and positively influences user satisfaction.

Information Quality

Halawi et al. (2007), Sirsat and Sirsat (2016), and many others in information systems research argued that information system quality concept is related to system output that is useful for business users. The most important informational insufficiency that managers suffer from is plenty of irrelevant information. Information quality problems, such as incorrect information due to program or data errors and irrelevant information arise due to changed user requirements. Some important dimensions were studied under information quality, like relevance, understandability, accuracy, conciseness, completeness, being up to date (timeliness), and usability. Sirsat and Sirsat (2016) further stressed that information quality refers to the ability to acquire information that is sufficient, that meets end-user needs, and is comprehensive in nature. Many researchers in different studies have measured information quality and the most common measures were of timeliness, completeness, ease of understanding, relevance, security, consistency, accuracy and personalisation, importance, usefulness, readability, and so on. Sirsat and Sirsat (2016) found in their empirical study that measuring system characteristics like the content of database, aggregation of details, human factors, response time, and system accuracy positively correlates

to user satisfaction and system performance. Hence, for IPLS, it can be hypothesised as follows.

H2: IPLS information quality significantly and positively influences user satisfaction.

Service Quality

The dimension service quality represents the quality of the support that the users receive from the IS department and IT support personnel. Organisational success is delivered by the service provider. On-time and error-free performance by IS unit improves organisational efficiency (Halawi et al. 2007; Romi, 2011; Sirsat & Sirsat, 2016). Some of the dimensions that are used to measure this success by most of the researchers include assurance, empathy, flexibility, interpersonal quality, intrinsic quality, IS training, reliability, and responsiveness. IPLS services, which are part of the overall IS services, will become better aligned with organisational goals, resulting in improved quality of decision making and improved profitability, better expectancy of customer demands, and more accurate sales forecasting (Halawi et al. 2007; Romi, 2011; Sirsat & Sirsat, 2016). Hence, it can be hypothesised as follows.

H3: IPLS service quality significantly and positively influences user satisfaction.

Cultural Factors

In many systems literature, cultural factors are believed to influence the level of diffusion and utilisation of the system. According to Al-Jumeily and Hussain (2014), cultural neutrality has been identified as a blind spot in previous Technology Acceptance models (TAMs), because culture has been demonstrated in the literature to exert a major influence on acceptance. Unfortunately, the literature shows that technology is predominantly developed for the young, and some studies are concerned with the investigation of how technology acceptance cuts across national borders. Often the practice is to take the existing knowledge regarding technology acceptance in developed western nations and relate it to other cultures based on cultural beliefs and values (Hofstede, 1980). Al-Jumeily and Hussain (2014) identified three primary continuums drawn from the cultural dimensions theory of Hofstede that are used to identify the differences in the cultural factors: individualism/collectivism, uncertainty avoidance, and power distance.

Individualism/collectivism is the degree to which individuals are integrated within any group. In

individualism the emphasis is on individual roles and rights, where individuals are expected to stand up for themselves, their family, and their affiliations. In contrast, in collectivism, individuals behave as members of an organisation or group, so that their family is that group or organisation to which they pay unquestioning loyalty. Uncertainty avoidance is defined as the tolerance of a society towards uncertainty. It measures the extent of coping with anxiety by avoiding uncertainty. High uncertainty-avoidance cultures implement rules and laws to support plans that are followed step-by-step to minimise unknown and ambiguous circumstances. On the other hand, low uncertainty-avoidance cultures have as few rules as possible; they tolerate changes and accept a changeable environment and situations. These cultures tend to be pragmatic cultures. Power distance reflects the way people accept and perceive power differences. High power-distance cultures accept autocratic power relationships, where people are not equal to each other, and their positions are classified hierarchically from superior to subordinates (Akour et al., 2006). In contrast, low power-distance cultures experience more democratic relationships, and equality is practiced by all members of the society who have the right to criticise and change the decision making of those in power (Teo et al., 2008).

As Ziefle and Jakobs (2010), as well as Romi (2011), affirm, people use technology within a cultural and social context, and this influences how humans behave towards technology. Often a whole host of factors differ across cultures, and these factors include social taboos, political and legal constraints, and religious, ethical and traditional values. Therefore, technology users across the globe have different perceptions, styles of thinking, cognitive and cultural values, and assumptions. Hence, it can be claimed that the above argument applies to IPLS as one category of system and it can be hypothesised as follows.

H4: Good culture of using IPLS significantly and positively influences user satisfaction.

User Satisfaction

Halawi et al. (2007), Dreheeb, Basir and Fabil (2016), as well as Sirsat and Sirsat (2016), stated that user satisfaction is defined as the recipient's response to the use of the output of an information system. They mentioned studies which found that user satisfaction was closely related to user attitude; therefore, studies which include user satisfaction as a success measure should ideally also include measures of user attitudes. Sirsat and Sirsat (2016) further asserted that user satisfaction can be measured indirectly through

information quality, system quality, and other variables. Hence it is used as a mediating variable between system performance and organizational performance (Halawi et al., 2007; Dreheeb, Basir & Fabil, 2016). Hence, it can be hypothesised as follows.

H5: User satisfaction of IPLS significantly and positively influences logistics performance of HIV/AIDS commodities.

Organizational Impact

According to Sirsat and Sirsat (2016), organisational impact represents the firm-level benefits received by an organisation because of information system applications. Measures of organisational performance, which might be appropriate for measuring the contribution of IPLS, is return on investment for profit-oriented business organisations. Several authors have developed constructs to measure IPLS impact on organisations. The success of information systems impacts not only on firm performance, but also on industry structure. As stated by Kim and Hu (2019), ICTs are important to logistics because they provide the right information at the right time and place. Other advantages are operating cost reduction, staff reduction, productivity gain, increased revenues and profits, and increased work volume (productivity). Sirsat and Sirsat (2016) stated that effective use of information system contributes to the success of individuals, groups or the organisation as a whole. They concluded in their study about e-commerce that net benefits is the most important construct, since it captures the balance of positive and negative impacts of e-commerce on customers, suppliers, employees, organisations, markets, industries, economies, and even societies. This same logic applies to IPLS and net benefit of IPLS is a successful performance of HIV/AIDS commodities.

The ILS (integrated logistic system) was designed to address shortcomings in the previous vertical systems. By clarifying roles, simplifying forms, streamlining processes, and consolidating responsibility for key logistics functions, hospitals hope to improve product availability and customer service (USAID PROJECT, 2011). Integrated supply chains have collateral benefits for a health system. A cohesive, well-performing public health supply-chain helps build the foundation for a strong pharmaceutical management system, provides essential information for managing health programmes and financing mechanisms, and helps to achieve the level of accountability exemplified in the commercial sector. Integration has helped companies learn to deliver

good quality products efficiently, on time, and securely to their customers. These improvements have translated into increased profits, more viable companies, and better customer service. Integrated supply chain links all the actors involved in managing essential health commodities into one cohesive supply-chain management organisation. Integration helps clients access quality healthcare services and supplies (Berhane, 2017).

RESEARCH METHODOLOGY

The explanatory research method was used, whereby the influence that IPLS has on user satisfaction and the logistics performance of the HIV/AIDS commodities in the selected hospitals was studied. Explanatory studies would help manipulate the independent variable to influence the mediating and dependent variables. Explanatory research determines the causal relationships among variables (Saunders et al., 2012). A quantitative research method using survey questionnaire was used to conduct this study. As the number of respondents reached was large enough, it was decided to limit the study using quantitative data only. There are 14 government owned and 20 private hospitals in Addis Ababa, Ethiopia. Thirteen hospitals from both were randomly selected using the lot system. The units of analyses for this study were pharmacy professionals of the hospitals selected who use the IPLS for their day-to-day operations. From each hospital, all the pharmacy professionals were taken as respondents on a census basis. Around 160 questionnaires were distributed and collected, but five of them were not usable and were discarded. Hence, this resulted in a usable dataset of 155 respondents. To collect the data from the primary sources, self-administered questionnaires were distributed for the target respondents identified above. The five-point Likert scale (strongly disagree to strongly agree) was used to measure the variables of the study. The instrument was customised from prior studies and it was pretested for its applicability in the study area.

Head of the hospitals (the Medical Director) were approached with a letter of support from the university the researchers work at, to obtain consent and permission of the respondents to undertake the data collection process. Then, the questionnaires were distributed and collected in person from the respondents, resulting in no effect of non-respondent bias.

The respondents were informed in the survey instrument that the data would be used only for academic purposes and assured that their responses would be confidential. In addition, they were informed that the data would not be analysed in isolation, but rather analysed together with the responses of other respondents to assure that they could not

be identified individually. These assurances in the survey instrument would help minimise the Common Methods Bias (CMB) of collecting data about the independent and dependent variables from the same audience.

The quantitative data were entered and analysed using SPSS for analysis. Descriptive statistics (mean and standard deviation) were computed and summary results were presented using tables and graphs. Correlation coefficient was computed to see the association between aspects of IPLS performance and user satisfaction and the logistic performance of HIV/AIDS commodities. Health information is a private and highly sensitive matter. Hence, a greater degree of confidentiality was maintained during data collection process and the names of the participating subjects (respondents) were not revealed in any part of the research paper.

The reliability of the data was checked using Cronbach's Alpha. All the variables indicated Cronbach's Alpha of 0.751 and above, which are in the acceptable range of the minimum value of 0.70, as indicated by Tavakol and Dennick (2011). Validity was checked using a survey instrument from prior studies, which was pre-tested for completeness and use in the Ethiopian context. This approach will address face validity, construct validity, and content validity.

RESULTS, DISCUSSION AND INTERPRETATION

The respondents were asked for their demographic data, to verify if they were right for this research. Their profile data is presented as follows:

Table 1: Demographic Profile of Respondents

		Frequency	Percentage
Level of Education	Diploma	20	12.9
	BSc Degree	127	81.9
	Masters	8	5.2
Years of Experience	1-5	51	32.9
	6-10	68	43.9
	11-15	35	22.6
	>16	1	.6
Managerial Position	Top Level	6	3.9
	Middle Level	21	13.5
	Lower Level	27	17.4
	No Position	101	65.2
Sex of Respondents	Female	58	37.4
	Male	97	62.6
	Total (for all)	155	100.0

As indicated in Table 1, data for this research was collected from 13 public and private hospitals in Ethiopia, Addis Ababa. These data are believed to be representative of all the hospitals in the country, as they are homogeneous in governance, operating procedures, budget administration, and other matters. The sample included small, medium, and large hospitals with pharmacists from three to 37 per hospital in number. The qualification of a majority of respondents was a BSc degree (81.9%), followed by diploma holders (12.9%). This indicated that the respondents were able to understand the issues in the questionnaire and provide appropriate responses about IPLS and its effect on logistics performance of HIV/AIDS commodities. A majority of the respondents have six to ten years of experience (43.9%), followed by those up to five years of experience (32.9%). Of course, quite a good number of respondents (22.6%) have 11 to 15 years of experience. The experience of the respondents, like their academic qualifications, was a factor that indicates that the respondents are fit for this research process. From Table 1 it is clear that top-level managers were very few in number, and a large number of respondents did not hold a managerial position (65.2%). This implies that the respondents were the actual operators of the system (IPLS). However, participation of lower-level managers (17.4%) and middle-level managers (13.5%) will help obtain the view of the management about the system. The gender distribution of the respondents was 62.6% males and 37.4% females. Even if the number of females is lower than their male counterparts, both groups were fairly represented, as the number of females is fewer in all aspects of organisational affairs in the Ethiopian context. This implies that the respondents were properly picked from both groups. Before data analysis was conducted, the data were tested for multi co-linearity and normality, and found to be fit. A large sample size (more than 30 respondents) is believed to be normally distributed (Ghasemi & Zahediasl, 2012). As this study used 155 respondents, the data tended to be normally distributed. In the next part, descriptive analysis of factors influencing IPLS performance data will be presented.

Descriptive Analysis of the Variables

Table 2 summarises the descriptive analysis of the constructs.

Table 2: Descriptive Analysis of Variables (N = 155)

	N	Minimum	Maximum	Mean	Std. Dev.
System Quality	155	1.00	5.00	4.10	.81
Information Quality	155	1.00	5.00	4.00	.77
Service Quality	155	1.00	5.00	3.95	.80
Cultural Factors	155	1.00	5.00	3.98	.90
User Satisfaction	155	1.00	5.00	4.13	.73
Logistics Performance	127	1.00	5.00	4.24	.80

System quality measures conformity to specifications and meeting customer's expectation (Sirsat and Sirsat, 2016; Romi, 2011). This is reflected by assessing whether IPLS is friendly to handle, error-free, fulfils management requirements, and is a secure system. System quality has an overall mean score of 4.10 and standard deviation of 0.81, which is not a bad result. On the other hand, information quality is the outcome of a quality system (Halawi et al., 2007; Romi, 2011; Sirsat & Sirsat, 2016). Information quality is measured in terms of whether the information IPLS produced is accurate, precise, easy to find, complete, and understandable. The overall mean score of information quality was 4.00 and standard deviation was 0.77.

Service quality is the quality of support that the users of IPLS receive from the IS department and IT support personnel (Halawi et al., 2007; Romi, 2011; Sirsat & Sirsat, 2016). The overall mean score is 3.95 and standard deviation is 0.80. Finally, cultural factors are believed to influence the level of diffusion and utilization of the system. Al-Jumeily and Hussain (2014) stated that cultural neutrality has been identified as a blind spot in previous Technology Acceptance Models (TAMs). They have identified three primary variables drawn from the cultural dimensions theory of Hofstede (individualism, uncertainty avoidance, and power distance) to influence IPLS adoption. The mean value of cultural factors was 3.98 and standard deviation was 0.90.

The mediating variable, user satisfaction, is the degree to which the recipients of the output of information system are satisfied in performing their tasks and

making sound decisions (Sirsat & Sirsat, 2016). User satisfaction is measured in terms of how the IPLS enables in accomplishing tasks, helps perform tasks quickly, improves job performance, increases productivity, and enhances effectiveness. The respondents stated that even if the system has some quality problems, it facilitates their job performance. Therefore, user satisfaction has an overall mean score of 4.13 and standard deviation of 0.73, which is a good result. This indicated that users are quite satisfied with the system output and this shall further be enhanced in the future by proper training, system updates, and other attributes of IPLS.

Logistics performance of HIV/AIDS commodities is the final outcome of a well-designed IPLS and user satisfaction. The respondents were asked about the logistics performance of HIV/AIDS commodities and the responses had a mean score of 4.24 and standard deviation of 0.80, which is a good result. This indicated that IPLS facilitates the work of HIV/AIDS logistics performance. Modern systems are used to increase efficiency and effectiveness of operations and to reduce cost as well. This capacity shall be better utilised by improving it in the future, based on feedback obtained from users and their level of satisfaction.

Correlation Matrix of Dependent and Independent Variables

The correlation matrix of the independent, mediating, and dependent variables is shown in Table 3.

Table 3: Correlation Matrix of Variables

		(1)	(2)	(3)	(4)	(5)	(6)
System Quality (1)	Pearson Correlation	1					
	Sig. (2-tailed)						
Information Quality (2)	Pearson Correlation	.632**	1				
	Sig. (2-tailed)	.000					
Overall Service Quality (3)	Pearson Correlation	.563**	.623**	1			
	Sig. (2-tailed)	.000	.000				
Overall Cultural Factors (4)	Pearson Correlation	.391**	.342**	.361**	1		
	Sig. (2-tailed)	.000	.000	.000			
User Satisfaction (5)	Pearson Correlation	.501**	.725**	.615**	.415**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
Logistics Performance (6)	Pearson Correlation	.411**	.539**	.442**	.367**	.616**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	

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

Table 3 indicates that each construct is highly correlated to the dependent variables (both mediating and criterion variable) at one per cent level of significance, indicating that change in each independent variable results in change in the dependent variable. It is obvious that the components shall be correlated with one another and with the dependent variables, as system quality should lead to information quality supported by good working culture, resulting in user satisfaction, which in turn leads to better logistics performance (Halawi et al., 2007; Dreheeb, Basir & Fabil, 2016; Sirsat & Sirsat, 2016). There was strong positive relationship between user satisfaction and

logistics performance of IPLS ($r = 0.616$), followed by the relationship between information quality and logistics performance of IPLS ($r = 0.539$). The other constructs did have a moderately strong relationship.

Regression Analysis of IPLS Factors with User Satisfaction

Table 4 presents multiple linear regression data between the independent variables (system quality, information quality, service quality, and cultural factors) and the mediating variable (user satisfaction).

Table 4: Regression Analysis of IPLS Attributes with User Satisfaction

Model		Coefficients ^a				
		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.858	.242		3.553	.001
	System Quality	-.037	.065	-.042	-.579	.564
	Information Quality	.517	.070	.547	7.340	.000
	Service Quality	.217	.064	.241	3.417	.001
	Cultural Factors	.126	.047	.157	2.710	.008

a. Dependent variable: Overall user satisfaction

The regression table shows that all the independent variables have a significant influence on the mediating variable, except system quality, which was not significantly correlated with user satisfaction at 5% level of significance. The adjusted R² of 57.8% shown in Table 5 indicates that the independent variables identified as constructs of this study account for 57.8% of the variations in user satisfaction of IPLS.

Table 5: Adjusted R²

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.767 ^a	.589	.578	.47449

a. Predictors: (Constant), overall cultural factors, overall info. quality, overall system quality

Vijai (2018) stated that system quality and information quality singularly and jointly affect both use and user satisfaction. Additionally, the amount of use can affect the degree of user satisfaction positively or negatively. The reverse is also true. Hence, there is a possibility that information quality may positively influence user satisfaction even when the system quality is not up to the expected level of the users.

Even though the system quality was not as good as it ought to be, the overall information quality was acceptable, as the system contributed something in performing

organisational logistics tasks (Halawi et al., 2007; Dreheeb, Basir & Fabil, 2016; Sirsat & Sirsat, 2016). As observed from the interviews, users lack confidence in the system quality due to human resource related matters, such as turnover and low compensation. However, system quality should be improved by proper training, maintaining the trained staff, and motivating them to work for the better of the organisation via different motivational mechanisms. Nguyen et al. (2019) also empirically confirmed that only complementarity of IT infrastructure integration and interpersonal communication contributes to the achievement of internal information visibility in the supply chain, which successfully contributes to organisational performance.

Regression Analysis of User Satisfaction with Logistics Performance

As it was observed from the extant literature, such as Dreheeb, Basir and Fabil (2016) and Sirsat and Sirsat (2016), user satisfaction results in proper utilisation of the system (with its own limitations) and the performance of operational activities of the firm and the making of sound decisions based on the information produced from the system.

Regression between the mediating and the dependent variables are shown in Table 6.

Table 6: Regression Analysis of User Satisfaction with Logistics Performance of HIV/AIDS Commodities

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
		1	(Constant)	1.643	.268	
User Satisfaction	.618		.064	.616	9.671	.000

a. Dependent variable: Logistics performance of HIV/AIDS commodities

The mediating variable had a significant and positive role on the dependent variable at 37.8% of adjusted R^2 . This is in line with the extant information systems literature and empirical findings as indicated, for example, in the studies of Halawi et al., 2007, Dreheeb, Basir and Fabil, 2016, Sirsat and Sirsat, 2016. Table 7 explains 38.7% of logistics performance of HIV/AIDS commodities.

Table 7: Adjusted R^2 of the Second Relationship

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.616 ^a	.379	.375	.57954

a. Predictors: (Constant), overall user satisfaction

This implies that increase in user satisfaction of IPLS will significantly influence logistics performance of HIV/AIDS commodities. Satisfied users will use the system properly to perform their logistics tasks. The working environment that is capable of motivating employees to use the system properly should be in place to make better use of the IPLS for improved logistics performance of HIV/AIDS commodities (Halawi et al., 2007; Dreheeb, Basir & Fabil, 2016; Sirsat & Sirsat, 2016).

CONCLUSIONS

The data collected and analysed indicated that the performance of IPLS has both strengths and weaknesses. For instance, in terms of system quality, the system was not found to be error-free and secure. However, respondents stated that it was friendly to handle. Further, the system quality was compromised due to high turnover of trained staff and lack of skill upgrading training. In terms of information quality, the accuracy of the system was questioned by the respondents. This is the same conclusion as that stated for the system being error-prone. In addition, the report formats are not frequently updated and the employees complete the forms carelessly. However, information is easy to find in the system, which is in line with the conclusion that the system is user-friendly. In relation to cultural factors, power distance among team members within the organisation does not affect system performance very much. However, individualism has more effect in the IPLS environment.

IPLS enhances job performance of users and increases their productivity, which further improves their satisfaction. Overall, the system was good in terms of enhancing user satisfaction, which is important for

organisations. IPLS resulted in a big improvement in the accuracy of logistics, by enhancing planning, decision-making, productivity, and overall logistics objectives. Improving IPLS performance will further enhance logistics performance of HIV/AIDS commodities. The regression analysis indicated that all independent variables (information quality, service quality, and cultural factors), except system quality, have strong and positive effects on user satisfaction, and thereby on logistics performance of HIV/AIDS commodities. As indicated in the interview, system quality did not have a strong and positive effect on user satisfaction due to factors specific to the Ethiopian environment, such as turnover of trained staff, lack of skill upgrading trainings, and other motivational factors such as compensation.

IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH

The findings of this study could be used by policy makers and practitioners in designing and implementing various types of information systems, be it applicable in Human Resource Management, Logistics, Marketing, Accounting, Database Management, Enterprise Resource Planning Systems, or others. Antecedents and consequences of information systems implementation could be observed by utilising the research model used in this study.

Future research may be conducted, enriching this study in many ways, such as incorporating other variables that affect IPLS from the extant literature, covering a wider geographic area in Ethiopia as well as Eastern Africa, and also incorporating private hospitals that operate side-by-side with public hospitals. Replicating the same study to observe the reliability of the outcomes of this research is another area to be explored in the future.

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