ADDIS ABABA UNIVERSITY

COLLEGE OFBUSINESS AND ECONOMICS

The Effect of Integrated Pharmaceutical Logistic System (IPLS) on User Satisfaction and Logistics Performance of HIV/AIDS Commodities: The Case of Selected Public Hospitals in Addis Ababa.

Research Thesis submitted to the Department of Logistics and Supply Chain management, School of Commerce, Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Art (MA).

By

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THE EFFECT OF INTEGRATED PHARMACEUTICAL LOGISTIC SYSTEM (IPLS) ON USER SATISFACTION AND LOGISTICS PERFORMANCE OF HIV/AIDS COMMODITIES: THE CASE OF SELECTED PUBLIC HOSPITALS IN ADDIS ABABA.

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DECLARATION

I, Tibeb Zeleke Dillnessa, declare that the thesis entitled "**The effect of integrated pharmaceutical logistic system (IPLS) on user satisfaction and logistics performance of HIV/AIDS commodities: the case of selected public hospitals in Addis Ababa**" is my original work. I have carried out the present study independently with the guidance and support of my research advisor Mengistu Bogale (PhD). Moreover, this study has not been presented for any other program or university and that all source of materials used have been acknowledged accordingly.

Student Researcher	**Signature**	**Date**
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LETTER OF CERTEFICATION

This is to certify that Tibeb Zeleke Dillnessa has carried out his research wok on the topic "**The effect of integrated pharmaceutical logistic system (IPLS) on user satisfaction and logistics performance of HIV/AIDS commodities:** the case of selected public hospitals in Addis Ababa". The work is original and is suitable for submission for the award of Master of Arts in Logistics and Supply Chain Management.

Research Advisor	**Signature**	**Date**
Mengistu Bogale (PhD)	_____	_____

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The Researcher

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Abstract

This study was conducted to assess the effect of IPLS on user satisfaction and logistics performance of HIV/AIDS commodities. Data were collected from 127 respondents from six public Hospitals using questionnaire and interview with six participants (pharmacy head of each hospital visited). The study employed explanatory design with mixed method of research. The data collected and analyzed indicated that the performance of IPLS indicated that there are strengths and weaknesses. For instance in terms of system quality, the system was not found to be error free and secured. But respondents stated that it was friendly to handle. The system quality was also compromised due to high turnover of trained staff and lack of skill upgrading training. Information accuracy of the system was questioned by the respondents. The report formats are not also frequently updated and the employees complete the forms carelessly. But information is easy to find from the system which is again in line with the above conclusion that the system is user friendly. In terms of service quality, the system lacks added supplementary services, it avails only basic services. In relation to cultural factors, power distance among team members within the organization doesn't affect system performance very much. However, individualism has more effect in the IPLS environment. IPLS enhances job performance of users and increased their productivity which increases their satisfaction. Over all, the system was good in terms of enhancing user satisfaction which is the base for organization. IPLS resulted in big improvement in the accuracy of logistics by improving planning, decision making, productivity and overall logistics objectives. Improving IPLS performance will further improve Logistics performance of HIV/AIDS commodities. The regression analysis indicated that all the independent variables (information quality, service quality, and cultural factors) have strong and positive effect on user satisfaction and thereby on Logistics performance of HIV/AIDS commodities except system quality. System quality did not have strong and positive effect on user satisfaction due to factors specific to the Ethiopian environment which were indicted in the interview such as turnover of trained staff, lack of skill upgrading trainings and other motivational factors such as compensation. Future research may be conducted by incorporating other variables that affect IPLS, covering wider geographic area, and also incorporating private hospitals. Replicating the same study to observe the reliability of the outcomes of this study is another area of research for the future.

Key words: IPLS, System Quality, Information Quality, Service Quality, cultural factors, user satisfaction, Logistics of HIV/AIDS commodities

Chapter One

Introduction

This chapter will provide a general background of the study, problem statement, study objectives and research question, scope of the study and limitation of the study.

1.1. Background of the Study

Health is one of the crucial elements for the development of any country. To achieve goals set in the Millennium Development Goals, the Government of Ethiopia has developed various programs and strategies. However, the evaluation of the Health Sector Development Program (HSDP) I and II indicated that the pharmaceuticals supply management system of Ethiopia has been suffering of several problems including non-availability, un-affordability, poor storage and stock management and irrational use of pharmaceuticals. Various products used to be managed using vertical systems (Berhane, 2017).

Family health products were managed by Ministry of Health route using the quarterly logistics reports from the lower levels. Anti-TB and Leprosy drugs are also managed by the ministry of health route but there was no defined reporting and resupplying schedule (Health Sector Development Program 2011).

HIV/AIDs pharmaceuticals and supplies were distributed by the PFSA distribution networks though PFSA central, PFSA branches and then to health facilities using monthly LMIS reports. These all lead to lots of distribution networks, warehouses, human resources for managing the products. As a result there were high wastage of products and it demanded high resources for managing products at all levels and created gaps in mobilization of resources from different stakeholders.

To solve these problems in public health facilities, the FMOH initiated a comprehensive supply chain strategic planning process emphasizing the integration of all products into one supply chain (PFSA 2014). In late 2006, the Ministry approved the Pharmaceutical Logistics Master Plan (PLMP)

through which, Pharmaceuticals Fund and Supply Agency (PFSA) was established in 2007 by Proclamation No. 553/2007. To execute this mandate, PFSA, in collaboration with different partners who were currently working in the health sector developed and began implementing the Integrated Pharmaceuticals Logistics System (IPLS) in 2009.

With the introduction of IPLS, PFSA worked to establish an integrated health commodity supply chain that would include all health program commodities, and would connect all levels (from health facility-PFSA branches-PFSA central/RHB/FMOH) with accurate and timely data for decision making (PFSA, 2014).

IPLS is the term applied to the single pharmaceuticals reporting and distribution system based on the overall mandate and scope of the PFSA. It aims are to ensure that patients always get pharmaceuticals they need.IPLS integrates the management of essential pharmaceuticals including pharmaceuticals that were used to be managed vertically: HIV/AIDS, Malaria, TB and Leprosy, EPI, MCH and purchased essential drugs. It is the primary mechanism through which all public health facilities obtain essential and vital pharmaceuticals (FMOH, 2010).

It also standardizes and streamlines inventory management and LMIS to improve availability of essential medicines in public health facilities including the last mile Health Posts with the Health Post Re supply .Products included on the National pharmaceuticals procurement List (NPPL) are supplied and managed through the IPLS (USAID, 2006).

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. It has three main components including the policies and guidelines for logistic management information system (LMIS), inventory control and storage of pharmaceuticals at all levels of the supply chain system throughout the country.

Each component (sub-system) has its own set of indicators for measuring progresses and performances. These indicators can also be used to check for: system leakages, to track the

availability and utilization of records (e.g. bin card records), and to determine the extent to which facility complete and submit LMIS reports.

Using a phase-based approach, IPLS is now implemented in most of the public health facilities in Ethiopia. Phase I antiretroviral sites started to be implemented the IPLS in FY2011; phase II facilities preventing mother-to-child transmission sites, in FY2012; and phase III facilities smaller health centers started IPLS in FY2013(FMOH,2010).

IPLS is expected to facilitate the logistics performance of HIV/AIDS commodities. Well-designed and practical IPLS is essential for the supply management cycle of HIV/AIDS commodities is to function effectively and efficiently (Tadesse, 2015).

Hence this paper will addresses the performance status of IPLS in public Hospitals found in Addis Ababa and issue and challenges faced during the performance.

1.2. Statement of the Problem

Integrated pharmaceutical logistics system (IPLS) is the system which can ensure access to quality, safe, affordable and uninterrupted supply of vital and essential Medicines, if it is operated perfectly at different level of supply chain members (Nigussie, 2017).

Until just a few years ago, Ethiopia's health system struggled with an inadequate supply of quality and affordable medicines, poor storage conditions, and weak stock management, resulting in high levels of waste and stock out and also the healthcare supply chain in Ethiopia has suffered from weak systems with limited data visibility which result in Wastage, stock outs, and poor health outcomes.

Hence, Ethiopia has a number of health programs that require efficient pharmaceuticals supply chain system for their effective and efficient implementation (Berhane, 2017).

The previous health care supply chain in Ethiopia was the vertical system through which the country had several parallel logistic systems for selecting, procuring and distributing different types of medical supplies to clients. Often health programs (HIV/AIDS) each manage and distribute for their program this system.

Consequent investment in "vertical program" systems improved availability for those program specific commodities (effectiveness) but all this lead to lots of distribution networks, warehouses, human resources for managing the products. As a result there were high wastage of products, and it demanded high resources for managing products at all levels and created gaps in mobilization of resources from different stakeholders (Berhane, 2017).

The national pharmaceutical supply system reform has given rise to the designing of a new system called horizontal system (Integrated Pharmaceutical Logistics System-IPLS) as primary mechanism to ensure un-interrupted supply and continuous availability of quality-assured essential medicines at all public health facilities.

IPLS is a back bone for the component of pharmaceutical logistic system (selection, quantification, procurement and distribution), and a failure in the system leads to the failure of the whole pharmaceutical management process.

The literature indicates that IPLS is improving information recording and reporting, storage and distribution systems, as well as the availability of essential commodities at Service delivery points as a result of different efforts like: supportive supervision, training and on job training.

However, the performance of IPLS is still a challenge in Ethiopian hospitals. More over no objective measurement so far was made to assess the influence IPLS has on logistics performance of HIV/AIDS commodities in public hospitals found in Addis Ababa.

Bearing the aforementioned facts in mind, this study, therefore, aimed to assess the performance status of IPLS (Integrated pharmaceutical logistic system) and to measure the system's influence on logistics performance of HIV/AIDS commodities in public hospitals found in Addis Ababa.

1.3. Research Questions

Based on the previous statement of research problem, the following main research questions were addressed:

1. What is the status of System (IPLS) quality in public Hospitals in Addis Ababa?
2. How do cultural factors affect IPLS Performance in public Hospitals in Addis Ababa?
3. What is the effect of IPLS on user satisfaction in public Hospitals in Addis Ababa?
4. What is the effect of user satisfaction on logistic performance of HIV/AIDS commodities in public Hospitals in Addis Ababa?

Based on the above research questions, the research has tested the following hypotheses:

H1: Information quality from using IPLS will have strong and positive effect on user satisfaction.

H2: The system (IPLS) quality will have strong and positive effect on user satisfaction.

H3: H4: Cultural factors surrounding the users operating IPLS will have strong and positive effect on user satisfaction.

H4: User satisfaction from using IPLS will have strong and positive effect on Logistics Performance of HIV/AIDS commodities.

These hypotheses were explained in detail in the literature review based on theoretical and empirical studies.

1.4. Objective of the Study

1.4.1. General objective

The general objective of this study was to assess the role of IPLS (Integrated pharmaceutical logistic system) on the logistics performance of HIV/ AIDS commodities in public Hospitals.

1.4.2. Specific objectives

1. To assess the status of System (IPLS) quality in public Hospitals in AA

2. To identify cultural factors that determine the performance of IPLS
3. To assess the influence of IPLS on user satisfaction in public Hospitals in AA
4. To assess the influence of IPLS on user satisfaction on logistic performance of HIV/AIDS commodities in public Hospitals in AA

1.5. Significance of the study

Managing health commodity through the Integrated Pharmaceutical Logistics System (IPLS) is a strategy to enhance the smooth flow of commodities and prevent frequent stock outs of critical items that could hinder continuous provision of quality health services.

Its effective performance is crucial for the government to produce the intended outcome in health care provision. Hence follow up of its performance as well as filling the gaps identified during performance is the concern of performance including FMOH.

The result of the study is useful for administrators of HIV/AIDS commodities in public hospital in Addis Ababa health bureau and different stakeholders involved in the influence performance of IPLS.

It will also have academic contribution by adding empirical evidence to the existing body of knowledge on IPLS for public Hospitals. Furthermore, it will also give an insight to any individual who has an interest to further research on pharmaceutical logistic system.

1.6. Scope of the study

The study focused on assessing the effect of IPLS on the logistics performance of HIV/ AIDS commodities in public Hospitals. To make the research work more manageable, the research was delimited to HIV/AIDS commodities only.

This is because such medicines are so critical that can't be interrupted and there is large number of patients treated in the hospital.

In addition, the study was conducted in selected public Hospitals in Addis Ababa as the hospitals are managed in homogeneous manner under the supervision of the same bureau or minster organization (MOH).

1.7. Limitation of the study

This study was designed to collect relevant data to answer the research question and achieve the objectives. However it did have some limitations. Firstly, the respondents were busy to complete questionnaires. Close follow up effort was put to maximize collection of questionnaires and minimize this limitation.

Another limitation may be respondent bias. Triangulation of different data collection methods (questionnaire and interview) was used again to minimize this part of the limitation.

1.8. Operational definition

- IPLS: Integrated pharmaceutical logistic system. It has three main components: LMIS, inventory control and storage (Mutugi, B.2014).
- LMIS: is Logistic management information system that has a purpose: to collect, organize, and report information to other levels in the system in order to make decisions that govern the logistics system and ensure that all six rights are fulfilled for each client. It comprises stock keeping records, transaction records, and consumption record (Desalegn A,Taye B, Belay G,Nigatu A.2013).
- ICS: Is inventory control system that help health center to have appropriate stock by informing personnel when and how much of a pharmaceuticals to order and to maintain an appropriate stock level to meet the needs of patients (Melese, M.2012).
- DUs: are those units who directly give/deliver pharmaceutical to patients (Nigussie, G.2017).

- IFRR: is internal facility report and resupply that is used by dispensing unit to report their stock status and be resupply by the store man (Tilahun, A.2014).
- RRF: Report and requisition form that is used by health centers to report and to be refill program commodity by PFSA (Tilahun, A.2014).

1.9. Organization of the study

This study was organized in the following five chapters. Chapter one presented general introduction to the thesis which begins with providing back ground information on the overall concept of IPLS followed by describing other components of the chapter such as statement of the problem, research question, objectives, significance, scope and limitation of the study.

Chapter two presented a review of relevant literatures related to the subject matter IPLS and logistics performance including different empirical studies, Research gap, conceptual model and detailed hypotheses. Chapter three presented the methodology used in conducting the research. It included research design and approach, targeted population and sample, data type and source, method of data analysis and ethical considerations.

Chapter four presented the result (findings) and discussions part of the thesis work based on the analysis indicated in chapter three. Finally, Chapter five presented the summary, conclusion and recommendations part of the research work which is based on the findings and discussions made in chapter four.

Chapter Two

Review of Related Literature

This chapter will cover theoretical literature review, Empirical literature review, conceptual frame work of the study and the identified literature gap.

2.1. Theoretical Literature Review

In this part the theoretical aspects of IPLS performance and logistics performance of HIV/AIDS commodities will be presented. It begins with the basics of logistics management, identifies attributes of IPLS performance and effect on user satisfaction as well as logistics performance of HIV/AIDS commodities.

2.1.1. Logistics Management

Logistics and its management plays key role in business success. Mutugi (2014) described that logistics is the process of strategically managing the acquisition, movement and storage of materials, parts and finished inventory and related information flows through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost effective fulfillment of orders.

He further argues that logistics is that part of Supply Chain Management (SCM) that plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.

Logistics has helped many successful companies around the world to transform cost proposition into value proposition, therefore leveraging the companies for a competitive edge in a dynamic and turbulent global market. Several companies are making a paradigm shift by looking at the logistics as an opportunity rather than a cost center. They are leveraging logistics to improve the service level

of the customers, to accelerate the speed of launching new products and enter new markets faster than before within and beyond the national boundaries (Mutugi, 2014).

Indeed in the contemporary business environment, logistics is as much about the flow and storage of information as it is about the flow and storage of goods. Logistics is one of the major enablers of growth of trade and commerce activity in a country. At a macro level, the logistical infrastructure such as modes of transportation, transportation equipment, storage facilities, connectivity and information processing, are contributing to a large extent to the physical movement of goods produced in manufacturing, mining and agricultural sectors. The speed and reliability in distribution from a place of production to the place of consumption contributes greatly to the growth of a country's domestic and international trade.

Mutugi (2014) also described that logistics management deals with the planning and control of material flows and related information in organizations, both in the public and private sectors. Generally speaking, its mission is to get the right materials to the right place at the right time, while optimizing a given performance measure and satisfying a given set of constraints. Logistics is one of the most important activities in modern societies. It is constructed on subsystems which in turn contain a collection of interrelated components.

2.1.2. Pharmaceutical Logistics Management

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 manufacture to consumers. The nature of ART and the specific characteristics of ARV medicines and how they are used pose particular challenges for managing the supply chain for ARV medicines.

Effective pharmaceutical supply management and inventory control avoid stock out, loss due to unnecessary expiry, theft and ensure that the desired pharmaceutical products are available at all times in adequate quantity. But in many low and middle income countries (LMICs), the capacity of the pharmaceutical supply management system has always been challenging and weak. The ARV

supply chain management has become increasingly difficult due to increasing number of people on ART, increasing number of sites providing ART and a greater diversity of different ARV regimen Berhanemeskel *et al.* (2016). Moreover, there are certain common challenges associated with the quantification of ARV medicines and supplies mainly in LMICs. Data on ART services and ARV medicine supply are limited and when available, are often unreliable or insufficient to be used for quantifying ARV medicine requirements.

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. A pilot study done in Ethiopia, however, showed that out of the 48 hospitals and health centers, 10(21 %) of the institutions didn't have HIV medicines and out of 27 health posts, 9 (33 %) did not have rapid diagnostic tests . This shortage of critical medicines and supplies in health facilities may compromise appropriate clinical management (Tilahun, 2014).

Mudzteba (2014) stated pharmaceutical logistics data are collected, processed, and reported through LMIS, increasing the likelihood of an adequate supply of EDs. An effective LMIS may be manual or computerized collecting essential data about stock status and consumption. It ensures accountability, a reduction in supply imbalances (stock outs and overstocks), and efficient, cost-effective pharmaceutical logistics.

Because a pharmaceutical logistics system cannot function effectively without timely, accurate LMIS data, the LMIS is an essential tool. It provides personnel responsible for pharmaceutical logistics with the information they need to react or, more important the information they need to anticipate demand (Mudzteba 2014). To be effective, LIMS should be equipped with adequate trained staff, forms, equipments, and facilities. However, some studies showed that there is a problem in this regard.

Kagashe & Massawe (2012) as cited in Mudzteba (2014), LMIS is an important tool in inventory management, therefore accurate record keeping is essential. A study in Tanzania reported 8% and 72% recorded balance that was less and greater than the physical count. Another study done in Tanzania showed that often neither minimum nor maximum levels were defined (MOHSW 2008).To

the worst, in South Sudan, only 27% of the assessed health facilities were reported to fill forms accurately (GH Tech 2011).

2.1.3. Overview of IPLS in Ethiopia

Hospitals order different program drugs including ARV drugs, every two months using Logistics Management Information Systems (LMIS) tool called Resupply Requisition Form (RRF) that is used to report previous consumption while at the same time requesting to refill for the next two months consumption in the Hospital. Pharmaceutical Fund and Supply Agency (PFSA) after reviewing the RRF sent by the Hospital will directly refill items requested by the Hospitals (Tadesse, 2015).

The decision to refill by PFSA with the required quantity as requested by the hospital and with he expected re-supply period depends on the timely submission of the RRF report with good quality of logistic data such as data on previous period consummation, stock on hand at the time of report, maximum stock level, minimum stock level and others LMIS data (Tadesse, 2015).

Once PFSA received good quality and timely LMIS data, it will use third data to make appropriate and reasonable logistic decisions on how much to refill the items with in the expected resupply period. In addition, this data will help the PFSA to prepare for future logistic management decision such as in forecasting the future demand and procuring the items so that it can have sufficient stock in the future to provide uninterrupted supply of program drugs to health facilities like hospitals and health centers (FRDE IPLS SOP, 2015).

2.1.4. Logistics Management Information System (LMIS) in IPLS

Information is the motor that drives the logistics cycle. Without information, the logistics system would not be able to run smoothly. Managers gather information about each activity in the system and analyze that information to coordinate future actions. For example, information about inventory levels and consumption must be gathered to ensure that a manager knows how much more of a product to procure (Mutugi, 2014).

Logisticians added the word logistics to Management Information System (MIS) to create Logistics Management Information System (LMIS). They wanted to make it clear that the collection of data for logistics is a separate activity from the collection of data for other information systems. Logistics is not just a set of operations to move products from one place to another, but rather a key element on helping the people to meet their needs and to achieve the goals of various activities. Logistics refers to activities concerned with selecting, financing, delivering, and distributing supplies (Mutugi, 2014).

An LMIS is a system of records and reports whether paper based or electronic used to aggregate, analyze, validate, and display data (from all levels of the logistics system) that can be used to make logistics decisions and manage supply chain. The term supply chain describes the various organizations and activities that are linked to the delivery of supplies from the manufacturer to the different agencies involved, governmental and private, on to the end clients. Similarly it is also the flow of supplies through storage and transportation to the facilities central and regional warehouses, province and district stores to Service Delivery Points (SDPs) and to end users. In fact the terms "supply chain management" and "logistics" are often used interchangeably (USAID, 2000).

According to Lucey (2005), information system is made up of a number of components. Some of the components are pencil and paper, word processor, computers and communications networks, operating systems and procedure manuals, and people (customers, suppliers, managers or clerks) to construct, work with, and operate such components.

The information system must be capable of effective data retrieval and data processing, data analysis and report generation. The speed and quality of the information flows have direct impact on the cost and efficiency of the entire logistic system. Slow and erratic communications can lead to loss of clients or excessive transportation, inventory, and warehousing costs, as well as possible manufacturing inefficiencies through frequent line changes (Mutugi, 2014).

The order processing and information system forms the foundation for the logistics and corporate management information systems. A logistics management information system is necessary in order to provide management with the knowledge to make strategic and operational decisions about

providing supplies. The LMIS may be fully automated or manual, and most of them are somewhere in between. Depending on the sophistication of the system, the quality and speed of information flow will vary (Lambert, 2004).

The information system collects, processes, and reports supply chain data. A well-functioning LMIS provides decision makers throughout a supply chain with accurate, timely, and appropriate data. It can be manual (paper based), or partly or wholly computerized. For any supply chain system, there are three essential data LMIS data items quantity of stock on hand, rate of consumption quantity of stock consumed (dispensed to users), losses and adjustments, (USAID, 2010).

A well designed LMIS involves collecting, organizing, and reporting relevant and quality logistics data on timely basis and to the right recipient. The timeliness and quality of logistics data depends on the arrangement of the sources of data according to a certain procedure (system). Possible sources of a logistics data include stock movement cards, transaction vouchers, purchase/procurement vouchers, returning records, etc. (John Snow Inc. /DELIVER, 2004).

No single system will work for every country, but applying a consistent approach to building LMIS that takes into consideration the local context and engages stakeholders at multiple levels in the data flow system improves the probability of sustainability (Rodriguez, 2009).

The LMIS design and implementation is dependent on the intended purpose and resource availability. While a comprehensive set of data provides accurate information, a statistically representative data set can provide equally good information for less cost and in a shorter time (Mutugi, 2014).

For efficient use of resources, it is also important to integrate the LMIS with other data collection systems. For huge volume of data and depending on the required complexity of the analysis, computerization of the LMIS is advisable (MSH, 2012).

To make logistics decisions, a logistics manager needs at least three essential data items: stock on hand, rate of consumption, and losses and adjustments. Although one may make good use of other data items in logistics, these three data items are absolutely required to run a logistics (MSH, 2012):

1. **Stock on hand (SOH):** This is the amount of usable stock available at a certain point in time, usually at the end of a defined regular period. Knowledge of what one has in stock will in turn inform re-supply, forecasting, procurement, and/or redistribution decisions of the item. The main sources of data for SOH can be stock movement cards (stock card and bin card) and physical inventory (MSH, 2012).
2. **Rate of consumption:** This is the average amount of the item being consumed during a certain period of time and reported usually at the end of defined regular period. Knowledge of how much is being consumed within a certain period of time and in forms re-supply, forecasting, procurement and/or redistribution decisions of the item. The sources of data for consumption can be stock movement cards (stock card and bin card), dispensing registers and issue vouchers, depending on the design of the LMIS system (MSH, 2012).
3. **Losses and adjustments:** These include all adjustments that need to be made for changes in the amount of products recorded in the stock movement cards; adjustments are usually recorded anytime when there is a difference between the recorded quantity and the actual amount available in stock. The main sources of data for SOH can be stock movement cards (stock card and bin card) and physical inventory (MSH, 2012).

2.1.5. Theories of Information Systems

Theories of information systems are considered to comprise various models and approaches:

2.1.5.1. Technology Acceptance Model

Sirsat and Sirsat (2016) stated that the Technology Acceptance Model (TAM) was developed by Davis (1989) to explain the Theory of Reasoned Action (TRA). The theory is needed to explain why some ISs are more readily accepted by users than others.

The TAM will predict information system acceptance and diagnose design problems in any system implementation such as LMIS as well as IPLS before users have experience with a system. User acceptance of IPLS through TAM model will determine their perceived usefulness and perceived ease of use.

Within the model, perceived usefulness is defined by the degree to which they believe that using the system will enhance performance. Perceived ease of use is defined as the degree to which the user believes that using the LMIS system will be free from effort. This will impact on user's attitude toward using the LMIS system is shown by their feelings of being favorable or unfavorable to the system.

2.1.5.2. The DeLone and McLean Models

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 DeLone and McLean (2003) 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.

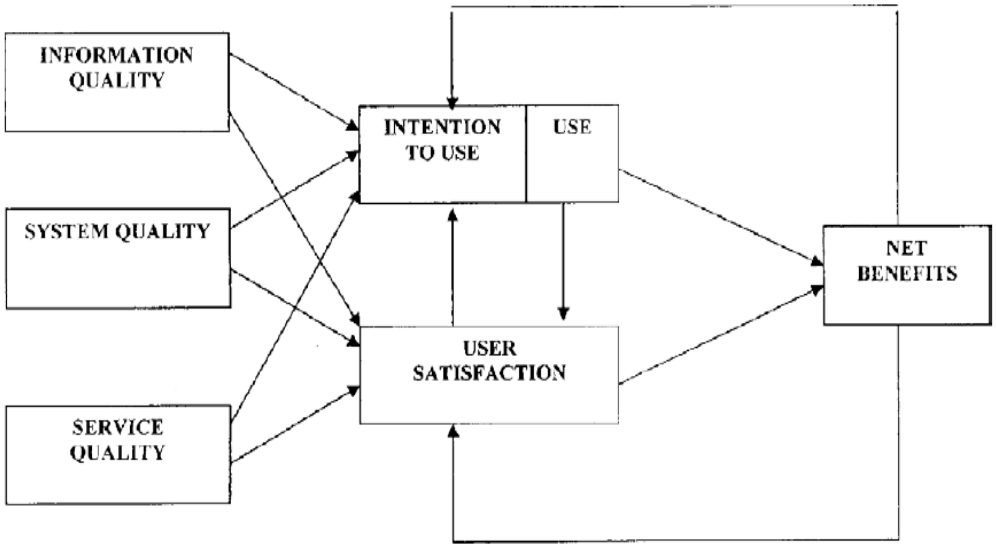

Fig. 2.1: The DeLone and McLean Model of System Success from Sirsat and Sirsat (2016)

2.1.6 Factors Influencing IPLS on Health Commodity Management

Information system effectiveness is the extent to which a specific information system actually contributes to achieving organizational goals, that is, its effect on organizational performance (Hamilton and Chervany, 1981).

The influence IPLS effectiveness is factored under information system factors and supply chain management factors.

2.1.6.1 System quality

According to Sirsat and Sirsat (2016) the term quality means excellence, value, conformity to specification, and quality meeting customer expectation. The value of information system can be realized by improving profit margins for the organization, providing easy-to-use and useful applications, and designing easily maintainable system.

Thus system quality is an important aspect in IS success. Measures of the system quality which have been used in the literature are flexibility, stability, reliability, usefulness, user-friendly interface, ease of use and response time.

2.1.6.2 Information quality

Sirsat and Sirsat (2016) argued that information system quality concept is related to system output that is useful for business users. The most important informational insufficiency the 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 studied under Information quality like relevance, understandability, accuracy, conciseness, completeness, 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 personalization, importance, usefulness, readability etc.

2.1.6.3 Cultural Factors

In many systems literature, cultural factors are believed to influence the level of diffusion and utilization 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 to 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 (1997) that are used to identify the differences in the cultural factors-individualism/collectivism, uncertainty avoidance, and power distance. Each factor is elaborated a bit as follows:

a. **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 own family and their own affiliations. In contrast, in collectivism, individuals behave as members of an organization or group, so that their family is that group or organization to which they pay unquestioning loyalty.
b. **Uncertainty Avoidance** is defined as the tolerance of a society for 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 minimize 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 (Hofstede, 1984).

c. **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 criticize and change the decision making of those who are in power (Teo *et al.* 2008).

2.1.7 User Satisfaction

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 closely related with user attitude; therefore, studies which include user satisfaction as a success measure should ideally also include measures of user attitudes.

2.1.8 Organizational Impact

According to Sirsat and Sirsat (2016), organizational impact represents the firm-level benefits received by an organization because of Information System applications. Measure of organizational performance which might be appropriate for measuring the contribution of IPLS is return on investment. Several authors have developed constructs to measure IPLS impacts on organizations. Effective Management Information System contributed to meeting organizational goals. The success of information systems impacts not only on firm performance but also on industry structure. Operating cost reduction, staff reduction, productivity gain, increased revenues, sales, market share, profits and increased work volume.

2.1.8.1 Availability and Utilization of Logistics Records and Reports

According to the national survey on IPLS which was conducted in 2015, the availability of blank bin cards, IFRRs, and RRFs were high at hospitals (above 90 percent) and health centers (close to 80

percent). However, the availability of the recording and reporting formats decline when moving down the supply chain. According to the survey, the availability of bin cards (the fundamental logistics records that captures essential inventory data) was 40 percent at the health post–level. In phases I and II health facilities, IFRRs used in at least one DU was close to 91 percent in hospitals and 87 percent in health centers but the percentage is lower for phase III health centers (77 percent) (Tilahun *et al,* 2016).

The lower utilization of bin card in hospitals in the study conducted in Addis Ababa indicates poor implementation of IPLS. That was due to large amount of line items/products integrated in one system through IPLS and managed in hospital pharmacy store, where updating of bin card becoming a tedious and time consuming exercise. On the other hand, higher utilization rate of bin cards at health center might be due to the implementation of quality management system that demands standard inventory control system and storage practices. Findings of the assessment suggest that bin cards, IFRRs and RRFs were available among 96.2% of the health facilities. Among those facilities, 61.5% health facilities update bin cards regularly, and 84.6% of them complete and send IFRR to their respective facility stores, while 92.6% of the facilities were completing and sending RRF to supplying PFSA every two months. Better utilization of the records and reports in general and bin cards and IFRRs (internal records and reporting formats) was observed among the health centers compared to the hospitals (Tilahun *et al,* 2016).

Regarding the accuracy of information reported on the report formats (RRF) discrepancy was found in the calculated consumption compared to total quantity issued from the facility stores recorded on the bin card during the review period was observed in 17 (68%) facilities (Tilahun *et al,* 2016)

According to Desalegn *et al. (2013), a* study which was conducted on facility found in Addis Ababa showed that, majority of stock/bin cards were not updated with accurate information matching with the physical count done at the time of visit. The overall accuracy (matching with physical count) of stock/bin cards in all facilities was 38.9%. The basis reason for this was absence of supportive, programmed supervision and work load as confirmed in FGD were the reasons for low accuracy of stock/bin cards in our case.

Fifty percent (50%) of the assessed hospitals and 54% of health centers were currently using stock/bin cards for all HIV/AIDS and TB laboratory commodities in main pharmacy store, among these only 25% and 20.8% of them were updated with accurate information matching with the physical count done at the time of visit for hospitals and health centers respectively. (Desalegn *et al* 2013)

2.1.8.2 Effect of Integration on Supply Chain Performance

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 at MSD, Tanzania hopes to improve product availability and customer service. Stock out rates were relatively low in both integrated and nonintegrated regions, The data collected for the study suggest that the integrated system itself did not necessarily cause higher stock out levels for certain products. Instead, it appears that some issues with system design (inventory control and buffer stocks), delays and stock availability issues at the central level, and some instability during the beginning of the transition to an integrated system may have translated into stock outs (USAID PROJECT, 2011).

The study also had observed non integrated facilities experienced higher stock out rates than did the integrated facilities. The study revealed that integration is a long and complicated process that must be carefully managed to avoid stock outs in the short, medium, and long term. There was assessment which was conducted in Nicaragua which carried out qualitative and quantitative assessment and regular monitoring of logistics indicators to determine the effectiveness of the integrated system and results of that assessment were generally positive. For example, the qualitative and quantitative analyses found that more than half of all service delivery points visited managed adequate levels of stock. Based on a result, non- integrated logistic system does not have a clear buffer stock defined for the management of essential medicine (6%) but integrated logistic system can be managed. In another angel supervision is much more frequent in integrated logistic system than it is in those that are still managing separate LMIS for essential drugs and contraceptives which in non integrated logistic system. This is due to the fact that integrated LMIS may facilitate more frequent supervision

because the reporting system easily demonstrates where managers need to target supervision (Olson *et al*, 2008).

In addition, managers in the integrated system may be able to leverage resources for supervision visits more easily because all commodities are managed under the same LMIS and personnel. Storage conditions assessed did not vary significantly between the integrated and nonintegrated). Facilities with a more integrated system were more likely to have greater than fifty percent of their drugs stocked out over the last six months, than nonintegrated system. Facilities with an integrated LMIS were more likely to always submit the requisition forms than in nonintegrated LMIS (Olson *et al*, 2008).

The finding was also congruent with the findings in the report that showed that, in the nonintegrated system, reporting rates were significantly higher in the integrated regions. In other words, the integration process may have some positive effects on reporting rates because staffs are required to submit their forms, including consumption data, in order to place their order (USAID PROJECT, 2008).

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 programs 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 organization. Integration helps client's access quality healthcare services and supplies (Berhane, 2017).

2.2 Empirical Literature Review

In this part, empirical studies about IPLS, HIV/AIDS logistic performance and their relationship will be presented.

2.2.1. Attributes of IPLS Effectiveness and Consequences

Information system effectiveness is the extent to which a specific information system actually contributes to achieving organizational goals, that is, its effect on organizational performance (Hamilton and Chervany, 1981).The influence IPLS effectiveness is factored under information system factors and supply chain management factors.

- **System Quality**: - 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. Sirsat and Sirsat (2016) stated that system quality positively correlates with user satisfaction and better benefit realization.
- **Information Quality**: - 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.
- **Cultural Factors: -** However, as Ziefle and Jakobs (2010) affirm, people use technology within a cultural and social context, and these influence how humans behave towards technology. Often a whole host of factors differ across cultures, and these factors include social taboos, political and legal constraints, together with religious, ethical and traditional values. Therefore, technology users across the globe have different perceptions, styles of thinking, cognitive and cultural values, and assumptions.
- **User Satisfaction**: - Sirsat and Sirsat (2016) claimed 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.
- **Net benefits:** - Sirsat and Sirsat (2016) stated that effective use of information system contributes to the success of individuals, groups or organizational profits. 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 the e-commerce on customers, suppliers, employees, organizations, markets, industries, economies, and even societies. This same logic applies for IPLS and net benefit of IPLS is performance of HIV/AIDS commodities.

2.3. Conceptual Framework

Prior studies on IPLS emphasized on system implementation predominantly. Those that relate with organizational performance assess only limited Hospitals. Most of the studies were descriptive by their nature of design. In this study, explanatory factors that influence IPLS performance and its effect on logistics performance of HIV/AIDS commodities in 6 hospitals was assessed. The study is believed to bridge the gap in previous studies. Below is the research model to be used in this study (adapted from Sirsat and Sirsat 2016).

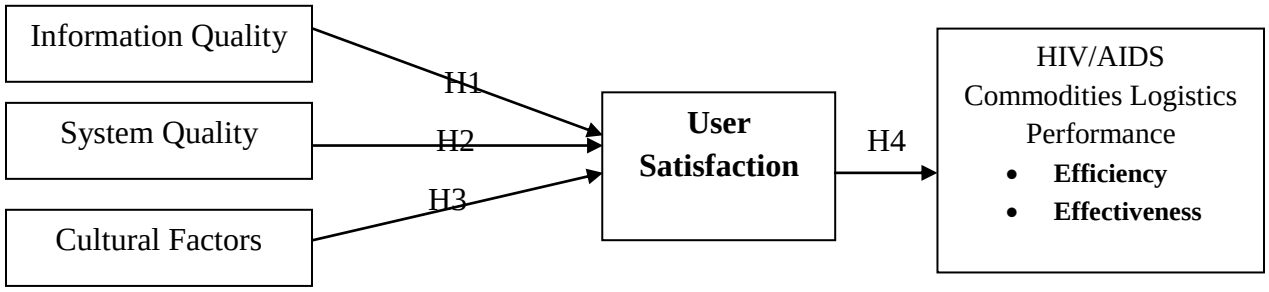

Fig 2.2: The Conceptual Framework (Based on Sirsat and Sirsat, 2012)

The conceptual framework illustrates how the independent variables (attributes of IPLS performance) and the mediating variable- user satisfaction on IPLS) influence logistics performance of HIV/AIDS (the dependent variable). IPLS factors are information quality, system quality, cultural factors which influence user satisfaction and HIV/AIDS logistics performance.

Chapter Three
Research Methodology

This chapter includes the overall research methodology of the study. It includes description of the study area, research design, research approach, target population and sampling method, data source and type, and method of data analysis.

3.1. Description of the Study Area

Addis Ababa is a capital city of Ethiopia with 10 sub cities and 116 Woredas. The study will be conducted in Addis Ababa because in most health care facilities, a high proportion of patients suffer from chronic shortage and interruption of vital program drugs such as HIV/AIDS drugs, TB drugs, FP drugs etc.

The study area is chosen because of the most accessible area and facilities are nearby to Addis Ababa PFSA hub, this will help for better implementation of IPLS compared to other parts of the country and poor functioning of the system in such area will enable to see how severe the problem will be in the rural areas of the country.

Addis Ababa hosts public hospitals that make the study more appropriate to conduct in these hospitals. There are both federal level and city government level Hospitals with specialized services that fit the study topic.

3.2. Research Design

The type of research design used was an explanatory research whereby the influence that IPLS will have on the logistics performance of the HIV/AIDS commodities in the selected hospitals. Explanatory studies will help manipulate the independent variable to influence the mediating and dependent variables.

3.3. Research Approach

A mixed research method of both quantitative and qualitative ones was used to conduct this study. This mix of methods helped to triangulate the responses from different sources to better improve the conclusion from the study.

Quantitative data were gathered via survey from questionnaire on Likert Scale. Qualitative data were from interview of pharmacy heads about IPLS in the Hospitals selected for the survey above.

3.4. Target Population and Sampling Method

There are 14 government owned hospitals in Addis Ababa of which four are under the federal ministry of health, one is university hospital, six are general hospitals under Addis Ababa City Administration Health Bureau and the other three are army and police hospitals.

The study was conducted on six of these government hospitals selected on convenient bases and considering the mix of the Hospitals, three hospitals under Addis Ababa City Administration Health Bureau and the other three hospitals are under the Federal Ministry of Health to get proper mix of hospitals.

The three from AACA are Minilik II Referral Hospital, Ras Desta Hospital and Zewuditu Memorial Hospital. The other three are from Federal government which includes St Paul hospital, Alert hospital and Black Lion Specialized Hospital). The unit of analysis for this study are pharmacy professional of the Hospitals. From each hospital, overall Pharmacy section in general and ***all the pharmacy section professionals*** were taken as respondents of this study.

3.5. Data Sources and Types

The following two types of data sources were used to collect the qualitative and quantitative types of data from primary sources of data.

Questionnaires were distributed for the target respondents identified above to gather detailed information about the performance the IPLS and the logistics of HIV/AIDS commodities. Likert scale questions were designed to assess the level of performance. The instrument was customized from prior studies.

In addition interviewing key informants using structured interview and observations was used to answer why and how question.

3.6. Data collection procedures

Head of the hospitals (the Medical Director) were approached having support from the school of commerce to obtain consent and permission to undertake the data collection process. Then, the questionnaires were distributed and collected in person for the respondents.

For the interview, pharmacy heads were approached for convenient time and place of interview. Even if interview guide may be used as the starting point, additional questions may be raised based on the responses for the earlier questions.

3.7. Data Analysis Method

The quantitative data were entered and analyzed using SPSS for analysis. Descriptive statistics (mean, median and percentage) were computed and summary results were presented using tables and graphs. Correlation coefficient was computed to see the association between IPLS performance with the logistic performance of HIV/AIDS commodities. The qualitative data obtained from interview were summarized using thematic analysis (similarity and differences).

3.8. Ethical Considerations

Health information is so private and highly sensitive matter. Hence, much degree of confidentiality were maintained during data collection process and no name of the participating subjects (respondents) is revealed on any part of the research paper.

3.9. Data Reliability

Data were collected from 127 respondents who were working in 6 pharmacies of public hospitals in AA. The reliability of the data was checked using Cronbach's Alpha. The summary of the findings is presented as follows:

TABLE 3.0.1: TEST OF RELIABILITY OF SURVEY INSTRUMENT

No	Item	No of Items	Cronbach's Alpha
1	System Quality Variables	4	0.751
2	Information Quality Variables	5	0.854
3	Service Quality Variables	5	0.873
4	Cultural Factors	3	0.875
5	User Satisfaction	5	0.875
6	Logistics Performance	5	0.883
7	Overall Reliability	27	0.951

As indicated in table 4.1 above, all the variables indicated Cronbach's Alpha of 0.751 and above which are in the acceptable range of minimum value of 0.70 as indicated by Tavakol and Dennick (2011).

3.10. Data Validity

The Validity was also checked by using a survey instrument from prior studies, that was pre-tested for completeness and use in Ethiopian context. This approach will address both face validity, construct validity and content validity.

Chapter Four

Result, Discussion and Interpretation

Introduction

This chapter presents data analysis and the main findings from the study. This includes analysis of demographic data, descriptive analysis of the independent and dependent variables and inferential analysis of the relationship.

4.1. Demographic Profile of Respondents

The respondents were asked their demographic data to check if they are the right respondents for this research and their profile data are presented as follows:

TABLE 4.1: DEMOGRAPHIC PROFILE OF RESPONDENTS

		Frequency	Percent
Hospitals Visited	Alert Hospital	27	21.3
	Black Lion Specialized Hospital	37	29.1
	Gandi Memorial Hospital	12	9.4
	Ras Desta Hospital	19	15.0
	St Paul Hospital	17	13.4
	Zewuditu Memorial Hospital	15	11.8
	Total	127	100.0
Level of Education	Diploma	18	14.2
	BSc Degree	102	80.3
	Masters	7	5.5
	Total	127	100.0
Years of Experience	1-5	44	34.6
	6-10	48	37.8
	11-15	34	26.8
	>16	1	.8
	Total	127	100.0
Managerial position	Top Level	2	1.6
	Middle Level	19	15.0
	Lower Level	27	21.3
	No position	79	62.2
	Total	127	100.0

Sex of Respondents	Female	49	38.6
	Male	78	61.4
	Total	127	100

As indicated in the table above, the data for this research were collected from 6 Hospitals (3 Federal Level and 3 from City Government of Addis Ababa).

These data are believed to be representative of all government hospitals as they are homogeneous in governance, operating procedures, budget administration and other matters. The sample included small, medium and large Hospitals with pharmacists from 12 to 37 in number.

The qualification of majority of respondents was BSc Degree (80.3%) followed by Diploma holders (14.2%). This indicated that the respondents were able to understand the issues in the questionnaire and provide appropriate responses about IPLS and its impact on logistics performance of HIV/AIDS commodities.

As indicated above, the majority of the respondents have 6 to 10 years of experience (37.8%) followed by those up to 5 years of experience (34.6%). Of course, quite good number of respondents (26.8%) also has experience of 11 to 15 years.

The experience of the respondents, like their academic qualification, is a factor that indicates that the respondents are fit for the research process.

The managerial position of the respondents indicated that the top level managers were very few and large number of respondents were without managerial position (62.2 %). This implies that the respondents were the actual operators of the system (IPLS). But participation of lower level of mangers (21.3%) and middle level mangers (15%) will help to get the view of management about the system.

As indicated in the table, the gender distribution of the respondents was 61.4% males and 38.6% females. Even if the number of females is less than male counter parts, both groups were fairly

represented as the number of females is lesser in all aspects of organizational affairs. This also implies that the respondents were properly picked up from both groups.

4.2. Testing Model-Data Fitness

4.2.1. Test of Multi Colinearity

Multi Co-linearity was tested by checking VIF for the factors used in the study as indicated in the regression analysis table.

TABLE 4.2: TEST OF COLINEARITY

Colinearity Statistics		
Variables	Tolerance	VIF
Overall system quality	.49	2.00
Overall Info quality	.46	2.14
Overall cultural factors	.83	1.2

As indicted the table above, variance inflation factor of less than 10 indicates no problem of Colinearity.

4.2.2. Test of Normality

The data should be tested for normality before analyzing it. A large sample size (more than 30 respondents) is believed to be normally distributed (Ghasemi and Zahediasl 2012). As this study used 127 respondents, the data tend to be normally distributed.

They also suggested that the normality can be checking visually using for instance P-P plot (probability-probability plot). The standardized residual term was used to test for normality using visual methods.

FIGURE 4.1: TEST OF NORMALITY OF DATA

Source: Own Computation

Next will be presented the descriptive statistics followed by correlation and regression analysis of the findings. The descriptive analysis part of the data analysis includes background data about the respondents and their organization is presented followed by analyses of independent and dependent variables.

4.3. Descriptive Analysis of Factors Influencing IPLS Performance

In the next part, descriptive analysis of factors influencing IPLS performance data will be presented.

4.3.1. System Quality

System quality measures conformity to specifications, and meeting customer's expectation (Sirsat and Sirsat, 2016). This is reflected by assessing whether IPLS is friendly to handle, error free, fulfils management requirements and a secured system. The table below summarizes responses from the participants:

TABLE 4.3: SYSTEM QUALITY(N=127)

Items	Mean	Std. Deviation
IPLS Friendly to handle	4.33	.86
IPLS is error free	3.62	1.28
IPLS Fulfils mgt requirements	4.04	.89
IPLS is secured system	3.84	1.07
Overall system quality	4.10	.88

Source: Own Computation

The respondents stated the least mean result (3.62) and the highest Standard deviation (1.28) for the question whether the system is error free. The highest mean score system quality component was the system being friendly to handle (4.33) followed by the system fulfilling management requirements (4.04). Considering all the variables together, system quality has overall mean score of 4.10 and standard deviation of 0.88 which is not bad result.

During the interview, participant Es commented the following about the system quality:

> "*The main challenge of system quality is turnover of trained staff. When new staffs are replaced, proper training how to operate IPLS is not given*".

This indicated that the system quality may not have problem but the staff having prerequisite knowledge.

Participant B also added the following two points about the system quality:

> "*One challenge is no skill upgrading training of the existing employees. Another main problem is lack of proper pharmacy infrastructure*".

According to this participant, skill set problem is not only for new employees but for existing ones also. Continuous skill upgrading training is needed for all employees to properly utilize the system.

4.3.2. Information Quality

Information quality is the outcome of a quality system (Sirsat and Sirsat, 2016). Information quality is measured in terms of whether the information IPLS produced is accurate, precise, easy to find, complete and understandable.

The table below summarizes responses from the participants:

TABLE 4.4: INFORMATION QUALITY (N=127)

	Mean	Std. Deviation
IPLS Information accurate	3.84	1.00
IPLS Information is precise	4.08	.84
IPLS Information easy to find	4.11	.93
IPLS provides complete info	4.10	1.02
IPLS info is understandable	4.02	.88
Overall Info quality(Grand mean)	4.02	.8

Source: Own Computation

The respondents stated the least mean result (3.84) and the highest standard deviation (1.02) for the question whether the information is accurate.

The highest mean score information quality component was the Information easy to find (4.11) followed by the information provides complete information (4.10).

Considering all the variables together, information quality has overall mean score of 4.02 and standard deviation of 0.83 which is not bad result.

From the interview, participant C commented the following about the information quality:

> "*The main challenge of information quality is in IPLS there are different reporting formats like Bin card, stock record card, IFRR and RRF. These report formats are not frequently updated. This is due to budget shortage to prepare the formats".*

This indicated that the information quality is compromised no due to the system itself rather availability of accessories.

Participant F also added the following about the information quality:

> "*The employees complete the forms carelessly due to work load or lack of motivation*".

This indicated that motivational packages shall be availed for employees to encourage them perform their duty properly.

4.3.3. Cultural Factors

Cultural factors are believed to influence the level of diffusion and utilization of the system Al-Jumeily and Hussain (2014) cultural neutrality has been identified as a blind spot in previous Technology Acceptance models (TAMs).

Al-Jumeily and Hussain (2014) identified three primary variables drawn from the cultural dimensions theory of Hofstede (1997) that are used to identify the differences in the cultural factors individualism, uncertainty avoidance, and power distance. The table below summarizes responses from the participants:

TABLE 4.5: CULTURAL FACTORS (N=127)

	Mean	Std. Deviation
Individualism affects IPLS use	3.99	1.07
Uncertainty avoidance affects IPLS use	3.96	1.09
Power distance influences IPLS use	3.89	1.00
Overall cultural factors	3.98	1.02

Source: Own Computation

From the table above, the least mean result (3.89) and the highest standard deviation (1.09) is for the question whether power distance influences IPLS use. This indicated there is good communication among the different power hierarchies due to absence of power distance.

The highest mean score of cultural factors is if individualism affects IPLS use (3.99) followed by the factor of uncertainty avoidance affects IPLS use (3.96). All employees work for their assignments individually instead of collaborating among themselves. Considering all the variables together, cultural factors has overall mean score of 3.98 and standard deviation of 1.02.

This indicated that the IPLS is not affected mush by cultural factors such as individualism, uncertainty avoidance and power distance. This is a good organization culture and should be encouraged further.

4.3.4. User Satisfaction

User satisfaction is the recipients to the use of the out of information system. (Sirsat and Sirsat, 2016).user satisfaction is measured IPLS enables accomplish tasks; helps perform quickly, improves job performance, increases productivity and enhances effectiveness.

The table below summarizes responses from the participants:

TABLE 4.6: USER SATISFACTION (N=127)

	Mean	Std. Deviation
IPLS enables accomplish tasks	4.11	.89
IPLS helps perform quickly	4.19	.88
IPLS improves job performance	4.22	.78
IPLS increases productivity	4.21	.86
IPLS enhances effectiveness	4.09	.95
Overall user satisfaction	4.18	.78

Source: Own Computation

The respondents stated the least mean result (4.09) and the highest standard deviation (0.95) for the question whether the user satisfaction is enhances effectiveness. As they indicated low result for system quality, its contribution to their effectiveness is lesser.

The highest mean score user satisfaction is improves job performance (4.22) followed by IPLS increases productivity (4.21). Even if the system has some quality problems, it facilitates their job performance. Considering all the variables together, user satisfaction has overall mean score of 4.18 and standard deviation of 0.78 which is good result.

This indicated that users are so much satisfied with the system and this shall further be enhanced in the future by proper training, system update and other attributes of IPLS.

4.3.5. Logistics Performance of HIV/AIDS Commodities

Logistics performance of HIV/AIDS commodities is the final outcome of well designed IPLS and user satisfaction. The respondents were asked about the logistics performance of HIV/AIDS commodities and the responses were summarized as below:

TABLE 4.7: LOGISTICS PERFORMANCE OF HIV/AIDS COMMODITIES (N=127)

Items	Mean	Std. Deviation
IPLS enhances planning logistics	4.18	.94
IPLS enhances logistics decision making	4.29	.84
IPLS improves accuracy of logistics	4.30	.78
IPLS increases logistics productivity	4.20	.85
IPLS enables achieve logistics objectives	4.03	.92
Overall logistics performance	4.24	.80

Source: Own Computation

The respondents stated the least mean result (4.03) for the question whether IPLS enables achieve logistics objectives. This is prime objective of the system and a better result was expected. The highest mean score was for the issue whether IPLS improves accuracy of logistics (4.30) followed by IPLS enhances logistics decision making (4.29). Considering all the variables together, user satisfaction has overall mean score of 4.24 and standard deviation of 0.8 which is good result.

This indicated that IPLS is facilitated the work of HIV/AIDS logistics performance very much. Modern systems used to increase efficiency and effectiveness and as well reduce cost. This capacity shall be better utilized by improving it in the future based on feedback obtained from users and their level of satisfaction.

4.4. Correlation Matrix of Dependent and Independent Variables

The correlation matrix of the independent, mediating and dependent variables is shown below:

TABLE 4.8: CORRELATION MATRIX OF VARIABLES

		1(SyQ)	2(IQ)	3(CF)	4(US)	5(LP)
System Quality (1)	Pearson Correlation	1				
	Sig. (2-tailed)					
Information Quality (2)	Pearson Correlation	.659**	1			
	Sig. (2-tailed)	.000				
Cultural Factors (3)	Pearson Correlation	.389**	.346**	1		
	Sig. (2-tailed)	.000	.000			
User Satisfaction (4)	Pearson Correlation	.524**	.724**	.419**	1	
	Sig. (2-tailed)	.000	.000	.000		
Logistics Performance (5)	Pearson Correlation	.424**	.550**	.362**	.619**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: Own Computation

The table indicated that the variables are highly correlated and change in the independent variables causes change in the dependent variables. The relationship is strong at one percent level of significance.

It is obvious that the components shall be correlated one another and with the dependent variables as system quality should lead to information quality supported by good working culture and resulting in user satisfaction which in turn leads to better logistics performance.

4.5. Regression Analysis of IPLS Factors with User Satisfaction

TABLE 4.9: REGRESSION ANALYSIS OF IPLS ATTRIBUTE WITH USER SATISFACTION

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.081	.267		4.052	.000
	Overall system quality	.026	.073	.029	.355	.723
	Overall Info quality	.605	.076	.641	7.968	.000
	Overall cultural factors	.143	.050	.186	2.835	.005

a. Dependent Variable: Overall user satisfaction

Source: Own Computation

The regression table shows that all the independent variables have significant influence on the mediating variable except system quality which was not significantly correlated with user satisfaction at R^2 of 54.7% as shown in table below:

TABLE 4.10: ADJUSTED R^2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.747[a]	.557	.547	.52802

a. Predictors: (Constant), Overall cultural factors, Overall Info quality, Overall system quality

Source: Own Computation

Even though the system quality was not good, overall information quality was good as the system contributes something in performing organizational logistics tasks. However, the system quality should be improved by proper training, maintaining the trained staff and motivating them to work for the better of the organization.

4.6. Regression Analysis of User Satisfaction with Logistics Performance

Regression between the mediating and the dependent variable were as follows:

TABLE 4.11: REGRESSION ANALYSIS OF USER SATISFACTION WITH LOGISTICS PERFORMANCE

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.58	.30		5.16	.00
	Overall user satisfaction	.63	.07	.619	8.80	.00

a. Dependent Variable: Overall logistics performance

Source: Own Computation

The mediating variable had significant and positive role on the dependent variable at 37.8% of adjusted R^2.

TABLE 4.12: ADJUSTED R2 OF THE SECOND RELATIONSHIP

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.619[a]	.383	.378	.63

a. Predictors: (Constant), Overall user satisfaction

Source: Own Computation

This implies that change in user satisfaction will influence Logistics performance of HIV/AIDS commodities. Satisfied users will use the system properly to perform their logistics tasks. The environment to motivate employees use the system properly should be in place to better use the IPLS for better logistics of HIV/AIDS commodities.

Chapter Five
Summary, Conclusion and Recommendation

This study was conducted to assess the effect of IPLS on user satisfaction and logistics performance of HIV/AIDS commodities. Data were collected from 127 respondents from six public Hospitals using questionnaire and interview with six participants (pharmacy head of each hospital visited).

5.1. Summary

The data collected were entered in to SPSS, edited and tested for fitness with model such as reliability, validity, normality, and Colinearity before analysis. All the testes indicated that the data were fit to the model.

Finally the data were analyzed using descriptive analysis, correlation and regression analysis for the quantitative part and using content analysis (similarities and differences) for the qualitative part.

The background of the respondents and the composition of the hospitals visited were also appropriate to draw conclusions from the study.

The following conclusions and recommendations were drawn from findings of the study.

5.2. Conclusions

The data collected and analyzed indicated that the performance of IPLS indicated that there are strengths and weaknesses. For instance in terms of system quality, the system was not found to be error free and secured. But respondents stated that it was friendly to handle. The system quality was also compromised due to high turnover of trained staff and lack of skill upgrading training.

In terms of information quality, information accuracy of the system was questioned by the respondents. This is the same conclusion as what was stated for the system being error prone. The report formats are not also frequently updated and the employees complete the forms carelessly. But information is easy to find from the system which is again in line with the above conclusion that the system is user friendly.

In relation to cultural factors, power distance among team members within the organization doesn't affect system performance very much. However, individualism has more effect in the IPLS environment.

IPLS enhances job performance of users and increased their productivity which increases their satisfaction. Over all, the system was good in terms of enhancing user satisfaction which is the base for organization.

IPLS resulted in big improvement in the accuracy of logistics by improving planning, decision making, productivity and overall logistics objectives. Improving IPLS performance will further improve Logistics performance of HIV/AIDS commodities.

The regression analysis indicated that all the independent variables (information quality, service quality, and cultural factors) have strong and positive effect on user satisfaction and thereby on Logistics performance of HIV/AIDS commodities except system quality.

System quality did not have strong and positive effect on user satisfaction due to factors specific to the Ethiopian environment which were indicted in the interview such as turnover of trained staff, lack of skill upgrading trainings and other motivational factors such as compensation.

5.3. Recommendations

Based on the conclusions made above, the following recommendations are forwarded:

There are several strengths of IPLS that should be maximized to achieve organizational objectives. There are also major limitations that should be resolved.

- System quality should be improved by providing training for new comers and exiting staff as lack of know how about the system affects the system quality. This is because the system also includes the people who operate it.

- The work environment, storage facilities and compensation packages of the staff should be improved to motivate them work hard.
- Team work sprit shall be encouraged by providing group reward and other enabling mechanisms.

5.4. Direction for Future Research

Future research may be conducted by incorporating other variables that affect IPLS, covering wider geographic area, and also incorporating private hospitals.

Replicating the same study to observe the reliability of the outcomes of this study is another area of research for the future.

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Appendices

Appendix 1: Questionnaire

This questionnaire is designed to gather data about Integrated Pharmaceutical Logistics System (IPLS) performance and its effect on Logistics Performance of HIV AIDS Commodities in selected public Hospitals in AA. The findings of the study will be used as part fulfillment of Master's Degree in Logistics and Supply Chain Management at AAU School of Commerce. I assure you that your responses will be held confidential and used only for the purpose intended.

The following questions are designed to assess the effectiveness of the Integrated Pharmaceutical Logistics Systems (IPLS) in your specific Hospital.

It will take about 10 minutes to complete the questionnaire. By participating in completing this questionnaire, it is believed that you have expressed your consent. You are free to stop anywhere if you don't feel comfortable. Please answer all the questions by filling in the questions by marking in (√) the correct answer.

At the end of the survey if you wish to receive the summary of the findings please write your email address only at the end of the questionnaire. Thanks in advance for your cooperation. You don't need to write your name on the questionnaire.

PART A: DEMOGRAPHIC PROFILE (*Tick where appropriate*)

1. Education level: ☐ Diploma ☐ Bachelor Degree ☐ Master Degree ☐ PHD Other (Specify)……
2. How many years have you been employed by organization?
   1-5 years ☐ 6-10 years ☐ 11-15 years ☐ over 16 years ☐
3. Job Management level:
   Top ☐ Middle ☐ Low ☐
4. Gender: Female ☐ Male ☐

PART B: IPLS Effectiveness in terms of Information System Factors. Please indicate your answers by encircling the numbers in the scale below where:

1 Strongly Disagree, 2 Disagree, 3 Neutral, 4 Agree and 5 Strongly Agree

No	Variable	Scale				
System Quality						
1.	IPLS is very easy and user friendly to handle	**1**	**2**	**3**	**4**	**5**
2.	IPLS is up to date and error free	**1**	**2**	**3**	**4**	**5**
3.	IPLS usually fulfills the requirement of management	**1**	**2**	**3**	**4**	**5**
4.	IPLS is a secured one	**1**	**2**	**3**	**4**	**5**
5.	I always feel that the IPLS is user friendly	**1**	**2**	**3**	**4**	**5**
Information Quality						
6.	The information provided by the IPLS is accurate and is free from errors.	**1**	**2**	**3**	**4**	**5**
7.	IPLS provides the precise information I need.	**1**	**2**	**3**	**4**	**5**
8.	It was easy to find what you were looking for in IPLS	**1**	**2**	**3**	**4**	**5**
9.	IPLS provides a complete information	**1**	**2**	**3**	**4**	**5**
10.	The output information of the IPLS is easy to understand	**1**	**2**	**3**	**4**	**5**
User Satisfaction						
21.	IPLS enables me to accomplish job's tasks	**1**	**2**	**3**	**4**	**5**
22.	IPLS enables to perform work's requirements more quickly	**1**	**2**	**3**	**4**	**5**
23.	IPLS improves my job performance.	**1**	**2**	**3**	**4**	**5**
24.	IPLS increases my productivity.	**1**	**2**	**3**	**4**	**5**
25.	IPLS enhances my effectiveness in the job.	**1**	**2**	**3**	**4**	**5**
Cultural Factors						
26.	Individualism attitude affects IPLS utilization	**1**	**2**	**3**	**4**	**5**
27.	Uncertainty Avoidance affects IPLS utilization	**1**	**2**	**3**	**4**	**5**
28.	Power Distance influences IPLS utilization	**1**	**2**	**3**	**4**	**5**
Effect on HIV/AIDS Logistics Performance						
29.	Enhancement of Planning of HIV/AIDS Logistics Performance	**1**	**2**	**3**	**4**	**5**
30.	Enhancement of the decision making	**1**	**2**	**3**	**4**	**5**
31.	Improvement in the accuracy of logistics work	**1**	**2**	**3**	**4**	**5**
32.	Increase in the productivity of HIV/AIDS Logistics	**1**	**2**	**3**	**4**	**5**
33.	Enabling to achieve HIV/AIDS Logistics objectives	**1**	**2**	**3**	**4**	**5**

If you need a copy of this report, please write your email here:

Appendix 2: Interview Guide

1. What does IPLS system quality look like in your Hospital and how does it affect user satisfaction?

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2. What does information quality look like in your Hospital and how does it affect user satisfaction?

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3. What is the effect of cultural factors on IPLS user satisfaction in your Hospital and how does it affect user satisfaction?

……

……

……..

5. What is the level of IPLS user satisfaction in your Hospital?

……

……

……..

6. What is the overall effect on logistic performance of HIV/AIDS commodities?

……

……

Appendix 3: Interview Schedule and List of Interviewees

No	Participant's Hospital	Participant Code
1.	Gandi Memorial Hospital	Code A
2	Zewuditu Memorial Hospital	Code B
3	Black Lion Specialized Hospital	Code C
4	Alert Hospital	Code D
5	St. Paul Hospital	Code E
6	Ras Desta Hospital	Code F