ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Evaluation of the Success of the Health Commodity Management Information System: The Case of Public Health Facilities in Addis Ababa, Ethiopia

BY

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Declaration

I, Mekbib Lalensa declared that a thesis entitled: An Evaluation of the success of the Health Commodity Management Information System: The Case of Public Health facilities in Addis Ababa, Ethiopia and it is my original research work and has never been submitted to any other university for any Diploma or Degree. I also declare that all the resources used in this research have been acknowledged clearly.

Name_____

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Letter of Certification

This research proposal is submitted to Addis Ababa University, School of Commerce, Department of Logistics and Supply Chain Management for examination with my approval as a University Advisor.

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Abbreviations and Acronyms

E-LMIS	Electronic Logistic Management Information System
E-HCMIS	Electronics Health Commodity Management Information System
IT	Information Technology
MOH	Ministry of Health
HCMIS FE	Health Commodity Management Information System, Facility Edition
HCSS	Health Commodity Supply System
HSTP	Health Sector Transformation Plan
IPLS	Integrated Pharmaceutical Logistics System
LMIS	Logistics Management Information System
PEPFAR	President‘s Emergency Fund for AIDS Relief
EPSA	Ethiopian Pharmaceutical Supply Agency
PLMP	Pharmaceutical Logistics Master Plan
PSTP	Pharmaceutical Sector Transformation Plan
RRF	Report and Requisition Form
SCM	Supply Chain Management
SOP	Standard Operating Procedure
USAID	United States Agency for International Development
AACAHB	Addis Ababa City Administration Health Bureau
SC	Supply chain
HSSCP	Enabled Healthcare Sustainable Supply Chain
HSCP	Health care supply chain performance
PSC	Pharmaceutical supply chain
IS	Information System
HIV	Human immunodeficiency Viruses
ART	Antiretroviral therapy
COVID-19	Coronavirus disease
WMS	Warehouse management systems
HIS	Health Information Systems
DSM	Drug Supply Chain Manager
D &L Model	DeLone & McLean Model
UTAUT model	Unified Technology Acceptance and Use Theory (

ABSTRACT

In Ethiopia, the Federal Ministry of Health (FMOH) is coordinating sector wide reforms to improve the equity and quality of healthcare. As part of these efforts, the ministry is also exerting concerted efforts to improve availability of health commodities through efficient and effective supply chain system by using e-LMIS. The health commodity management information system (HCMIS), that is an inventory and LMIS control tool, is one of the systems that the MOH is using in health facilities for collecting, organizing, analyzing and reporting supply chain data to make optimal supply chain decisions. In this research, the success of Health Commodity Management Information System (HCMIS) is evaluated using the information system success model (DeLone & McLean (2003) and the Unified Technology Acceptance and Use Theory (UTAUT model). The research model was evaluated using data from 200 users of an electronic health commodity management information system in public health facilities under Addis Ababa City Administration Health Bureau, Ethiopia. Four factors from (UTAUT model) (performance expectancy, Social influence, facility condition & social influence) and six factors from DeLone & McLean (2003) model (information quality, system quality, service quality, users satisfaction ,intention to use and net impact with HCMIS) were found and used in assessing the success of health commodity management information system. The study found that, the quality influencing factors that affect user's satisfaction with HCMIS (Performance expectancy, Effort expectancy, Social influence, facility condition , information quality, system quality & service quality) all have appositive effect but statistically insignificant except social influence and performance expectancy which have appositive and significant effect in contributing to users 'satisfaction with HCMIS. Another interesting finding of this study is among the quality influencing factors on user's intention to use of the HCMIS (performance expectancy, Social influence, facility condition, information, system, and service quality factors) have appositive and significant effect but the quality factor effort expectancy has appositive but insignificant effect on users intention to use of the HCMIS .Generally, this study found that there is a positive and significant relationship between user satisfaction and organizational net impact and users intention to use and organization net impact. Evaluating the success or effect of information systems is critical for understanding the value, efficiency, and investment in information system management activities. Thus, the system assessment contributes to the effective functioning of the health commodity management information system.

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Evaluating the success of information systems is critical for understanding the value, efficiency, and investment in information system management activities (model by DeLone and McLean, 2003). Thus, the system assessment contributes to the effective functioning of the system and the quality of the healthcare services provided. In this research, the net impact of Health Commodity Management Information System (HCMIS) user satisfaction and intention to use is evaluated using the model of DeLone & McLean (2003) and that of Venkatesh et al. (2003) developed the Unified Technology Acceptance and Use Theory or model (UTAUT model).

In 1992, DeLone and McLean introduced the popular Information System Success Model (ISSM), which includes six evaluation measures and the relationships between the measures. According to the model, six concepts influence the success of an information system including system quality, information quality, service support, user satisfaction, use or user intention and and net impact. System quality means measurements of the IS itself; Information quality relates to IS output measures; Service support refers to technical support or user service. ; User satisfaction represents the recipient's response to the use of the information system output. Use (intent to use) represents the extent and manner in which information system (IS) is used by its users, as well as the net impact (individual impact emphasizes impact of information on recipient behavior, while organizational impact relates the impact of information on performance). DeLone and McLean went on to say that user intent and satisfaction are the top predictors of IS success. Many researchers have examined the success of IS from different angles, but the model proposed by DeLone and McLean remains the most popular and cited model. In the light of its constructions and their connections, the model can be interpreted as follows: A system can be evaluated with regard to information, system and service quality; these properties affect subsequent use, intended use, and user satisfaction. A number of benefits are achieved by employing a system that improves individual and organizational performance

Information technology acceptance assessment is often done in volunteer system such as business sectors. But, the workflow systems used in health system are mostly obligatory systems. To account this difference , impact measures to model intention to use ,users satisfaction and users performance for the mandatory nature of health commodity management information system

were reviewed in this study. These studies used the Unified Theory of Technology Acceptance and Use (UTAUT)., which include four constructs with an intermediate variable, users intention to use and user satisfaction, with an organizational impact variable, and the DeLone and McLean model for measuring HCMIS success. The UTAUT model was developed to describe user acceptance of the technology. This model describes four main dimensions, namely; 1) Expectancy of Performance, defined as the extent to which a user believes that using the system can help them acquire professional proficiency 2) Expected Effort denotes the level of usability associated with using the system 3) Social influence assessed by UTAUT is the extent to which a user believes that someone more important than them believes they should use the technology and 4) the facility condition, which concern the extent to which the technology facilitates the organization and the manner in which the user believes that the existing organization and technical infrastructure can support the deployment of the technology (Venkatesh et al ., 2003).

Many computer systems that are introduced in developing nations frequently fail completely or partially. According to the research done by Kalinga and Omary (2017), absolute failure happens when a system is bought but never used or when it is used but then abandoned right away. On the other hand, incomplete failure happens when the system has been used but the primary goals have not been achieved or there have been major negative repercussions (Heeks, 2002). Evaluation of Electronics Logistics Management Information system (e-LMIS's) success in maintaining complete data visibility is necessary when it is implemented in emerging nations (Kalinga and Omary, 2017).

In Ethiopia, the Federal Ministry of Health (FMOH) is coordinating sector reforms to improve the equity and quality of healthcare. As part of these efforts, the ministry is also exerting concerted efforts to improve availability of health commodities through efficient and effective supply chain system. The Logistics Management Information system (LMIS), one of the pillars in the supply chain system, is also designed to collect, organize, analyze and SC data for decision making. The Ministry of Health (MOH) is digitizing health information systems that include the supply chain system as part of its reforms to get the necessary data for real time decision making. The health commodity management information system (HCMIS), that is an inventory and LMIS control tool, is one of the systems that the MOH is using in health facilities for collecting, organizing, analyzing and reporting supply chain data to make optimal supply chain decisions (FMOH HCMIS Manual, 2022).). With the rapid growth of innovative technology applications for individual professionals and organizations, it is important to examine the success of

digitization tools such as the HCMIS. With this in mind, this study evaluates the success of a HCMIS using the success model D&M IS (2003) and the Unified Technology Acceptance and Use Theory or UTAUT framework developed by Venkatesh et al., 2003, which may be appropriate in the target context and care conditions. However, there is little concrete information to evaluate the HCMIS in public health facility (HF) of the Addis Ababa City Administration Health Bureau (AACAHB) in terms of success. Consequently, the purpose of this research is to evaluate the success of HCMIS in public HF within the framework of the AACAHB. Appropriate actions and measures follow.

1.2 Background of the Health Commodity Management Information System

Integrated pharmaceutical logistic system refers to a single pharmaceutical reporting and distribution system based on the overall mandate and scope of Ethiopian Pharmaceutical Supply Service (EPSS) (IPLS Manual, 2017). The logistics management information system of the IPLS is important to maintain end to end data visibility to other levels of the system to make optimal decisions throughout the SC system. The operation of LMIS in institutions consists of two components; facility edition (DAGU) and warehouse edition (FMOH HCMIS Manual, 2022).

To ensure that health products are ready for the right customers in need, managers need to have visibility to the health supply functions flow, specifically in procurement, warehousing, inventory management, distribution, and funding. With this, strong logistic information is needed (USAID, 2014). According to USAID (2017), e-LMIS is designed to facilitate commodity ordering at all levels; capture consumption data from health facilities and other distribution systems; and support effective management and planning of all tasks involved in logistics management. And, its introduction sought to address shortfalls in Ethiopia's supply chain system (e.g., the enormous costs spent in inventory management associated with expiries losses, stock-outs, and emergency orders treatment) and data availability and quality challenges (e.g., unreal time data, data invisibility through the value chain, data with poor quality, and deficiency in data validation and integrity checks) (USAID, 2017). Managers with access and an open view of all supply chain functions can draw the right conclusions and direct the system towards the required level of product availability and improved health outcomes (JSI, 2019).

HCMIS is a locally developed electronic LMIS to support the pharmaceutical logistics management system in public Health Facilities (HF) in Ethiopia. It provides a systematic record-keeping system for managing healthcare products in healthcare facility warehouses. The FMOH and EPSS in cooperation with development partners are implemented the system in over 900 HF,

including most hospitals and HC in Ethiopia. HCMIS, the web-based inventory management system, is important to manage and control the transaction and improve store management control for store managers, pharmacists, and facility managers while increasing data visibility throughout the SC (John S, 2010).

The HCMIS was developed for the following objectives: improve the national pharmaceutical supply chain management system and improve the countries to improve the pharmaceutical logistics management information system, establish good inventory management in the health care facilities. Healthcare facilities will be able to make better use of their drug budgets by reducing shelf life and simplifying inventory management, while enabling healthcare facilities to collect reliable, high-quality data in a timely manner (HCMIS Workbook, 2017).One of the main users who use HCMIS to manage healthcare products on a daily basis is the store manager who uses it to manage inventory and LMIS. Secondary users using HCMIS results for decision making are healthcare facility administrators/management units and EPSSs for replenishment decisions and stock out/waste monitoring. (H. Ejigu et al.,2012).

2. Statement of the Problem

Hunge et al, 2010 revealed that hospitals are implementing health information system (HIS) solutions to achieve a range of business benefits but consequently they encounter some issues. Such crucial issues are how hospital will be utilized to manage huge amount of patient information and then how to enhance the quality of the delivered medical services in various wards. Besides, Petter et al., 2012 stated that the managers of the organization want to ensure that their information systems are effective or successful. Similarly, many healthcare organizations have adopted various logistics and supply chain systems to coordinate the supply and delivery of healthcare products to various healthcare facilities. In fact, there is no strong healthcare system that can function without a well-designed and well-managed supply chain management system capable of providing customers with an adequate supply of essential healthcare items.

In Ethiopia, the Federal Ministry of Health (FMOH) is coordinating sector reforms to improve the equity and quality of healthcare. As part of these efforts, the ministry is also exerting concerted efforts to improve availability of health commodities through efficient and effective SC system. The Logistics Management Information system (LMIS), one of the pillars in the supply chain system, is also designed to collect, organize, analyze and SC data for decision making. The MOH is digitizing health information systems that include the supply chain system

as part of its reforms to get the necessary data for real time decision making. The web-based HCMIS, that is an inventory and LMIS control tool, is one of the systems that the MOH is using in health facilities for collecting, organizing, analyzing and reporting supply chain data to make optimal supply chain decisions (FMOH HCMIS Manual,2022).

The FMOH and in collaboration with partners implemented IS for the management of health products in over 900 public HF. It was launched in Ethiopia in 2009 and implemented by the USAIDDELIVER PROJECT to improve the ability of healthcare facilities to handle pharmaceutical products in their stores. HCMIS is a locally developed, easy-to-use software package that helps healthcare facilities manages all necessary medication, medical supplies and laboratory supplies. HCMIS automatically receives and issues reports and orders, manages inventory, and generates a variety of product reports for store managers, purchasing managers, and facilities managers (Snow, 2012).The HCMIS is designed to support logistics management information systems. Overall, the digital tools ensure improves processes, customer service and data visibility (USAID, 2018).

By using the above system, electronic reporting has simplified the approval process and order processing time. Additionally, HCMIS enables hospital management teams to easily identify overstocks or shortages and then offer reallocation to meet patient needs while reducing waste due to expired products. Additionally, the logistic data is observable to official users throughout the logistics operation, allowing managers to identify when monitoring assistance may be needed to assist users (USAID, 2018).

With the rapid growth of innovative technology applications for individual professionals and organizations, it is important to examine the success of digitization tools such as the Health Commodity Management Information System (HCMIS). With this in mind, this study evaluates the success of a health commodity management information system in public health facilities under Addis Ababa City Administration Health Bureau (AACAHB) using the success model D&M IS (2003) and the Unified Technology Acceptance and Use Theory or UTAUT framework developed by Venkatesh et al., 2003, which may be appropriate in the target context and care conditions.

3. Objectives of the Study

3.1The General Objective of the Study

The general objective of this study is to measure the success of the HCMIS in public HF under the AACAHB by using DeLone and McLean, 2003 revised version model and the Unified Theory of Acceptance and Use of Technology or UTAUT framework developed by Venkatesh et.al (2003).

3.2The Specific Objective of the Study

The specific objectives of the study are: -

- To identify variables which measure the success of the HCMIS
- To identify the success factors of intention to use of the HCMIS
- To identify the success factors of user satisfaction of the HCMIS
- To identify the success factor of HCMIS net impact

4. Research Hypothesis Formulation

In this study it is assumed that the net impact of health commodity management information systems on the performance of the pharmaceutical supply chain depends on the level of user satisfaction. Respondent intentions and employee satisfaction with electronics digital tool are influenced by three quality concepts: system quality, information quality, and service quality. Based on previous theoretical and empirical evidence (Choi et al., 2013, 2015, Kalinga and Omary, 2017, Karitis et al. 2021, November, Ojo, 2017, Ebnehoseini et al., 2019, Alipour et al. al. . , 2017, Elsadig et al., 2019, Saghaeiannejad et al., (2015) . So, this study puts forward the following hypotheses :

- Hypothesis 1: System Quality has a positive effect on user satisfaction with the HCMIS.
- Hypothesis 2: Information Quality has a positive effect on user satisfaction with the HCMIS
- Hypothesis 3: Service Support has a positive effect on user satisfaction with the HCMIS
- Hypothesis 4: System Quality has a positive effect on user intention to use with the HCMIS.
- Hypothesis 5: Information Quality has a positive effect on user intention to use with the HCMIS
- Hypothesis 6: Service Support has a positive effect on user intention to use with the HCMIS

Information technology acceptance assessment is often done in volunteer system such as business sectors. But, the workflow systems used in health system are mostly obligatory systems. To account this difference , impact measures to model intention to use ,users satisfaction and users performance for the mandatory nature of health sector information systems were reviewed in this study. These studies used the Unified Theory of Technology Acceptance and Use (UTAUT)., which include four constructs with an intermediate variable, users intention to use and user satisfaction, with an organizational impact variable, and the DeLone and McLean model for measuring HCMIS success. The UTAUT model was developed to describe user acceptance of the technology. This model describes four main dimensions, namely; 1) Performance Expectancy, defined as the extent to which a user believes that using the system can help them acquire professional proficiency 2) Effort Expectancy, denotes the level of usability associated with using the system 3) Social influence assessed by UTAUT is the extent to which a user believes that someone more important than them believes they should use the technology and 4) the facility condition, which concern the extent to which the technology facilitates the organization and the manner in which the user believes that the existing organization and technical infrastructure can support the deployment of the technology (Venkatesh et al ., 2003).

So, this study puts forward the following hypotheses:

- H7: EE has appositive and significant effect on user satisfaction with the HCMIS
- H8: PE has appositive and significant effect on user satisfaction with the HCMIS
- H9: SI has appositive and significant effect on user satisfaction with the HCMIS
- H10:FC has appositive and significant effect on user satisfaction with the HCMIS

Performance expectancy (PE) refers to the degree to which a user considers adopting an m-platform contributes to his work performance (Venkatesh et al., 2003). In previous literature, if individuals figure out that the profit of using new technology outweighs the disadvantages, they will be more inclined to accept and continue to adopt the technology (Venkatesh et al., 2012). Unambiguously, in a large number of m-payment scenarios, PEs are found to directly affect the user's usage intention of the relevant information system (Baptista and Oliveira, 2015). In the m-commerce environment, consumers will judge the effectiveness of using the m-payment application platform to help complete their business transactions. Clearly, PE is one critical element in the process of consumer evaluation. Many previous studies (Faqih and Jaradat, 2015) explicitly support the positive influence of the willingness to use m-commerce. In addition, more research results show that PE plays a critical role in affecting the willingness to use m-payment platforms (Morosan and DeFranco, 2016). So, this study puts forward the following hypotheses:

- H11: Performance expectancy positively and significantly influences usage intention.

Effort expectancy's (EE) definition (Venkatesh et al., 2003) is "the degree of ease associated with using the system." In a large number of studies involving UTAUT2, the expected workload has been generally considered a vital precondition for the expected work (Venkatesh et al., 2003, 2012; Slade et al., 2015). That is, the influencing factors of consumers' willingness to accept a new platform are not only the benefits of the platform itself, but also the difficulty and effort of using the system. The ease of access to a system tends to stimulate users to adopt it (Oliveira et al., 2014; Dwivedi et al., 2019). Under the background of m-payments, the EE will be regarded as the capability to carry out a certain mobile business function with the least amount of work. Reasonable work expectations can make consumers feel very comfortable when they carry out the m-commerce transaction. In addition, the particularity of m-banking also forces system operators to have some basic finance knowledge and related operational skills. Therefore, efforts are expected to effectively influence determining customers' willingness to use an m-payment platform system (Alalwan et al., 2016). Many m-banking studies demonstrated the factors

captured by effort expectations positively affect measuring customers' usage intention of m-banking (Gu et al., 2009). The interaction interface, function design, and computing power of m-banking can directly influence the consumers' willingness to adopt. The interaction interface, function design, convenient navigation, and the computing power of m-banking can directly affect the user's willingness to adopt (Venkatesh et al., 2003; Kim et al., 2009). Therefore, the following hypothesis is given:

- H12: Effort expectancy positively and significantly influences usage intention

Social influence (SI) indicates some extension to which platform users' important social relations (e.g., family, friends, or leaders) have faith in the new m-payment system should be adopted (Venkatesh et al., 2012; Tam and Oliveira, 2016). Social impact reveals the impact of individuals on the adaptation of technology by their social relatives. Users often consider the opinions of others when choosing a new technology. Supposing the attitude of his social relatives is active, users will accept it; on the contrary, negative attitudes will affect users' decision not to adopt. The social preferences and values coming from family relatives, friends, and neighbors often profoundly change users' views and opinions (Rana et al., 2017). Especially when the present user intends to change from using one technical service to another technical service, the user's willingness to change will be easily influenced by peers and influence of family members (Baptista and Oliveira, 2015; Dwivedi et al., 2019). Under the background of mass media dominating the online world (Kapoor et al., 2018), the impact of social relations may not only continue the usage intention of old technology but also guide users to new technologies recognized by social relations (Williams et al., 2015). Through multicultural surveys between Australia and Thailand, Mortimer et al. (2015) found that even in different cultures, social impact can become a significant element in the usage intention of a new platform. Moreover, under the background of Saudi Arabia's electrical commerce, prior research also proves the active influence of SI on the adoption willingness of m-banking (Al-Husein and Asad Sadi, 2015). The hypothesis is given:

- H13: Social influence positively and significantly influences usage intention

Facilitation (FC) reflects a positive and significant impact of the infrastructure related to organization and technology on the use of online banking, such as consumer expertise, related operational skills, and platform resources (Venkatesh et al., 2003). In fact, the enhancement of the willingness to use m-payments requires online banking to train users to have specific

operation skills, provide service resources and basic hardware and software conditions of high matching financial systems (Alalwan et al., 2015). The necessary knowledge reserve and skill accumulation play many roles in adopting m-banking services, thus affecting the usage intention. Previous literature studies pointed out convenience significantly impacts usage willingness (Alalwan et al., 2016). Therefore, the following hypothesis is given:

- H14: Facilitating conditions positively and significantly influences usage intention

Based on D and L IS Success Model (2003) and the UTAUT, this study puts forward the following hypotheses:

- Hypothesis 15: User satisfaction regarding the health commodity management information systems will positively and significantly influence users 'net impacts.
- Hypothesis 16: Intention to use regarding the health commodity management information systems will positively and significantly influence users 'net impacts.

5. Significance of the Study

The developed IS Success Model allows us to consider not only the holistic view of the IS Success Model, but also the user aspects overlooked by the IS Success Model in mandating system use in the healthcare sector. This study can be used to support further research in the implementation and use of IS in various IS fields, especially in the medical field. The research results are presented below from three different perspectives, including theoretical, methodological and practical aspects. This is combining UTAUT model indicators with that of the indicators of IS model by DeLone and McLean and user satisfaction and intention to use the system are defined in the developed model (theoretical contributions). A qualitative design of the IS net impact study was defined and adapted to the quantitative SI success model (methodological contribution). The developed model can be used in the medical information system "HIS". To mandate the use of the system and other organizations, and create insights into IS success models, awareness of IS implementation, and health acceptance of all stakeholders within the organization (practical contributions)

6. Scope of the Study

This study is being conducted in public HF in AA, Ethiopia under the AACAHB. HCMIS Facility Editing and Store Editing are two types of automated systems. This study focuses on HCMIS facility edition in governmental HF of the AACAHB. In this study, the main models, structures and theories of information system, the DeLoan and McLean information system success model, were reviewed. UTAUT was selected as the platform model of the information system and considered in connection with the impact and success of the information system. The main goal of the research is user satisfaction, intention to use and user‘s net impact with the mandatory use of the system in the health context. The HCMIS applications in a public healthcare facility generate the majority of transactions between the various health information sub systems. For this reason, the HCMIS, one of the most important subsystems of the HIS, was selected for the study. Six public hospitals and 82 HF of Addis Ababa Health Bureau, Ethiopia, are selected. Non random sampling method is selected as the sampling technique. Public hospital and health center (HC) pharmacy managers, drug supply chain managers and store managers who were exposed to LIMS and had at least one year of experience were considered**.**

7. Limitation

The scope of the study focuses on evaluating the success of health commodity management information systems users‘ satisfaction, intention to use and user‘s net impact and measuring the success of the information system in public hospitals and health centers under the AACAHB using HCMIS. The study conducted at public health facilities: 6 hospitals and 82 HC.

8. Operational Definition of Concepts and Terms

In this research, user's role refers to user quality (user capabilities) such as IT capability, perception, involvement, training, and personal characteristics such as age, gender, and experience. User's quality affects user's behaviors and can be manipulated during research, while personal characteristics affect user's attitudes and cannot be manipulated during research.

1 **Mandatory system** refers to information system applications which has been implemented in an organization and had to be used by employees to deal with their daily tasks (Venkatesh et al., 2003).

2 **System Quality (SQ):** measures the desired characteristics of the IS system (D &L, 2003).

3 **Information Quality (IQ):** The success dimension information quality constitutes the desirable characteristics of an IS's output (D &L, 2003)

4 **Service Quality (SQ):** The success dimension service quality represents the quality of the support that the users receive from the IS department and IT support personnel, such as, for example, training, hotline, or helpdesk (D &L, 2003)

5 **User Intention (UI) or Use (U):** The success dimension (intention to) use represents the degree and manner in which an IS is utilized by its users (D &L, 2003)

6 **Users Satisfaction (US):** The success dimension user satisfaction constitutes the user's level of satisfaction when utilizing an IS. It is considered as one of the most important measures of IS success. Measuring user satisfaction becomes especially useful, when the use of an IS is mandatory and the amount of use is not an appropriate indicator of systems success. Widely used user satisfaction instruments are the ones by Ives et al. (1983) and Doll et al. (2004).

7 **Net Impact (NE):** The success dimension net benefits, constitutes the extent to which IS are contributing to the success of the different stakeholders (D &L, 2003)

8 **Performance Expectancy (PE):** It is the degree to which users feel that the system is useful (Venkatesh et al., 2003).

9 **Effort Expectancy (EE)**: It is the degree to which users feel that the system is easy to use (Venkatesh et al., 2003).

10 **Facility Condition (FC)**: It is ―the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh et al., 2003).

11 **Social Influence (SI)**: it is the degree to which a user perceives that significant persons believe technology use to be important (Diaz & Loraas, 2010). It is similar to the factor ―subjective norm‖ as defined in Technology of Acceptance Model (TAM) 2, an extension of TAM (Venkatesh et al., 2003).

12 **Effectiveness:** a measure of the success in achieving a clearly stated objective (Harcourt, 1992).

13 **Impact:** In this study, the impact is defined as a sudden and powerful effect that something has on a situation, process, or person.

14 **Health SC**: In his study, Health supply chain refers to the process of obtaining medical products to be used in human medicine.

15 **Health product**: in this study, health commodities refer to any medical products including essential medicines, medical consumables, and laboratory-related health products.

16 **Evaluation**: The process of assessing the overall efficiency, effectiveness, and success of an ongoing project in achieving its goal, concentrates on the standards of project design to differentiate a program's effects from others, through a modification of the existing operation.

9. Organization of the Research

The research is organized in five chapters. All of the chapters are interrelated to one another. Thus, the chapters should not be read in isolation and the whole thesis is organized as follows:

a) Chapter one presents background of problem, problem statement, the objectives of the study research hypothesis, as well as scope of the research and the significant and contribution of the research.
b) Chapter two focuses on and talks about previous literatures of the relevant issues and subjects. Such reviewed issues were critical success factors, IS models, IS framework as well as IS theories. Usage quality in the system usage and decision rules to specify formative and reflective constructs were also discussed. Represents gap analysis and

offers solution by proposing a new IS success model based on Delone and McLean IS success model and UTAUT. Finally, based on proposed model, research hypothesis is listed.

c) Chapter three is allocated to presents road map of the research to achieve the research objectives and to answer the research questions. Research design and approach in two main phases is detailed as well as analysis tools and techniques.

d) Chapter 3 is allocated to discussion on research instrument development and instrument validation. Pilot study is discussed and initial finding is presented. Chapter 3 is arranged to present reliability‘s test of specified research‘s instrument and validating proposed model and main research steps, measurement model and structural model,

e) Chapter four will summarize the results/findings of the study, and discusses the findings linked with the literature review as well as the summary research‘s finding and discussion are also presented in the chapter six.

f) Chapter five is allocated to revisit research hypothesis and objectives to control the achievement. Brief conclusion is presented as well as future work and research limitations.

CHAPTER TWO

2. RELATED LITERATURE REVIEW

2.1 Introduction

Chapter two discusses theoretical data for instance the overview of the topic, determinants, summary of the literature, and conceptual framework through investigations and evaluating the effect of web-based electronics health commodity management information system users‘satisfaction to enhance pharmaceutical supply chain performance.

2.2 Theoretical framework

2.2.1 Logistic management information systems

The development of the supply chain concept requires logistics organizations to improve internal and external information flows. Recent developments in ICT have shown that different systems need to be developed to enable progress in managing operations and logistics in different organisations. One such ICT program in healthcare logistics management is called e-LMIS. (Omar, 2017)

The logistic management information system ‒LMIS‖ is a system of records and reports in paper or electronic form. The goal of LMIS is therefore to collect and report the right data in the right quantity, in the right quality, at the right time, in the right place (where decisions are made) and at the right price (it doesn't have to give more for data collection from than for purchases) (Snow, 2012 and Chikumba PA, 2014). Recent developments in the field of ICT have highlighted the need to develop different systems to facilitate the management of chain operations and logistics in different organizations. Such an application of information and communication technology in logistics management is called e-logistics (PATH, 2010).

Digital LMIS can also optimize and customize feedback reports by generating and forwarding notifications, reminders and alerts. The notification can be a text message to the carrier to access, review and approve the request, or to the healthcare provider that the shipment is ready for pickup or delivery. The reminder can help employees perform routine tasks, such as B. to take inventory at the end of the month and place an order. A warning can indicate issue, such as a product that has a limited shelf life or is running low. A digital LMIS can also enable routine reporting to other stakeholders, Department of Health programs and departments, development

partners and funding agencies.Likewise, the digital LMIS allows you to analyze supply chain performance by displaying specific dashboards for each user and role in the system. At higher levels, they can help supply chain managers see the big picture using KPIs and analyze specific metrics and system levels when they determine something is amiss. The e-LMIS allows users to navigate through country-wide metrics and specific products in specific locations to identify performance issues and risks (John Snow, Inc. 2017).

Finally, the digital LMIS can be integrated with broader supply chain and HISs (HIS) to enable deeper analytics, better workflows and increased visibility across all health-related domains. Electronic LMIS can be connected to electronic medical records (EMR) or hospital management systems to automatically collect medication dispensing data. It can also be connected to supplier's ERP systems to enable automatic order entry and order fulfillment status tracking. In addition, the e-LMIS can be linked to themajor operational registers, allowing all SIS applications to use the same operational code, as well as to HMIS applications to enable further analysis, such as vial reject rate (John Snow, Inc. 2017) .

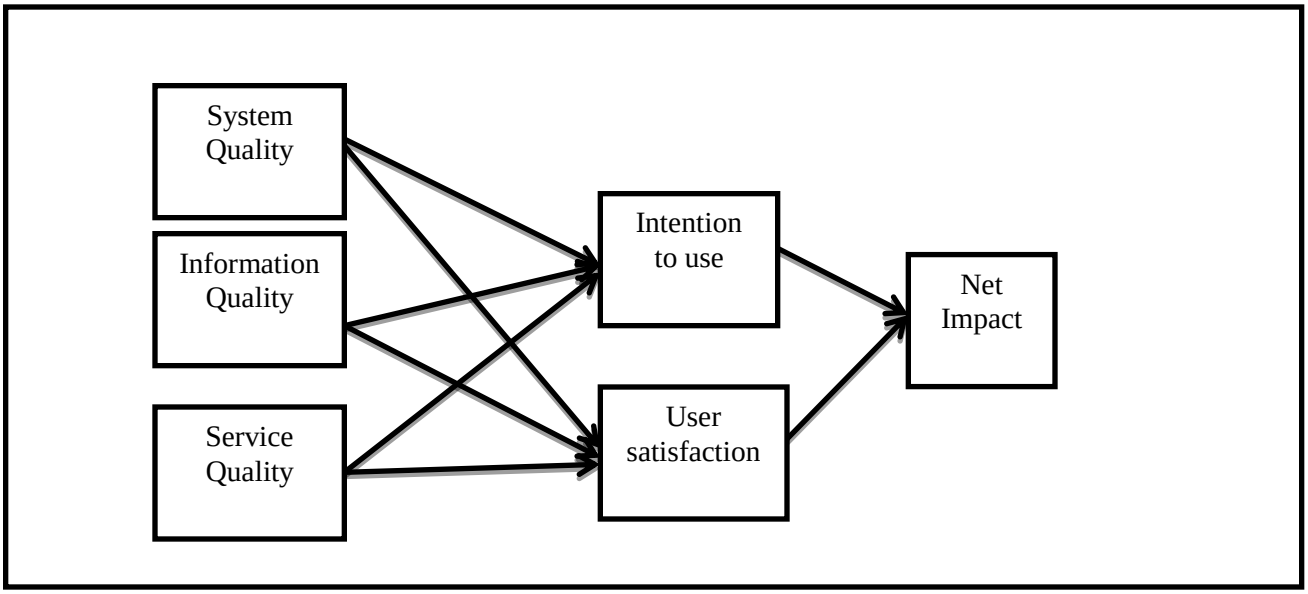
2.2.2. Theoretical or Model Foundations

2.2.2.1. The Delone &Mc Lean Information Success model

The D & L model originally consists of success factors such as system quality and information quality, which influence usage, user satisfaction and individual impact, and represents the impact organization as the end result. This model was developed by the authors (Delone and Mclean, 2003) and several other researchers (Pitt et al., 1995; Petter and McLean, 2009), adding quality of service as another success factor, and used to evaluate types of computer systems. Delone and McLean (2003) have proposed net impact as the end result, which can include all measures of 'impact' such as individual impact, organizational impact, consumer impact, and so on.Goodhue and Thompson's (1995) findings are the individual impacts on their efficiency, productivity and efficiency, which can be factored into the net impacts of Delone and McLean (2003).

Figure 2-1Updated DeLone and McLean 2003 IS Success Model.

Source: D & L model (2003)



The major difference between the TAM (Davis, 1989; Davis et al., 1989) and the other two models is that the TAM emphasizes acceptance of the technology, intention to use it, and actual use while in the other two models, the focus on acceptance of the technology, intention to use it and actual use focuses on long-term effects after the use of information systems such as individual and organizational benefits. It is important and necessary to integrate and connect these frames into a common logical structure via a common connection pin. For that, we need to take a closer look HERE. The TAM is a widely used general information systems assessment framework that influences many HIS assessment frameworks (Yu et al., 2016). This TAM was extended to TAM2 (Venkatesh and Davis, 2000) and then to UTAUT (Venkatesh et al., 2003). TAM emphasized the human factor and the user perspective, but this model provided a streamlined analysis tool that mainly focused on the user and technology factor (Yu et al., 2016).The TAM is known to be the two main concepts that influence computer adoption, namely perceived ease of use and perceived ease of use (Davis, 1989; Davis et al., 1989). These two main constructs in TAM were changed in UTAUT to constructs with similar meanings, namely expected effort and expected benefit, respectively (Venkatesh et al., 2003). In addition, UTAUT has several constructs, such as B. Facilitation conditions and social influences derived from other existing theories and literature.

2.2.2.2. The Unified Theory of Technology Acceptance and Use (UTAUT)

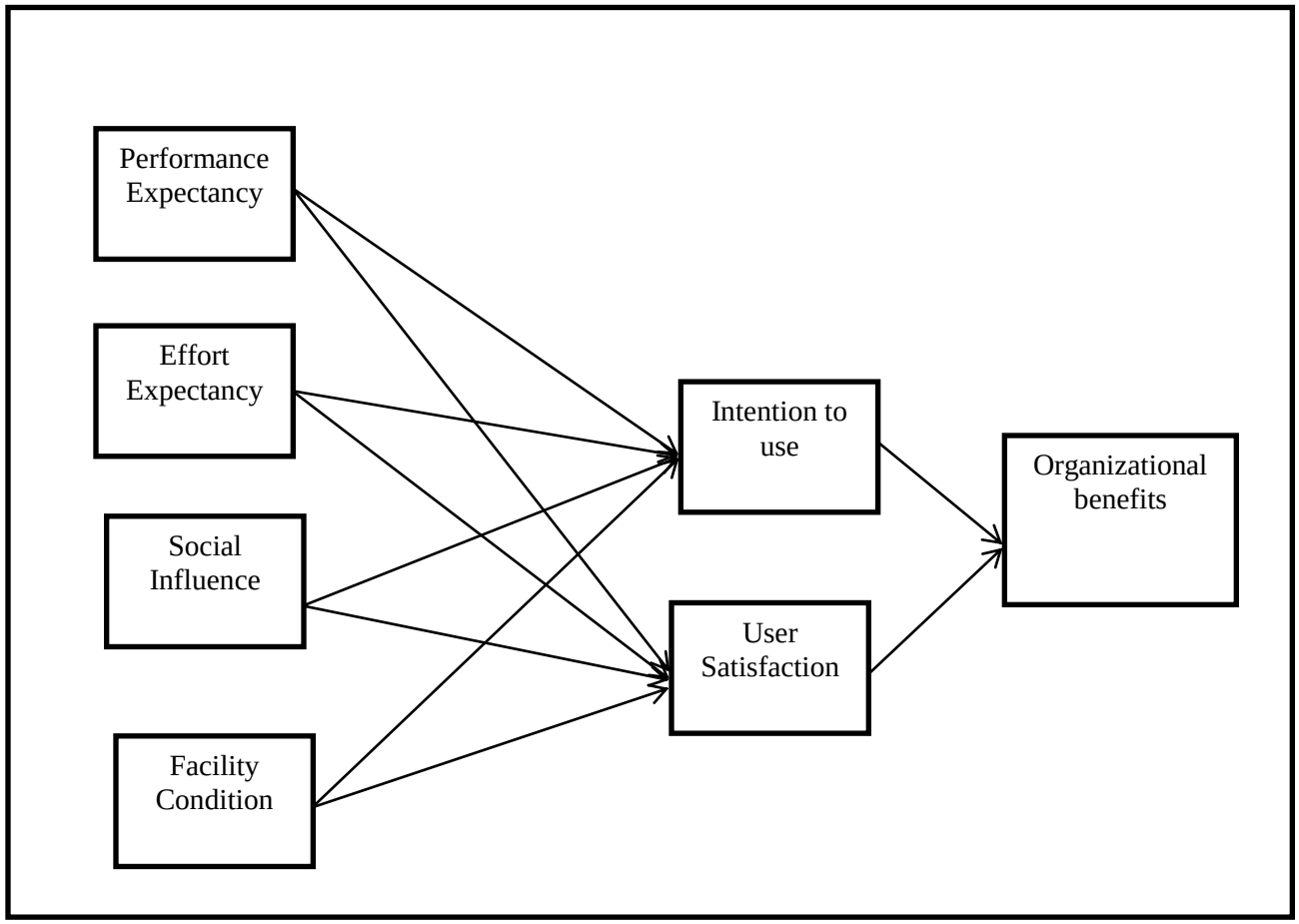
This model suggested four main indicators that influence intention to use of the digital tools. The firs one is Performance Expectancy (PE) which refers to the degree to which an individual believes that using the system to improve job performance. Secondly Effort Expectancy (EE), which refers to ease use of the system. The third one is Facility Condition (FC)., that refers to the availability of organizational and technical infrastructure exists to support use of the system. Fourth is Social Influence (SI). It is the degree to which an individual perceives that others believe that he or she should give value for using the new system. This model is the most popular and well cited model both in health care and business sector (Sykes, 2015; Sykes, Venkatesh & Johnson, 2014) and (Thong, Venkatesh, Xu, Hong & Tam, 2011; Venkatesh et al., 2012), agile IS (Hong,Thong, Chasalow, & Dhillon, 2011), (Chan, Thong, Venkatesh, Brown, Hu, & Tam,2010), and (e.g., Venkatesh, Sykes, & Zhang, 2011)

Evaluating technology acceptance is often applied to voluntary systems. However, workflow systems used in healthcare settings are mainly mandatory systems. Given the differences, we re-consider the outcome measures to model intention to use and usage to cater for the mandatory nature of the healthcare information systems. The new perspective would allow us to adjust our measures to model technology acceptance in the form of benefits. In this research, we utilised the Unified Theory of Acceptance and Use of Technology (UTAUT) including four constructs of that lead to an intermediate variable, user satisfaction, with an ultimate outcome variable of organisational benefits. The research model was evaluated using survey data from 202 users of an electronic medication management system in an Australian hospital. The results indicated that performance expectancy, effort expectancy, social influence, and facilitating conditions have led to increased user satisfaction. Furthermore, user satisfaction has led to increased organisational benefits (Kim,et al,2017).

Figure 2-2 the Unified Theory of Technology Acceptance and Use (UTAUT) Model

Source: Venkatesh etal., 2003, 2012.

Kim,et al,201



Empirical Review

As a common gauge of IS performance, "user satisfaction" has primarily been used as a stand-in for other success factors. The Doll and Torkzadeh (1988), Doll et al. (1994) End User Computing Support (EUCS) tool, and his Ives et al. (1983) User Satisfaction Information Tool (UIS) are the most often used user satisfaction tools. Both "User Satisfaction" techniques only assess users' overall pleasure in a system comparison and are made up of "System Quality," "Information Quality," and "Service Quality" components. not. In order to match the D&M model, "user satisfaction" was eliminated by Seder et al. (2008). This is because it cannot account for additional success variability because of how strongly it corresponds with other quality indicators. Even further, Seder et al.'s (2013) study said as much.

Using the prior information success model, Choi et al. (2013) expand information success research beyond general information systems to customer relationship management (CRM) systems in health promotion centers. This serves as the foundation for assessing health promotion center systems and offers helpful direction for the effective deployment of CRM systems in hospitals. The study's findings demonstrated a statistically significant relationship between perceived benefit and user satisfaction and the quality of the provided information and services. As a result, perceived usability and user satisfaction have a big influence on both individual and indirect corporate performance.In a 2017 research using the Technology Acceptance Model (TAM), Kaling and Omar developed a model for a literature search and used it to examine factors influencing user satisfaction with electronic LMIS.

Chios Hospital's Skylitsio information system was evaluated using demographic and success determinants from the DeLone & McLean model. The study included 71 users, examining the link between the DeLone and McLean success model elements. The results indicated that users are content with the system, indicating a positive impact on the hospital's overall performance. They also think that by utilizing the method, they were able to Only via the use of information systems can patient information be more easily accessed, patient care improved, choices made, and a paperless environment created. digital means. The data given above suggest that the system's quality had an impact on users' happiness. The more effective they thought the system was, the happier they were with it. Additionally, it appeared that the Hospital staff's usage of the system was impacted by the information's quality. More people used the system as the information quality improved. Additionally, it appeared that the information's quality had an

impact on how satisfied users were with the system. (Karitis et al. 2021, November).

The same study discovered that changes in the value of the factor "system quality" had a greater impact on the value of the variable of the factor "use" than do changes in the value of Changes in the value of the factor "information quality" have an impact on the variable of the factor "user satisfaction" as well, but more so than changes in the value of the factor "system quality." Changes in the value of the factor "use" have an impact on the variable of the factor "benefits from using the system," but not changes in the value of the "user satisfaction" factor. Based on the above, it can be concluded that there are statistically significant relations between some of the factors of the DeLone & McLean IS success model (Karitis et al. 2021, November).

The term "HIS" refers to a type of HIS that is frequently utilized in clinical settings. As HIS' influence has consequences for scientists, doctors, and managers, determining its success rate is a subject of current research. Based on user feedback at the teaching hospital, the authors of this study have created a new tool for assessing the health information system, or "SIS"; Success rate. The study was carried out at the Psychiatric Hospital and Education Center in Mashhad, Iran, by Ebnesina and Dr. Hejazi.A self-administered structured questionnaire with seven aspects,based on ISSM including system quality, information quality, service quality, system utilization, ease of use, satisfaction, and net benefit, served as the data collection method. The study had 125 people in all. With a content relevance index (CVI) of 0.85 and a content relevance rate (CVR) of 0.86, the instrument has been approved by an expert panel. The instrument's overall Cronbach alpha was 0.93. Significantly favorable correlations between the dimensions under investigation were revealed by Pearson's correlation coefficient. At the study hospital, the mean SIS success rate was 65% (CI: 64%, 67%).The success rates were highest for the variables "suitability," "quality of the system," and "net benefit" (Ebnehoseini et al., 2019).

Hospital information systems (HIS) post-implementation evaluation is crucial to ensuring system goals are met. A cross-sectional study that was descriptive and analytical was carried out in 2016. Hospital information system users and IT administrators made up the study population. In total, 468 people took part in the study. Two questionnaires were used to collect data, which was then analyzed with descriptive and analytical statistics using SPSS software.From the users' point of view, the examined hospital information systems were considered to be relatively ineffective in terms of behavioral, organizational, and pedagogical elements, but moderately effective in terms of functional, ethical, and cultural ones. Only the legal element was successful from the SIS and

IT authorities' perspectives, whereas the organizational, behavioral, technical, and educational factors displayed moderate success. Hence, in order to achieve a higher level of success of the system, it seems essential to assess the needs of the users before implementing the system and to involve the users in the different phases of operrations, training and ICT capability improvement (Alipour et al., 2017).

It is crucial and required to assess and evaluate the quality of information systems. HIS (HIS) is widely used and adopted. Today, HIS is growing in reputation value and offers developing nations limitless opportunity. Diverse healthcare providers have endorsed HIS as a means of delivering a high level of patient safety, patient healthcare services, efficient and effective patient care, minimal medical errors, and patient happiness by providing patients with access to accurate information whenever and wherever they need it. Since many hospitals in KSA have deployed HIS, it is now crucial to assess the quality of these systems. In order to maintain and, if necessary, improve the standard of patient care in Riyadh, this study adopted the Delone & McLean (D&M) quality model. The most widely used and widely accepted approach for classifying the HIS system success elements is the Delone & McLean quality model. The study's primary goal is to evaluate the HIS installed in KSA hospitals, which results in better patient healthcare. The six interconnected assessments of the model-specified IS success criteria are the focus of this study. Information quality, system quality, user satisfaction, services quality, use, and net benefits make up these measurement criteria. These factors are interconnected and have a positive impact on one another, according to the D&M model. In four hospitals in Riyadh, a questionnaire was distributed to all potential HIS stakeholders as part of this study. In order to verify the success, the results of the questionnaire were analyzed to validate the success of HIS and to recover the HIS Quality in KSA Hospital (Elsadig et al ,2019).

At three public hospitals in Korea, the study that assessed the effectiveness of the recently created information system (IS) went into effect on July 1, 2014. On the basis of the DeLone and McLean IS Success Model, user satisfaction scores of twelve key performance indicators of six IS success elements were used to compare the performance of the system before and after it was implemented. After the system was implemented, all scores increased with the exception of the influence on the clinical environment and the completeness of medical data. In order to pinpoint the critical variables affecting the three IS success elements (Intention to Use, User Satisfaction, and Net Benefits), correlations among the six IS components were also examined. With the

exception of the connections between Service Quality, Intention to Use, and Net Benefits, all correlations were significant. The study's findings suggested that hospitals should place more of an emphasis on service quality than only systems and information quality in order to increase user satisfaction and finally realize the full potential of IS performance (Cho et al., 2015).

According to empirical findings, user happiness and system utility are strongly correlated (Iivari, 2005). User satisfaction has been shown to positively affect user performance (Yoon and Guimaraes, 1995; Guimaraes and Igbaria, 1997; Torkzadeh and Doll, 1999), improved productivity (McGill et al., 2003), higher productivity and efficiency (Igbaria and Tan, 1997; Rai et al., 2002; McGill and Klobas, 2005; Halawi et al., 2007), to improve decision-making (Vlahos However, according to Yuthas and Young (1998), the relationship between user happiness and decision performance was just marginal. In one study that looked at the connection between user satisfaction and organizational impact, it was discovered that satisfaction was associated with outcomes that were profitable and revenue-based (Gelderman, 1998). Similar findings were reached by a different study that looked at the connection between ERP system user satisfaction and organizational performance (Law & Ngai, 2007).

Assessments of technology adoption are frequently used with volunteer projects. Although most of the workflow systems utilized in the healthcare industry are mandated systems. The authors reevaluate outcome measures in light of the differences in order to simulate intended use and take into account the requirement of HISs. They would be able to modify their companies to capitalize on the technology's acceptance model thanks to the new viewpoint. The Unified Technology Acceptance and Use Theory (UTAUT), which includes four constructs and yields two final variables—organizational utility and user satisfaction—was employed in this study. Survey information from 202 users of an electronic medication management system in an Australian hospital was used to evaluate the research model. Findings indicated that performance expectancy, effort expectancy, social influence, and facility condition resulted in better user satisfaction

Technology acceptance assessment is often applied to voluntary programs. However, the workflow systems used in healthcare are mostly mandatory systems. Given the differences, the authors reconsider outcome measures to model intent to use and to account for the mandatory nature of HISs. The new perspective would allow them to adapt their businesses to the technology's acceptance model in the form of profits. In this study, they used the Unified

Technology Acceptance and Use Theory (UTAUT), which included four constructs that resulted in an intermediate variable, user satisfaction, and an end-result variable, organizational utility. The research model was evaluated using survey data from 202 users of an electronic medication management system in an Australian hospital. The findings demonstrated that increased user satisfaction was a result of predicted performance, expected engagement, social impact, and activation circumstances. Additionally, increased organizational benefits have been a result of customer satisfaction (Kim et al., 2017).

When creating technology-driven solutions and use cases, one of the verticals that are most heavily considered is the pharmaceutical supply chain (Ghosh & Aithal, 2022). For instance, billions are spent annually on the worldwide market for counterfeit, and grey-market medications. Studies have indicated that many medications, medical equipment, and biologics are counterfeited in low-, middle-, and high-income countries. This shows that this kind of global pharmaceutical criminality affects the entire drug supply chain. Supply chain vulnerabilities as well as new types of technologies have emerged as a result of the introduction of digital health platforms, along with the expansion of the pharmaceutical business internationally and an increase in worldwide medication sales (Ghazal., et al,2022). Up until now, Technology likeownership-transferable radio frequency identification (RFID) chips, smartphone apps to trace pharmaceutical pedigree, and other item authentication systems have received the majority of the attention in efforts to protect and improve the supply chain (Goria,2022).

Health facilities in Ethiopia are able to perform better overall by utilizing the e-LMIS at facility (HCMIS Facility Edition) and warehouse management system (HCMIS Warehouse). Users with a range of backgrounds, including those with little computer expertise and professionals, can utilize the system because of its user-friendliness. Managers may now supervise and record deliveries and pickups, keep track of inventory data, and locate items thanks to the HCMIS Warehouse. They may always manage their inventory effectively by using this thorough information. To improve decision-making, web-based dashboards add the possibility of displaying the most recent data from all branch distribution locations. In other words, decisions about forecasting, restocking, and inventory management are made using information about stock status. The facility manager has visibility into every health item in their store thanks to the e-LMIS (HCMIS Facility Edition). Stockouts are less frequent and last shorter periods of time when users and managers can respond more quickly to changes in inventory and make more

informed judgments about which goods and how much of those products are required to bring any facility up to sufficient stock amounts (USAID | DELIVER PROJECT, 2016).

2.2.2 Use of Information Technology and the Performance of the Pharmaceutical Supply Chain

Supply chains in the modern era have developed into incredibly complex value networks that are now a key source of competitive advantage. Verifying the origin of raw materials and maintaining product and merchandise visibility as they move through the value chain network, however, have grown more and more difficult. The Internet of Things (IoT) application can assist businesses in observing, tracking, and monitoring goods, actions, and processes within their individual value chain networks. Product monitoring is one of the IoT's additional uses in manufacturing, transportation, and warehouse operations optimization. Blockchain technology can enable a wide range of various application scenarios to improve value chain transparency and boost B2B trust when combined with IoT. The potential benefits of combining IoT with Block chain technologies has the potential to increase the effectiveness and efficiency of modern supply chains (Rejeb, et al, 2019).

By ensuring the availability of high-quality critical medicines and medical supplies, health supply chain systems are crucial for an effective and efficient healthcare system. Health facilities in Uganda continue to report stockouts despite numerous efforts to assure the availability of high-quality vital medicines and medical supplies. Health institutions performed poorly across all supply chain activities and procedures. It is crucial to invest in infrastructure development, provide computer gear and an internet connection, and increase the capacity of key staff if health institutions are to improve the performance of their supply chains. This is essential to ensure that the supply chain operates as intended and that the end user has access to high-quality medications and medical supplies (Lugada et al., 2022).

The supply chain system must be digitalized in order to improve its performance, sustainability, and efficiency. Digitalization presents a chance to combine cutting-edge technology, concentrate on customer service, cut intra- and inter-organizational costs, and increase value for the supply chain system. This can be accomplished by putting data capturing technology into place, improving data quality, and expanding data use (Beaulieu, 2021). The Ugandan supply chain system is supported by a number of digital supply chain platforms that have either been adopted or created. The electronic Logistics Management Information System (e-LMIS) and the District

Management Information Software (DHIS-2) are important platforms for the health system's supply chain operations (MoH. Uganda's, 2020).

The continued availability of antiretrovirals (ARVs) for HIV-positive individuals is essential to the success of the Namibian government's "treatment for all" strategy for containing and ending the disease. However, an ineffective paper-based pharmaceutical information system in Namibia limited the public health system and resulted in incorrect and inaccessible data, which in turn contributed to ongoing stock-outs of ARVs and other vital medications. The national antiretroviral therapy (ART) program in Namibia and the Ministry of Health and Social Services (MoHSS) are using an integrated pharmaceutical management information system that is being gradually implemented to provide timely and accurate commodity and patient data for decision-making (Mabirizi, et al., 2018).

The healthcare supply chain system in Nigeria has been characterized as being disjointed, disorganized, and rigid in its ability to adapt to patients' constantly changing needs. Since pharmaceuticals fail to reach the correct end-user at the right time, right cost, right quality, and right place, the requirement to manage health care supplies effectively and creatively has asignificant impact on the effectiveness of the health system. In order to fulfill customer requests, supply chain methods such as flexible sourcing and value stream analysis must be implemented. However, the elimination of redundant and unneeded materials, the use of information technology to integrate healthcare activities, supplier prequalification, and reduction of redundancy are the most crucial strategies for achieving timely efficiency in the healthcare supply chain.(Oyenuga, et al,2022).

Facilities can generate reports from the system at any time, including indications like stock on hand, consumption, and expirations. Data is provided in real-time. Through the use of this statistics, commodity consumption is made more transparent (USAID, 2015). The availability of life-saving medications at the level of health facilities was highlighted by the author as a result of stakeholder coordination, better data availability, flexibility, and planning. This prevented disease occurrence and urgent orders at the central medical store.

The anticipated advantages of successfully implementing the web-based electronic health commodities management Utilization of information systems results in less waste, forecasting assistance, educated decision-making for regular tasks like restocking, planning and budgeting

for medical needs, ease of report production, improved reporting quality, and product availability. Reduced waste and support with forecasting account for the bulk of the system's advantages, according to the findings of both the structured questionnaire and the in-depth interview (John Snow Inc., 2012).

2.2.3 Effect of Information Technology usage on enhancing supply chain Data management

Modern and accurate data are increasingly needed in supply chain management. Electronic information systems give key stakeholders improved visibility into the logistics information system and allow them to use that data to make the necessary decisions. The electronic logistics management information system (e-LMIS) also improves the quality of logistics data, enhancing public health institutions' supply chain management efficiency and commodity availability, which ultimately improves patient health outcomes (USAID, 2015b).

The fragmentation of health systems in developing countries, particularly in areas with public supply chains and procurement processes, frequently causes last-mile healthcare facilities to run out of drugs. To address these issues, sophisticated technologies are required, frequently in collaboration with the demand-driven supply chain management (DDSCM) concept, which is gaining popularity in other sectors. The majority of processes must be digitalized in order for the DDSCM vision to come to fruition, and the transformation of conventional supply chains into a networked, intelligent, and highly effective supply chain ecosystem powered by real-time demand data will be a crucial step. Supply chain efficiency can be improved by using digital implementation, decision support, and DDSCM supply chain strategy (Bvuchete et al., 2022).

E-LMIS has significantly improved supply chain fulfillment, system efficiencies, and reporting rates. (USAID, 2016). The article went on to point out that customers now have easier access to a long variety of necessary medications. A study conducted in Rwanda revealed that district pharmacies are now more effective in the management of inventory, accurate reporting, efficient use of allocated funds at an optimal level, and are more effective in the management of human resources and material after the health supply chain was strengthened through the use of e-LMIS. (USAID,2016). The e-LMIS is used by facility employees to provide physical count data, disperse it to the district pharmacists, and provide reports for decision-making.

Information technology is crucial for managing the pharmaceutical supply chain, and it supports

a number of daily jobs and activities that are related to pharmaceuticals. The operational focus of the technology is on automating tasks including quantification, scheduling for procurement and delivery, warehouse reporting, inventory management, purchasing, dispensing, and patient tracking (Hawkin et al., 2009). The logistics cycle is propelled by information, which also ensures the proper operation of the logistics system (USAID, 2011a). The information system assists in gathering and analyzing data from the health sector. The system also guarantees the data's general quality, applicability, and timeliness and transforms the data into knowledge that can be applied to making decisions about one's health (WHO, 2016). Making use of information systems can have a significant role in managing and integrating data and information within the supply chain (Omary and Kalinga, 2017).

2.2.4 Dimensions of Success evaluation of HCMIS

This study will update our knowledge and reveal insights into the impacts/effects of the web-based e HCMIS system user satisfaction on pharmaceutical supply chain performance based on an extension of DeLone and McLean's (2003) and the Unified Theory of Acceptance and Use of Technology or UTAUT evaluation framework.

2.2.4.1 Performance Expectancy

The degree to which a person expects that using the system will enable him or her to advance in a career is known as performance expectancy (Davis et al., 1992; Shin, 2009).Compeau & Higgins (1995) claim that the theoretical foundation of this variable originates from Technology Acceptance Model's utility perceptions, Motivation Model's extrinsic motivation, Model of PC Utilization's job-fit, Innovation Diffusion Theory's relative advantage, and Social Cognition Theory's outcome expectancies. Perceived usefulness, extrinsic motivation, and work fit are three elements that have an impact on performance expectations (Shin, 2009). The variables related to performance expectancy were the best predictors of intention to employ the target technology within each of the individual models examined. The likelihood of filing electronically is significantly influenced by performance expectations, social influence, facility conditions, and and voluntariness (Kijsanayotin,Pannarunothai, & Speedie, 2009).

According to Zhou et al. (2010), user adoption is significantly influenced by performance expectations, task technology fit, social influence, and facility condtion. In addition, task technology fit had a considerable impact on performance expectancy (Venkatesh et al., 2003).

The findings indicated that customers' intentions to adopt e-commerce are significantly influenced by perceived usefulness, perceived enjoyment, trust, cost, network influence, and trust. The levels of performance and effort expected with regard to the transaction and the amount of user innovation both have a favorable impact on the desire to make an online purchase. Additionally, the relationship between performance expectancy and online purchase intention is moderated by the innovativeness construct (H. S. Martn & Herrero, 2012).

2.2.4.2 Effort Expectancy

According to UTAUT, effort expectancy is the level of simplicity associated with system usage. Venkatesh et al. (2003) claim that this element was generated from the Technology Acceptance Model (TAM) aspect of perceived ease of use. According to Davis (1989), a user-friendly application is more likely to be accepted by users. According to a related study by Davis et al. (1989), effort-oriented constructs are predicted to be more prominent in the beginning of a new behavior when process difficulties represent obstacles to be overcome and later be overwhelmed by instrumentality concerns. According to Diaz and Loraas (2010), this is in line with earlier findings by Davis (1989), Davis et al. (1989), Venkatesh and Davis (2000), and Davis (1989). According to Deng, et al. (2011), both performance expectations and effort expectancy are important indicators of the intention to utilize WBQAS (WebBased Questions and Answers Services). Overall use intention is influenced by performance expectations, effort expectations, enabling conditions, and social influence; potential users' evaluations of these antecedents differ significantly from those of early users' (Yen-Ting Helena Chiu et al., 2010).

2.2.4.3 Social Influence

According to Diaz and Loraas (2010), social influence is the extent to which a user believes that influential people value technology use. It is comparable to the concept of "subjective norm" as described in the second iteration of the Technology of Acceptance Model (TAM). According to Moore and Benbasat (1991), image refers to how much an individual's image or position in their social group is judged to be improved by employing a technological innovation. Despite the fact that subjective norm and image have several names, each of these elements involves the explicit or implicit idea that the person's behavior is influenced by how they imagine others will perceive them as a result of using the technology.

Maldonado et al. (2011) discovered that social influence and learning motivation had a beneficial impact on behavioral intention, while the enabling condition had no impact on the use of e-learning portals. Similar to this, Gonzalez et al. (2012) discovered that internal auditors in North America are more inclined to utilize continuous auditing as a result of social influence demands from peers and higher authorities. On the other hand, if the technology is required by the higher authorities, Middle Eastern auditors are more inclined to use it. The acceptance of IT is also impacted by social influence (Kijsanayotin et al., 2009).

2.2.4.4 Facility Conditions

The degree to which a person believes that the organizational and technological framework is in place to facilitate use of the system is known as the "facilitating conditions." Similar discussion may be found in Thompson et al.'s (1991) model of personal computer utilization. According to Keong et al. (2012), the technological and/or organizational environment features intended to lower barriers to usage are included in the underlying construct of the enabling condition. The UTAUT construct, which is made up of items from perceived behavioral control, is intended to describe the relationship between the organization's efforts to remove usage-related obstacles and the intention of potential users to use. The power of this indicator to forecast usage declines after initial acceptance is similar to effort expectancy. According to Gupta et al. (2008), performance and effort expectancy, social influence and facilitating conditions all positively impact the use of the ICT.

In general, the four UTAUT conceptions have a strong favorable influence and impact on the behavioral intention of the ADSU academic staff to accept and use ICT. Im et al. (2011) discovered that there was no discernible difference between the US and Korea in the effect of performance expectancy on behavioral intention. It can suggest that performance has a significant impact on technology adoption globally. It's intriguing that in the US versus Korea, effort expectancy has a bigger influence on behavioral intention. This suggests that the ease of use of the technology has a greater influence on US consumers' decisions to adopt it than it does on Korean users. Additionally, behavioral intention and enabling intention have a big impact on how WBQAS is actually used. There is no social influence impact on the intention to use of the service (Deng et al., 2011).

2.2.4.5 User Satisfaction

The degree to which people are satisfied with reports, websites, and support services. Ives et al. (1983) and Doll and Torkzadeh (1988), for instance, are two of the most used multi-attribute instruments for gauging user information satisfaction (UIS).In the research on the individual level of the D&M IS Success Model, claims relating to user happiness obtained broad and frequently substantial support for positive connections relative to actual system use. In the majority of research done to far, system and information quality were discovered to have strong positive relationships with user satisfaction. On the other hand, the findings regarding service quality only offer sporadic evidence for its capacity to account for user happiness (D&M, 2003).

Petter et al. (2008) draw attention to the paucity of conclusive data on the causes of user satisfaction at the organizational level. No one looked at the five constructs' interactions that affect user satisfaction more than four times. However, when examining the quality components, the studies carried out thus far do show a favorable link. On the other hand, the results of system usage and net benefits are inconsistent. The analysis of user satisfaction in an organizational environment continues to be an intriguing subject for future research into the success of IS, similar to the research on system use (D&M, 2003).

The Ministry of Health Community Development Gender Elders and Children through Medical Store Department has been implementing electronic Logistic Management Information System (eLMIS) to streamline the flow of health commodities in the country, according to the study by Kalinga & Omary (2017) on assessing Users' Satisfaction with Tanzanians' Public Health Supply Chain Electronic Logistic Management Information System. The study developed a research model from the literature and used a sequential explanatory mixed research methodology to explore factors influencing users' satisfaction with eLMIS. Four criteria were identified as having a substantial impact on users' satisfaction with the eLMIS: information quality (=0.28), system quality (=-0.21), perceived usefulness (=0.22), and facilitation conditions (=0.26). System support had no appreciable impact, though. Numerous customers who participated in interviews said they needed additional instruction on the system and suggested new features that should be implemented. Additionally, the greatest barrier to using eLMIS remained Internet connectivity. The methods for increasing system users' pleasure and, as a result, the efficiency of systems (Kalinga & Omary, 2017).

2.2.4.6 Net Impacts

Net impact is the extent to which information systems are contributing (or not contributing) to the success of individuals, groups, organizations, industries, and nations. Net benefits play a significant role in IS success research as the overall dependent variable of the D&M IS Success Model. At the individual level, recent investigations have discovered that all interrelations have at least moderate support. Although most of the influence is reduced by system use and user satisfaction, system quality has generally been found to have a positive association with net benefits. The same holds true for information and service quality, though less frequently. In turn, system use also has a modestly positive relationship with net benefits, despite the fact that six of the research Petter et al. (2008) analyzed found no evidence of a significant relationship. All of the research we analyzed revealed that the user satisfaction construct was positively related to the net benefits of a system (D&M,2003).

The degree of personal satisfaction with and usage intention of the IS will positively influence the individual and the organizational outcome, according to DeLone and McLean's (2003) analysis of net benefits. According to Chang et al.'s (2008) research, nurses typically felt satisfied or very satisfied with e-learning courses and demonstrated a favorable willingness to study use online learning. These findings were supported by this investigation. For the long-term nursing education program of a hospital, senior management should carefully evaluate how to promote the benefits of e-learning and create a continuous plan to satisfy nurses' needs. Of course, this investigation showed that high-quality system upkeep and service assistance were essential to boosting nurse contentment when using e-learning (Chang et al., 2011).

The degree of personal satisfaction with and usage intention of the IS will positively influence the individual and the organizational outcome, according to DeLone and McLean's (2003) analysis of net benefits. According to Chang et al.'s (2008) research, nurses typically felt satisfied or very satisfied with e-learning courses and demonstrated a favorable willingness to study.The Nguyen et al. (2014) study confirms the significance of information quality and system quality as significant factors. Assuring data accuracy and completeness, providing outstanding information access, and maintaining data availability are all aspects of information quality. The success or failure of the EHR system is largely dependent on the usability and utility of the system (Nguyen et al., 2014).

2.2.5 Development of Conceptual Framework

The study began by hypothetically examining a number of potential characteristics that other researchers have used to evaluate the efficacy of various information systems. Even though the returns on investment and information system usage were employed to gauge an information system's success, user happiness was determined to be the way that was most frequently used.

Five criteria were identified by Omary and Kalinga (2017), who utilized them to evaluate the model. All of the factors—information quality, system quality, perceived usefulness, and facilitation conditions—had a significant impact on users' satisfaction with the eLMIS after a linear regression, with the exception of system support, which had no statistically significant impact on users' satisfaction with the e-LMIS.

System quality, information quality, system use, perceived usefulness, and service quality are characteristics that influence the user's happiness with the success of the information system, according to Seddon (1997) and DeLone and McLean (2003). Additionally, Davis (2002) found that TAM measurements of perceived usefulness and ease of use were reliable indicators of an information system's success.

A lot of times, voluntary systems are used while evaluating technological acceptance. However, the majority of workflow systems utilized in healthcare environments are compelled systems. They reevaluate the outcome measures in light of the variations in order to model usage and intention to use for the required nature of the healthcare information systems. The authors might modify their measurements to represent technology adoption in terms of benefits thanks to the new viewpoint. They made use of the UTAUT, which is an amalgam of four constructs that result in the intermediate variable of user satisfaction and the final outcome variable of organizational benefits. The findings showed that higher user satisfaction was a result of higher performance expectations, higher effort expectations, higher social impact, and higher enabling conditions. Additionally, user satisfaction has elevated organizational performance (Kim,et al,2017).

2.2.6 Empirical evidence that combine the UTAUT model with DeLone and McLean Model

Under the background of global cross-border mobile commerce (m-commerce) integration, the importance of cross-border payment research is becoming increasingly prominent and urgent. The important value of this study is to empirically research the influence power of key elements

in using two different mobile payment (m-payment) platforms in Korea. The extended unified theory of acceptance and use of technology (UTAUT2) has been widely applied in various studies because of its strong interpretive power. In Korea, there are a few empirical studies on Chinese users. Based on a survey of 908 Chinese participants (486 WeChat Pay's Chinese users and 465 Kakao Pay's Korean users) in Korea, this study is one application extending UTAUT2 by incorporating multi-group and multi-model constructs: UTAUT2, information system success (ISS) model, and an initial trust model (ITM), considering a multi-group analysis with some mediating variables (payment difference). By comparing the two different payment platforms' characters, this manuscript provides a set of targeted measures to ensure Chinese WeChat Payment platform decision-makers create effective long-term strategic policies for cross-border m-payments in Korea, and eventually, benefit cross-border m-commerce and economic cooperation in Southeast Asia (Lin, et al (2022).

The Internet of things (IoT) has forced the mode of universities evaluating the performance of people and the way of disseminating the knowledge. Consequently, universities capitalize a substantial amount in sophisticated Higher Education Management Information Systems (HEMISs) technology to stay updated with the current trend. However, the implementation of the technology does not automatically inspire the modifications in working culture of the public universities in Indonesia as values and cultures remain outmoded and collusive. This indicates that most public universities are internally slow to adopt the technology making the application to be more beneficial for academia are still out of reach. This study aims at scrutinizing the organizational requirement that boosts technology implementation mainly in a higher education organization located in developing countries. The findings from the analysis of a structural equation model tested on end-users consisting of 150 (one hundred fifty) public university officers throughout Indonesia evidenced that implementation of the technology in terms of information, system, and service quality make significant, positive impacts on performance expectancy leading to the intention to adopt the technology. The research underpins the significance of system flexibility to organizations as one source for sustainable competitive advantage (Harlie, et al, 2019).

Telkom University plans to become a university that plays an active role in the industrial revolution 4.0 in the field of education by creating the CeLOE(Center for e-Learning and Open Education) e-Learning program. Learning Management System (LMS) is one of the e-Learning

platforms developed by CeLOE. LMS was applied to the entire academic community starting the 2020/2021 academic year and was accelerated due to the COVID-19 pandemic. This study aims to analyze the factors that influence the LMS of Telkom University in the learning media platform. This study uses the TAM, UTAUT and Delone-McLean model. Based on litelature review, TAM and UTAUT can predict intention to use. Variable Perceived Usefulness (PU) developed by TAM and variables Performance Expectancy (PE), Effort Expectancy (EE), and Social Influence (SI) by UTAUT model that significantly predict intention to use. Delone-McLean is mode for assessing Information System Success. Based on the conceptual models developed by Delone-McLean using three variables, which are Information Quality, System Quality, and Service Quality. The variables of TAM and UTAUT model are integrated into Delone-McLean model. The data collection method that will be used in this study is quantitative method with respondents of LMS users as lecturers, student and CeLOE system managers at Telkom University (Sukandi & Ariyanti, 2022).

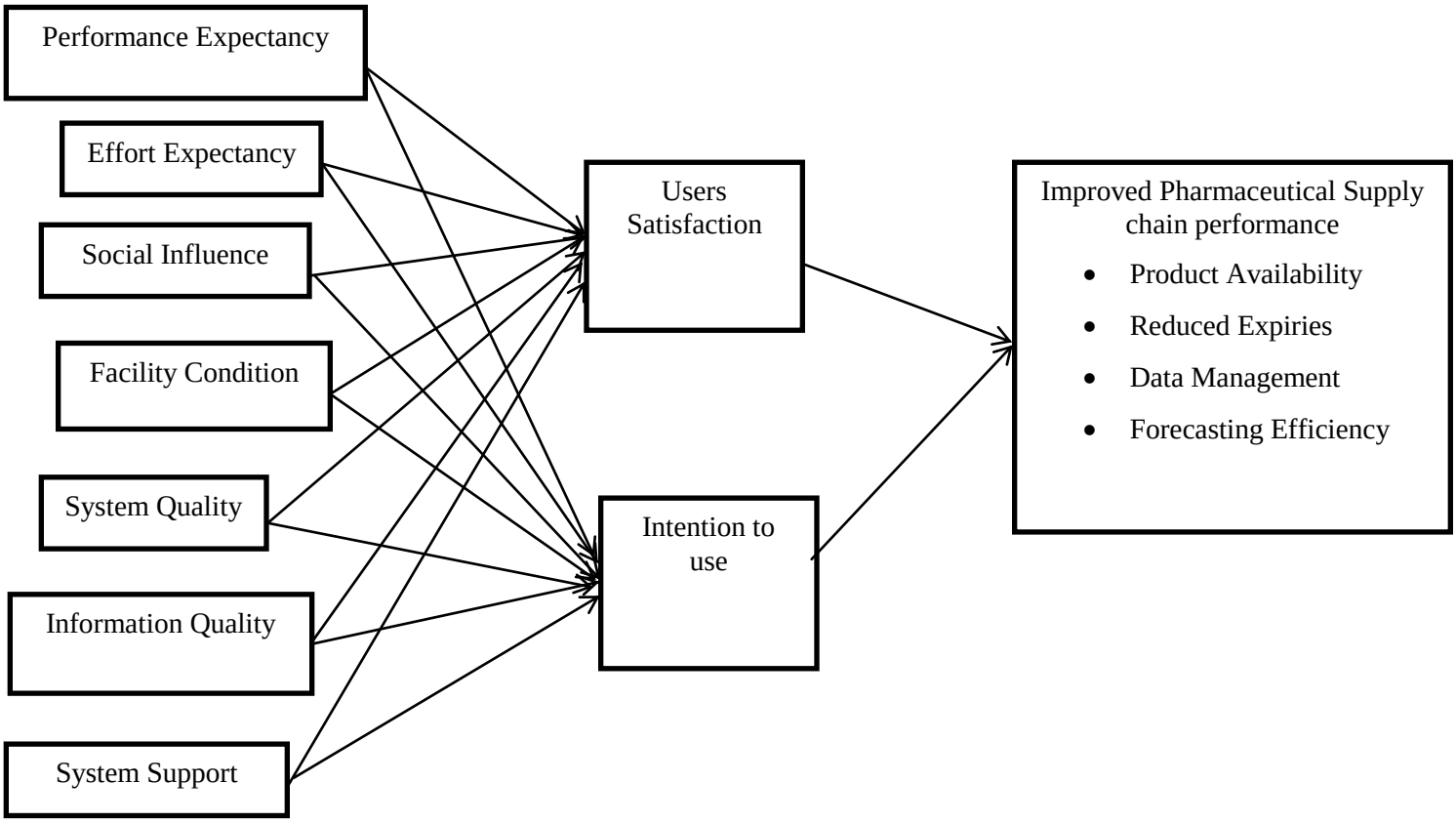
The study investigated patient's behaviour towards the adoption of telemedicine health services with the integration of three well-Known theories, namely, unified theory of acceptance and use of technology (UTAUT), the protection motivation theory (PMT) and DeLone & McLean information success model. The results of the study indicated that altogether UTAUT, PMT and DeLone & McLean information success model explained 80.4% variance in patient attitude towards adoption of telemedicine health services. Findings suggest that health-care professional can boost patient attitude towards adoption of telemedicine health services by improving factors such as service quality, computer self-efficacy and performance expectancy (Rahi, et al, 2021).

Figure 2-3 the Proposed Model

Source: DeLone and McLean Model (2003,2016)

The Unified Theory of Technology Acceptance and Use (UTAUT) Model (Venkatesh etal., 2012)

Kim,et al,2017



CHAPTER THREE

3 RESEARCH METHODOLOGY

The UTAUT and Information Systems (IS) Success Model are used in the study to assess the effectiveness of health commodities management information systems (Venkatesh et al., 2003; D& L, 2003). The D and L success model is an information systems (IS) theory that tries to provide a thorough knowledge of AI success by establishing a connection between the six main success criteria that are used to evaluate and explain information systems. Information Quality, System Quality, Service Quality, User Satisfaction, Usage Intent or Usage Intention, and Perceived Net Benefits are six of the principles included in the model. The study also made use of UTAUT, which had four constructs that led to the intermediate variable of user satisfaction and the final variable of organizational performance. Higher user satisfaction was the consequence of PE, Expected Effort, SI, and FC. Greater organizational benefits were also produced as a result of user satisfaction and usage intent.

3.1 Research Approach

A quantitative and qualitative research used to provide a wide and detailed assessment of the success of HCMIS in public HF under the AACAHB.

3.2 Design of the Research

A cross-sectional descriptive study design conducted from March to June 2023.

3.3 Target Population and Sampling

The AACAHB, established by Proclamation 311/95 and City Service No. 2/1995, is responsible for organizing and coordinating the planning and implementation of all health programs and services in the city. In line with national health policy, the Office is committed to promoting healthy lifestyles, with a particular focus on the prevention of infectious and non-communicable diseases and the provision of curative and rehabilitative health services with the active participation of the community and stakeholders.

In recent years, AACAHB has undertaken a major infrastructure project involving the construction of health facilities that will improve access and the quality of health services provided. Currently, Addis Ababa has more than 50 hospitals (public, private and non-

governmental), 99 health centers and 723 clinics providing services at different levels (AACAHB HSTP II, 2020).

The total number of hospitals in the Addis Ababa Administration Health Bureau is 50 of all hospitals, of which 7 are government hospitals. The rest is run by private investors and non-profit organizations ((AACAHB HSTP II, 2020). Also, there are 99 health centers, including 45 high-volume centers and 54 low-volume centers. Six hospitals and 82 HC in Addis Ababa City Health Bureau and 11 sub-cities that fully implemented the HCMIS were included in this study to meet the route analysis minimum sample size of SPSS AMOS. Abbech Gobena Hospital MCH, located under Yekatit 12 Hospital, is excluded from the study

3.4. Selection of Study Subjects and Source of Data

All pharmacy professionals (pharmacists and druggists) working at AACAHB hospitals and HC in Addis Ababa were considered as source populations. All pharmacy heads (directors, coordinators), store managers, drug supply managers, and logistics head at all of the 11 sub city were the study population due to their position of information for HCMIS

3.5. Eligibility criteria for HCMIS Success Measures

1. **Inclusion criteria**
    - Those Public health facilities using the HCMIS (DAGU 2) currently and fully implementing the system for at least one year.
        - Those HF that have computer (desktop, laptop, mobile device) to access the HCMIS
        - Those HF that have workable internet connection
        - Those HF that fully implemented the integrated pharmaceutical logistics system
    - All logistics head at all sub city who are responsible for monitoring and supervising the HCMIS activities
    - Pharmacy professionals who working with HCMIS-FE with the last six months and trained on integrated pharmaceutical logistics management system (IPLS)
    - Pharmacy professional who is willing to participate and pursue their work in those

selected health facilities

2. **Exclusion criteria**
    - Those public health facilities that did not implemented HCMIS (DAGU2) and did not have adequate infrastructure system to access the system.
    - Pharmacy professionals who were not available during the data collection period and were not willing to participate were excluded from the study
    - Pharmacy professionals who did not take IPLS and HCMIS training

3.5 Sample Size Determination

Because testing the proposed model requires path analysis using SPSS version 26 AMOS software, the sample size was determined based on recommendations for studies using such analysis. According to Gefen et al. (2000) it would take at least 100-150 respondents to perform a trajectory analysis. The most commonly used method for estimating the minimum sample size in SEM path analysis in information systems, as in other fields, is the "rule of 10" method (in the more complex structure, 10* the number of elements is recommended) (Gefen et al., 2000, Capelli et al., 2011, Goodhue et al., 2012, Peng and Lai, 2012, Kock and Hadaya, 2018). Another formula suggested by Green is ―N>50+8m‖, where ―m‖ is the number of independent variables (Green, 1991). The study has a total of 9 independent variables, so the minimum sample size required for this study was 50 + (8 x 9) = 122. In the study areas, a total of 88 health facilities and 11 suburban facilities were surveyed, and 200 respondents were interviewed in the study. Therefore, the sample for this study met all of the recommended sampling thresholds above.

3.6 Sampling Technique

A non-probability purposive sampling method was used to select the study participants that fulfill all the inclusion criteria among the targeted healthcare facilities. Since the study of participants, were choice by their knowledge, experience and familiarity with the tool from the chosen HF. The HF were selected based on the inclusion and exclusion criteria

3.7 Data Collection Procedure

A structured self-administered questionnaire based on the Delone &Mc Lean Information Success model and the Unified Theory of Technology Acceptance and Use model (UTAUT) and developed to collect the data. This study uses system quality, information quality, service quality, performance expectancy, effort expectancy, social influence, facility condition, intention to use ,user satisfaction, and net impact as a measure of HCMIS success. Each dimension includes different assessment measures. The questionnaire was reviewed by experts from FMOH and Digital Health Activity (DHA J SI Ethiopia) and modified based on their feedback. In order to test the reliability and validity of the questionnaire, a preliminary test was carried out in a federal hospital with 5 study participants. Based on the pre-test results, some questions were worded/ changed as unclear and some questions were deleted as superfluous. The rush of respondents' work (data collection time/during the annual inventory) was a direct factor identified during the pilot and an ingestion and drop-out survey was used to collect the data. The final design of the instrument consisted of three parts. In the first part, user characteristics such as age, gender, level of education, number of working hours per month, seniority, computer skills and experience in e-HCMIS were taken into account (n = 7 questions). The second section consists of 10 sections. The two subsections contain 71 rating questions on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) in 10 dimensions. The second section contains six questions on the level of HCMIS usage and the third contains 12 questions showing the impact or success of HCMIS on pharmaceutical supply chain performance. The data is collected by the researcher. Information is obtained by analyzing the questions related to the questionnaire (purpose of the study, how to reach the participants, how to collect the questionnaires for the benefit of the study). The data collection procedure is as follows: 1) the researcher is authorized to collect data and Addis Ababa University Business School issues an acceptance letter. 2) The objectives and

benefits of the study will be explained to the participants in either English or Amharic depending on the language chosen.3) Data collection takes place on workdays/weekdays from 8:00 a.m. to 5:00 p.m. within one month. 4) The researcher obtained written informed consent from the participants prior to submitting the questionnaire to ensure their independence. 5) The questionnaire was given to the participants voluntarily and the researcher asked them to fill it out individually in a private room. Names were not included in the questionnaire and information was disclosed to ensure anonymity. The completed questionnaire will be encrypted and secure. 6) The researcher checks that the completed questionnaires are not incomplete

3.8 Data Analysis

Data was sorted, checked, and coded by a researcher. Then data entry was performed using SPSS AMOS latest version. Demographic characteristics and the HCMIS success and impact in enhancing pharmaceutical supply chain performance will be analyzed using descriptive statistics.

The effect and success of the users' satisfaction of HCMIS in enhancing pharmaceutical supply chain performance categorized and described by SPSS. To achieve the objectives of the study SPSS 25 version used for the analysis of the study questionnaires. The study analyzed the primary data by using several descriptive and statistical methods such as:

- Descriptive statistics: frequencies, mean and standard deviations calculated and correlation analyses between the factors conducted
- To check the reliability and consistency Cronbach's alpha and CR used in the study and the validity test was also performed in this study
- Analyses performed using SPSS version 26 AMOS software
- To examine the relations between the factors, path analysis using SPSSS AMOS conducted

CHAPTER FOUR

4 DESCREPTIVE STATISTICS OF THE RESPONDENT AND CONSTRUCTS

4.1 Demographic features of the study participants

4.1 tables show the characteristics of the respondents. 275 structured quaternaries were distributed and 200 quaternaries were collected. After data screening, which involved the removal of incomplete or unengaged responses, 200 valid responses remained. The preponderance of the respondents were from the health centers under Addis Ababa city administration 79.5% (159), 14.5% (29) were from hospitals and the remaining 6% (12) from the sub city . Of the 200 responses, 46.5% (93) were female while the remaining 53.5% (107) were male. In terms of experience, of using HCMIS (DAGU2), the majority of the respondents 88% (176) have used HCMIS (DAGU2) for over 1 year, 69.5% (139) of the respondents had taken training on electronics logistics system while only 12% (24) have used the application for less than a year. Almost half the respondents 54.5% (109) were between 26 and 30 years old, 5% (10) were under 26 but over 20 years of age while 1.5 % was above the age of 40. Thus 91.5% (183) were under the age of 36. In terms of educational level, the majority of respondents were bachelor_s degree holders 77% (154), 15.5% (31) were diploma and 7.5 % (15) were masters. Nearly half of the respondents were store managers 43.5% (87),34.5% (69) were pharmacy head ,16% (32) were drug supply chain managers and 6% (12) were sub city pharmaceutical logistics head and nearly half of the respondents 52% (104) had 6-10 years of work experience.

The users who consider that they have high computer self-efficiency that they could complete the job using the HCMIS (DAGU2) were 53.5% (107) and only 13.5 % (27) of the respondent couldn‘t complete the job if there was no one around to tell them what to do as they go, those who consider that they could complete the job using the HCMIS (DAGU2) If they had never used an information system like it before were 56.5 % (113) and 16% (32) of the respondents consider that they couldn‘t complete the job If they had never used an information system like it before. The users who consider that they could complete the job using the HCMIS (DAGU2) only if they have the information system manuals were 10% (20) and most of respondents 90% (180) could complete the work even if they had not had the information system manual. The

users who consider that they could complete the job using the HCMIS (DAGU2) If they had seen someone else using the information system before trying it themselves were 60.5% (121) and 37.5% (75) of the respondent couldn‘t complete the job if they hadn‘t seen someone else using the information system before trying it themselves. The users who consider that they could complete the job using the HCMIS (DAGU2) if they could call someone for help if they got stuck were 97% (194) and only 3% (6) of the respondent couldn‘t complete the job if they couldn‘t call for someone for help if they got stuck. The users who consider that they could complete the job using the HCMIS (DAGU2) if someone else had helped them get started were 64% (128) and 36% (72) of the respondent couldn‘t complete the job if someone else hadn‘t helped them get started. 85.5% of the respondent considers that they could complete the job using the HCMIS (DAGU2) without taking a lot of time, 91% (182) of the respondents consider that they could complete the job using the HCMIS (DAGU2) If they had just the built in help facility for assistance, all of the respondent consider that they could complete the job using the HCMIS (DAGU2) if someone showed them how to do it first and 91.5 % (183) of the respondents consider that they could complete the job using the HCMIS (DAGU2) if they had used similar information system before HCMIS (DAGU2) to do the same job

The users who consider that they have adequate infrastructure they normally used to access the HCMIS (DAGU2) were 38 (53.5%), those who consider that they have average familiarity with computers and ICT were 74.5 (149), 73.5 % (147) of the respondent have workable internet connection to access the HCMIS (DAGU2), 47 % (94) of the respondents responded that they have adequate speed and reliability for the internet connection to access the HCMIS (DAGU2)

Table 4-1 Scio -demographic characteristics of the study participants

Variables	n=200	Frequency	Percent
Gender	Male	107	53.5
	Female	93	46.5
	Total	200	100.0
Age in years	n=200	Frequency	Percent
	21-25	10	5.0
	26-30	109	54.5
	31-35	64	32.0
	36-40	14	7.0
	40-45	3	1.5

	Total	200	100.0
Academic status	n=200	Frequency	Percent
	Diploma	31	15.5
	Degree	154	77.0
	Masters	15	7.5
	Total	200	100.0
Work experience	n=200	Frequency	Percent
	0-5years	58	29.0
	6-10years	104	52.0
	11-15years	35	17.5
	16-20years	2	1.0
	Above20years	1	0.5
	Total	200	100.0
Number of respondent who had taken eLMIS	n=200	Frequency	Percent
	NO	61	30.5
	Yes	139	69.5
	Total	200	100.0
The position you currently hold in the HF	n=200	Frequency	Percent
	Pharmacy head	69	34.5
	Drug supply chain manager	32	16.0
	Store manager	87	43.5
	Sub city logistics head	12	6.0
	Total	200	100.0
Time period for using (HCMIS (Dagu2))	n=200	Frequency	Percent
	<3month	3	1.5
	3-6months	4	2.0
	6-12months	17	8.5
	>1year	176	88.0
	Total	200	100.0
CSE1 (respondents who could complete the job using the HCMIS (DAGU2)if there was no one around to tell them what to do as I go.)	n=200	Frequency	Percent
	Disagree	27	13.5
	Fair	66	33.0
	Agree	99	49.5
	Strongly agree	8	4.0
	Total	200	100.0
CSE1 2 (respondents who could complete the job using the HCMIS (DAGU2)if they had never used an information system like it before)	n=200	Frequency	Percent
	Disagree	32	16.0
	Fair	55	27.5
	Agree	105	52.5
	Strongly agree	8	4.0
	Total	200	100.0

CSE1 3(respondents who could complete the job using the HCMIS (DAGU2)If they had only the information system manuals for reference)	n=200	Frequency	Percent
	Disagree	158	79.0
	Fair	22	11.0
	Agree	20	10.0
	Total	200	100.0
CSE 4(respondents who could complete the job using the HCMIS (DAGU2)If they had seen someone else using the information system before trying themselves.)	n=200	Frequency	Percent
	Strongly disagree	6	3.0
	Disagree	69	34.5
	Fair	4	2.0
	Agree	121	60.5
	Total	200	100.0
CSE 5(respondents who could complete the job using the HCMIS (DAGU2)If they could call someone for help if they got stuck)	n=200	Frequency	Percent
	Fair	4	2.0
	Agree	190	95.0
	Strongly agree	6	3.0
	Total	200	100.0
CSE 6(respondents who could complete the job using the HCMIS (DAGU2) If someone else had helped them get started.)	n=200	Frequency	Percent
	Disagree	72	36.0
	Agree	128	64.0
	Total	200	100.0
CSE 7 (respondents who could complete the job using the HCMIS (DAGU2)If they had a lot of time to complete the job for which the information system was provided)	n=200	Frequency	Percent
	Disagree	171	85.5
	Fair	9	4.5
	Agree	14	7.0
	Strongly agree	6	3.0
	Total	200	100.0
CSE 8(respondents who could complete the job using the HCMIS (DAGU2) If they had just the built-in help facility for assistance)	n=200	Frequency	Percent
	Disagree	18	9.0
	Fair	13	6.5
	Agree	165	82.5
	Strongly agree	4	2.0
	Total	200	100.0
CSE 9(respondents who could complete the job using the HCMIS (DAGU2)If someone showed them how to do it first)	n=200	Frequency	Percent
	Agree	190	95.0
	Strongly agree	10	5.0
	Total	200	100.0
CSE 10(respondents who could complete the job using the HCMIS (DAGU2)If they had used similar information systems before this one to do the same job)	n=200	Frequency	Percent
	Disagree	17	8.5
	Agree	183	91.5
	Total	200	100.0
CTQ 1 (Respondents who have adequate infrastructure to access the HCMIS(DAGU2))	n=200	Frequency	Percent
	Disagree	51	25.5
	Fair	62	31.0
	Agree	64	32.0
	Strongly agree	23	11.5
	Total	200	100.0

CTQ 2 (Respondent who have workable internet connection to access the HCMIS(DAGU2))	n=200	Frequency	Percent
	Strongly disagree	4	2.0
	Disagree	49	24.5
	Fair	30	15.0
	Agree	109	54.5
	Strongly agree	8	4.0
	Total	200	100.0
CTQ 3 (Respondents who have workable internet connection to access the HCMIS(DAGU2))	n=200	Frequency	Percent
	Strongly disagree	6	3.0
	Disagree	100	50.0
	Fair	17	8.5
	Agree	73	36.5
	Strongly agree	4	2.0
	Total	200	100.0
CTQ 4 (Respondents who have adequate internet reliability to access the HCMIS is adequate to access the HCMIS(DAGU2)))	n=200	Frequency	Percent
	Strongly disagree	6	3.0
	Disagree	100	50.0
	Fair	17	8.5
	Agree	73	36.5
	Strongly agree	4	2.0
	Total	200	100.0
Numbers of respondents per health facility	n=200	Frequency	Percent
	Hospital	25	12.5
	Health center	164	82
	Sub city	11	5.5
	Total	200	100

4.2 Normality test, and Path analysis

4.2.1 Normality test

The test of normality was checked for normality distribution using skewness and kurtosis measures; thus found that the standard error values were 0.172 for skewness and 0.342 for kurtosis. In addition, the skewness values for the model constructs ranged between −0.293 and 0.298, while the kurtosis values ranged between -1.455 and 1.988. The values lies within the range of - 3 to +3 for the skewness and -3 to +3 for the kurtosis, hence the data is normally distributed (Ghasemi and Zahediasl, 2012, Meri et al., 2019). In addition to this, the Kolmogorov-Smirnov and Shapiro-Wilk test also was conducted and the constructs p-value

>0.05(for Shapiro-Wilk the p-value is 0.866 and for Kolmogorov-Smirnov the p-value is 0.191) indicates that the data are normally distributed, Consequently, it was acceptable to continue with the analysis.

Table 4-2 Normality Test

Tests of Normality												
Computed variables	N	Skewness		Kurtosis			KolmogorovSmirnov[a]			Shapiro-Wilk		
	Statistic	Statistic	Std. Error	Statistic	Std. Error		Statistic	Df	Sig.	Statistic	df	Sig.
PE(6 items)	200	-0.095	0.172	-0.870	0.342	NPSP	0.191	200	0.000	0.866	200	0.000
EE(4 items)	200	0.844	0.172	-0.049	0.342	a. Lilliefors Significance Correction						
FC(4 items)	200	-0.125	0.172	-1.375	0.342							
SI(4 items)	200	-0.521	0.172	-0.497	0.342							
IQ(8 items)	200	1.026	0.172	0.676	0.342							
SQ(7 items)	200	0.353	0.172	0.400	0.342							
SS(4 items)	200	0.298	0.172	-0.447	0.342							
US(5 items)	200	0.141	0.172	-0.938	0.342							
NPSP(9 items)	200	1.193	0.172	1.988	0.342							
CSE(10 items)	200	-0.288	0.172	-1.455	0.342							
CTQ(4 items)	200	-0.037	0.172	-0.645	0.342							
UI(4 items)	200	-0.293	0.172	-0.121	0.342							
U(6 items)	200	0.097	0.172	-1.340	0.342							
EPSP(12 items)	200	0.106	0.172	-0.914	0.342							

4.3 Sampling Adequacy

According to Ardito et al. 2001the Kaiser-Meyer-Olkin measure of sampling (KMO) was used to measure the sampling adequacy of the data. According to, the KMO below 0.50 is unacceptable and factor analysis should not be performed. In this study, the KMO was 0.6 and confirmed the sampling adequacy. Moreover, Bartlett‘s test of sphericity $p < 0.001$ indicated that the correlation between items was sufficiently large. Consequently, it was acceptable to continue with the analysis for performing the Maximum Likelihood Analysis (MLA).

4.4 Measuring the success of HCMIS

Based on the data depicted on table 4.2 below, the total number for each indicators suggest that pharmacists had a rather positive perception for most of the model_s constructs (EE, FC, SI, IQ, SQ, SQ, UI, utilization rate and net pharmaceutical supply chain impact quality factors) However, for PE of the HCMIS indicator, the score of 17.4 from a maximum of 21 , for users satisfaction(US) quality factors the score of 13.4 from a maximum of 17 and system quality the total of 21.6 from a maximum of 26 suggests that the HCMIS is only moderately used to support their practice. The final verified items of each variable (constructs) were computed and the results are described in table

Table 4-3 Descriptive statistics of computed variables

Descriptive Statistics of computed variables											
Computed variables	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Median	Skewness		Kurtosis	
	Value	Value	value	Value	value	value	value	Value	Std. Error	Statistic	Std. Error
PE	200	14.00	21.00	3480.00	17.4000	1.61027	17.00000	-0.095	0.172	-0.870	0.342
EE	200	13.00	20.00	3255.00	16.2750	1.75350	16.00000	0.844	0.172	-0.049	0.342
FC	200	10.00	18.00	2919.00	14.5950	2.11977	15.00000	-0.125	0.172	-1.375	0.342
SI	200	9.00	18.00	2866.00	14.3300	2.55612	14.00000	-0.521	0.172	-0.497	0.342
IQ	200	23.00	32.00	5456.00	27.2800	1.91046	27.00000	1.026	0.172	0.676	0.342
SQ	200	17.00	26.00	4324.00	21.6200	1.94280	21.00000	0.353	0.172	0.400	0.342
SS	200	10.00	19.00	2671.00	13.3550	2.44312	14.00000	0.298	0.172	-0.447	0.342
US	200	10.00	17.00	2681.00	13.4050	2.15037	13.00000	0.141	0.172	-0.938	0.342
NPSP	200	26.00	34.00	5773.00	28.8650	1.59042	29.00000	1.193	0.172	1.988	0.342
CSE	200	30.00	38.00	6723.00	33.6150	2.58655	34.00000	-0.288	0.172	-1.455	0.342
CTQ	200	6.00	20.00	2465.00	12.3250	3.06207	12.00000	-0.037	0.172	-0.645	0.342
UI	200	12.00	18.00	3028.00	15.1400	1.51389	15.00000	-0.293	0.172	-0.121	0.342
U	200	24.00	31.00	5347.00	26.7350	1.98860	27.00000	0.097	0.172	-1.340	0.342

EPSP	200	25.00	38.00	6415.00	32.0750	3.56129	32.00000	0.106	0.172	-0.914	0.342

4.4.1 Level of satisfaction of HCMIS users

Table 4.5 revealed that most of the respondents (71%) were not satisfied with the HCMIS and only (29%) of the respondents are pleased with HCMIS. Majority of the respondents (83.5%) consider that the perceived utility about the HCMIS (DAGU2) was large and greeter than half of the respondents (64%) argue that the overall interaction with the system was very satisfying.

Table 4-4 Level of satisfaction of HCMIS users

Code	Questions	Level of Agreements	Frequency	Percent
US1	You think that the perceived utility about the HCMIS is high.	Strongly disagree	0	0
		Disagree	40	20.0
		Fair	73	36.5
		Agree	87	43.5
		Strongly agree	0	0.0
US2	The HCMIS has met your expectations.	Strongly disagree	0	0
		Disagree	122	61.0
		Fair	48	24.0
		Agree	30	15.0
		strongly agree	0	0.0
US3	I am pleased with the HCMIS is Successful	Strongly disagree	0	0
		Disagree	108	54.0
		Fair	72	36.0
		Agree	20	10.0
		Strongly agree	0	0.0
US4	Majority of the respondents have a positive attitude or evaluation towards the HCMIS	Strongly disagree	0	0
		Disagree	68	34.0
		Fair	94	47.0
		Agree	38	19.0
		Strongly agree	0	0.0
US5	Overall my interaction with the HCMIS is very satisfying	Strongly disagree	0	0
		Disagree	87	43.5
		Fair	104	52.0
		Agree	9	4.5
		Strongly disagree	0	0.0

4.4.2 Level of the intention to use ~~of~~ HCMIS

As described in table 4.6 regarding the domain of the system intention to use, nearly (75%) of the respondents agree with the statements — *You depend upon the HCMIS* to perform the major pharmaceutical supply chain operations, 98 % of the respondents agree with the statements— *Your frequency of use of the HCMIS is high* and (91%) of respondents agree on the — *You were able to complete a task using the HCMIS even when there was no one around to tell you what to do* and , most of the respondents (88%) *have the integrated pharmaceutical logistics system (IPLS) knowledge necessary to use the HCMIS*

Table 4-5 Level of Intention to use of HCMIS users

Code	Questions	Level of Agreements	Frequency	Percent
UI1	Your frequency of use of the HCMIS is High	Strongly disagree	3	1.5
		Disagree	22	11.0
		Fair	6	3.0
		Agree	162	81.0
		Strongly agree	7	3.5
UI2	You depend upon the HCMIS	Strongly disagree	3	1.5
		Disagree	31	15.5
		Fair	42	21.0
		Agree	122	61.0
		Strongly agree	2	1.0
UI3	You were able to complete activities using the HCMIS even when there was no one around to tell you what to do	Strongly disagree	0	0
		Disagree	18	9.0
		Fair	32	16.0
		Agree	130	65.0
		Strongly agree	20	10.0
UI4	You have the IPLS knowledge necessary to use the HCMIS(DAGU2)	Strongly disagree	0	0
		Disagree	26	13.0
		Fair	50	25.0
		Agree	105	52.5
		Strongly agree	19	9.5

4.4.3 Level of net impact of pharmaceutical supply chain

The net impact of HCMIS use in health supply chain management is presented with below indicators.

Job performance

The study indicated that HCMIS use contributed to improvement on individual job performance with (8.5 %) strongly agree, (74%) agree and (17.5%) fair.

Improvement on business processes

The findings on table 4.5 showed that 9.5% of respondents disagreed, 87% of respondents responded fair and 3 % of respondent agree that the HCMIS has resulted in improved business processes (Purchase requisition, Receive, Issue, selection, quantification).

Efficiency and effectiveness

The findings of this study showed that using HCMIS has contributed at (6.5%) disagree, 59% fair, 30 % agree and 4.5 % strongly agreed that HCMIS has resulted in improvement in efficiency and effectiveness of pharmaceutical supply chain operations and performance.

HCMIS contribution on reduction of wastage rate

This study revealed that two third of respondents agreed that e-LMIS has contributed to the reduction of wastage rate where 57% agreed and 41.5% strongly agree on the success of HCMIS. None of respondents in this study disagreed on contribution of HCMIS on health supply chain wastage rate reduction.

The tables above showed that through the use of HCMIS, the quantity of expired health commodities as well as corresponding value has been reduced year by year

Effectiveness of communication and collaboration

The study indicated that HCMIS use contributed at (8%) strongly disagree and 94 % disagree that HCMIS has resulted in effectiveness of communication and collaboration across different entities within the Pharmaceutical supply chain (EPSS and Health facilities, Health facilities & dispensing units). Almost the entire respondent agreed that the HCMIS of the health facility is not linked with other electronics tools within the facility and electronics tools of Ethiopian pharmaceutical supply service (EPSS).

Managing a growing volume of activity

As described in table 4.5, this study indicated that more the majority of the respondents agreed (85.5 %) and strongly agrees (10.5%) that the HCMIS has increased their ability to manage a large product transactions and dispensing units

Management control

This study revealed that 88% of the respondent disagree that the HCMIS has improved management control (monitoring & evaluation), this is because most of the pharmacy head of the health facility and logistics head of the sub city did not used the HCMIS to manage the transaction in the health facilities due to inadequate infrastructure like computer ,printer and other materials.

Supply chain practice and outcomes

This study indicated that HCMIS use contributed at 97.5% fair and 2.5 % agreed that the HCMIS contributed to optimal supply chain practices by enhancing data capture, reporting, accessibility, transparency, timeliness, and quality which lead to effective decision-making for superior supply chain outcomes

Generally, this study revealed that the HCMIS system has improved data management, forecasting efficiency, reduced expiries rate & product availability with 99.5 % fair level of agreement.

Table 4-6 Net Pharmaceutical Supply chain performance

Level of individual and organizational performance(Net Pharmaceutical Supply chain performance)				
Code	Questions	Level of Agreements	No of occurance	Percent
NPSP1	The HCMIS improve my job performance	Strongly agree	17	8.5
		Agree	148	74.0
		Fair	35	17.5
		Disagree	0	0.0
		Strongly disagree	0	0.0
NPSP2	The HCMIS has resulted in improved business processes (Purchase requisition, Receive, Issue, selection, quantification).	strongly agree	0	0.0
		Agree	6	3.0
		Fair	175	87.5
		Disagree	19	9.5
		Strongly disagree	0	0.0
NPSP3	The HCMIS is important to increase efficiency and effectiveness of pharmaceutical supply chain performance	Strongly agree	9	4.5
		Agree	60	30.0
		Fair	118	59.0
		Disagree	13	6.5
		Strongly disagree	0	0.0

NPSP4	The HCMIS has resulted in wastage rate reduction	Strongly agree	83	41.5
		Agree	114	57.0
		Fair	3	1.5
		Disagree	0	0.0
		Strongly disagree	0	0.0
NPSP5	The HCMIS has resulted effectiveness of communication and collaboration across different entities within the Pharmaceutical supply chain (EPSS and Health facilities , Health facilities & Dispensing units)	Strongly agree	0	0.0
		Agree	0	0.0
		Fair	0	0.0
		Disagree	192	96.0
		Strongly disagree	8	4.0
NPSP6	The HCMIS has enabled in an increased ability to manage large product transactions and dispensing units	Strongly agree	21	10.5
		Fair	4	2.0
		Agree	171	85.5
		Disagree	4	2.0
		Strongly disagree	0	0.0
NPSP7	The HCMIS has improved management control (monitoring & evaluation)	Strongly agree	0	0.0
		strongly agree	4	2.0
		Agree	20	10.0
		Fair	0	0.0
		Disagree	176	88.0
		Strongly disagree	0	0.0
NPSP8	The HCMIS contribute to optimal supply chain practices	strongly agree	0	0.0
		Agree	5	2.5
		Fair	195	97.5
		Disagree	0	0.0
		strongly disagree	0	0
NPSP9	Generally, the HCMIS system has improved data management, Forecasting efficiency, Reduced expiries rate & product availability	strongly agree	0	0
		Agree	1	0.5
		Fair	199	99.5
		Disagree	0	0.0
		Strongly disagree	0	0.0

4.5 Utilization level of HCMIS

The utilization level of the HCMIS assessed through six multiple choice questions and findings presented as described in table 4.6. This study showed that more than two third of

respondents(92%) used at always (100%) as part of their job, 6% of respondents use HCMIS usually (90% rate) and minority (4%) use it often at 70% rate.

This study indicated that majority (60%) of the respondents use HCMIS to make inventory adjustment at every quarter during inventory. Others (40%) made inventory adjustments at the end of Ethiopian fiscal year and during transaction, when there is damage and loss and also when they transfer the product for other health facilities.

This study indicated (84%) of respondents use all HCMIS functions beside 16% use only HCMIS respectively for transaction management.

Table 4.6 is showing that 25.5% responded that using HCMIS, generated information are incomplete and inaccurate, 32.5 % accurate but incomplete, 6.5% responded that those information are received on time but inaccurate and only 5.5 % complete but inaccurate .

Table 4.6 is showing that majority (100%) of respondents use HCMIS information to produce all required reports like inventory summary report, stock status report, and monthly consumption report, near expiry, Expiry summary report and pharmaceutical report and resupply report (RRF) report .

In this study 100 % have responded that HCMIS does not take more time for requisition, Issuing for Dispensing units, consumption, review and reporting data. All of respondents said that receiving take more time than other HCMIS functions.

Table 4-7 HCMIS UTILIZATION LEVEL

Code	Questions	Level of response	Frequency	Percent
U1	At which frequency do you use the HCMIS as part of your job?	Often	4	2.0
		Usually	12	6.0
		Always	184	92.0
U2	With health commodities management using the HCMIS, inventory adjustment is made:	At the end of Ethiopian fiscal year	80	40.0
		every quarter	120	60.0
U3	Among the HCMIS functions, I most experience using:	Transaction management only	32	16.0
		Transaction management, store management and	168	84.0

		Reporting		
U4	With the HCMIS use, generated information for reporting or decision-making are:	Incomplete and inaccurate	51	25.5
		Accurate but incomplete	65	32.5
		Received on real time but inaccurate	73	36.5
		complete but inaccurate	11	5.5
U5	Do you use the HCMIS information to produce any other reports? which of the following: (MULTIPLE RESPONSE)	Stock status	200	100
		Monthly consumption report	200	100
		Near expiry	200	100
		Expiry Summary Report	200	100
		Stock out report	200	100
		RRF	200	100
		Wastage rate report	200	100
U6	What activities in HCMIS take more time than it was with paper based?	Receiving	200	100.0

4.6 Effect of HCMIS on pharmaceutical supply chain performance

Effect or outcomes of HCMIS use in health supply chain management are presented with below indicators.

Data Accessibility

This study indicated that the use of HCMIS contributed to the accessibility on past and current information at any time of need (2%) disagrees, 72% fair and 21 % agrees.

Data Availability for decision making

The findings of this study showed that using HCMIS has contributed at (2%) disagree, 72% fair and 21 % agree to the data availability and health facility level information at a given time as can be needed purposively in decision making.

Reduction of forecasting and quantification challenges

The findings on table 4.7 showed that 15.5% of respondents disagreed and 84.5% respondents responded fair that data captured through HCMIS contributed to the reduction of some forecasting and quantification challenges like inaccuracy and incompleteness of data.

Stock level control

The findings from this study showed that available stock of tracer drugs (100%) chosen purposefully due to their high program impact, may last from 90% to 95 %. And the stock of one item out of ten falls below one month, one out of ten fall above three months. This study indicated that 8 items in 2018-2019 have been redistributed as the way of stock optimization according to the need, shelf life, protocol and consumption rate

Data accuracy

From the findings of this study, the stock on hand for 7 items taken purposefully due to their high program impact match with HCMIS buffer on hand ranges from 70% to 100% at the time of data collection.

Improvement of logistics data

This study indicated that the use of HCMIS in health supply chain contributed to logistics data improvement with 5.5% strongly agrees, 52% agreed. 41.5% of respondents are fair that utilization of HCMIS in health supply chain has improved logistics data and 1% of them are disagree on contribution of HCMIS to the improvement of logistics data.

Effect of HCMIS on tracer drugs availability and stock out duration

This study indicated that 29% of respondents and users of HCMIS agreed that Since the introduction of the HCMIS use, stock of tracer drugs is most of the time at optimum level without frequent stock out and or expiries. Greater than half (63%) are fair on the statement, and small number of respondents (8%) disagrees on it.

Effect of HCMIS on Supervision practices and monitoring and evaluation

The finding of this study showed that 22.5% of respondents and users of HCMIS agreed that since the introduction of HCMIS utilization in health facility supply chain has simplified supervision practices and time it takes for conducting supervision. Less than half (15%) are fair on the statement, and large number of respondents (62.5%) disagrees on it.

The finding of this study showed that 22.5% of respondents and users of HCMIS agreed that since the introduction of HCMIS utilization in health facility supply chain has simplified supervision practices and time it takes for conducting supervision. Less than half (15%) are fair on the statement, and large number of respondents (62.5%) disagrees on it.

Contribution of HCMIS on Workload reduction

In this study, only (0.5%) of respondents agreed that use of HCMIS in health supply chain management may considerably reduce the workload whereas more than half of respondents among them ((93.5) disagree, (6%) %strongly disagree that HCMIS utilization has contributed to the reduction of health supply chain related workload.

Time required to achieve responsibility through HCMIS

Most respondents in this study (70%) disagreed that use of HCMIS can increase the time to achieve their tasks than other tools.

Commitment of health facilities' manager regarding commodities and data management through HCMIS use

This study indicated that (29%) of respondents agreed that health facility managers became accountable regarding commodities and data management through HCMIS use. And less than half (40%) fairly showed that HCMIS has contributed to the good practice through commitment of health facilities managers, 31% disagreed on that.

The study showed that 93% of respondents disagree and 7% Strongly disagree agreed that workload that is frequently noted in health commodities management at health facilities level has been simplified through interfaces with other e-tools that are mostly used in the health facility and with electronics tools of Ethiopian pharmaceutical supply service (EPSS)

Table 4-8 Effect of HCMIS on pharmaceutical supply chain performance

Code	Questions	Level of agreements	Frequency	Percent
EPSP1	With the use of the HCMIS, I have access on past and current information at any time I need them	Strongly disagree	0	0
		Disagree	4	2.0
		Fair	154	77.0
		Agree	31	15.5
		Strongly agree	11	5.5
EPSP2	With the use of the HCMIS, Decision -	Strongly disagree	0	0.0

	makers have access on information at any health facility on time of need	Disagree	4	2.0
		Fair	154	77.0
		Agree	31	15.5
		Strongly agree	11	5.5
EPSP3	Using data captured through the HCMIS, has contributed to the reduction of some quantification (Forecasting) and product selection challenges like inaccuracy of data, incompleteness of data.	Strongly disagree	0	0.0
		Disagree	31	15.5
		Fair	169	84.5
		Agree	0	0.0
		Strongly agree	0	0.0
EPSP4	Since the introduction of the HCMIS use, our stock of health commodities is most of the time at optimum level without frequent stock out and or expiries	Strongly disagree	0	0.0
		Disagree	16	8.0
		Fair	126	63.0
		Agree	58	29.0
		Strongly agree	0	0.0
EPSP5	With health commodities management through the HCMIS,	Yes	160	80.0
		No	40	20.0
EPSP6	Since the introduction of the HCMIS use in your facility, using logistics data has changed.	Strongly disagree	0	0.0
		Disagree	2	1.0
		Fair	83	41.5
		Agree	104	52.0
		Strongly agree	11	5.5
EPSP7	Supervision practices and time have been simplified since the introduction of HCMIS in health supply chain indicators in your health facility	Strongly disagree	0	0.0
		Disagree	125	62.5
		Fair	30	15.0
		Agree	45	22.5
		Strongly agree	0	0.0
EPSP8	Since the introduction of HCMIS use in my job, workload has considerably reduced	Strongly disagree	12	6.0
		Disagree	187	93.5
		Fair	0	0.0
		Agree	1	0.5
		Strongly agree	0	0.0
EPSP9	Due to different factors, I spend more time, reporting data with HCMIS than it was with paper based.	Strongly disagree	0	0.0
		Disagree	69	34.5
		Fair	8	4.0
		Agree	123	61.5
		Strongly agree	0	0.0
EPSP 10	Since the introduction of the web –based e-HCMIS, health commodities managers become accountable regarding data and commodities management	Strongly disagree	0	0.0
		Disagree	62	31.0
		Fair	80	40.0
		Agree	58	29.0

		Strongly agree	0	0.0
EPSP 11	Workload that is frequently noted in health commodities management at health facilities level is simplified through interfaces with other e-tools that are mostly used in health facility	Strongly disagree	14	7.0
		Disagree	186	93.0
		Fair	0	0.0
		Disagree	0	0.0
		Strongly disagree	0	0.0
EPSP 12	Since the introduction of the e-HCMIS, my responsibilities become more time- consuming (Receiving, Issuing , Generating report and Inventory)	Strongly disagree	0	0.0
		Disagree	95	47.5
		Fair	14	7.0
		Agree	91	45.5
		Strongly agree	0	0.0

4.7 Model reliability and validity evaluation

Reliability ensures the internal consistency of the results for the many things being tested within each component, according to Foster (Foster JJ, 2001). Cronbach's Alpha was used to gauge the degree of reliability. According to the SPSS findings, the 11-item Cronbach's alpha coefficient was 0.735. The instrument was considered reliable by Sekaran (2003) since Cronbach's alpha was higher than 0.70, as recommended for basic research. By checking the items' internal consistency, Cronbach's alpha results were also assessed. According to Table 4.4, the values for the ten constructs varied from 0.646 to 0.752.

Table 4-9 Reliability Measurement

S.N	Construcs	Cronbach's Alpha if Item Deleted
1	PE	0.752
2	EE	0.707
3	FC	0.724
4	SI	0.646
5	IQ	0.733
6	SQ	0.756
7	SS	0.739

8	US	0.683
9	UI	0.675
10	NPSP	0.701

A commonly employed threshold value to accept individual item reliability is not absolutely but roughly 0.7 (Hair et al., 2008), and in practice loadings less than 0.7 but greater than 0.5 have often been deemed acceptable (Hulland, 1999; Mettler, 2012). The values of composite reliability (CR) for all latent variables are greater than 0.7. Hence, convergent validity of the survey instrument was supported. The content validity of the instrumented was tested by expert opinion from the FMOH and DHA JSI and pretest was also performed at one of the federal hospitals, after conducting the pretest and taking feedback from the experts some modification made to make the measurement more specific for the respondents.

Table 4-10 Testing Result of Convergent validity

Items	Factor Loadings	Factor Loadings square	CR
PE	0.342	0.116964	0.9
EE	0.092	0.008464	1.0
FC	0.092	0.008464	1.0
SI	0.115	0.013225	1.0
IQ	0.482	0.232324	0.8
SS	0.442	0.195364	0.8
SQ	0.266	0.070756	0.9
SS	-0.096	0.009216	1.0
SI	0.519	0.269361	0.7
PE	0.174	0.030276	1.0
EE	0.015	0.000225	1.0
FC	0.268	0.071824	0.9
IQ	0.02	0.0004	1.0
SQ	0.094	0.008836	1.0
US	0.216	0.046656	1.0
UI	0.453	0.205209	0.8

4.8 Hypothesis testing

Since path analysis results showed the validity of the underlying structure of the items measured, hence it is possible to the test the structural model. The path analysis of the structural equation model was performed using SPSS AMOS for testing hypotheses proposed in the previous section. The study evaluates the relationship between dependent and independent variables and the testing results of the hypotheses with the structural model are shown in table 4.9. Among seven antecedents of users satisfaction, social influence has the highest positive significant effect on user satisfaction (path coefficient=0.516, t-value 0.448, p-value<0.001). The relations between performance expectancy and users satisfaction with HCMIS is positive and significant (path coefficient=0.341, t-value 0.445, p-value<0.001). Information quality, system quality, effort expectancy and facility condition has appositive effect on users satisfaction but statistically insignificant with users satisfaction. Service quality factors have negative effect on user‘s satisfaction and it is statistically insignificant.

Moreover, user satisfaction has a significant positive effect on organizational benefits in terms of net pharmaceutical supply chain performance (path coefficient=, 0.208 t-value 0.154, p-value<0.001).

Among the seven quality influencing factors on user‘s intention to use of the HCMIS satisfaction such as performance expectancy, Social influence, facility condition, information, system, and service quality factors social influence quality factors has the highest positive and significant effect (path coefficient=, 0.516 t-value 0.448, p-value<0.001) on users intention to use of the HCMIS but the quality factor effort expectancy has appositive but insignificant effect on users intention to use of the HCMIS (path coefficient=, 0.015, t-value 0.0.13, p-value<0.754). Moreover, users intention to use regarding HCMIS has a significant positive effect on organizational benefits in terms of net pharmaceutical supply chain performance (path coefficient=, 0.553 t-value 0.559, p-value<0.001).

Table 4-11 Summary of hypothesis testing

Hypothesis testing	Standard Estimate	t value	p –value	Decision
Performance Expectancy has positive effect on user satisfaction on HCMIS	0.341	0.445	***	Supported
Effort Expectancy has positive effect on user satisfaction on HCMIS	0.092	0.113	0.14	Supported
Facilitating conditions has positive effect on user satisfaction on HCMIS	0.092	0.092	0.074	Supported
Social influence has positive effect on users intention to use of the HCMIS	0.114	0.069	0.036	Supported
Information quality has positive effect on users intention to use of the HCMIS	0.479	0.369	***	Supported
Service quality has positive effect on users intention to use of the HCMIS	0.441	0.264	***	Supported
System quality has positive effect on users intention to use of the HCMIS	0.281	0.2	***	Supported
Service quality has negative effect on users satisfaction on HCMIS use	-0.096	-0.083	0.119	Not supported
Social influence has positive effect on users satisfaction on HCMIS use	0.516	0.448	***	Supported
Performance expectancy has positive effect on intention to use of the HCMIS	0.173	0.156	***	Supported
Effort expectancy has positive effect on user intention to use of the HCMIS	0.015	0.013	0.754	Supported
Facility condition has positive effect on user intention to use of the HCMIS	0.267	0.185	***	Supported
Information quality has positive effect on user satisfaction on HCMIS use	0.02	0.022	0.703	Supported
System quality has positive effect on users satisfaction on HCMIS use	0.1	0.103	0.097	Supported
User satisfaction regarding the HCMIS use positively and significantly influences users‘ net impacts.	0.208	0.154	***	Supported

User‘s intention to use regarding the HCMIS use positively and significantly influence users‘ net impacts.	0.553	0.589	***	Supported

Table 4-12 Total effect of the model Dimensions

Total Effects (Structural model path)										
Effect		SQ	SS	IQ	SI	FC	EE	PE	UI	US
Indirect effect	UI	0.2	0.264	0.369	0.069	0.185	0.013	0.156	0	0
Indirect effect	US	0.103	-0.083	0.022	0.448	0.092	0.113	0.445	0	0
Direct effect	NPSP	0.134	0.143	0.221	0.109	0.123	0.025	0.16	0.589	0.154
Total effect		0.437	0.324	0.612	0.626	0.4	0.151	0.761	0.589	0.154
Relationship		Moderate	Small	High	Large	Medium	Small	Large	Medium	Small

This study has evaluated the relationship among the dimensions. For this study indirect effects denote mediation effects whereas the direct effect is the hypothesized relationship between two constructs. The total effect is the sum of the direct effect and the indirect effect of a variable on another variable (Yakubu & Dasuki, 2018). The results of this study suggest that IQ has the highest positive direct effect on user‘s intention to use of the HCMIS, but EE has the lowest indirect effect on user‘s intention to use of the HCMIS. For users satisfaction toward HCMIS use SI has the highest indirect effect whereas SS has the negative direct effect on users satisfaction toward HCMIS use which implies that users satisfaction cannot explained in terms of system support quality factors .Among the ten construct PE has the highest direct effect on NPSP whereas EE and US has the lowest direct effect on NPSP. Moreover, among the ten construct of the model PE has the highest total effect whereas US has the lowest total effect which implies the users believes that the HCMIS improve their job performance but due to inadequate improvement on SQ, SS, FC and UI the users satisfaction toward HCMIS use is low, hence the AACAHB and the health facility to ensure the sustainability of the system they have to give special attention for users satisfaction

4.8 Model fit summary

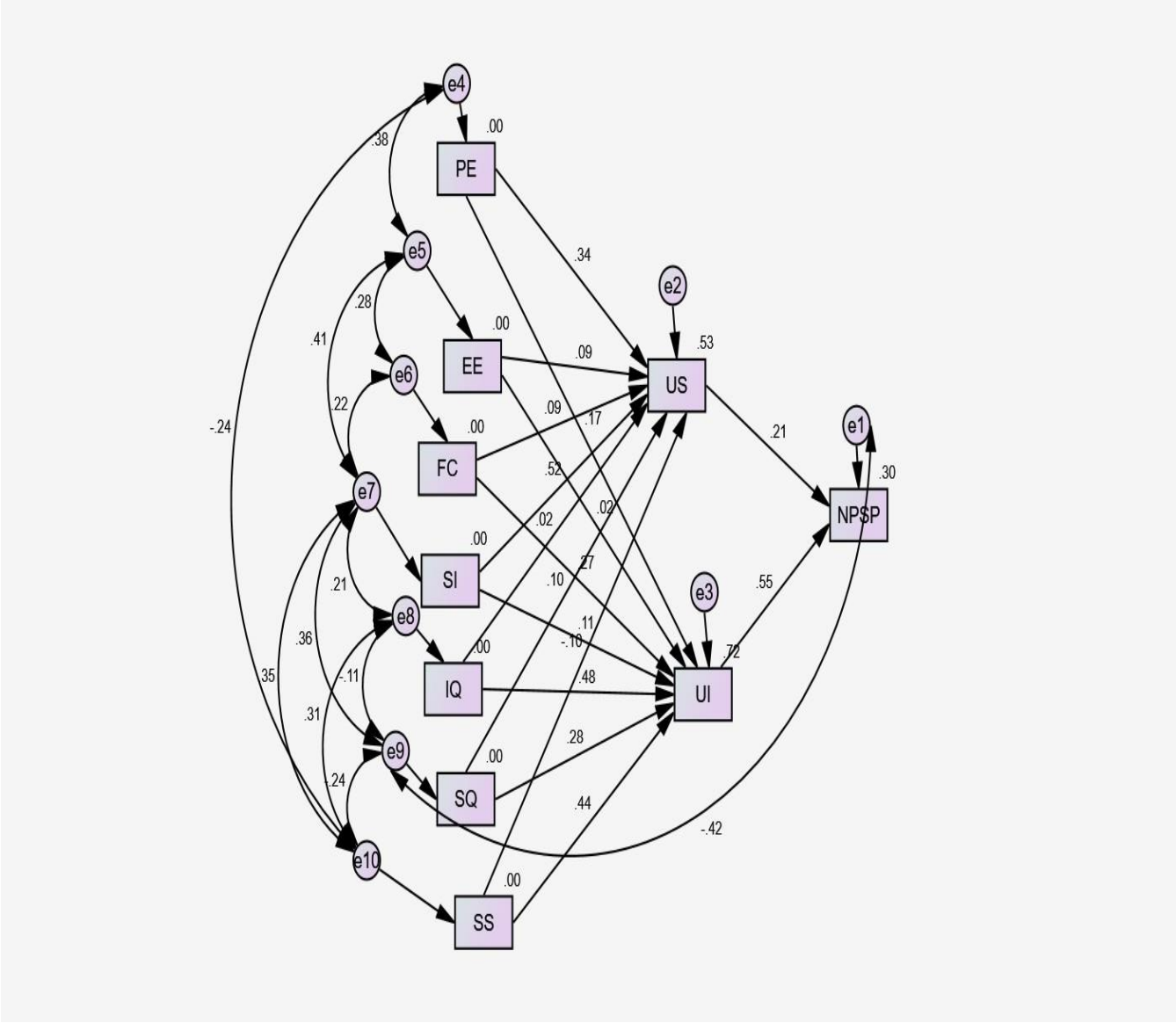
Numerous indices, including the Tucker-Lewis Index (TLI), Standardized Residual Mean Square (SRMR), Normalized Fit Index (NFI), Unnormalized Fit Index (NNFI), and Comparative Fit Index (CFI) are evaluated, as well as mean square error of approximation (RMSEA) and others, can be used to measure the overall fit of the model. (Hu and Bentler, 1999) state that the threshold for a satisfactory match for Maximum Likelihood (ML) is suggested when the SRMR

value is less than 0.08, close to 0.06 for RMSEA, and near to 0.90 for TLI, CFI, and RNFI. All goodness-of-fit indices fall within the permitted range, as stated in Table 4.13, which is.

Table 4-13 Model Fit Summary

Goodness of fit indices	Value
Normed chi-square	2.298
SRMR	0.0611
RMSEA	0.075
TLI	0.94
CFI	0.93
RNFI	0.88

Figure 4-1 Path analysis results SPSS AMOS



4.9 Results and Discussion

This study is based on the principles of technology acceptance patterns (technology acceptance patterns); Emphasizing the integration of the UTAUT and ISS models, as well as the integration of the autonomy of computers and the quality of complementary technologies. A hypothetical, empirically validated conceptual research framework to predict HCMIS implementation success as dimensions of UI, US, and net impact (individual and organizational).

If we review the literature on information technology adoption and supply chain management, the current literature lacks cutting-edge research on the adoption of information systems in the supply chain by healthcare organizations using a multimodal integration approach. Thus, this research model provides strong incentives to accurately predict information systems usage intent, user satisfaction, and net impact as a dimension of HCMIS success in the chain domain. Therefore, the model integrates UTAUT and ISS models as indicators of usage intention, user satisfaction, and net user performance in the net performance of the pharmaceutical supply chain as predictors of HCMIS success. In addition, CSE and the CTQ were tested as predictors of HCMIS use. This study also evaluated the level of usage and impact of HCMIS on pharmaceutical supply chain performance.

This study showed the relationship between variables and the testing results of the hypotheses with the structural model are shown in table 4.11. From the seven antecedents of US, SI has the largest positive and significant effect on user satisfaction (path coefficient=0.516, t-value 0.448, p-value<0.001). The relations between performance expectancy and users satisfaction with HCMIS is positive and significant (path coefficient=0.341, t-value 0.445, p-value<0.001). IQ, SQ, EE and FC has appositive effect on users satisfaction but statistically insignificant with users satisfaction. Furthermore, US has a positive significant effect on organizational benefits in terms of net pharmaceutical supply chain performance (path coefficient=, 0.208 t-value 0.154, p-value<0.001).

This study varies from other researches like DeLone and McLean (2003) model that showed that IQ and SQ are significant predictors of users‘ satisfaction. Another study conducted by Seddon (1997) as well found that SQ, IQ and PE are significant predictors of US. This is because the

operation of the HCMIS is not stable and also there was no backup system in the health facility to capture the logistics data. In addition to this the HCMIS is not connected with other units in the health facility as well as with digital tools of the Ethiopian pharmaceutical supply service and there is also problem related to providing high speed information access due to lack of server storage. Moreover, the system did not allow the users to customize the product by themselves and due to different factors the data and report from the HCMIS are not accurate and complete. This study indicated that service quality factors have negative effect on user‘s satisfaction and it is statistically insignificant. This shows that US could not be explained by service quality provided by IT Unit at the health facility. The reason behind this is because the onsite training provided by HCMIS team did not enhance user‘s ability to perform analysis to make optimal decision like ABC analysis and no adequate training is provided by HCMIS team to enhance users‘ability to use the system. The UTAUT constructs such as performance expectancy increase user satisfaction, which is different from the original UTAUT model but the other UTAUT constructs such as EE, SI, and FC did not statistically significant effect on user satisfaction, which is a conceptually similar effect from the original UTAUT model.

Most crucially, the study discovered that system quality had a positive effect on system user satisfaction but it is statistically insignificant. This is because the hypothesis was not supported by the beta value of 0.103 with a p-value of 0.097, which was not significant. According to the research, users complain that the system is unstable, that it takes too long to get information, and that there are issues with the completeness and accuracy of data and reports. It demonstrates that you are conscious that you are decreasing rather than eliminating manual labor. The outcomes provide constructive criticism to the HCMIS team and system developers. To enhance features that directly impact how people use a system, a system redesign is necessary. This can be seen in the qualitative component as well. The majority of respondents agreed that more training should be provided on system functionalities and that the system should be used both online and offline because offline mode does not provide the system with sufficient stability. At addition to serving as an excellent backup, this will connect with other systems utilized at the facility and digital tools and systems of the EPSS to enable end-to-end data transparency throughout the supply chain. It also presents prospective outcomes. Medical institutions should be assigned the task of hosting servers so that information can be quickly

accessed by patients.

The fact that Information First-class with a p cost of 0.073 isn't always in the study's appropriate degree of full-size (0.05) means that the speculation isn't always statistically full- size, and its beta cost of 0.02 doesn't always support it. For the data collected inside the HCMIS to be of high quality, FMOH, DHA JSI, and all deliver chain players must work together. The facts have to be well timed in line with the time every respective organization record to the machine, the facts and reviews have to be correct in addition to the HCMIS have to offer enough facts to generate the desired reviews, facts that is simple to understand, and the reviews with inside the HCMIS system need to be to be had every time you need to use and the HCMIS to offer facts that appears to be precisely IPLS trendy there need to be linkage some of the HCMIS and different virtual gear which are used with inside the clinic in addition to EPSS and the guide paintings have to be transformed into completely automatic machine to lessen the paintings load with a purpose to enhance user`s delight with HCMIS. This additionally turned into found with inside the qualitative evaluation as all of the interviewee confirmed the significance on having excessive facts first-class because of the cause that the facts determined with inside the machine is utilized in making excessive important selection making

Performance expectations were also found to have a positive and significant impact (β=0.341) on user satisfaction and user intention to use HCMIS (β=0.173). Therefore, users seem to believe that using the system will improve their work performance. We also believe that the system allows us to complete our daily tasks faster and more efficiently. (Venkatesh et al., 2003) explained that performance expectations are a good indicator of usage. Therefore, if DHA JSI, FMOH, and AACAHB continue to demonstrate the value of the system to users, it means that users are likely to continue using the system. Nearly all respondents indicated the importance of the system in their daily activities and called for more training, especially at the institutional level where the data originated.

The social influence quality factors have the highest positive and significant effect (path coefficient=, 0.516 t-value 0.448, p-value0.001) on users intention to use the HCMIS, but the quality factor effort expectancy has the lowest positive and significant effect (path coefficient=,

0.448, p-value0.001) on users intention to use the HCMIS. This is an additional interesting finding of this study. In addition, users' intention to utilize HCMIS significantly improves organizational gains in terms of the efficiency of the pharmaceutical supply chain (path coefficient=, 0.553, t-value0.559, p-value0.001). This outcome is consistent with both the UTAUT model and the original DeLone and McLean (2003) work. The fact that FC had no discernible impact on behavioral intention in the original UTAUT model, which was claimed to be because the impact has been captured by effort expectancy (Venkatesh et al., 2003), is another resemblance to the original UTAUT model. This demonstrates that HCMIS is being used at a high rate. Users may assume they have the resources necessary to use the system if there is a significant positive correlation between facility conditions and user desire to use the system. . Computers and internet connectivity are among the available resources for accessing your system. This is consistent with the qualitative research, which found that only sub-urban logistics managers were asked for computers, and that the AACAHB needed access to HCMIS missions to improve monitoring and evaluation activities. To make sure our staff has the proper infrastructure, we need to collaborate more with a sufficient number of partners.

The results of this study generally supported the notion that, in terms of net pharmaceutical SC performance, there is a positive and significant association between user satisfaction and organizational benefits as well as between user's intention to use and organizational advantages. In this study, the HCMIS users were questioned about how much they believe a number of net benefits are being attained. Additionally, the respondents were questioned about organizational net benefits rather than individual or personal results, such as decreased wastage rate, increased data administration, quantification and forecasting efficiency, and product availability. In order to determine whether a user is satisfied or content with the system they are using personally or individually, as well as their intention to use the system frequently.

4.10 Contribution

The established IS Success Model enables us to take into account both the user aspects that the IS Success Model ignored while requiring system use in the healthcare industry as well as the IS Success Model's overall perspective. Further investigation into the use and utilization of IS in many IS disciplines, particularly in the medical profession, can be supported by this study. Below are three various viewpoints on the research findings, including theoretical, methodological, and practical ones. The created model (theoretical contributions) defines user satisfaction and intention to use the system by integrating the indications from the UTAUT model with those from the DeLone and McLean IS model. The IS Net Impact Study's qualitative design was defined.

4.11 Limitations

This research has currently some limitations which can be developed further in the future. The first limitation is that this was a cross-sectional study that took place at one-time point. First, organizational benefits in terms of net pharmaceutical supply chain performance, one of the major constructs of this research did not measure whether or not it is realized. Thus, in order to reinforce and refine the hypotheses proposed, it is needed to empirically measure and test actual realization of these benefits. This will make a stronger and meaningful theory, which can help to provide practical implications and insights in a healthcare setting. As a result, future research could adopt a case study with quantitative research approach to measure actual use and to get more accurate results from system users. Second, the study conducted at the same level of HCMIS use and it is good to perform comparative analysis between health facility and EPSS to measure the digital tools success. Third this study shows only the relationship among the different construct further any causality between actual use and realized benefits such as effectiveness, efficiency, and safety can be studied.

CHAPTER FIVE

5 Conclusion and Recommendation

5.1 CONCLUSTION

The study proposed and validated a model and relevant metrics that used in evaluating user‘s satisfaction, user‘s intention to use and net impact user‘s evaluation in a specific healthcare setting, which is a health commodity management information system in public health facility Addis Ababa Ethiopia. The model was an outcome of an intensive literature review of different models proposed by different authors for the assessment of information systems. In this vein, this study evaluate the success of the health commodity management information system by using the D & M IS success model (2003) and Unified Theory of Acceptance and Use of Technology or UTAUT framework developed by Venkatesh et.al,2003 model that is potentially adequate for the targeted professional context and healthcare setting. Ten factors were found and used in assessing the model. After a path analysis using SPSS AMOS, all the factors were found insignificant except system performance expectancy which was significant in contributing to users‘ satisfaction with HCMIS.

Another interesting finding of this study is among the seven quality influencing factors on user‘s intention to use of the HCMIS satisfaction such as performance expectancy, Social influence, facility condition, information, system, and service quality factors, social influence quality factors has the highest positive and significant effect (path coefficient=, 0.516 t-value 0.448, p-value<0.001) on users intention to use of the HCMIS but the quality factor effort expectancy has appositive but insignificant effect on users intention to use of the HCMIS (path coefficient=, 0.015, t-value 0.0.13, p-value<0.754).

Generally, this study find that there is significant positive relationship between user satisfaction and organizational benefits and users intention to use and organization benefits in terms of net pharmaceutical supply chain performance. Hopefully the results and experiences of this study can be helpful to other researchers in this area.

5.2 Recommendations

According to health sector transformation plan of FMOH digitalization gains special attention to make end to end data visibility thought the pharmaceutical supply chain operation to optimize the supply chain performance. Hence, FMOH, DHA JSI and all supply chain stakeholders should collaborate to ensure that the information obtained in the HCMIS are of high quality. The data should be timely according to the time each respective group report to the system, the data and reports should be accurate as well as the HCMIS should provide sufficient information to generate the required reports, information that is easy to understand, and the reports in the HCMIS system must be available whenever you want to use and the HCMIS to provide information that seems to be exactly IPLS standard there must be linkage among the HCMIS and other digital tools that are used in the health facility as well as EPSS and the manual work should be converted into fully automated system to reduce the work load so as to improve user‘s satisfaction with HCMIS. In addition, to strength the monitoring and evaluation system and to simplify the supervision practice and time the AACAHB should give due attention for the logistics service at the sub city level.

This study found that system quality has the negative effect on users‘ satisfaction towards the system. This finding implies that users found that the operation of the system is not stable, the system is not providing high speed information access, there is also problem related with data and report accuracy and completence and the system did not reduced manual work. These findings validate similar studies which found that system quality had a negative effect on users‘ satisfactions with the system such as those in Omary, et al (2017). The results provide a good feedback to the HCMIS team and system developers. The system should be redesigned to improve features that have a direct impact on the way users use the system. This is also well observed in the qualitative part as most of the interviewee said that more training on the system features should be conducted and the system should be both online and offline mode due to the reason that the system is not stable so that the offline mode can be a good backup and also adding some future to link the system with other systems used in the facility as well as the digital tools of the Ethiopian pharmaceutical supply service to make end to end data visibility throughout the supply chain. It is also good to have server storage in the health facility to provide high speed information access and the role of customizing the product into the system should be given for the health facility.

Finally, to improve the acceptance and use of HCMIS, the health facilities should give attention for computer self-efficiency and complementary technology quality to improve the HCMIS use . The study also recommends ACAHB should look at the issue of the quality of internal and external support from organizational and technical infrastructure exists to support the use of HCMIS. The facilities, together with the concerned stakeholders, should strengthen their HCMIS by giving more emphasis on the IQ, SYQ and SS aspects of the HCMIS and develop the capability to run the system by them for enhancing acceptance and use of the system to ensure the sustainability of the system.

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ANNEX

Annex 1. List of Health facilities assessed

S.no.	Name of the facility	
	Hospitals	**Administration**
1	Gandi memoral Hospital	AACAHB
2	Tiruneshi Bejeing Hospital	AACAHB
3	Yekatit 12 Hospital	AACAHB
4	Zewditu Hospital	AACAHB
5	Millink 11 Hospital	AACAHB
6	Ras desta Hospital	AACAHB
7	Forty Five High work load HC	AACAHB

Annex 2. List of tracer drugs for hospitals and HCs

1. ORS+/- Zinc sulphate
2. Medroxyprogesterone Injection
3. Ferrous sulphate + folic acid
4. TDF/3TC/DTG
5. RHZE/RH
6. Tetracycline eye ointment
7. Hydralazine injection
8. Medroxyprogesterone Injection
9. Pentavalent vaccine
10. Oxytocin injection
11. Gentamycin injection
12. Amoxicillin dispersible/suspension/capsule
13. Iron + folic acid
14. Albendazole/Mebendazole tablet/suspension
15. Co-trimoxazole 240mg/5ml suspension
16. Amlodipine tablet
17. Frusemide tablets
18. Metformin tablet
19. Normal Saline 0.9%
20. 40% glucose
21. Adrenaline injection

22. Tetanus Anti Toxin (TAT) injection
23. Omeprazole capsule
24. Metronidazole capsule
25. Cipro floxacillin tab