FACTORS AFFECTING THE IMPLEMENTATION OF ELECTRONIC MEDICAL RECORDS SYSTEMS (EMRs) IN JORDANIAN HOSPITALS

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Abstrak

Sistem Rekod Perubatan Elektronik (EMRS) merupakan satu aplikasi yang membolehkan akses dan dapatan semula data sejarah perubatan pesakit. Pada masa kini pelaksanaan EMRS hanya meliputi tidak lebih 50% daripada hospital di Jordan, dan penyelidikan untuk mengenal pasti faktor utama yang mempengaruhi pelaksanaan EMRS di Jordan juga adalah terhad. Kajian ini bertujuan untuk meninjau faktor yang mempengaruhi pelaksanaan EMRS di hospital di Jordan. Model konsep, disesuaikan daripada Model Penerimaan Teknologi (TAM), yang dibangunkan untuk mengaitkan Faktor Organisasi (OF) dan Faktor Ciri Individu (ICF) dengan pelaksanaan EMRS di hospital di negara Jordan. Soal selidik tadbir kendiri telah digunakan untuk mengumpul data daripada kakitangan profesional penjagaan kesihatan di dua buah hospital utama yang melaksanakan EMRS sepenuhnya. Penemuan menunjukkan bahawa OF mempunyai hubungan signifikan dengan Tanggapan Kemudahan Penggunaan (PEOU) dan Tanggapan Kebergunaan (PU), ICF mempunyai hubungan yang signifikan dengan PEOU, hubungan Pengguna - Pesakit mempunyai kaitan yang signifikan dengan PU kecuali Autonomi pengguna, PEOU pula mempunyai kesan yang signifikan dengan PU, PU mempunyai hubungan yang signifikan dengan Sikap terhadap Penggunaan (ATU) kecuali PEOU, dan ATU mempunyai hubungan yang signifikan dengan Niat Tingkahlaku Penggunaan. Hasil kajian ini menyumbang kepada peningkatan pengetahuan berasaskan teori tentang penggunaan TAM dalam domain informatik kesihatan. Kajian ini telah menambahbaik model TAM yang menggabungkan PEOU dan PU, dengan mempertingkatan pemboleh ubah OF dan ICF. Maka, dapatan kajian ini boleh membantu pembuat keputusan dalam merangka strategi-strategi pelaksanaan EMRS di Jordan.

Kata kunci: Sistem Rekod Perubatan Elektronik, Model Teknologi Penerimaan, Faktor Organisasi, Faktor Ciri Individu

Abstract

An Electronic Medical Record System (EMRS) is an application that enables access and retrieval of a patient's medical history. Currently EMRS implementation does not encompass more than 50% of the hospitals in Jordan, and limited research has been done in Jordan to identify the main factors affecting the implementation of EMRS. The aim of this study is to explore the factors that affect the EMRS implementation in Jordanian hospitals. A conceptual model, adapted from Technology Acceptance Model (TAM), was built to relate Organizational Factors (OF) and Individual Characteristic Factors (ICF) to EMRS implementation in Jordanian hospitals. Self-administered questionnaires were used to collect the data from healthcare professionals in two major hospitals that have full implementation of EMRS. Findings indicated that OF has significant relationships with Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), ICF has significant relationships with PEOU, User – Patient relationship has significant relationships with PU with exception of User Autonomy, PEOU has a significant effects with PU, PU has significant relationship with Attitude Toward Using (ATU) exception of PEOU, and ATU has a significant relationship with Behavioural Intention to Use. The finding of this study has led to the enhancement of the theoretical knowledge of TAM's application in the health informatics domain. This study has extended the current model comprising PEOU and PU, by adding the OF and ICF. Consequently, the findings can assist decision makers in formulating EMRS implementation strategies in Jordan.

Keywords: Electronic Medical Record System, Technology Acceptance Model, Organizational Factors, Individual Characteristic Factors

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In the name of Allah and His mercy, the more you learn, the more you realize how little you know. We come to understand that our accomplishments are not possible without the help of Allah. The following are just a few of the countless people who have helped me to complete my Ph.D. studies.

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List of Abbreviations

ACR	American College of Rheumatology
ATB	Attitude Toward Behaviour
BI	Behavioural Intention
CBPR	Computer-Based Patient Record
CCD	Continuity of Care Document
CDO	Care Delivery Organization
CDR	Clinical Data Repository
CEO	Chief Executive Officer
CPOE	Computerized Physician Order Entries
CPT	Current Procedural Terminology
DOI	Diffusion of Innovation Theory
DTPB	Decomposed Theory of Planned Behaviour
DV	Dependent Variable
EFA	Exploratory Factor Analysis
EHR	Electronic Health Record
EMRs	Electronic Medical Record System
EPR	Electronic Patient Record
HIT	Healthcare Information Technology
HS	Healthcare System
ICD	International Classification of Diseases

ICT	Information Communication Technology
ICU	Intensive Care Unit
IT	Information Technology
IV	Independent Variable
JH	Jordan Hospital
KAUH	King Abdullah University Hospital
MI	Medical Informatics
MIS	Management Information System
MoH	Ministry of Health
MSA	Measure of Sampling Adequacy
PCB	Perceived Behavioural Control
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PMR	Paper Medical Record
PU	Perceived Usefulness
SCT	Social Cognitive Theory
SN	Subjective Norm
SNOMED	Systematizes Nomenclature of Medicine-Clinical Terms
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action

UMHC	University Mississippi Health Care
UI	User Interface
USA	United States of America
UTAUT	Unified Theory of Acceptance and Use of Technology
UUM	Universiti Utara Malaysia
WHO	World Health Organization

CHAPTER ONE
INTRODUCTION

This chapter presents the background information of the research, the research motivation, problem statement and the study's objectives. The chapter also presents the scope of the study and the research contributions. Finally, this chapter ends with a discussion on research strategy and the organization of this thesis.

1.1 Background

Traditionally, hospitals keep paper-based profiles of patients to keep track of patients' illness history, their development and their overall general health conditions. Though this traditional technique has long been adopted, it is not without practical problems. One living example of the shortcoming of traditional hospital profiling systems of patients' data was demonstrated by Hurricane Katrina in New Orleans in the United States of America in 2005. Hurricane Katrina destroyed the hardcopies of medical records of untold numbers of people, hence bringing new attention to the need for electronic medical records. Lost medical records expose patients to considerable risk of medical mistakes because physicians were unable to draw connections between the current health conditions of the patients and their medical history namely on diagnosis, drugs, effects and surgery risks assessment (Terry, 2009).

The increasing numbers of hospitals and the number of patients in recent years have posed a burden to the profiling system of patients, rendering it inadequate or precisely

ineffective. Until recently, more effective profiling systems have been proposed with the aid of Information Communication Technology (ICT). Medical Informatics (MI) has emerged as a promising field to solve the profiling system problems, which incorporate the fields of Computer Science, Information Science, Decision Sciences, and Epidemiology. Researchers in medical informatics have developed new methods and techniques to improve health care, biomedical research, and education through ICT (Terry, 2009).

It is expected that MI would be able to provide a plausible solution for the hospitals' profiling system to reduce the congestion in information retrieval of the patients' history and related information. Electronic Medical Record system (EMRs) is one type of Healthcare Information Technology (HIT) or Medical Informatics like Electronic Health Record (EHR) and Computerized Physician Order Entries (CPOE) that has been introduced to help improve healthcare by activating the communication among the users, to ease the patients' data retrieval, to reduce medical errors, and to provide medical diction support (Beaver, 2003). Although many hospitals around the world today have implemented EMRs, the widespread use of EMRs applications by healthcare professionals has not yet occurred because of many challenges faced during the implementation and use of EMRs.

The purpose of this study is to identify and examine the factors that affect the implementation of EMRs in Jordanian hospitals, using the Technology Acceptance Model (TAM). The total number of hospitals in Jordan (without medical centers) are 104, serving healthcare to about 5.7 million people in the Kingdom of Jordan (Alwan, 2005). The number of hospitals which has actually implemented EMRs is around fifteen

hospitals, two hospitals have full implementation, i.e., The King Abdullah University Hospital (KAUH) and Jordan Hospital (JH); thirteen have partial implementation comprising: Istishari Hospital, Specialist Hospital, Khalidy Hospital, King Hussein Cancer Center, University of Jordan Hospital, Al-Husien Medical City, Jarch Hospital, Prince Hamza, Queen Alya, Adoon Hospital, Alslamy Hospital, Alsra Hospital and Alamal Hospital (Sumor, 2011). Some of the hospital facilities are totally dependent either on manual paper work or on very basic software tools to do their day-to-day tasks such as patient admissions. Owing to recent developments in Jordan, the EMRs implementation has experienced a rise. Unfortunately, EMRs successful implementation rates were so low (Alwan, 2005; Sumor, 2011).

The reasons behind the failure are still unclear and unexplained as some projects fail from the onset while others fail owing to lack of use or failure to meet user expectation (Sumor, 2011). Generally EMRs collect data from various information systems, which are then used by different groups to carry on their tasks. EMRs complex workings in the healthcare environment should be fully comprehended. Failed EMRs implementation have also been associated with various factors; communication, complexity, people, organization, technology, planning and leadership (Hidar, 2004). Therefore, it is imperative to know more about the users coupled with organizational, and individual characterizes, social factors and behavioral challenges before the onset and after implementation of EMRs.

1.2 Motivation of the Research

The specific motivation of the current research is that Jordan is considered to be the center of the Middle-East healthcare system, where a fairly high level of medical care standards is provided (Amer and Ammari, 2006). This study will use TAM as the underpinning theory as it has been widely adopted by many researchers in this area. The highlight of this work is the development of an extension to TAM, which includes individual characteristics, technical, and organization factors as perceived by healthcare professionals. These factors have not been studied comprehensively as a whole as previous studies only concentrated in parts on these factors (Miller and Sim, 2004).

Also, the general motivation of this research is to better understand and investigate the factors that affect EMRs implementation in Jordanian hospitals. Jordan's medical sector is of high-quality in general, and especially relative to neighboring countries (Amer and Ammari, 2006; Alwan, 2005). Therefore, the number of people all around the world choosing Jordan for healthcare purposes is increasing.

The total number of patients who headed for Jordan in 2000 from both neighboring and foreign countries was nearly 24, 800 patients. In 2001, the number of patients who entered Jordan had doubled; 15, 370 patients entered Jordan within the first six months of the year for medical purposes (Amer and Ammari, 2006). Since then, the total number of patients who entered Jordan in 2004 has quadrupled; precisely, it was 115, 000. In 2005, Jordan recorded 135,000 patients whilst, in 2006, it was 160,000. The years, 2007 and 2008, saw 190,000 patients and 210,000 patients respectively, and until August of 2009, the numbers stood at 225,000 patients (Ahyagna, 2009). The increase in number is

due to the fact that Jordanian hospitals provide attractive offers to attract patients from the western countries.

However, the increase in patients' number will have negative effect on the overall healthcare performance because the available resources will fall short to meet the required quality for healthcare performance. Therefore, it is important to meet these challenges and offer the necessary resources for improving the healthcare services. Consequently, it is expected that the number of patients coming to Jordan will increase due to the continual development in the healthcare sector and the good reputation of the medical services that Jordan had established throughout the years (Amer and Ammari, 2006). However, this good reputation has started to face some threats because of the lack of medical technology adoption and usage in Jordanian hospitals (Amer and Ammari, 2006).

Since 2008, Jordan's government started to implement EMRs in stages at all the government hospitals via Medsphere Systems Corporation, which is based in USA (Viejo, 2008). However, problems may occur when these EMRs are not fully utilized. Hence, with other problems related to EMRs implementation, it will continue to limit the usage of these systems by healthcare professionals (Alwan, 2005). This will eventually contribute to the failure of the EMRs implementation. Therefore, studying the factors that affect EMRs implementation is important to ensure successful implementation of these systems.

1.3 Problem Statement

The quick accessibility of retrieving the relevant information of the patients offered by EMRs technology offers tremendous opportunities in improving the healthcare standards, staff proficiency and experience, and the patients' overall health conditions. Among the benefits of EMRs are: to support healthcare professionals in their day-to-day and research work, to reduce clinical errors, and to improve the quality of health care.

However, the EMRs implementation does not encompass more than 50% of the hospitals in Jordan as shown in Appendix A (letters obtained from Jordanian hospitals on EMRs implementation), compared to the EMRs in other countries such as United Kingdom, Netherlands and Australia (Amatayakul, 2004; Ash and Bates, 2005). According to a preliminary study in 2011 with (Sumor, 2011) (Director of Information Technology Department in Ministry of Healthcare of Jordan), there are indications that the Jordanian hospitals have not fully utilized the EMRs technology and the EMRs in Jordan falls short of offering the medical services that are offered by other countries that have implemented EMRs (Alwan, 2005 and Hidar, 2004).

Also, the preliminary study shows that in Jordan, amongst the problems of EMRs implementation is the partial utilization of all of the functions provided by EMRs, i.e., EMRs has a variety of functions that the users are not familiar with or cannot even discover despite the multiplicity of functions available. EMRs provide many of functions that most of the users cannot use because they are not trained to use or many of the users are computer illiterate despite numerous entry of patients' data through many departments of the hospital (for example: radiology, laboratory, pharmacology and others) using the EMRs, hospital staff are not familiar with it and have problems in

dealing with its main functions. The problem is the ineffective Modus Operandi of EMRs in Jordan which is expected to provide practitioners with timely access to patients' complete health history (Sumor, 2011).

There were several studies conducted in the field of EMRs, such as the works of Alanazy, (2006); Brookstone, (2004); Gurley and Rose, (2004); Miller and Sim, (2004); Miller and Sim, (2004) and Morton (2008). However, there are limited studies conducted in Jordan to identify and investigate the main factors that affect the implementation of EMRs in Jordan (Fauziah, Ola, Haslina, and Mahmood, 2011). This problem is made worse by the many challenges and factors that are still hindering the adoption of the implementation of EMRs in Jordan (Sumor, 2011).

There are other reasons that contribute to the limited information technology (IT) implementation in Jordanian organizations at different sectors such as in effective organizational leadership (Faysal, 2011; Hidar, 2004); training program, high implementation cost (Malkwy, 2002); lack of standards (Faysal, 2011); users' involvement, resistance to new technology, users' autonomy and others (Bataineh, 1995; Frhan and Trawna, 1996) and lack of computer background amongst users (Akel, 1999; Faysal, 2011). Other factors that are most often cited to be crucial to IT success are user autonomy and user involvement in the design and implementation process (Hirschheim, 1985). Their suggestions pertaining to user involvement in IT should be allowed, to assist in determining other existing challenges (Lazar, Jacko, Ratner, and Sears, 2008; Terry and Standing, 2004). The researcher strongly believes that understanding the underlying factors would provide a comprehensive overview to what is necessary to be done and to formulate the right strategy to overcome these in an attempt to ensure a

successful implementation of EMRs in Jordan. Furthermore, some medical organizations want to implement EMRs but they are unable to take the bold step in implementing EMRs for their hospitals (Hidar, 2004 and Sumor, 2011).

Hidar (2004) conducted his study on IT and recommended research on the factors affecting implementation of IT in Jordanian Healthcare environment. Some of the factors listed as reasons for the slow IT implementation in Jordanian environment include organizational factors and individual characteristics factors.

Some other factors that have created barriers to IT implementation are the organizational behaviour including lack of organizational leadership support in terms of IT budget allocation that includes the cost of hardware and software maintenance and training (Murphy, Partin, Williams, Harris, and Lauer, 1998), usability problems of healthcare application that discourages users from making use of the system owing to more time consumption and modifications in staff roles and miscommunications among roles and structure (Chan, 2001; Cimino, Teich, and Zhang, 1999; Sittig, Kuperman, and Fiskio, 1999). Also, training is important for users as this leads to the improvement of users in entering data faster and knowledge on computers (Alanazy, 2006; Miller and Sim, 2004), it is clear that the importance of training for IT users are plentiful as it assists them in practicing their work. Nevertheless, barriers in the human factor such as resistance to new technology and lack of standards are a challenge that has to be overcome (Lorenzi and Riley, 2000).

Studies in other researches highlighted that the slow acceptance of IT implementation among healthcare professionals has been studied and these include the lack of users'

background knowledge of computers and user involvement particularly among senior professionals (Anderson, 1997; Weber, 2004).

EMRs should be considered as a vital step in the realization of the healthcare sector's IT innovation in the future as EMRs is a kind of healthcare information system. Many researchers such as Alanzy (2006), Miller and Sim (2004) and Morton (2008), have studied and explored the importance of EMRs and the factors affecting its implementation in hospitals. Among the different kinds of models that IT researchers utilized to explain the encouraging factors of user acceptance and the factors barring its use is TAM (Behrens, Jamieson, and Cranston, 2005; Raitoharju, 2005).

Moreover, many researchers have also taken the step to test TAM in light of the factors that influence the implementation of EMRs as evidenced by the interviews conducted by Miller (2004) between mid-2000 and the end of 2002 with EMRs managers and physicians. Similar studies were also carried out by Aldosari (2003); Dansky, Gamm, Vasey and Barsukiewicz (1999) and Morton (2008) with physicians, Alanazy (2006) with healthcare professionals. This establishes the importance of studies that examine the behavioral, organizational and individual factors that affect and are affected by clinical information systems (Anderson, 1997; Anderson and Aydin, 2009). These is a need to identify the utilization among other healthcare professionals like nurses, pharmacy and laboratory staff to ensure the EMRs acceptance.

Although EMR usage positively impacts medical practices, its rate of use is still low (Deutsch, 2005; Donald, 1997; Feufel and Shalin, 2009) implying that healthcare professionals may be faced with numerous challenges while approaching EMRs

implementation including organizational and individual characteristic factors (Albert and Manda, 2010). This has been evidenced by acceptance studies underlying technology adoption particularly in the healthcare sector conducted by researchers around the globe; the studies present a very low healthcare professionals' acceptance of EMRs (Alanazy, 2006; Chan, 2001; Cimino, et al., 1999; Goedert 2003; Heim, Prenger, and Evans, 2004; Miller and Sim 2004; Poon, Blumenthal, Jaggi, Honour, Bates and Kaushal, 2004; Weber, 2004). However, in the biomedical information domain, especially in Jordan, there is no specific model integrating the three user acceptance perspectives to explain doctors' acceptance of EMRs implementation in Jordan (Fauziah, et al., 2011). Therefore, there is a need for this model because such as model supports the recent widespread EMRs implementation in Jordanian hospitals.

Based on Davis's (1989) study, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) should be considered as determinant factors impacting behavioural factors and usage intention (UIT) of the user's acceptance of application. Accordingly, several researchers have attempted to test the TAM based on the reliability and validity of the instrument in many countries. Majority of the studies presented the most crucial factors related to successful EMRs implementation, particularly in healthcare organizations and they revealed that healthcare professionals are notably slow and hesitant when it comes to EMRs implementation because of the following reasons: 1) Organizational factors comprising organizational leadership (Aldosari, 2003; Dansky et al; 1999; Morton, 2008), insufficient training (Brookston, 2004; Culbertson and Lee, 1996; Gad and Pernrod, 2001; Morton, 2008), high costs (Alanazy, 2006; Miller and Sim, 2004; Poon, 2001; Satinsky, 2004), also the important issues raised by the healthcare professionals

were the user friendliness and users' involvement of the systems with their workflow (Morton, 2008); 2) individual characteristics comprising physician-patient relationship (Aaronson, Murphy-Cullen, Chop and Frey, 2001; Dansky et al; 1999; Detmer and Friedman, 1994; Morton, 2008) users' autonomy (Aldosari, 2003; Gardner and Lundsg, 1994; Gadd and Penrod, 2001; Dansky et al; 1999; Morton, 2008) users' background of computers (Alanazy, 2006 and Dansky et al; 1999) and resistance to new technology (Alanazy, 2006 and Dansky et al; 1999).

The need for the construction of an extended TAM with the ability to provide statistical evidence of the user acceptance level, with consideration of the strengths and the weaknesses of the observed EMRs, is apparent. The weaknesses pose problems causing rejection or low acceptance of EMRs implementation. Therefore, TAM should be developed on the basis of individual characteristics, organizational and behavioral aspects from the healthcare professionals' perspective (Morton, 2008; Alanazy, 2006). Additionally, other aspects, besides UIT factors should also be explored (Haslina, 2009).

Alanazy (2006), Meinert (2005) and Morton (2008) have conducted many studies on EMRs and recommended research on the factors affecting implementation of EMR system in other countries, as well as to include additional user groups within the same healthcare system, such as nurses, administrators or clerical staff for pre-implementation and post-implementation studies. Other recommendations include studying different healthcare professionals including healthcare facilitators, physicians, nurses, pharmacists, and laboratory staff (Alanazy, 2006 and Morton, 2008).

The use of EMRs in Jordan is believed to be affected by some factors that limit its full implementation and hence reduces its overall efficiency and healthcare performance (Fauziah et al, 2011). Thus, to achieve a full implementation of EMRs and to reach a higher quality healthcare performance accordingly, comprehensive understanding of the barriers or the factors affecting the implementation of EMRs needs to be studied and investigated using TAM (Alanazy, 2006 and Morton, 2008). This would provide empirical evidences that would offer appropriate decision for implementation of EMRs in Jordan.

This can help to increase the level of EMRs usage to cover all of the functions available in the system and to achieve expected EMRs usage level and henceforth arrive at higher healthcare delivery.

1.4 Research Questions

There is a need to identify and examine the factors that affect the implementation of EMRs as discussed in section 1.3. Therefore, the research questions of this study are:

1. What are the important factors that affect the implementation of EMRs in Jordan's healthcare environment?
2. What are the significant factors that affect the implementation of EMRs as perceived by healthcare professionals in Jordan?
3. What are the relationships between organizational and individual characteristic factors with PEOU and PU?
4. What is the based model that describes the factors affecting EMRs implementation in hospitals in Jordan?

1.5 Research Objectives

The general aim of this research is to investigate the factors that affect the implementation of EMRs in Jordan.

The specific research objectives are:

1. To identify the most important factors which are perceived by healthcare professionals in Jordan to improve the implementation of EMRs in the healthcare environment in Jordan.

2. To determine the significant factors that affect the implementation of EMRs as perceived by healthcare professionals in Jordan.

3. To examine the relationships between organizational and individual characteristic factors with PEOU and PU.

4. To develop a model based on TAM that includes factors affecting EMRs implementation in Jordanian hospitals.

1.6 Scope of the Study

The scopes of this study are the factors that affect the implementation of EMRs in the Jordanian healthcare environment focusing on healthcare professionals of EMRs. This includes organizational factors comprising organizational leadership, users' involvement, training and cost, also individual characteristics comprising users- patient relationship, user background of computer, user autonomy and resistance to new technology.

This research includes two hospitals in Jordan including the King Abdullah University Hospital (Government hospital) and Jordan Hospital (Private hospitals). The research

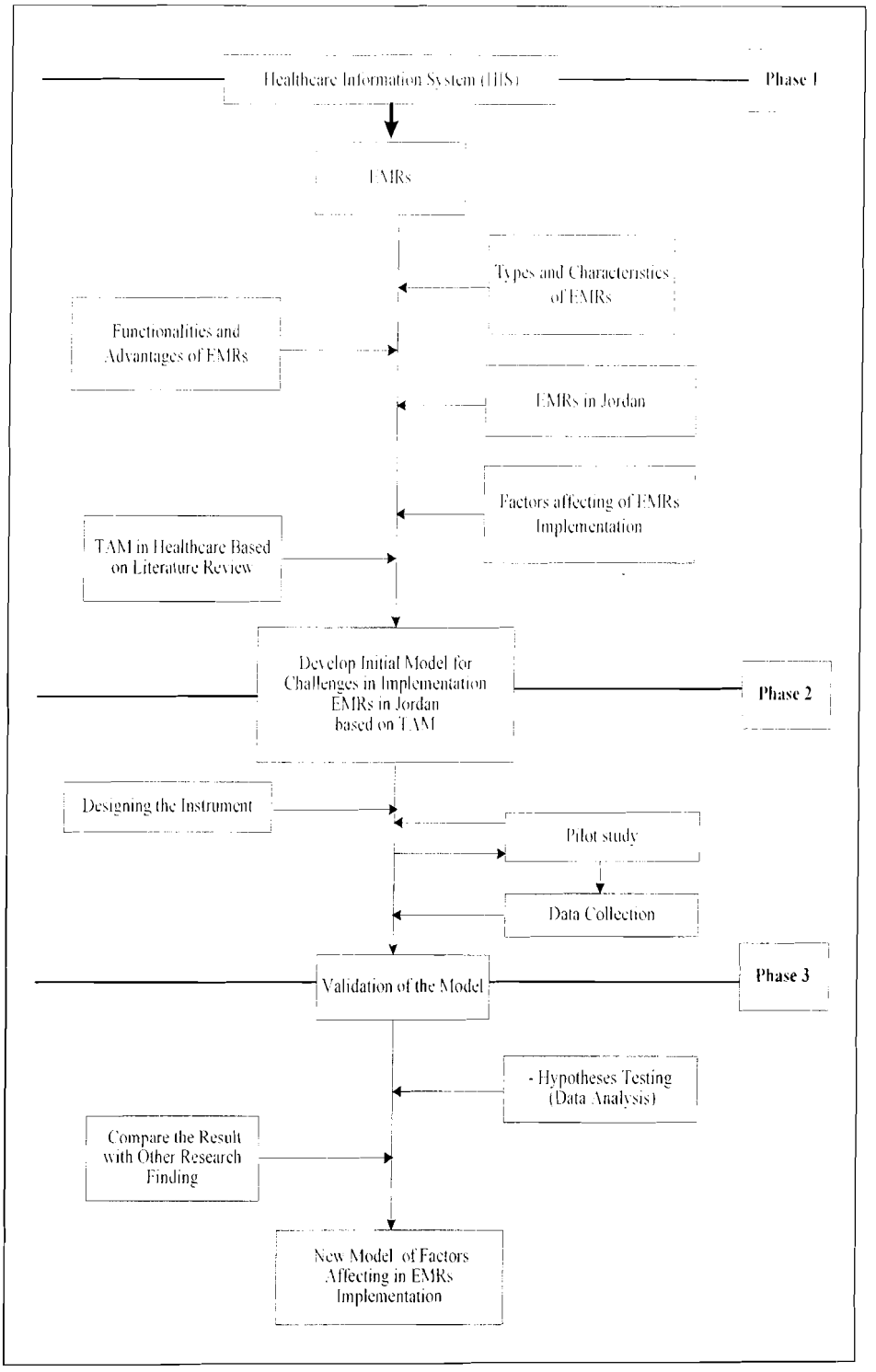

Figure 1.1 Research Strategy

1.9 Thesis Organization

The thesis is organized into six chapters comprising introduction, proposed conceptual model and research hypotheses, research methodology, data analysis, results discussion, conclusion and future research.

1.9.1 Chapter 1: Introduction

The First Chapter contains the overview and background information of the study and describes the research background. The rationales behind conducting the research are also discussed along with the research problems, the research objectives, the contributions of the research and the research strategy.

1.9.2 Chapter 2: Literature Review

Chapter Two review literature on HIT focusing on EMRs with a special highlight on its details, EMRs types, characteristics, functionalities and advantages of EMRs. Also, this chapter discusses in detail the studies on TAM in healthcare and EMRs. Finally this chapter highlights the factors affecting EMRs implementation.

1.9.3 Chapter 3: Research Methodology

Chapter Three highlight the methodology of the research as well as the theoretical basis that lies behind the chosen approaches and their definitions. Details regarding the subjects, research hypotheses, research procedure, and provides an overview of EMRs in Jordanian hospitals, scale development, items, instruments, content validation and data handling also discussed in this chapter .

1.9.4 Chapter 4: Data Analysis and Results

In Chapter Four, a detailed analysis of the research is given including the response rate and respondents' profiles. Additionally, the chapter also deals with the explanations of discriminate validity and other validity and reliability tests along with correlation and regression analysis that are used for testing the hypotheses. The hypothesized model is discussed against reasonable alternative models. The chapter concludes with the explanation of the factors that are identified in the study.

1.9.5 Chapter 5: Discussion of Results

Chapter Five presents with the discussion and explanation of the final results obtained from the analyses of organizational factors such as organization leadership, users involvement, training and cost. Discussions pertaining to the individual characteristic factors, such as user-patient relationship, users' background of computers, user autonomy and resistance to new background along with the discussions revolving around technology antecedents on actual use are also presented. Finally, the discussions about the important factors affecting the implementation of EMRs in Jordan are highlighted.

1.9.6 Chapter 6: Conclusion and Future Research

Chapter Six presents the overall conclusion of this research and highs the contribution, limitations of the study and future research.

Recently, HIT has demonstrated newer perspectives and higher levels of innovations. HIT is considered as a promising potential for meeting the challenges of the increased healthcare costs and shortcomings of the healthcare services and quality. The concept of a system that offers users with timely, effective and easy access to the patient's health history hastened out to be a reality and its advances are being updated on a daily basis. The HIT has proved to have a crucial role to enhance the medical processes in healthcare sector and to reduce the costs of programming by using some other software that has been utilized in different aspects and sectors (Beaver, 2003; Blumenthal, 2009; Hynes, Weddle, Smith, Whittier, Atkins, and Francis, 2010; Snyder and Paulson, 2002). HIT can be classified into three main systems and these are EMRs, EHR, and CPOE.

2.3 Electronic Medical Record System (EMRs)

EMRs are often seen as an "alphabet soup" because it has been attributed to many diversified names and titles, for example, some of these attributed names are 'clinical data repository' (CDR) and electronic patient record (EPR) (Beaver 2003). However, the issue is not the names or titles but rather the problem that concerns the definition of criteria as to what the names would entail, or simply the definition by itself. EMRs has not covered all areas of applications in healthcare, therefore, there is no standard EMRs application, and any EMRs application have to consider an ordered transmission system and organized reference system that would include all the application domains (Beaver, 2003).

EMR is an electronic record of a patient's medical history produced by one or more medical visits. Incorporated in this system are patient demographics, progress notes,

problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports, encounters, tests results, administrative issues, orders and other information. The EMRs organize the physicians' workflow and have the capacity to produce a full record of a clinical patient visit, and enhance other care-related processes involved in using a networked interface including evidence-based decision support, quality management and outcomes reporting. Furthermore, EMRs can allow the providers to access patients' information from anywhere at the same time at different places (Alanazy, 2006; Beaver, 2003; Blumenthal, 2009).

EHR is a software that offers networked and long-term information of patients. The information comprised in EHR includes demographical and healthcare documentation. EHR are able to provide multiple and diversified software applications in a linked environment, which may consist of clinical decision-making support, physician order entry, wired links of interaction among laboratories, imaging centers, and many relevant medical facilities, including population health administration that can be available at anytime and from anywhere (Nissman, 2009; Morton, 2008). EHR is a form of digital storage facility that offers quick entering, processing and retrieving of data to users, which includes improved accessibility to healthcare information and better effectiveness (Nissman, 2009; Waegemann, 2003).

CPOE is the other type of HIT that helps a patient's care provider to order a certain kind of medication, reduce medical errors, review clinical laboratory or test results, or make any necessary processing of patients' information via computer (Aarts and Koppel, 2009; Beaver, 2003). CPOE is computer-based system that populates the general features of automating the medication ordering process in a standardized, legible, and

complete procedure and makes communications between users easier, retrieval of data faster and reduces medical errors (Aarts and Koppel, 2009; Kaushal and Bates, 2003).

2.3.1 Types of EMRs

EMRs are categorized into three types namely, template-based EMRs, description-based EMRs and a combination of both types (template-description-based EMRs) (Macaulay, 1996). The template-based systems make us of a mouse or a light pen to help fill in the blanks, while the description-based system comprises of many variations including complete free form and free form with a list. Description-based EMRs works faster compared to the template-based EMRs because its interfaces contain less variables and they are less generic and more versatile.

2.3.2 Characteristics of EMRs

Literature provided seven EMRs characteristics which are described as follows: (1) Comprehensiveness: At the least, the medical records should include problems lists, allergies, medications, immunizations, history of visits, history of family medication, test results, doctors and nurses' notes, summaries of referral and discharge, communication between patient and healthcare professionals (Beaver, 2003; MacDonald, 2001 and Mandl, Szolovits, Koharie, Markwell); (2) Accessibility: The patient information's must be available at all times (Amberg and Graber, 1996; Miller, 2003) and they should be up-to-date (Beaver, 2003; Miller, 2003); (3) Data Compatibility: Data concerning patient's records should be compatible when distributed among different healthcare givers; (4) Interoperability: Data concerning patients should be distributed to multiple related sources such as doctors' offices, hospital computer

systems, laboratories and patients' personal computers (Beaver, 2003; Mandl et al., 2001); (5) Confidentiality :Patients should be consulted on who can go over and carry out alterations in their records (Mandl et al., 2001; Miller, 2003); (6) Accountability: Access to patients' records should be noted and recorded and it should be within the knowledge of the patient and finally, (7) Flexibility: Patients have the right to grant or deny access to his/her particulars in the personal medical data (Beaver, 2003; Mandl et al., 2001; Miller, 2003).

2.3.3 Functionalities of EMRs

EMRs can allow users to perform up to ten functions which are listed below in order of importance to healthcare professionals (Satinsky, 2004): (1) Identify problem lists, medications and serious reactions, test results, or any other data that are pertinent to patients' visit; (2) Document the events of patient's visit and the reasoning for clinical decision-making; (3) Identify health topics by the use of red flags as alert and for reminding physicians; for example, alerts might direct physicians of drug allergies or indicating the sensitivity of age and sex to certain screening; (4) Choose health issues aided by extensive and credible databases; (5) Arrange preparations by using refills, accessing formularies, consulting drug utilization databases, and e-prescribing by routing new scripts directly to pharmacies; (6) Organize lab tests, screening and any other procedures; (7) Interact safely among other medical co-workers inside and outside the profession, and with patients in an organized manner; (8) Code by matching international classification of diseases (ICD) and current procedural terminology (CPT) codes with details in the visit notes, by using a coding tool, and Systematizes Nomenclature of Medicine-Clinical Terms (SNOMED) clinical vocabulary; (9) Support

privacy and secured interaction communication: and (10) Accumulate information on individual patients into long-term documentation.

2.3.4 Advantages of EMRs

There are many advantages that are linked to implementation of EMRs which can be classified as: (1) Reduce Medical Errors (Deutsch, 2005); (2) Improve Clinical Decision Making (Ayers, Menachemi, Ramamonjiarivelo, Matthews, and Brooks, 2009; Deutsch, 2005; Leitman, 2001); (3) Privacy and Security (Gurley and Rose, 2004); (4) Enhances Communication and Patient Care (Donald, 1997; Feufel and Shalin, 2009;); (5) Improve Productivity and Revenue (Deutsch, 2005; Waegemann, et al., 2002); and (6) Avoidance of Costs (Deutsch, 2005; Gurley and Rose, 2004; Waegemann, et al., 2002) .

2.4 Research Using Technology Acceptance Models (TAMs)

The TAM developed by Davis in 1986, has been constantly utilized for the following purposes: 1) in the assessment of the sufficiency of accepting new technologies, and 2) in the identification of challenges of user-system relationship in an organization. TAM is basically an adapted version of prior cognitive-behavioral intention model known as Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), which represented a framework created in the 1970s to explain the relationships between human beliefs, attitudes and behavior (see Figure 2.1).

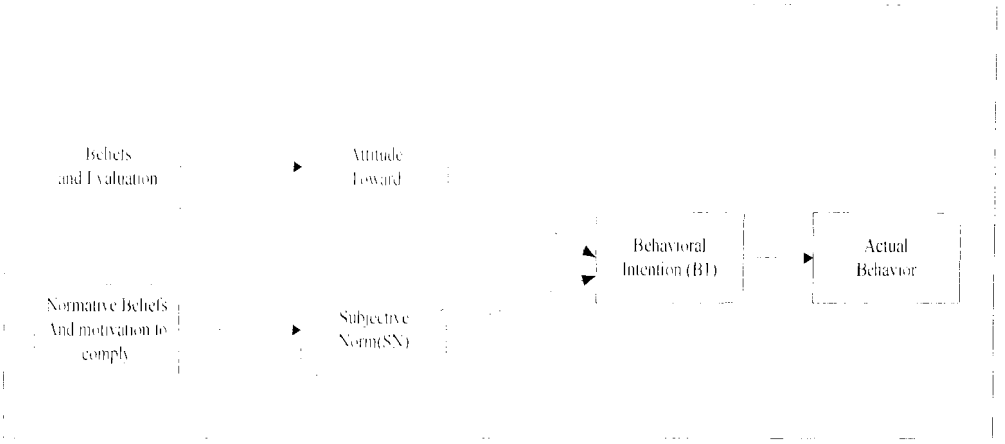

Figure 2.1 Theory of Reasoned Action

TRA model suggests that behavior intention is a direct antecedent of actual behavior and determined by both attitude towards a behavior and social pressure; also known as Subjective Norm (SN). TRA considers evaluations and beliefs to be antecedents of attitudes and SN. Before the development of TAM, computer systems set up for worker's utilization in the organization had to face many challenges in the form of resistance and unwillingness to use. Davis was the first to observe such phenomenon and ended up questioning its reason and coming up with novel constructs for the formation of a model that particularly explains computer usage behavior (Groll, 2006).

TAM identified Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as the two basic determinants of technology acceptance. The model suggests causal relationships between both determinants' users' attitudes, intentions and computer adoption behavior (see Figure 2.2).

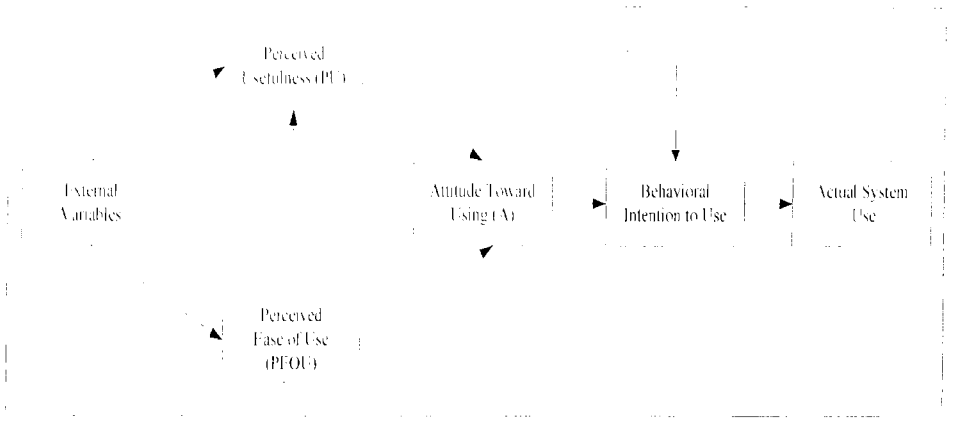

Figure 2.2 Technology Acceptance Model (TAM)

PU is considered as "*the degree to which a person believes that using a particular system would enhance his or her job performance*" (Davis, 1986), a definition that calls for secondary reinforcements.

PEOU is defined as "*the degree to which a person believes that using a particular system would be free from* effort" (Davis, 1986). Viewed from the job performance context in the organization, both constructs are suitably applied to means-end behaviors and performance-contingent rewards and the model is evidenced by both theoretical as well as empirical research mainly comprising samples of students and IT employees. The model can be utilized to predict and explain usage of concrete systems or prototypes.

Despite Davis's reference to Ginzberg (1981) discussion regarding the importance of anticipating user acceptance at the initial stages, majority of the empirical support for TAM was collected through the exposition of a group of users to a system and the measurement of the predictive value of the factors in the model (Groll, 2006). Davis

concluded that (a) an individual's computer use can be predicted from his/her intentions; (b) PU is a top determinant of intention to use computers; and (c) PEOU is a vital secondary determinant of intention to use computers. Till today, TAM still stands as one of the most influential frameworks when it comes to an exploration of IT acceptance (Saga and Zmud, 1993).

Furthermore, TAM includes beliefs that cater specifically to technology adoption and further generalizes to different computer systems as well as user samples (Davis, 1989; Davis, Bagozzi, and Warshaw, 1989). As a result, it is constantly cited and validated in its prediction of user acceptance of IS and in addition, it continuously comes up with reliable research results (Davis, 1989; Legris, Ingham, and Collerette, 2003). Researchers using the model are not only allowed to predict and assume but also explain a certain system's level of acceptability to users (Davis, et al., 1989). However, it is vital to keep in mind that TAM is really useful in determining post and pre-implementation attitudes regarding ISs in an organization where discretionary IS used and not mandated.

TAM provides a hypothesis whereby PU and PEOU are basic determinants of user acceptance. The former depicts the level of the individual's belief in the new IS's contribution in enhancing job performance, while the latter is the level of the individual's belief in the system's user-friendliness. Additionally, TAM suggests that external factors indirectly depict an individual's attitude toward technology acceptance through its affect on PU and PEOU (Davis, et al., 1989). These external factors many relate to individual user attributes, job tasks, system development and implementation process, system design characteristics or adequate training and user support. Other factors also include political influences which relate to the organizational environment

and may also influence an individual's attitudes toward PU as well as ease of use (Fishbein and Ajzen, 1975).

Rose and Straub (1998) investigated the applicability of TAM to the Arab world. They investigated whether explanations for IT diffusion (specifically TAM) which originated in the developed world would also apply to developing nations and cultures. The technology investigated was general computing usage in five Arab countries (Jordan, Lebanon, Egypt, Sudan, and Saudi Arabia). The sample consisted of knowledge workers in various sectors such as airline, public and healthcare, and the organizations included in the sample presented IT diffusion at relatively high and low ends of the spectrum. Data was gathered through structured questionnaire. The hypotheses were tested using the partial least square method and the findings showed that PEOU is strongly related to PU and both TAM constructs impact system usage. PU mediates the relationship between PEOU and system use and the overall explained variance of the dependent variable (system usage) was slightly above 40 percent, comparing favorably to prior TAM studies. The results indicated that TAM transferred successfully to the Arab world.

Nevertheless, the authors advised that caution must be used when interpreting these findings justifying bringing attention to the fact that social and cultural norms are also good predictors of technology use, hence, it is possible that over emphasis of rational factors could lead to setbacks rather than cultural acceptance. The Arab world as indicated in Hill, Loch, Straub, and El-Sheshai's study (1998) has such a complex culture that practitioners and vendors should follow certain implementation and effectively tailored training strategies (Hill et al., 1998).

In a similar study, Morris and Dillon (1997) revealed TAM can predict acceptability of the system although it is incapable of relating the strengths and weaknesses of the system under investigation, and what should be done to the User Interface (UI) of the system. Nevertheless, even with the weaknesses, TAM is still successful in its prediction of system acceptability or otherwise, and in addition, its utilization is cost-effective that can also be used to carry out an evaluation of the system design life cycle (Morris and Dillon, 1997).

In a related study, Legris, et al., (2003) conducted a meta-analysis to critically evaluate particular TAM studies. They revealed that in the past, IS research mainly concentrated on discovering factors facilitating IS use and they came up with various factors having little or no practical value. A shift in focus changed in the mid-1980s as IS begun focusing more on how to develop and test models for their prediction of system use (Chau, 1996; Cheney, Mann, and Amoroso, 1986). It then became imperative to categorize various factors in the model that would help analyze and predict IS use (Legris, et al., 2003).

Along the same vein, Davis et al. (1989) replicated the study utilizing the tools used by Davis (1989). The results of the studies revealed that the scales were valid and highly reliable. In addition, Szajna (1994) revealed that PU and PEOU can also be used to predict intent to use, self-reported usage, and attitude toward use. In short, the implications of the results of these studies revealed TAM's flexible testing in various domains, tools, and users and hence, the robustness and validity of the PU and PEOU as proposed by Davis (Szajna, 1994).

In a related study, Hong, Thong, and Tam, (2006) conducted a study to compare between three IT usage models namely, (1) Expectation-Confirmation Model in the IT Domain; (2) TAM; and (3) Hybrid integration model between ECM-IT and TAM on Mobile Internet users. The findings of the study reveal that TAM had an appropriate fit to the data, followed by ECM-IT and the integration model of ECM-IT and TAM. The variance presented intention to continue IT usage with the integration model ECM-IT and TAM having the highest R Square (R^2) (67%), closely trailed by TAM (63%) and ECM-IT (50%). The researchers reached to the conclusion that TAM is the most economical and generic model to be used in the study of both initial and continued IT adoption. The ECM-IT and TAM model provided an explanation of continued IT usage behavior and TAM and both models laid down additional information on how to increase the understanding of IT usage continuance (Hong et al., 2006).

Moreover, (Igbaria, parasuraman and Baroudi, 1996) proposed the employment of external expertise of vendors and consultants in order to guarantee the microcomputers' successful adoption. Later, studies conducted by (Igbaria, Zinatelli, Cragg, and Cavaye, 1997), were linked to the organizational support, management support, computing support, and computer support, as the antecedent factors of PU and PEOU. It was also revealed that PU and PEOU have positive relations with self- reported use of microcomputer adoption when it comes to small firms. Similarly, management support, computing support, and computer support were also revealed to have a significant effect upon PU and PEOU when supported by external expertise of vendors, consultants and friends.

According to Davis (1989), external variables could comprise system features, user characteristics, organizational structures, etc. without clarifying the sub-factors of the system features that may impact both the acceptance level and the usage of the system. In a related study, Hubona and Kennick (1996) investigated the antecedent factors of PU and PEOU by utilizing two models: original TAM and TAM with the external variables of age, employment category, and educational level. The findings revealed that antecedent factors, known as external variables, affected usage frequency. Hence, the authors reached the conclusion that for the purpose of IT's effective integration into the organization, it is imperative to introduce the impact of external variables in TAM in order to explain the exact system usage. Also, the functionality of the tasks as antecedent factors should be linked to usefulness. PEOU was promoted by the standardized UI as one of the antecedent factors of TAM (Hubona and Blanton, 1996).

Several researchers also attempted to extend the TAM by adding the following factors: various antecedent factors related to social and cognitive domains (Venkatesh and Davis, 2000), perception in system design and development (Gefen and Keil, 1998; Hubona and Blanton, 1996), organizational context (Mathieson, 2001), and technology, social, and implementation contexts (Lin, Hu, and Chen, 2004).

In a similar way, Lin et al.'s study (2004) study integrated the TAM constructs of PU and PEOU with both social influences (Taylor and Todd, 1995) and PBC (Mathieson, 2001) after which PU was identified as a significant factor of user acceptance decisions while output quality was revealed to be a key determinant of PU.

In short, the antecedent or external factors are: Perceived System Performance (Liu and Ma, 2006), Individual Characteristics (Gahtani and King, 1999), Developer Responsiveness (Gefen and Keil, 1998), and Organizational Leadership proposed by Igbaria et al., (1997) comprising Management Support, Computing Support, and Computer Support. These entire external factors significantly impact PU, PEOU, and behavioral factors such as Usage, Intention to Use, and others. The studies' findings also revealed the importance of antecedent factors in the justification of IS application's success factors (Gefen and Keil, 1998; Liu and Ma, 2006) or computer adoption (Igbaria et al., 1996, 1997) within the organization.

According to Davis (1989), PU was an antecedent to PEOU. Prior and current researchers had not been able to differentiate between PEOU and PU as components of input and output. David observed that PEOU could be viewed as the input and PU as output which raises the question of the nature of the relationship if PEOU was in the middle or at the end of the process in determining the users' intention to use electronic medical records. It has been said that if PEOU leads to a separate process that determines a user's intentions, then it may be possible to separate usefulness completely from the TAM equation. Usefulness is considered as output as it comes after the EMR technology has been used in patient care. For instance, a series of clinical results that is entered into a EMRs application would be useful if it is compared from one hospital unit to another. Consequently, evidence points to the belief that there might be a sequential relationship and not a concurrent variable determination existing between these variables.

The EMRs application is expected to enhance healthcare professional's productivity rather than obstruct it. It is however important that healthcare professionals find EMRs applications to be easy to use and to be useful in the examining room and the program needs to be user-friendly (Rogoski, 2003). Data entry can be easily facilitated through note templates and order sets. Healthcare centers that are fully implemented with EMRs have allocated computer workstations in-house along with off-site accessibility in physicians' offices and homes. Instantaneous response time with minimal system downtime and scheduled outages are crucial issues linked to ease of use and usefulness (Doolan, Bates, and James, 2003). An arranged 24 hour vendor support and technical assistance help to ensure ease of use (Ash, Anderson, Gorman, Zielstorff, Norcross and Pettit, 2000) as in most cases, physicians expect immediate support without waiting for the customer to finish (Rogoski, 2003).

The success of system implementation depends on the quality of software available for use in EMRs and HIT coupled with its PEOU and PU. Failure is characterized by a lack of definition of basic product features (Middleton, 2005). In 1971, the World Health Organization (WHO) in USA provided for the basic necessities for a HIS (Snyder and Paulson, 2002) which are: 1) System's identification of the person through name and place; 2) System's avoidance of unnecessary agglomeration of data; 3) System's Problem or Trend Orientation; 4) System's goal orientation for the purpose of monitoring evaluation; 5) The system's employability of functional and operational terms; 6) The system's ability to record all relevant data related to population groups services rendered, resources allocated and expended, and outcome of health services; 7)

The system's expression of information briefly, unambiguously, and imaginatively; and 8) The system's provision of feedback and appropriate sharing of data.

A few of the companies' products encompass all elements of administration, business, and clinical modules. As a result, the criterions are not always 100 percent available and an interfacing of some kind exists between a company's software modules, which results in the existing software's consideration before implementing an integrated system (Snyder and Paulson, 2002). In addition to the above requirements, a survey published by the American College of Rheumatology (ACR) claimed that EHR systems should be able to easily integrate laboratory and imaging results, procedure notes, and in-patient and outpatient clinical documents (Mosley-Williams and Williams, 2005).

The result of the survey revealed that the main clinical data elements holds the most important concern to practicing physicians, and yet, is the weakest area of the available software. It can be said that the ease of use and usefulness of EMRs can make or break the successful implementation of the system (Ogrod, 2000). This is evidenced by a case at Nash Health Care Systems (NHCS) in Rock Mount, where most practitioners turned down the use of the electronic record system back in 1997 although it had been installed for five years. According to Guyla Evans, a senior clinical systems analyst, most physicians found paper charts to be user friendly and more trustworthy (Wilson, 1997).

Generally, most clinician IS do not allow clinicians to be privy to other clinician's activities (Anderson and Knickman, 2001). It has been observed that ease of use, usability, and data entry go hand in hand and it is important that these enable and not constrain them (Ash, et al., 2003). In addition, data entry is required to be done in a

quick and efficient manner for it to be available for perusal (Mosley, et al., 2005). The ideal electronic records system should be user friendly in order for clinicians to add narratives easily through handwriting and sketches as well as speech input either at the patient's bedside or at the office desk (Walsh, 2004). Unfortunately, the scenario is quite the opposite in practice as evidenced by the initial implementation of a CPOE at the Ohio State University Health System in the intensive care unit (ICU) which encountered numerous obstacles such as slowed ordering because of cumbersome security and organization, learning issues resulting from inadequate training and extensive order revision necessitated by a lack of ICU-specific CPOE content (Ali, Mekhjian, Kuehn, Bentley, Kumar, Ferketich, 2005).These problems were enough to force the unit to revert back to the obsolete paper-based orders until after the improvement of the software.

The previous section discussed the ease of use and usefulness' influence upon EMRs Implementation; TAM was clearly used by various researchers to study both factors and they recommended investigating them in the light of factors affecting the implementation of EMRs (Alanazy, 2006; Chau, 1996; Morton 2008; Sachidanandam, 2006) .

Review of literature reinforces the idea that prior research regarding TAM's user acceptance, forms the basic foundation of the study regarding user acceptance and usage of EMRs by healthcare professionals. The present study attempts to replicate prior TAM research but confines it to healthcare professionals involving organizational and individual factors which will assist in understanding the IT acceptance behavior of these professionals in healthcare organizations. Moreover, various hypotheses are tested on

the bases of the relationships existing between the variables which assists in extending the theoretical validity and empirical applicability of TAM literature to healthcare professionals.

2.5 Factors Affecting EMRs Implementation

EMRs implementation still has barriers and challenges in the form of factors inhibiting its widespread use. Despite today's technology's assistance of EMRs, several factors impacting the relation have to be resolved to have a successful and effective system. Technology development is ever-evolving at a fast pace, but it is the various organizational and human issues that bar the effective and successful implementation of electronic documentation records (Archer and Cocosila, 2009; Young, Mintz, Cohen, and Chinman, 2004). The proceeding sections 2.5.1 to 2.5.10 discuss factors impacting EMRs implementation in the Jordanian context.

2.5.1 Organizational Leadership

Organizational leadership is considered as the management's ability to know its employees and to comprehend company goals for the purpose of having everyone work together (Meinert and Peterson, 2009; Wilson, 1997). Also, perceptions of organizational leadership relate to management's ability to provide adequate time and resources for EMRs implementation (Anderson, 1997; Lorenzi and Riley, 2000; Lorenzi et al., 1997). Oftentimes, an organization displaying excellent leadership is characterized by the fact that employees are made to feel that their opinions are heard and their work regarded as an invaluable contribution to the working of the organization.

The theorized cause for slow diffusion of computerized clinical decision support systems into a healthcare system mostly includes difficulties with financial investment, organizational and professional leadership and administrative coordination (Langberg, 2003; Poon, et al., 2004; Webster and Spiro, 2010). However, it is important to keep in mind that organizational leadership should work as a strategic vision that will motivate the organization's change to EMRs. In addition, the project must be linked to strategic goals and objectives of the organizations and internal leaders to the change should be nurtured (Aldosari, 2003). Any form of inefficient institutional leadership capacity or a reasonable executive adherence will likely result in barriers to the effective implementation of the new medical information system stemming from the healthcare professionals' PEOU. The ignorance of the medical staff and hospital members of the decision-making support coming from the top management will result in increased user's resistance and hence, no serious efforts will be undertaken for systems' performance enhancement (Morton, 2008).

Consistent with Aldosairi's findings (2003), Morton (2008) conducted a research concerning healthcare professionals which revealed a significant relationship between organizational leadership and PEOU. The path analysis showed a significant positive relationship between organizational leadership and PEOU. This variable has the greatest direct effect upon PEOU compared to other variables as other studies also reported a positive relationship between organizational leadership and PU (Aldosari, 2003; Dansky et al., 1999). In general, healthcare professionals expect management to facilitate adequate workstations, training, support, and timely care of technical problems. Expectations of feedback regarding the system are also noted as the comments provided

that will assist in aligning organizational leadership and physician involvement, as well as organizational leadership and training.

Lack of organizational leadership or executive commitment can be a barrier to the successful implementation of the new system. Without a strong sense of support or strategic vision, healthcare professionals may resist the change. A major change from a paper-based medical record into a totally computerized EMRs record can be considered as a strategic change (Gaikwad, 2007; Ilie, 2009) and hence a strategic information system plan must make sure that any clinical information technology is integrated into the management as well as the technical infrastructure (Beaver, 2003; Ilie, 2009).

It is important to create a vision for the change as people in the system are empowered through it and as a result, they help make things happen (Lorenzi and Riley, 2000). In other words, the healthcare providers will perceive the system easy to use through the vision. On the contrary, a hostile organizational culture that is directed towards management or the management information systems (MIS) department can be a major barrier to change. Strategies must be employed for the nurturing of the new culture such as solid systems support and availability of technical staff (Wager, 2002).

Successful implementation of EMRs healthcare facilities are characterized by strong executive leadership from the side of either the Chief Executive Officer (CEO), high-level clinicians, clinical managers or board-level committees (Lorenzi and Riley, 2000). Another element that helps in successful EMRs implementation is the constant commitment for financial and human resources (Morton, 2008). It is also imperative that senior executives must be united in their views toward clinical information systems

planning and development, for the main purpose of instilling trust and support to the members of the medical staff. This is more effective in cases where people possessing clinical backgrounds lead the initiative, and facilitate the involvement of healthcare professionals and other sponsorships (Lorenzi and Riley, 2000).

Finally, users of EMRs need a considerable amount of support particularly in the early stages following implementation. A number of questions and issues surface, with some trivial and others substantial. However, all can lead to critical evaluations if not resolved. There are many lessons that can be learned from the topic. Among those lessons is the fact that organizational leadership in all organizations impacts the adoption of EMRs implementation. Organizations that are blessed with leaders who help bring about change will have fewer challenges in embracing technology. This is owing to the leader's effective strategies of convincing healthcare professionals of the value of system adoption. On the contrary, organizations that possess unsuitable EMRs will not be successful in adopting the system as they may not be able to bring about change. Moreover, the significant amount of capital invested in designing the process in the organization impacts the EMRs adoption. Therefore, organizations should try their best in eliminating the hindrances to EMRs adoption.

2.5.2 Users Involvement and Participation

User involvement is considered as a user's subjective psychological state (Lorenzi and Riley, 2000) referring to the level of how the user feels towards IT on the basis of its importance and its relevance to the user. Importance has been defined as the level to which the users feel that IT is fundamental, essential and or required by them. Personal

relevance presents the measurement of the level of the influence of IT as perceived by users on their job, routines and tasks (Anderson, 2000; Ash, et al., 1997; Doolan, et al., 2003).

From the 1960s, staff and medical users' participation in the IS development has been perceived to increase the project success (Barki, 1994). In other words, barriers to the success will crop up in cases when there exists lack of communication between users and developers. User participation has been defined as the activities performed by the users during system development while user involvement is the perception of the user of the importance and personal relevance of the system.

User participation probably leads to an increased user gratification (Barki, 1994), and the perceived usefulness of the application (Barki, 1994; Foster and Franz, 1999; Rahimi, 2009). Foster and Franz (1999) highlighted the need for user participation, particularly at the inception stages of development, concluding that it is important for managers to pro-actively encourage user involvement in the cases of systems development activities.

Many researchers and practitioners perceive user involvement and participation in the advancement process of an IS is crucial element in deciding the success of the system (Garceau, Jancura, and Kneiss, 1993). System designers have promoted the development techniques that require user involvement, such as prototyping, rapid application development and joint application design. However, the research literature documented on the topic is uncertain regarding the value of user involvement, though the recognition of value is existent (Morton, 2008).

Based on Morton's (2008) study, a significant relation is found between users' involvement and PEOU. The results revealed the importance of healthcare professionals' leadership in the selection and implementation of EMRs in the health system. Similarly, research shows that a healthcare professionals lead the Clinical Information Systems Steering Committee; a committee responsible for overseeing the entire information systems in EMRs implementation (Rahimi, 2009). The committee is characterized as a visible one with majority of its members as healthcare professionals. The positive result of the factor implies the visibility of leadership in EMRs and this assumption is reinforced by the strong covariance revealed between the users' involvement and organizational leadership support scales.

Moreover, Morton's (2008) study implied that healthcare professionals should hold the responsibility of product selection owing to their innate understanding of clinical workflow. Therefore, it is imperative to them that the system is compatible with the patterns of the clinician's practice. Various concerns were brought up concerning computerized documentation with an overall apprehensiveness relating to the utilization of inflexible data entry templates and online forms (Anderson, 1997).

It is assumed that the healthcare professionals in the present study recognize the benefits of EMRs implementation and they expect healthcare professional leadership to select a system that they consider user-friendly.

However, there are still important assumptions that need to be considered in using IT to promote users' involvement and participation (Anderson, 1997; Morton, 2008). Users' involvement and participation are still considered among the potential external factors

that affect the implementation of EMRs and the other external factors are design, training, computer self-efficacy, user involvement in design, the individual's cognitive style, the nature of the implementation process, organizational context and others. Physicians' acceptance can contribute positively or negatively in the medical IS implementation (Edmund, Ramaiah and Gulla, 2009; Foster and Franz, 1999; McKeen, Guimaraes and Wetherbe, 1994; Rahimi, 2009; Terry and Standing, 2004) and the incompetence in developing the user ownership is a crucial factor that is responsible for the systems' failure (Anderson, 1997; Lorenzi and Riley, 2000; Morton, 2008).

The involvement of EMRs healthcare professionals during the implementation process yielded positive results in system design and updating innovations. Successful EMRs implementations have included all the medical staff in system design and improvement. Involving healthcare professionals, who have the experience, skills, or the interest in informatics, permits them to function as liaisons with other clinical users. Such kind of leadership allows the current feedback from healthcare professionals before, during and after EMRs implementation (Anderson, 1997; Ash, et al., 2000; Ilie, 2009; Roach, White, and Byers, 2004;). It is important that physicians are dealt with as customers and their requirements must be perceived and taken care of during the entire process (Liebhaber, Draper, and Cohen, 2009; Lorenzi and Riley, 2000; Lorenzi, et al 1997). Similarly, for implementation of EMRs, healthcare professionals' participation and involvement would enhance communication among the system users and would permit feedback for any necessary amendments and modifications. Interaction between physicians and management leaders is very important because insufficient and ineffective communication play a major role for the success of the system (Doolan, et

al., 2003).

In sum, the strong positive relationship between user involvement and attitude to use EMRs. This implies that healthcare professionals' attitudes are significantly impacted by their perceptions of involvement independent of the usability/utility of the selected system. This means that healthcare professionals have a strong sense of trust in the capabilities of the current health care professional leadership in choosing a system that satisfies their needs. Suggestions for training sessions by healthcare professionals were also provided by majority of the participants as they are experts in clinic workflow. This idea is supported by the covariance existing between users' involvement and sufficient training scales.

2.5.3 Training and Substrate to Learning

Training is important for users as this leads to the improvement of users in entering data faster and knowledge on computers (Alanazy, 2006; Miller and Sim, 2004).

Some organizations provide their workers with training in cases when they have to develop interface, change software or changes of the programs that are used or the introduction of those that would be used in their work (Poon et al, 2004). The unfamiliarity of the staff with the new programs and their lack of computer knowledge and skills is the main reason to conduct training sessions which clearly impacts their PEOU and PU as when they are not proficient in operating it, their perception of its use and actual ease of use is impacted. Poon et al (2004) revealed that training improves the healthcare professional's literacy of computers. Other researchers are of the opinion that training is invaluable as the users are not provided by proper instructions of the new

system, thus leading to their avoidance of its use (Pearsaul, 2002; Lorenzi, et al., 1997; Lorenzi and Riley, 2000). In other words, training impacts the healthcare professionals' PEOU which eventually leads to affecting their PU of the EMRs.

Finally, from the above discussion, it is clear that the importance of training for EMRs users is plentiful as it assists them in practicing their work. Nevertheless, barriers in the human factor such as resistance to change is a challenge that has to be overcome (Lorenzi and Riley, 2000).

Morton (2008) made use of TAM in her study of healthcare professionals' attitudes in EMRs implementation and utilized the model in determining organizational factors such as training that may have influenced healthcare professional's acceptance of the EMRs. She found training to be an element that increases costs in EMRs implementation as it involves the additional expense of paying people to take training and paying trainers to provide training, and the allocation of time and place for the training to take place. Oftentimes, staff request for overtime which means additional expense, in cases where classes are out of working time. The extra training classes result in an increase in costs and therefore, some organizations refuse to pay the cost of training due to their limited budget (Lorenzi and Riley, 2000; Morton,2008).

In a related study, Detmer and Friedman (1994) conducted a survey among healthcare professionals regarding the aftermath of EMRs implementation. The findings revealed a significant relationship between training programs and PEOU where the healthcare professionals were not convinced that they received adequate training. Training in EMR use guarantees that these professionals can make sure of the full potential and

capabilities of EMRs tools (Alanazy, 2006; Morton, 2008). Sufficient and quality training provided to healthcare professionals in the use of EMRs will enable them to find EMRs easy to use. Hence, the importance lies in the promotion and education of healthcare professionals regarding EMRs use.

Another similar study conducted by Aaronson, et al., (2001), found a significant link between training and PEOU of EMRs implementation. Training is important as it provides healthcare professionals with skills that will positively impact their PEOU and consequently, PU of the system. A sufficient training environment where healthcare professionals have the freedom to operate EMRs is imperative. Also, organizational influence should have the power to impact the formation of beliefs regarding the PU and benefits of the EMRs implementation. Further evidence provided by (Lau and Hebert, 2002) regarding EMRs in Canada, revealed lack of training to be one of the pertinent factors that impact EMRs implementation.

Furthermore, such training could prove to be expensive in terms of both time and money, and management might not always be willing to incur into such added costs (Lorenzi and Riley, 2000).

However, even after proper training, there is no guarantee that all users will feel comfortable using a computer. A number of systems has fallen short to offer the desired outcomes due to the inadequacy of training (Alanazy, 2006). In order for get users to have good skills, they should have successful training and available adequate techniques, timing and high-quality training materials for more effective system performance (Murphy, et al., 1998).

Another element of training that remains challenging is the amount of time expended for it. Despite the consensus of the relevancy of training in the implementation of new processes, it remains a challenge for organizational leadership to allocate some time for training during working hours, otherwise this would result in paying the workers for overtime (Ash, 1997; Murphy, et al., 1998). This holds true for medical organizations who refuse to provide training sessions for their medical staff (Alazmi, Al Saleh, and Al Ojayan, 2009; Greenhalgh, Macfarlane, Bate, and Kyriakidou, 2004).

Although organizations are successful in overcoming problems stemming from financial troubles connected to relevant training, real practice cannot be equated to what has been expected from the training. It cannot be guaranteed that all healthcare professionals will be comfortable in using a computer after training or that constant relevant training will be necessary as training might not be the only factor that influences EMRs implementation (Brookston, 2004).

However, training must be designed to meet the needs of healthcare professionals as this impacts their PEOU and PU and therefore, it is critical to get strong support from physician who assert leadership persona and participate in training so as to encourage others to join (Tonnesen, LeMaistre, and Tucker, 1999). Appropriate techniques, timing and high-quality training materials are required for successful implementation of EMRs (Berger, Neame, and Kluge, 1999).

In sum, training has a positive impact on the implementation of EMRs if conducted properly and if the prospective users are attracted to the training programs provided. It can be stated that training assists the providers to resolve the issues they face in the

EMRs implementation as they acquire information regarding computer literacy, data entry and information access. Moreover, among the underlying factors of EMRs implementation, training is still believed to be one the most important. In consideration of the relation between the training impacts upon EMRs in the above case, the training program fell short of achieving the envisioned outcome.

2.5.4 High Cost of EMRs Implementations

Cost represents the total amount of elements spent on goods or services which includes money, time and labor. The relation between EMRs and high cost can be illustrated by the impossibility of EMRs implementation in Jordan if the financial budget is lacking as EMRs significantly affect these costs (Alanazy, 2006; Podichetty and Penn, 2004). In addition, this statement is further supported by health organizations because they cite high costs as reasons for reconsidering EMRs implementation (Loomis, Ries, Saywell, and Thakker, 2002).

To further explain the relation, Alanazy (2006) utilized TAM to comprehend the low rate of implementation of EMRs in Saudi Arabia and results showed a significant relationship between costs and PEOU. The study revealed related information underlying current issues faced when implementing EMRs in the Kingdom of Saudi Arabia and simultaneously looked into the factors affecting the implementation. This particular study comprised Four groups of healthcare professionals including physicians, pharmacists, nurses and laboratory staff.. High costs in the form of installation and maintenance of EMRs, were expected to increase during EMRs utilization. Lack of organizational support of the cost issue did not only encompass the issue of software

cost because the implementation also involved the following: cost of hardware, networking (including Internet Service Providers), infrastructure, installation of operating system and training (Alanazy, 2006; Podichetty and Penn, 2004). Therefore, this increased the overall costs which may be unaffordable for hospitals (Alanazy, 2006) which consequently affected their PEOU.

Moreover, the EMRs cost can be categorized into phases namely the initial installment and the maintenance cost. Also, Alanazy (2006) carried out a comparison and found initial installment cost to be greater than the maintenance cost as the former requires the installment of computer hardware as well as support when it comes to training and technical problems. The cases expounding on this issue show that costs became a barrier when EMRs were implemented in the USA and the overall strategic plans for EMRs implementation in the hospitals had to be delayed until 2014 due to this matter (Murphy, et al., 1998). This is also because training and the time consumed during training are both included in the initial installment costs.

Additionally, Miller and Sim (2004) revealed in their study involving managers and physician in 30 organizations over the period from 2000-2002, that the upfront cost of EMRs implementation is the main obstacle to its adoption which was further compounded by the uncertain financial benefits that the hospital obtained (Khalil and Jones, 2007). Financial benefits were revealed to vary from nil to more than $20,000 per physician per year in cases where the paper processes were eliminated. The EMRs cost include excessive startup costs clashing with healthcare organizations' requirement to save costs and thus, compounding the implementation challenge further (Miller and Sim, 2004). According to Alanazy (2006), some organizations cannot afford to spend

excessive amounts at the initial stages as this would put a heavy financial burden on the employer (Dick and Steen, 1991). Due to the above high costs surrounding EMRs implementation, the PEOU of the healthcare professionals were affected.

In light of the EMRs implementation and its financial gains, Wang, Middleton, Prosser, Bardon, Spurr, and Carchidi (2003) revealed that the level of EMRs implementation directly influences the financial gains or losses. The cost of inception is reported to be greater than the potential gain in cases where EMRs are implemented to replace paper charts. On the other hand, when the system is used to replace charts and other activities like drug checks, a net gain of over a five-year period is possible.

In conclusion, among the many factors impacting EMRs employment is the high cost which in some cases, can be highly significant. At certain times when healthcare institutions or hospitals are requested to reduce costs, they find it a great challenge to allocate capital for the information systems in general and EMRs in particular. However, some claim that EMRs not only reduce costs but they also improve the quality of care as it is provides invaluable information to healthcare professionals and turn, provide quality care to patients. Additionally, EMRs also helps in avoiding duplicate testing and it facilitates the system's efficient coordination of healthcare professionals. As discussed above, high cost and its impact on EMRs implementation are explained. Some researchers acknowledge the cost factor and suggest its in-depth examination as one of the hindrances preventing EMRs implementation because of its significant impact on PEOU as revealed through TAM of EMRs implementation of healthcare professionals.

2.5.5 User-Patient Relationship

This is considered as the core of medical practice and is a requirement for the provision of high-quality health care and in the diagnosis and treatment of disease. The user-patient relationship has been considered as the basis of contemporary medical ethics (Aydin and Ischar, 1994). This is what medical schools and universities teach medical students at the onset even before they start practicing in hospitals. They are taught to nurture a professional relationship with patients, uphold the patients'dignity and guard their privacy.

At the emergence of EMRs implementation technology, patients' interaction with healthcare professionals showed a significant change. Therefore, medical education must prepare healthcare professionals on how to deal with this novel type of relationship. Most importantly, pedagogy has to give way for three major developments (Doolan, et al., 2003): (1) changes to doctor-patient interaction during clinical visits: (2) new patient and healthcare professionals roles and corresponding functions; and (3) new modes of communication between healthcare professionals and patient. The proceeding paragraphs will discuss recommendations of formal education curriculum that requires the modification of this relationship based on the three developments related with implementation of EMRs technology.

According to Lyons (2007), healthcare professionals are taught to be observant. They interact with their patients taking in postural or verbal cues patients give out to assist them in their diagnosis and design treatment strategies. The verbal exchange is considered as an effective strategy to assure patients of the doctor's advocacy and therefore, benefiting the patient as well. Patients also remain highly observant of

postural and verbal signals from the doctor assisting in letting the doctor gain new information (Roter and Hall, 1989). This places user-patient dialogue as an invaluable tool for both patient and healthcare professionals.

In the light of the evaluation of EMRs implementation influence on this tool, it is important that analysts explore it both from the view of patients as well as healthcare professionals. More importantly, implementation of EMRs data will be invaluable in the long run if attention to detail is paid. This means that healthcare professionals have to expend a considerable amount of effort to data entry during the treatment and diagnoses (Lyons, 2007). The problem arises in the fact that computer workstations normally need a certain way of body positioning, hand and eye movement that diverts the doctor's attention from the patient during the dialogue. This is why the implementation of EMRs technology in the examination room is sometimes found cumbersome as it bars effective communication (Lyons, 2007).

Also, the relationship of trustworthiness between the patient and the healthcare professionals plays a critical role in diagnosing and is a therapeutic process because it shapes the basic grounds for the user-patient connection (Lyons, 2007). For the purposes of making the healthcare professionals diagnose accurately and henceforth offer the optimal treatment, patients from their side, have to express in clear terms about their illness or injury. It is obligatory for the healthcare professionals to abstain from revealing secret information. The healthcare professionals' task is to preserve the patient's confidentiality that conforms to the ethical codes of the profession and which is characterized as a special connection between the healthcare professionals and the patients.

Some healthcare professionals consider computers as factors affecting their smooth workflow and a disturbance to patients in the examination room (Lyons, 2007). Little research has addressed this area (Morton, 2008), nonetheless, it has been indicated that implementation of EMRs technology might develop the patient provider connection, and that there is some encouragements and enthusiasm of EMRs implementation that were documented from the patients' side (Lyons, 2007). The research that has dealt with investigating the patient attitudes toward the computerization of healthcare professionals' work have shown positive findings; however, more research would be more indicative of investigating the nature of the issue (Gadd and Penrod, 2000; Hsu, Huang, Fung, Robertson, Jimison, and Frankel, 2005; Huber, 2001; Wager, Ward, Lee, and White, 2005) . The users-patients relationship, as has been suggested, seems to have positive effects towards patients' attitudes of EMRs implementation integration, given the particularity of EMRs implementation within such relationship.

Morton (2008) revealed a highly significant relation between users-patient relationship and PU. There is an indirect relation between a healthcare professional's anxiety surrounding user-patient relationship and his/her perceptions of usefulness; as the former increases the latter decreases. Also, user-patient relationship was related to autonomy; a finding consistent with Gadd and Penrod's (2000, 2001) finding. It is notable that while user-patient relation appears to impact EMRs attitude, it appears that healthcare professionals do not consider this as a hindrance to EMRs adoption. Future studies concerning post-implementation could provide a deeper knowledge about these initial perceptions.

It has however, been noted that some healthcare professionals may consider a computer a challenge in the examination room as it hinders work flow efficiency and disturbs patients. This area of research needs to be explored in a thorough manner (Morton, 2008). Nevertheless, EMRs implementation has been suggested to improve patient-provider relationship and some patients are hopeful of the efficiency of EMRs implementation. However, as mentioned earlier, studies in this area are few and far between therefore, this calls for further research on the issue.

In sum, only a few research has been dedicated to study this area (Morton, 2008), but it has been recommended that EMRs implementation may enhance user-patient relationship and some patients show enthusiasm and encouragement in EMRs use. Studies dedicated to the investigation of user-patient relationship attitudes toward healthcare professionals' computer use have revealed positive results. Nevertheless, further research is called for to investigate the issue. The user-patient relationship has been revealed to positively impact patients' attitudes towards EMRs implementation. Owing to the specificity of EMRs with such relationship, the attitude towards its implementation is similar to the attitude towards EMRs itself when considered in light of user-patient relationship and it may be expected that a user-patient relationship exists in the EMRs environment.

2.5.6 Users' Background of Computers

Healthcare professionals have various level of ICT literary. Healthcare professionals who have low ICT learn will not accept to use IT in their work, or at minimum, they need to have some kind of training to learn how to use computer during their work. They

may resist usingEMRs or even to participate in the training; especially, older individuals who have never used computers in their lives (Lorenzi and Riley, 1995; Lorenzi, et al., 1997). This is because the users' background impacts their PEOU. In other words, their background of computer use impacts their perception of how easy or how difficult it is to use the computer.

When medical users have proper experience or necessary computer skills, they will accept EMRs and hence there will not be any problem affecting the implementation of EMRs in their working environment (Greenhalgh, et al., 2004). Their sufficient computer skills will reinforce their perception of how easy it is to use the computer. The relationship between users' background and training is also notable because some of the trainees are expected to have some IT background and improve their skills during and after the training sessions, something that is not usually offered by the medical organizations for hospital staff (Aaronson, et al., 2001; Clayton, Pulver, and Hill, 1994; Ilie, 2009).

In addition, Alanazy (2006) revealed a significant relationship between user background and PEOU, and concluded that healthcare professionals lack the technical knowledge and skills required to deal with EMRs due to lack of organizational leadership in the form of training. Similarly, Jocelyn, Richard and Inga (2001) study revealed a significant relationship between individual factors like user background and PEOU; a result consistent with Dansky et al. (1999).

Along a similar vein, (Huang and Chiao-Ting Shih, 2010) revealed user background to have a significant positive effect on EMRs implementation implying that if healthcare

professionals are inclined to adopt EMRs, and have sufficient training on its use, this will consequently result in their improved EMRs operation, and hence their enhanced PEOU. This is consistent to prior findings (Staples, Hulland, and Higgins, 1999) implying that medical institutions have a responsibility to train individual healthcare professionals in EMRs operation to improve their use.

Based on researchers' surveys, healthcare professionals lack the technical knowledge and skills to operate EMRs and thus, resist its implementation (Jha, Bates, Jenter, Orav, Zheng, and Cleary, 2009; Meade, Buckley, and Boland, 2009; Simon, et al., 2007).

In a related study, Meade et al., (2009), observed that majority of the current generation of healthcare professionals in Ireland obtained their qualifications prior to the introduction of IT programmers while EMR providers seemed to underestimate the degree of computer skills needed to operate them. However, in reality, the EMRs is very complex to operate and good typing skills are required to enter patient medical information, notes and prescriptions which most healthcare professionals are sadly lacking (Morton, 2008; Alanazy, 2006). Moreover, a new type of medical error introduced by EMRs use is typos and this inadequacy in typing skills is not just confined to physicians but includes other healthcare professionals. Hence, this widespread lack of skills bars the wide adoption of EMRs implementation (Morton, 2008; Alanazy, 2006).

In sum, lack of computer skills for the purpose of EMRs implementation is a major hindrance not only for healthcare professionals but also for other staff as this affects their PEOU. With automation planned, attention should be provided to this issue as some institutions find training of users of the basic computer skills has helped relieve the

situation. However, resistance of staff to attend courses of this caliber could pose a challenge and hence, they need to be encouraged and supported to eradicate such reluctance. EMRs' successful implementation hinges on the computer skills of the entire healthcare professionals as well as other staff. Despite the wide use of computers in this day and age, particularly the Internet, some individuals are still lacking in skills to routinely operate and use computers both at work and at home.

2.5.7 User Autonomy

Autonomy of healthcare professionals is related to the quality of care and protection of patients (Morton, 2008). This provides the physicians with the freedom to make their judgments in the patient's best interests without opposing arguments from the society on the condition that healthcare professionals promise to act competently and to place the patient's well being ahead of their interests. These two are well balanced in the social contract that provides the medical profession the privilege of autonomy but at the same time, also puts upon them the responsibility for effective self-regulation (Lorenzi and Riley, 2000).

Normally, the governments of countries present their regulatory and policing power to the medical profession expecting them to fulfill its self-regulatory obligation. Due to a number of reasons, the medical profession has been doing a poor job and has often been accused of being complicit and complacent (Morton, 2008). As a response to negative media coverage and public pressure in different countries, the medical profession has adopted initiatives in the past years to make sure that continued healthcare professional competence, information sharing among different jurisdictions, increased transparency,

greater public participation in the regulatory process, and more vigorous exercise of its policing power are carried out (Castells, 2003).

In order to assist in the issuance of competence, recertification and revalidation requirements were done but this still did not quite eradicate concern of healthcare professionals' conduct of EMRs implementation. Progress can be observed regarding effective self-regulation but still greater effort is required to pacify public wariness (Lorenzi and Riley, 2000; Lorenzi, et al., 1997) Currently, external application in the form of pay-for-performance standards and required conformity to practiced guidelines are currently threatening healthcare professional autonomy of EMRs implementation (Khalig, Amir, Mwzchofi, Ari, Brobert, and Robert, 2010).

Moreover, individuals are provided autonomy by ICT regarding social and individual background, opting for a disposition in order to avoid the traditional control, allowing individuals to come face to face with society's contradictions while keeping in mind the relevance of networks in creating new social movements that are solely possible in the context of ICT's widespread use (Khalig, et al., 2010). Findings from studies of EMRs/CPOE pinpoints the relevance of having the monopoly of the care process (Larriviere and Bernat, 2008). Also, a study revealed the nurses' concerns regarding computer use as this would lead to increased monitoring of their actions (Castells, 2003). This was further confirmed by anecdotal evidence from children's patient care staff.

EMRs implementation involves significant change in the magnitude that may influence positions or power of individuals (Teich, Merchia, Schmiz, Kuperman, Spurr, and Bates, 2000; Upperman, Staley, Friend, Benes, Dailey, and Neches, 2005) which means if

healthcare professionals perceive that their autonomy is confined as a result of EMR implementation, their PEOU is affected which in turn impacts their PU of the system. Thus, in cases when work roles, status and autonomy are negatively affected, resistance arises (McLane, 2005). While healthcare professionals are convinced of the EMRs ability to improve healthcare, they may be wary of the facility's increased monopoly of monitoring and controlling their work (Lorenzi and Riley, 2000). Additionally, healthcare professionals are required to have the last word. In other words, although EMRs assists in providing medical decision support capabilities, it is the healthcare professionals who hold the clinical decision support rules (Anderson, 1997).

In this regard, Morton (2008) revealed a significant relationship between users' autonomy and PU but a strong negative direct relationship with attitude regarding EMRs implementation. This relationship was not part of the hypotheses but it implies that perceptions of autonomy have a strong effect upon attitudes. These findings conflict with findings obtained by Aldosari (2003) who also noted a strong negative relationship between healthcare professionals' autonomy and attitude, but revealed significant relationships between autonomy and both PEOU and PU.

The findings regarding the relationship between users' autonomy and attitude are consistent with the previous studies' findings (Detmer and Friedman, 1994; Gadd and Penrod, 2001; Gardner and Lundsgaarde, 1994). Moreover, Gadd and Penrod (2001) revealed how the system's impact on healthcare professionals' autonomy is one of the main primary concerns of healthcare professionals in EMRs implementation which is evident before the EMRs is implemented and gradually increased after implementation. The covariance between perceptions of autonomy and perceptions of doctor-patient

relationship was also noted by them. It is suggested that future studies follow up on the healthcare professionals' post-implementation in order to measure its impact on perceptions upon autonomy. However, in the current study, the relationship between user involvement and PEOU lacks support in the previous literature regarding their relationship (Morton, 2008).

In sum, evidence that presents the maintenance of user autonomy is the fact that healthcare professionals' work remains the same in light of type and content. Healthcare providers utilizing EMRs continue to provide patient care which is similar to those activities which they conduct when using the more traditional paper system. They also maintain their power and autonomy in the method they structure the achievement of works tasks and the way they go about completing them. On the other hand, the differences lie in the method of time utilization implying that healthcare professionals still get to decide how, when and where to achieve tasks.

2.5.8 Resistance to New Technology

Technology is changing rapidly every day in our life and this is reflected adversely on the technology systems that we use. Healthcare professionals' resistance to new technology is one of the factors affecting EMRs implementation (Berger, et al., 1999; Hie, 2009). Every time new EMRs technology appears, users will resist these new technologies. This is because it will take them more time to learn how to use the new software. Thus, it interferes with their workflow and slows down their work (Anderson, 1997; Weber, 2004).

New technologies force the healthcare professionals to work in a similar way, although most of them had practiced medicine in different ways. This causes frustration and impatience amongst them because EMRs is confusing and time consuming for them. Therefore, they are not able to attend to the same number of patients compared to when they were using a paper-based report writing (Langberg, 2003; Ludwick and Doucette, 2009 and Doucette, 2010). This resistance to new technology by the healthcare workers affects their PEOU of the system.

According to the Agency for Healthcare Research and Quality's National Resource Center for Health Information Technology in USA, EMRs implementations follow the 80/20 rule; that is, 80 percent of the work of implementation must be spent on issues of change management, while only 20 percents spent on technical issues related to the technology itself. Such individual factors including resistance to new technology of healthcare professionals, play a major role in slowing the rate of EMRs implementation from paper records (Ash and Bates, 2005; Rahimi, 2009).

EMRs is inherently linked to the computer industry, whose obsolescence is another concern. EMRs technology has undergone a rapid change, and just as the personal computer that someone bought three or four years ago will become obsolete by future technology updates, similarly, today's EMRs implementation will become obsolete with technological advances. Therefore, the EMRs implementation, that took a lot of time and money in terms of implementation, might become obsolete within a short span of time and by the time the practice will be fully implemented and used (Alanazy, 2006; Tipirneni, 2006). Therefore, it can be concluded that the acceptance of EMRs plays a

major role in adopting the use of EMRs as this will affect their perception of its ease of use, whereas resistance to accept the system will become a barrier to its implementation.

Thus, the worry concerning new technologies among healthcare professionals and medical users in one way or another, will decide the decision making of adopting or rejecting the new system. Technology acceptance or resistance among the healthcare professionals will decide upon the course of EMRs implementation according to the internal motives and attitudes of those users (Mahata and Lei, 2007). According to a survey conducted by Ash (1997) on 67 institutions to identify the factors which are the most important for implementing the Computer-based Patient Record (CPR), it was pointed out that those attributes related to technological innovation are major factors in CPR implementations.

Based on studies regarding healthcare professionals by Alanazy (2006) and Dansky et al., (1999), an insignificant relationship between resistance to new technology and PEOU was revealed indicating that healthcare professionals are inclined to believe that adopting novel and emerging technologies can be beneficial in their work particularly if it helps improve the quality of care and efficiency of health care. The findings revealed that majority of the healthcare professionals readily agree to make changes in their workflow to accommodate EMRs implementation. Alanazy's (2006) findings seemed to be contradictory at the onset implying that health care professionals in Saudi Arabia involved in the survey are themselves willing to adopt new technologies, but are convinced that their colleagues might not be ready to accept such technology and some might even be apprehensive in using technology as a tool to assist them in accomplishing their work.

Most healthcare professionals and other staff seemed to be reluctant to adopt new techniques of approaching things that are novel to their practice and that interrupt their routine workflow. They perceived that taking time from their patient work would be improper and would threaten their patients' health. Unfortunately, too fast of an adoption of a new technology can cause more problems than it solves, which is probably why most healthcare professionals tend to resist such innovations, and the technology of whatever system might be such as EMRs, EHRs or CPOE. They might have more disadvantages more than advantages (MacKinnon and Wasserman, 2009; Tipirneni, 2006). Therefore, the primary challenge of implementation of EMRs technology is healthcare professionals' resistance (Dansky et al; 1999; Long, 2009; MacKinnon and Wasserman, 2009).

According to research of Miller and Sim (2004), acceptance of EMRs by healthcare professionals and their supporting staff is of great importance if successful computerization of hospitals is desired. However, computerization resistance is still persistent and an active factor. Healthcare professionals' resistance escalates to the point of dissatisfaction that could inhibit the entire implementation process; therefore, healthcare professionals whose institution decides to embark on the process of implementing new technologies will face strong resistance from the healthcare professionals to accept and use such systems (Ash and Bates, 2005; Meinert and Peterson, 2009; Riesenmy, 2010).

The impact of resistance to new technologies upon EMRs' implementation is empirically validated through a study of healthcare professionals' resistance to new technology of EMRs implementation in Jordanian hospitals. In addition, healthcare

professionals' resistance lowered the effectiveness of their implementation and led to bias in their intention to use the system which eventually negatively affected their EMRs usage behavior. The combination of both direct and indirect affect of this resistance may prove greater than the affect of actual use, reinforcing the importance of resistance as a key barrier to EMRs implementation and an impact to PEOU. Moreover, healthcare professionals' resistance to new technology's root cause may be attributable to the perceived threat of their loss of control over their work procedures. In other words, healthcare professionals considered EMRs as tools that would make them lose control of their usual way of performing tasks such as: ordering patient tests, accessing lab results, making clinical decisions, and working in general.

2.6 TAM in Healthcare application and EMRs implementation

TAM's comprehensive nature was also tested in the context of healthcare as evidenced by the TAM studies in healthcare towards certain IT applications listed in Table 2.2. The last two decades witnessed TAM's complete evolution. Based on Wixom and Todd's (2005) study, TAM's extension can be expounded through three basic ways. The first one involves factors from related models while the second one introduces additional or alternative suggestions to the model which are adapted from the diffusion innovation theory (e.g. factors like tradability, compatibility, visibility or result demonstrability). Finally, the third approach involves external factors such as organizational and individual characteristics factors impacting PEOU and PU. The determination of particular antecedent factors affecting EMRs is summarized in Table 2.1.

Haslina (2009) developed the doctor's acceptance model of EMRs in light of technical, social and behavioral perspectives. The model adapted TAM as its basic theory and the study involved the survey method applied to two pioneer hospitals using EMRs – Selayang and Putrajaya hospitals in Malaysia. The findings from the survey led to the development of the Multiple Perspective Technology Acceptance Model (MP – TAM) from EMR. The model comprises three perspectives namely technical, social and behavioral perspectives and the interface reveals a positive significant relation with both PU and PEOU. Both factors were also revealed to have positive significant relations with user satisfaction which is the factor that was in the behavioral perspective. The findings of the study contributed new knowledge towards HI as the model is able to provide evidences to the EMR acceptance and can justify the strengths and weaknesses of the IT application in light of the following: system capabilities, information quality, and user interface.

In a related study, Chismar and Wiley-Patton (2003) conducted a test regarding TAM's applicability to EMRs acceptance applications involving 89 pediatric physicians in the US. The findings partially confirmed the model but a main construct of the model which was PEOU was not supported (Chismar and Wiley-Patton, 2003). In other words, PEOU could not predict intention to use while PU was found to be a strong determinant of the same. The authors explained that in the context of medicine, the crucial factor for intentions to adopt a novel technology are usefulness, relevance and the output quality that is enough to complete the daily tasks. Moreover, physicians tend to possess a high competency and capacity to allow for understanding technology faster than the average person and hence, they are willing to adopt beneficial applications of IT even if they

as opposed to other findings, PEOU was revealed not to have a significant effect on both PU and attitude. PU and PEOU contributed approximately 37 percent to the variances in attitude and hence, the authors concluded that TAM's power might be limited when it comes to technologies and user populations and PEOU might not be suitable to competent and intelligent, professional users as opposed to non-professional users such as students and the like Hu et al.'s (1999). Hence, this explains why PEOU becomes weak as end user competency increases.

In addition, Liu and Ma (2006) carried out a study of the acceptance of HyperCharts ™ application upon senior students at an American medical school. The acceptance model considered the perceived service level as the antecedent factor of PEOU, and PU as the antecedent of BI. The findings reveal that PEOU positively impacts PU and BI indirectly and hence, PU and PEOU significantly impacted BI. PU and PEOU also contributed approximately 40 percent of the variance in BI while PU provided a stronger affect on BI. PEOU contributed 26 percent towards the variance of PEOU.

Moreover, Chang, Tzeng, Wu, Sang, and Chen (2003) conducted a test of TAM model in Personal Digital Assistance (PDA) prototype and terminal systems utilized by nurses in the Emergency Department of Taipei Veterans' General Hospital. The two systems were tested for their ability to gather patients' complaints, demographic data, and vital signs. No significant difference was revealed between PEOUs for both systems but the nurses preferred to use PDA because of its familiarity, it's easy of operation and because of its user friendly functions compared to the terminal system. The nurses stated their positive attitudes towards PDA (Chang et al., 2003) . However, owing to the low margin of the acceptance between PDA and terminal systems, the authors proposed that the user

interface of the PDA system be improved and incorporated with speech recognition for entering data.

In a related study, Sujitparapitaya, Janz, Wetherbe, and Sammet (2001) applied the TAM in the identification of the user acceptance of enterprise user interface (EUI), commonly known as Common Access in Ascension Health Systems within healthcare organizations in the USA. The subjects comprised nurses, IS staff, physicians, clinicians, and other healthcare professionals. With regards to PU, the findings of the study revealed that all subjects from the four hospitals were of the consensus that EUI enhances their job performance and allows them to complete their tasks in a timely manner (Sujitparapitaya et al. 2001) . The findings also revealed the PEOU had the strongest impact on the acceptance of EUI. Hence, the authors concluded that EUI was perceived by the subjects as more useful and easier to use compared to the prior user interface technology.

As for the means and standard deviations, they are both acceptable in range based on TAM studies within physician population. For instance, in Chau and Hu's (2002) investigation of healthcare professionals' decisions to accept telemedicine technology, the mean of the constructs was recorded as: PU (3.02), PEOU (3.20), and BI (3.23) while Usage was not measured. All the items were measured on a seven-point Likert scale, with 4 as the mean or neutral value. If the results are interpreted to the scale utilized in the current study, the means of the three constructs of Chau and Hu's (1999) study would lie on the negative side of zero.

In a similar study, Alanazy (2006) made use of TAM to explain the low rate of the determination of organizational and individual characteristic factors impacting EMRs implementation in Saudi Arabia. The findings of the study showed related information regarding current challenges while implementing EMRs in the Kingdom of Saudi Arabia and at the same time investigated the factors impacting the implementation in seven hospitals. The study comprised six categories of healthcare professionals, namely physicians, pharmacists, nurses, laboratory staff, administration staff and medical records staff. The findings revealed a significant link between high cost of adopting EMRs, training, resistance to new technologies and lack of experience of computers with PEOU, and PEOU. PU and PEOU had significant impacts on attitudes toward using EMRs and attitude of EMRs had a significant impact on BI. The largest barriers to the implementation was found to be: lack of organizational leadership support, insufficient workstations for provision of training, support, lack of solutions to technical and financial issues in a timely fashion, reduced use of EMRs implementation, and cost (Alanzy, 2006).

In another similar study, Morton (2008) identified the organizational and individual characteristics factors affecting of EMRs implementation by using TAM in University of Mississippi Health Care (UMHC). The findings revealed that organizational leadership, user background and training had significant relationships with PEOU. The findings also revealed significant relationship between user involvements, user-patient relationship except users autonomy on PU while PEOU had significant impacts on PU. In addition, PEOU and PU had significant impacts on attitude of EMRs implementation. However, PEOU had an insignificant impact on attitudes toward using of EMRs, while attitude to

use EMRs had significant impact on BI. The variables explained more than 73 percent of the variance in EMRs implementation and an acceptable model fit was reached. The participants of the study stated their concern regarding perceptions of the EMRs potential negative impact on clinical workflow and efficiency. The study's major contribution includes development of a EMRs Acceptance Model for assessing healthcare professionals' intention to use EMRs implementation. The framework acts as precedent for other healthcare institutions in their assessment EMRs readiness while the findings are valuable to software developers in their product designing in order to meet various clinical specialties and user skill levels. The results also present an empirical support towards the affect of organizational and individual characteristic factors on healthcare professionals regarding implementation of EMRs.

Also, Miller (2004) made use of TAM to investigate the healthcare professional champions' intonation to use EMRs in 30 physician organizations from 2000-2002. He revealed pertinent factors impacting EMRs implementation. The findings showed the following: organizational factors like cost had a significant relationship with PEOU, resistance to new technology had significant impact on PEOU and a significant impact was shown between PEOU and PU. Additionally, PEOU and PU had significant impacts upon attitudes towards using EMRs while the latter had a significant relationship on BI. The author suggests that healthcare professionals pursue quality improvement in a major way but reveals that systematic quality improvement implementation of EMRs is costly and difficult and there is no simple way to accelerate EMRs implementation and use for quality improvement. Owing to the various facets of the nature of barriers to the implementation, policy interventions are needed to speed up

the successful EMRs-driven quality improvement. These interventions concentrate on data exchange improvement among health care entities, the provision of financial rewards and work/practice support, organizational leadership, cost and resistance to new technology for quality improvement. The interventions coupled with ongoing trends should speed up EMRs implementation and their uses for quality improvement particularly in ambulatory care.

Moreover, Seligman's (2001) research made use of the TAM in an investigation of the intonation to use EMRs of healthcare professionals comprising physicians, nurses and executives. The findings revealed the following: a significant relationship between physician autonomy and PU, a significant relationship between PEOU and PU, a significant relation between PEOU and PU with attitudes toward using EMRs and a significant relation between attitudes toward using EMRs and BI.

Similarly, Dansky et al.'s (1999) study made use of TAM to investigate the intonation of EMRs' use by healthcare professionals on their challenges of EMRs implementation. The results of the study revealed: a significant relationship between resistance to new technology with PU, a significant relationship between organizational leadership and users' background with PEOU, a significant relationship between PEOU and PU, a significant relationship of PEOU and PU on attitudes toward using of EMRs implementation and finally a significant relationship between attitudes toward using of EMRs with BI. The study attempted to identify specific attitudes or factors that should be considered prior to EMRs implementation to demonstrate empirical support for a model of PU of EMRs. Some proposed strategies for successful management of EMRs implementation are: training the physicians and practitioners in computer activities

before implementation and providing them organizational leadership before and during the redesign effort. For computerization to be successful, physicians and support staff should accept EMRs.

In a related study, Aldosari (2003) made use of TAM to study factors impacting physicians' attitudes towards medical IS usage and acceptance via the mandated implementation of integrated medical IS in the Saudi Arabian National Guard health system. The results of the study revealed: a significant relationship between organizational leadership and PEOU, an insignificant relationship with user autonomy, a significant influence of PU and PEOU on attitude to use, and significant impacts of PU and PEOU on attitudes toward using.

In another related study, Gadd and Pernrod (2001) utilized TAM to study factors impacting physicians during EMRs implementation. The findings revealed the following: a significant relationship between training and PEOU, and a significant relationship between user autonomy and user-patient relationship on attitude to use. Moreover, an assessment of physicians' attitudes was carried out prior and after the implementations of an outpatient EMRs in six practices. The results reveal: the physicians were ready adopters of EMRs when they were convinced of its value-added element for the effort required to use it.

Still another study by Detmer and Friedman (1994) utilized TAM to study attitudes towards computers in a healthcare involving healthcare professional champions in 272 physician organizations in two medical centers- Stanford University and University of North Carolina (UNC) in the U.S. The findings revealed: that organizational and

individual characteristic factors such as user background of computers and training had significant relationship with PEOU and user-patient relationship had a significant relationship on PU, a significant relationship between PEOU and PU, and PEOU and PU's significant impacts on attitudes toward using of IT implementation. Most participants to the survey had little or no formal training in computing or medical informatics. The study revealed that even younger physicians lacked formal training in computing during their medical school or residency. Those who had were more knowledgeable about informatics concepts compared to those who did not. The former reported that computers are beneficial to healthcare implying the effect of education on attitudes and for those who see value in medical computing; they are inclined to follow up with formal training.

Moreover, Jocely et al., (2001) adapted and extended TAM in their investigation of the primary care practitioners' attitudes towards a proposed system for maternity patients. The entire doctor and midwife employees holding maternity care contracts with a well known urban hospital in New Zealand, were involved in the questionnaire survey gathering their opinions regarding planned EMRs integrating the hospital and the primary care sectors. The findings revealed that organizational and individual characteristic factors like user background of computer, cost and training had significant relationship with PEOU. The findings also revealed the following: a significant relationship between PEOU and PU on attitudes toward using, and significant impact on actual use of EMRs implementation. In addition, the research revealed that while Davis' two key factors of PEOU and PU were crucial to healthcare professionals, perceived system acceptability concerning control and management of information, is equally so.

Two groups of professionals were revealed to have their own distinct requirements owing to various degrees of experience and practice computerization. The research finally noted wider organizational issues which are generally important to the utilization of inter-organizational systems and specifically important to healthcare systems.

Also, Sachidanandam (2006) conducted an exploration of the post-implementation usage behavior of physicians with regards to EMRs with the assistance of TAM. The findings revealed that the implementation can be considered as a critical organizational activity and the physician's acceptance of EMRs measured its successful implementation. This reinforces the importance of the present study's contribution to the knowledge regarding the topic. The author developed EMRs -TAM instrument that has been analyzed by the principal component analysis. Six hypotheses were developed and analyzed via hierarchical multiple regressions and the results revealed the following: PEOU had significant impacts on PU, PEOU and PU had significant impacts on attitude of EMRs implementation, PEOU had insignificant impact on attitudes toward using of EMRs, PU and PEOU had insignificant impacts on BI and attitude had significant on BI. The findings implied a significant impact of "total causal effects" of PU about EMRs and PEOU of EMRs upon the following: behavioral intention to use, EMRs (BI) and EMRs adoption. Moreover, PU was revealed to be more significant as compared to PEOU on the basis of their influence upon BI and EMRs adoption which implies that concentration on EMRs usefulness in training sessions matches the increase in ease of features of EMRs, notwithstanding the degree of effect which would also mean an effect on BI and EMRs adoption (Baron, Fabens, Schiffman, and Wolf, 2005; Huber, 2001).

Similarly, Groll (2006) studied TAM usage in comprehending the perspectives of patients suffering from testicular cancer on a disease-specific EMRs technology. Most of the respondents stated the importance of face-to-face encounters and physical examination, 91 percent of the patients use the internet to gain more information, while 75 percent of them use health information. Majority of the patients showed interest in the method of accessing test results through the internet. The key factor is in the way surveillance patients consider disease-specific EMRscomprise practicality, meaning of information, patient-doctor relationship, and risk of occurrence and role of technology. Moreover, according to Groll (2006), every one of the aforementioned factors work through a main theme of reassurance and the entire factors can be affected by temporality. A similar study by (Hsu, et al., 2005; Wager, et al., 2005) which is also considered as based on Davis' pioneer work on TAM, studied the attitude of nurses regarding EMRs from a month to three months before its implementation.

Sun and Zhang (2006) presented TAM extension and proposed ten moderating factors which are divided into three groups namely: 1) organizational factors comprising voluntariness and the nature of task/profession; 2) technology factors comprising technology complexity, individual versus group technologies, and the purpose of using technology: work versus entertainment-oriented; and 3) individual moderators comprising intellectual capacity, cultural background, gender, age and experience (Sachidanandam, 2006). These entire factors were explored in the user TAM. Moreover, PU, PEOU and SN factors along with three other groups of moderators comprise the proposed integrated model.

Chau and Hu's (2001) study, had reported that professionals like physicians are inclined to be more practical as compared to other users of information systems and are assumed to be more inclined to make use of applications which are suitable for their work. They theorized that professionals may regard system usefulness rather than ease of use. Along similar lines of study, recommendations were given for the investigation of the resident new technology, user involvement, background of computers (experience), perceived voluntariness and user characteristics upon adoption attitudes.

Table 2.1 TAM in Healthcare and EMRs

Significant External Variables	Type of Factor	Researcher	Subjects
PEOU, PU, user interface, information quality and user satisfaction	Social technical, and behavioral perspectives	Haslina, (2009)	Physicians
PEOU,PU Organizational leadership, physician involvement, training, physician autonomy, doctor- patient relationship , attitude and intention to use	Social perspectives, organizational and individual factors	Morton, (2008)	Physicians
PEOU, PU and intention to use.	Social perspectives	Liu and Ma, (2006)	students in medical school
PEOU, PU, cost, resistance to new technology, confidentiality and privacy, user background of computer, software quality, security and use, adoption of uniform standards and system maintenance, down-time and awareness, attitude and intention to use	Social perspectives, organizational and individual factors	Alanazy, (2006)	Physicians, nurses and administrators
PEOU, PU, attitude, intention to use	Social perspectives	Sun and Zhang, (2006)	Physicians
PEOU, PU and intention to use.	Social perspectives	Chismar et al, (2003)	Physicians

PEOU, attitude.	Social perspectives	Chang et al. (2003)	Nurses
PEOU, PU, attitude, intention to use, providing work/practice support systems, resistance to new technology leadership, cost, improving electronic clinical data exchange, and providing financial rewards for quality improvement.	Social perspectives, organizational and individual factors	Miller and Sim (2004)	Physicians and managers
PEOU, PU, organizational leadership and Physician autonomy	Social perspectives, organizational and individual factors	Aldosari, (2003)	Physicians
PEOU, PU, user background of computer, training, cost, attitude and intention to use.	Social perspectives, organizational and individual factors	Jocely et al.'s (2001)	Physicians and nurses
PEOU, PU and physician autonomy	Social perspectives and individual factors	Seligman, (2001)	Physicians, nurses, administrators
PEOU, PU, attitude and intention to use	Social perspectives	Hu, et al. (1999)	Physicians
PEOU, PU, attitude and intention to use	Social perspectives	Hu, et al. (1999)	Physicians
PEOU, PU, attitude and intention to use	Social perspectives	Chau and Hu, (2002)	physician
PEOU, PU, organizational leadership, residence to new technology and user background of computer	Social perspectives, organizational and individual factors	Dansky et al, (1999)	Physicians
PEOU, PU, training, users- patient relationship, user background of computer and attitude	Social perspectives, organizational and individual factors	Detmer and Friedman, (1994)	Physicians

Anderson and Aydin (2009) and Anderson (1997) claimed that there exists an element of importance in the exploration of behavioral, organizational and individual factors influencing and being influenced by a critical IS. Particular issues have cropped up from the medical informatics literature concerning the double affect upon the acceptance of medical systems. Notable technological factors can be categorized into two types.

It is apparent from Table 2.1 that organizational leadership, user involvement, training, costs, user background, user- patient relationship, user background of computers: user autonomy and resistance to new technology have not yet been tested with TAM factors in EMRs domain particularly in the context of Jordan. Hence, it can be stated that healthcare professionals' acceptance model can be developed on the basis of organizational and individual factors.

A review of literature reveals that organizational and individual factors might affect PU, PEOU attitude toward using and BI of EMRs implementation. Therefore, they can be integrated into an extended TAM as determinants of PU, PEOU, attitude toward using, BI and actual use of EMRs implementation. This is compounded by the evidence that shows the integration of different models can offer a deeper understanding and explanation of individual TAM (Chau and Hu, 2002; Yi, Jackson, Park, and Probst, 2006).

Healthcare professionals 'acceptance factors can be categorized into organizational and individual factors while the capabilities perspective comprises PEOU and PU. The healthcare professionals' acceptance perspective is the basis of the intended model.

Many countries have developed acceptance studies in many healthcare domains. However, in Biomedical informatics domain, a specific model integrating the three user acceptance does not exist, particularly in Jordan (Fauziah et al. 2011). Hence, a need for the development of such a model arises to support the recent widespread implementation of EMRs in Jordanian hospitals.

2.7 Conclusion

The healthcare information technology has been known to assist in the improvement of healthcare services and medical performance as evidenced by various electronic systems such as EMRs, EHR and CPOE, which basically enhance communication among medical users and improve the medical services of organizations in light of overall medical records. In addition, a detailed description of the potential tasks of EMR that enhances healthcare sectors and its advantages and disadvantages are tackled. Moreover, the challenges surrounding EMRs are discussed and presented. Contained in this chapter is also an explanation of the TAM and some other pertinent models of technology acceptance.

A look at literature shows that several researchers have accommodated EMRs implementation in a major portion of their works. Nevertheless, a gap still exists in the study of the factors impacting EMRs implementation. The present chapter attempts to fill this gap by presenting explanations of the details of the basis and the formulation of the research conceptual model. A review of literature also enabled the researcher to choose TAM. The present chapter attempts to reveal a clear insight into the understanding of the factors affecting EMRs implementation that are crucial to the

creation of EMRs and its usage. Most importantly, the chapter highlights prior TAM researches in order to identify the factors possessing statistical significant impact upon EMRs implementation.

Additionally, behavioral intention of the healthcare professionals may impact EMRs implementation and it may be significant in their refusal to shift from a paper-based system to the EMRs. The researcher is convinced of the significance of testing this factor in the research models in the context of healthcare organizations, the results of which can be utilized in EMRs implementation review from the viewpoints of healthcare professionals. Accordingly, PU and PEOU are considered in the present study as the external factors comprising organizational leadership and individual characteristic factors. The research model discussed in chapter Three in section 3.4 is developed in consideration of the healthcare professional viewpoints and related factors.

Although various global researchers have carried out acceptance researches in different healthcare areas, the domain of healthcare informatics in the context of Jordan is largely overlooked. To the researcher's knowledge, no specific model catering to the explanation of the factors influencing healthcare professionals' attitude towards EMRs implementation has been developed. This calls for the need to construct such a model which conveniently coincides with the recent rising EMRs implementation in various healthcare organizations.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodology that was used in the research and explains the basis of theories behind the methodology. Relevant definitions are listed for further elaboration. The chapter starts with explaining the distinction of exploratory research methodologies and research procedure by dissecting the conceptual model for the research based on TAM that was developed to answer the research questions and achieve the objectives of the study as well as formulate the much required hypotheses.

The present research strategy employed in the study is elaborated on followed by a discussion of the advantages and validation of employing the instrument. Data analysis is followed by the discussion of the validity and the reliability of Quantitative Analysis. In sum, the chapter attempts to elaborate on the research approach and strategy, discusses the data collection and the methodology used for sample selection, and lists down the research techniques that are used in the completion of the study. Finally, it exhibits the data analysis methods, data handling and the research results' validity.

3.2 Purpose of Research

Exploratory research is generally carried out to collect data concerning a specific subject (Yin, 2003). According to Saunders, Lewis, and Thornhill (2009), exploratory research can be carried out in three different ways. Firstly – by sifting through previous studies, secondly – by interaction with knowledgeable individuals concerning a given topic, and thirdly – by facilitating focused-group interviews.

The type of explanatory research, states that the main reason of this research is to carry out the analysis of the cause-effect relation and to explain which factors are the causes of specific effects (Yin, 2003). This notion is further emphasized by Sekaran (2003); these authors stated that the method followed by an explanatory research should be used as guidance when it is imperative to present a variable that results in the value of another. The authors further added that hypothesis testing generally deals with the explanation of the nature of a particular kind of relationship in order to clarify the variance in the dependent variable and to highlight the group of factor differences (Miller and Sim, 2004). A further reiteration by Yin's (2003) statement clarifies the fact further; the main aim of an explanatory research is the analysis of the cause-and-effect linkage, involving the determination of which cause results in which effect.

Enlightened by the cursory overview of types of research as well as the particularity of this research, it becomes clear that the explanatory type of research fits in very well as it can meet the research objectives and be able to answer the research questions in reliable and valid manner. Since the nature of this research intends to investigate cause-effect relationships among different factors affecting EMRs implementation, it becomes feasible to adopt explanatory research because it is a type that concerns causal relations, while other methods do not.

3.3 Research Procedure

The research procedure of the present study is presented in Figure 3.1. The flow initially begins with the literature review concerning TAM and EMR. On the basis of this review, the factors impacting EMRs implementation in healthcare as a notable domain

were highlighted. The research model was then developed and is discussed in the following section.

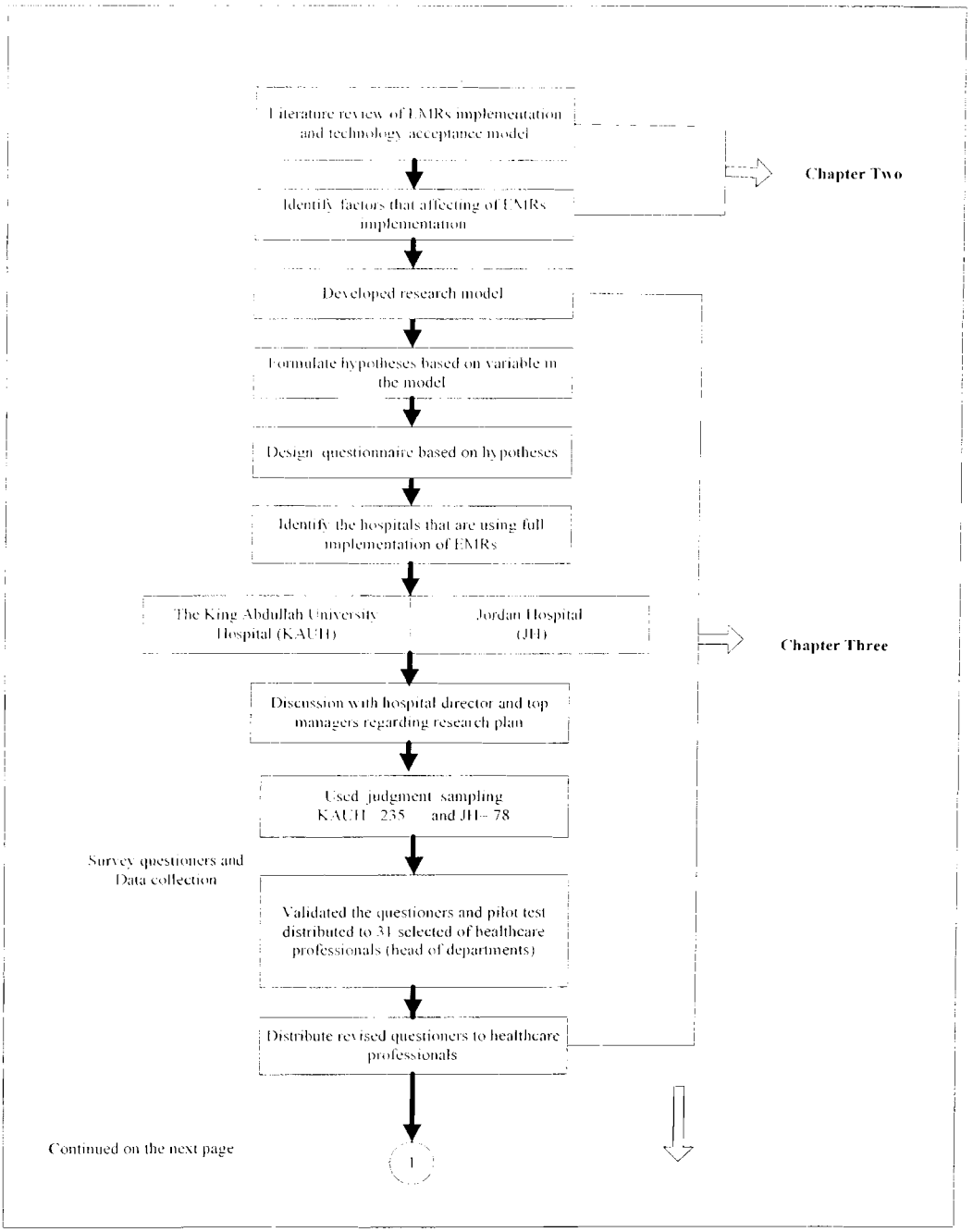

Figure 3.1 Research Procedure (adapted from Haslina, 2009)

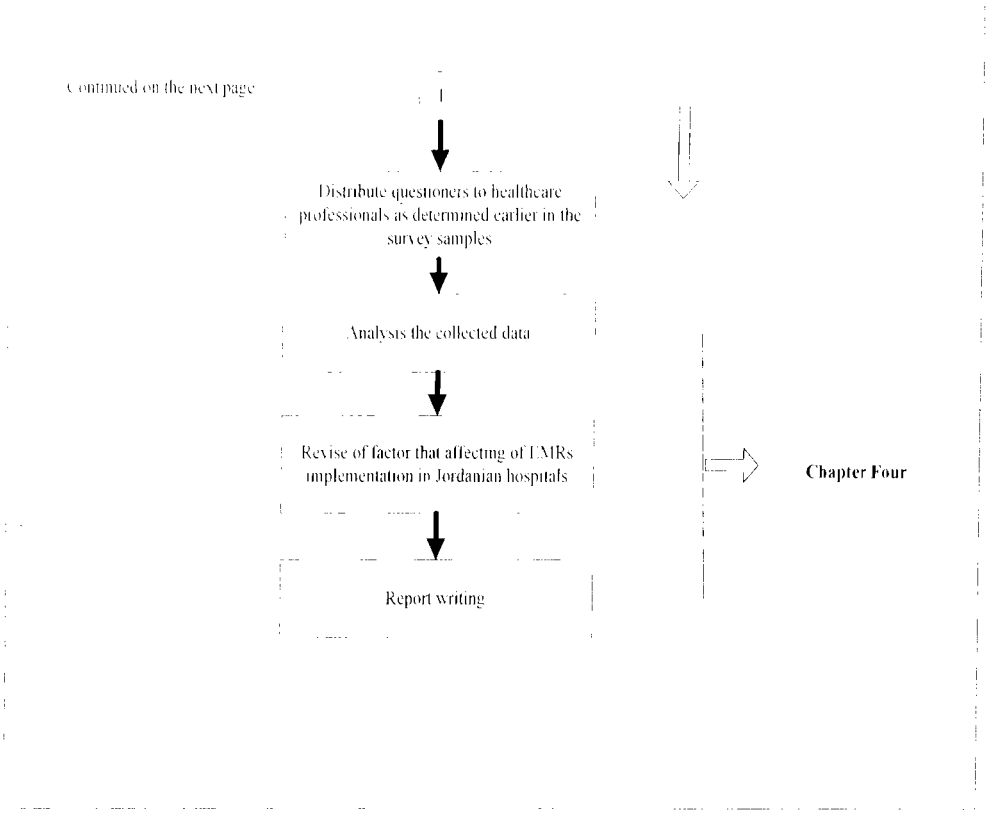

Figure 3.1 Research Procedure (continued)

3.4 Conceptual Model of the Research

Based on the theoretical framework measurement, factors play a very vital role in the research design. A successful measurement of these factors will assist the researcher in testing the research hypotheses. Sekaran (2003) is of the opinion that factors are of two kinds. The first kind comprises factors which are objective and present a precise measurement. The second kind comprises factors which are subjective and contrary to the first kind, they do not present a precise measurement. Regarding the second type of variables, there are certain strategies which could help reveal the subjective emotions and opinions of individuals. One of these strategies is to transform the abstract notions

or concepts like motivation, satisfaction, attitude and acceptance, into observable characteristic behaviors to make their measurement possible; a strategy known as operational zing the concepts (Yin, 2003).

In addition, when a certain concept gets operationally defined, it can be measured (Sekaran, 2003). In other words, it is the researcher's duty to look at the behavioral facets or features that the concept possesses, transform them into observable characteristics which will eventually help in measuring the concept. This activity is however, entirely costly and time consuming. An alternative approach would be for the researcher to seek answers through a survey which will determine individuals' response to certain items linked to the concept that is to be measured on a certain scale.

The factors contained in the extended model are listed in Figure 3.2 and the analysis of their elements is taken from the literature review, initial studies as well as the analysis of hypotheses. A collection of theories and models from literature underpinning a positivistic research study is known as a theoretical framework (Sekaran, 2003). A theoretical framework is a conceptual model displaying the way the researcher theorizes and makes logical sense of the interconnections between many factors that are known to be imperative to finding the solutions to the problem. Developing such a framework will assist in postulating hypotheses and in testing relationships which will lead to enhancing our comprehension of the study context. In other words, the theoretical framework explores the interlinking between the factors that are imperative to the study. According to Sekaran (2003), once the theoretical framework is formulated, a testable hypothesis is developed to determine the validity of the theory.

Factors that are studied under technology acceptance are of two main kinds, namely organizational and individual characteristic factors. Due to the strong characteristics of TAM, PU and PEOU, it is clear why the primary determinant of using new technology is considered instead of computer or paper-based systems as mentioned and shown in Figure 3.2: 1) Organizational factors comprising organizational leadership (Aldosari, 2003; Dansky et al; 1999; Morton, 2008), insufficient training (Brookston, 2004; Culbertson and Lee, 1996; Gad and Pernrod, 2001; Morton, 2008), high costs (Alanazy, 2006; Miller and Sim, 2004; Poon, 2001; Satinsky, 2004), also the important issues raised by the healthcare professionals were the user friendliness and users' involvement of the systems with their workflow (Morton, 2008); 2) individual characteristics comprising physician-patient relationship (Aaronson, Murphy-Cullen, Chop and Frey, 2001; Dansky et al; 1999; Detmer and Friedman, 1994; Morton, 2008) users' autonomy (Aldosari, 2003; Gardner and Lundsg, 1994; Gadd and Penrod, 2001; Dansky et al; 1999; Morton, 2008) users' background of computers (Alanazy, 2006 and Dansky et al; 1999) and resistance to new technology (Alanazy, 2006 and Dansky et al; 1999).

This leads the researcher to firmly believe that a comprehensive study of these factors will enhance the comprehension of what influences EMRs implementation and provide a clear look into the internal and external factors which assist in the adoption or the rejection (partial or full) of the EMRs software. Owing to TAM's generalize characteristics as a model, there is a need to answer the call for modification of the model in order to suit the purpose of the study.

In Figure 3.2, TAM modification is displayed in order to show factors which contribute to the final EMRs adoption. The external factors with TAM's modulation in this study

involve factors such as users' involvement and factors that are referred to as external factors influencing PU, PEOU, BI, and actual use or behavior (B). The relationship between PU, PEOU and BI are hypothesized to use PU as both a dependent variable directly impacting BI; and as an independent variable because it is predicted by PEOU.

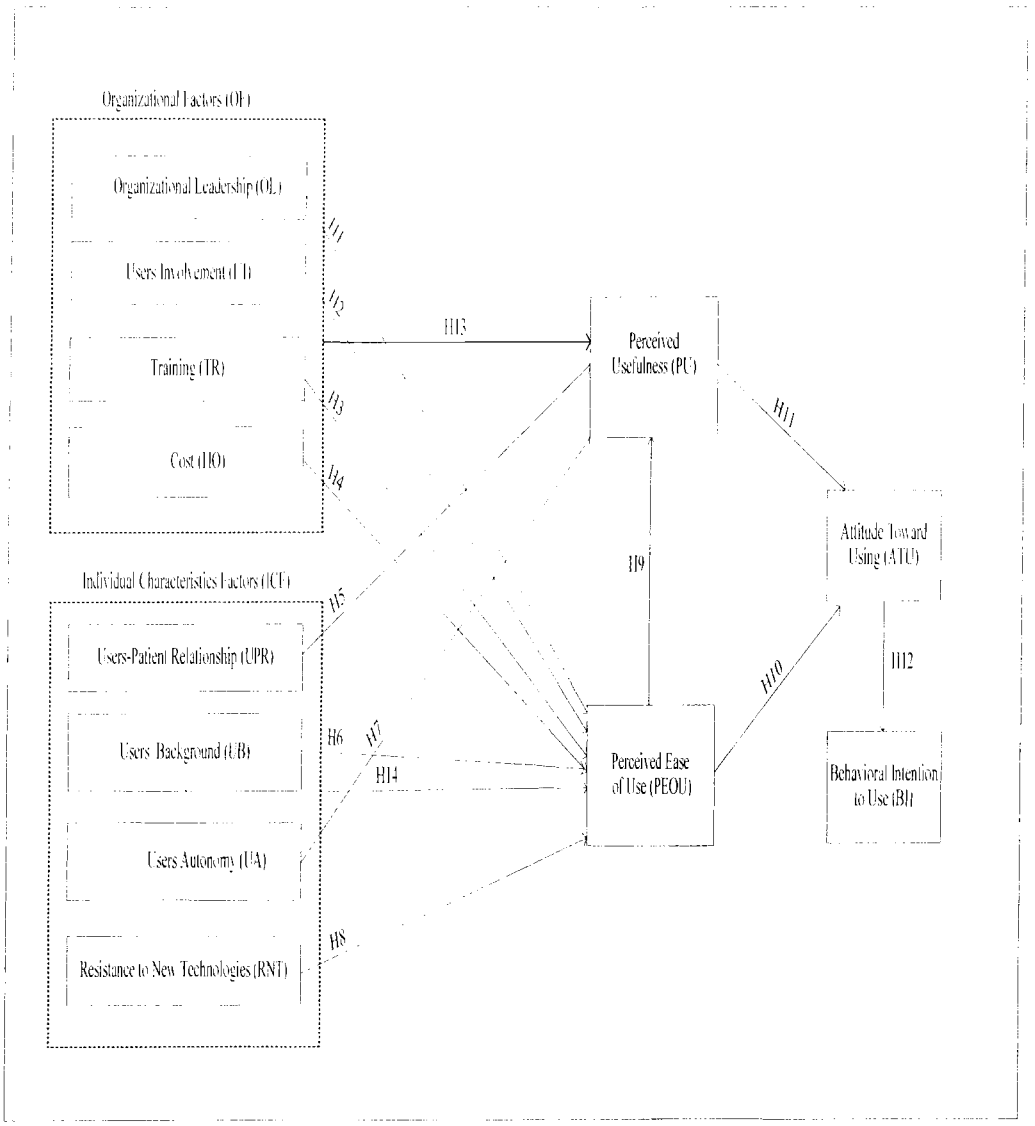

Figure 3.2 Conceptual Model of the Research

Moreover, the literature review sheds light on the significance of organizational leadership and individual characteristic factors that are categorized as external factors having the probability to influence EMRs implementation. Therefore, the researcher has integrated organizational leadership and individual characteristic factors into the extended TAM as antecedent factors of PU and PEOU. This decision from the researcher is backed by the fact that the integration of various models can provide a comprehensive explanation of external factors in different organizational topics and in this case, implementation.

3.5 Hypotheses Formulation

This section of this study formulates the hypotheses of which the study is based on. The researcher aims to test these hypotheses through SPSS, the principal components being factor analysis and independent samples, the details of which are discussed in chapter Four.

The research variables presented in the research model are presented in Figure 3:2 which represent both independent and dependent variables on the proposition being examined. A summary of these variables is presented in Table 3:1

Table 3.1 Research Propositions with Independent and Dependent variables

Propositions	Independent	Dependent
1. The OL has a significant relationship to PEOU	OL	PEOU
2. The UI has a significant relationship to PEOU	UI	PEOU
3. The TR has a significant relationship to PEOU	TR	PEOU
4. The CO has a significant relationship to PEOU	CO	PEOU

5. The UPR has a significant relationship to PU	UPR	PU
6. The UBC has a significant relationship to PEOU	UBC	PEOU
7. The UA has significant a relationship to PU	UA	PU
8. The RNT has significant a relationship to PU	RNT	PEOU
9. The PEOU has a significant relationship to PU	PEOU	PU
10. The PEOU has a significant relationship to ATU	PEOU	ATU
11. The PU has a significant relationship to ATU	PU	ATU
12. The ATU has a significant relationship to BI	ATU	BI
13.The organizational factors (OF) has a significant relationship to PU	OF	PU
14.The individual characterizes factors (ICF) has a significant relationship to PEOU	ICF	PEOU

According to Sekaran (2003), hypothesis can be defined as a logically conjectured relationship between two or more variables expressed in the form of a testable statement. Accordingly, relationships are to be validated based on the network of relationships determined by a conceptual model created specifically for the research study. By testing the hypotheses as 'statistically significant', solutions to problems can be determined. In other words, the researcher's confidence should rate 95 times out of 100 in order to rate the relationship as a true one. In the case of the present study, all the hypotheses are directional, therefore, in stating the nature of the relationship between two factors or between two groups, terminologies such as positive, negative, as well as more than and liked will be used accordingly.

A number of hypotheses are taken from the theoretical framework which is created for the present study. A list of all these hypotheses which aim to explore the factors affecting implementation of EMRs in Jordanian healthcare environment is shown in Table 3.2.

Table 3.2 The Research Hypotheses

Hypotheses	Source
H_1: Organizational Leadership (OR) has a significant relationship to Perceived Ease of Use (PEOU).	(Morton, 2008; Aldosari, 2003 and Dansky et al., 1999).
H_2: Users Involvement (UI) has a significant relationship to Perceived Ease of Use (PEOU).	(Morton 2008).
H_3: Training (TR) has significant relationship to Perceived Ease of Use (PEOU).	(Morton, 2008; Gadd and Pernrod, 2001; Brookston, 2004;Culbertson and Lee 1996)
H_4: Cost (CO) has a significant relationship to Perceived Ease of Use (PEOU).	(Alanazy, 2006; Miller and Sim, 2004; Satinsky, 2004 and Poon 2001).
H_5: Users - Patient Relationship (UPR) has a significant relationship to Perceived Usefulness (PU).	(Morton, 2008; Gadd and Pernrod, 2001; Dansky et al., 1999 and Detmer and Friedman, 1994).
H_6: Use Background of computer (UBC) has a significant a relationship to Perceived Ease of Use (PEOU).	(Alanazy, 2006; Jocely et al., 2001 and Dansky et al., 1999 and Detmer and Friedman; 1994).
H_7: User Autonomy (UA) has a significant relationship to Perceived Usefulness (PU).	(Morton, 2008; Aldosari, 2003; Gadd and Penrod, 2001)
H_8: Resistances to New Technology (RNT) has a significant relationship to Perceived Ease of Use (PEOU).	(Alanazy, 2006: Miller and Sim 2004 and Dansky et al., 1999)
H_9: Perceived Ease of Use (PEOU) has a significant relationship to Perceived Usefulness (PU).	(Haslina,2009; Morton, 2008; Alanazy, 2006; Sekaran, 2003); Miller and Sim 2004; Aldosari, 2003; Chau and Hu, 2002 and Hu,

	et al., 1999).
H_{10}: Perceived Ease of Use (PEOU) has significant relationship to Attitude Toward Using (ATU).	(Morton, 2008; Alanazy, 2006; Hussey and Hussey, 1997; Miller and Sim 2004; Aldosari, 2003; Chau and Hu, 2002 and Hu,et al., 1999).
H_{11}: Perceived Usefulness (PU) has a significant relationship to Attitude Toward Using (ATU).	(Morton, 2008; Alanazy, 2006; Sachidanandam, 2006; Miller and Sim 2004; Aldosari, 2003; Chau and Hu, 2002; Seligman, 2001 and Hu,et al., 1999)
H_{12}: Attitude Toward Using (ATU) has a significant relationship to Behavioral Intention to use (BI).	Morton, 2008; Alanazy, 2006; (Sachidanandam, 2006); Jocely et al., (2001); Hu, et al. , 1999)
H_{13}: The Organizational Factors (OF) has a significant relationship to PU.	
H_{14}: The Individual Characterizes Factors (ICF) has a significant relationship to PEOU.	

H 13 and H 14 do not have references, the researcher needs to test it to find if they have a significant relation or not.

3.6 Overview of EMRs in KAUH and JH

In the context of Jordan, in 2002, KAUH carried out EMRs implementation called MEDCOME in its HIT in its attempt to implement a patient-centered, enterprise wide information and management system that enhances healthcare professionals, administrative staff and medical record staffs' efficiency (ALyaseen, 2011). KUAH boasts of 800 inpatient beds and approximately 1311 healthcare professionals comprising physicians, nurses, pharmacists and laboratory technicians in its employ

working in 15 departments. EMRs implemented in KAUH were provided by a famous South African company.

On the other hand, another hospital, JH, carried out its EMRs implementation called CAREWARE in 2003 with its motives being similar to the former hospital – to provide a client-focused quality care through excellence and community participation in a workplace characterized by competent and committed staff with progressive points of view (Jamil, 2011). JH boasts of 300 beds and 433 healthcare professionals catering to patients divided among 10 departments. The EMRs implemented is also provided by a South African company. However, the EMRs implemented in KAUH and JH are characterized as smaller systems provided by the same company from South Africa.

The EMRs in the mentioned hospitals consists of three components which are inpatient, outpatient and administrative components. The inpatient component is made up of: Patient Chart/Progress Notes, Drugs, Radiology, Laboratory Ordering, Drugs and Lab Test Monitoring, Medical History, Referrals, Procedure, Admissions, and Discharge Procedures while the outpatient component is made up of; Patient Charts, Drugs, Radiology, Laboratory Ordering, Medical History, Referrals, and Procedures. Finally, the administrative component comprises; Patient Appointment, Billing Information, Warded and Discharge, Report Generation, Information of Demographics and others.

3.6.1 EMRs functionalities in KAUH and JH Hospitals

The present section explains the EMRs functionalities, that have been implemented in both hospitals. To start with, the patient chart records the patient's health data which is also called progress notes comprising of the patient's basic information, patient name,

medical record number, sex, date and place of birth, age, height, weight, address, allergy information, medical history, vital signs, history of drug use, radiology history, lab test history, and current patient chart for up-to-date patient vital signs, symptoms and diagnosis. Charting patient's records may either be template-based or free text-based; the latter being the preferred format of the healthcare professionals.

Moreover, drugs, radiology and lab testing ordering are other functionalities that allow the healthcare professionals to order drugs, access radiology tests and lab tests for patients. Drug ordering forwards the patient's drug prescriptions to the Pharmacy IS, radiology orders the patient's X-ray requirements and is forwarded to the Radiology IS in the Radiology Department while lab test ordering is forwarded to the laboratory IS in the Pathology Department for handling lab tests. The results of the tests will be recorded directly in the EMRs. Additionally, all three systems are directly integrated to the EMRs.

In addition to the above systems, laboratory monitoring works to monitor patient's drugs and antibiotics dosage. The lab tests are provided by the healthcare professionals to their patients in a timely fashion depicting the patient's health progress. All the patient's health progress, symptoms, diagnoses and treatments throughout the years are kept in the patient's medical history. This file is important for both present and future references and is always referred to by the healthcare professionals prior to their session with the patient.

Another functionality called procedure is utilized upon major or mild surgery, operation or investigation. When a healthcare professional is required to perform procedures during the operation, procedure allows him to discuss the necessary procedure with the

nurses or other doctors for medical advice and references. One other functionality is the admission information which is concerned with the patient's admission to the ward, recording the date, time, requirement of admission and date and time of patient's discharge.

After a thorough investigation of both hospitals representing public and private hospitals, and their EMR implementation for a considerable number of years, the researcher chose the hospitals as the case studies for the present research.

3.7 Research Approach

A research approach can be categorized into a qualitative and a quantitative approach owing to the kind of data required for the research. The former type of approach deals with the exploration of a subject as close to reality as possible (Saunders, et al., 2009) which makes them useful in carrying out case studies, for the purpose of collecting accurate information with an in-depth comprehension of the research problem. On the other hand, the latter approach (quantitative approach) comprises quantifiable data (Saunders, et al., 2009).

Further elaboration of the difference is provided by Yin (2003) who claims that qualitative methods generally deal with case studies, with the main goal of in-depth comprehension of the research problem while quantitative research comprises quantifiable numerical data (Saunders, et al., 2009). Quantitative research normally represents formalized and structured data which deals with quantifying numbers such as the number of people who would buy a particular product or the percentage of people

who advocate a certain statement or the rate of satisfaction of consumers. According to Sekaran (2003), this type of approach facilitates online research.

The choice of approach in a study is generally based on the purpose behind the study (Saunders, et al., 2009). Table 3.3 lists down the differences between the two approaches.

Table 3.3 Differences Between Qualitative and Quantitative Data

Questionnaire	Qualitative Data	Quantitative Data
Questions	Deals with meanings behind words	Deals with meanings behind the numbers
Data	Classifies unstructured data into different types	Often deals with numerical and structured data
Analyzes	Analyzes through conceptualization	Analyzes through diagrams and statistics

In the present study, the researcher aims to explore the perception of healthcare professionals regarding the implementation of EMRs in Jordanian hospitals. The aim indicates a need for a quantitative approach in studying professional healthcare population in hospitals regarding the implementation of EMRs. In the present study, this lends comprehension of factors that are relevant to studying EMRs implementation in the Jordanian context. Therefore, quantitative approach is chosen for the present research.

3.7.1 Causal vs. Correlation

The determination of the study is the correlation, which is suitable to be carried out and should be determined. In most studies, multiple factors are the causes of problems and in the present study; the aim is to identify the important factors that impact the problem as

opposed to laying down the relationship of cause and effect. Sekaran (2003) further discussed this type of approach by stating that correlation studies are generally carried out when the researcher aims to pinpoint the factors that impact the problem. The most suitable model to use for this type of approach is Pearson correlation matrix, which will exhibit the direction, strength, and significance of the bivariate relationships of the entire factors in the study.

In the case of a causal study, it is usually carried out in order to study a cause and effect relationship between one or more issues while a correlation study is often carried out if important factors of a problem are required to be identified (Sekaran, 2003).

3.7.2 Unit of Analysis

Unit of analysis is the level of summation of data collected which guides the research questions, data collection methods, sample size and the factors in the research framework throughout the analysis (Saunders, et al., 2009). The problem statement of the present study concentrates on the factors impacting the healthcare professionals regarding EMRs implementation. The study is specifically interested in studying every individual healthcare professional working in Jordanian hospitals; therefore, it comes to reason that the unit of analysis in this regard is the individual. The researcher regarded every individual healthcare professional's response to the questionnaire individually and considered their individual response just once for the purpose of the study.

3.8 Research Instrument Development

The development of the research instrument used for data collection regarding healthcare professionals' opinions and insights of EMRs implementation is described in this section. The entire details concerning the subjects, scale development and items, instrument and content validation are explored. In addition, a discussion regarding the carrying out of pilot tests and the explanation of the final instrument are also explored. From the first step of the development of the research instrument to the last, the entire consecutive steps are explained coupled with the suitable literature supporting the data analysis technique. Consequently, the data analysis is also explained.

3.8.1 Instrument

The researcher in this study is using personally administered questionnaire as the data collection method. There are several reasons which have inspired the researcher to choose the questionnaire approach. The first reason is related to the large scale sample being investigated. The convenience of the questionnaire as a data collection method in large scale samples has proven to be reliable. Secondly, anonymity is assured. Thirdly, doubts regarding the wording of the research can be eliminated and clarified. Fourthly, the response rate usually yields a high rate. Lastly, the accessibility of participants is high because the researcher can easily approach and assemble the participants at the workplace. The questionnaire was adapted as shows in Appendix B and its items that were used in the study are based on surveys formulated by Haslina (2009), Morton (2008), Alanazy (2006) and Davis (1989).

3.8.2 Scale Items

The origin of initial scale items were discussed in detail in the Appendix C and in section 3.8.3 of the present research along with the questionnaire, which list the items in the instruments along with its origin. In this section, the dimensions for each set of items are listed. Chapter Two described each dimension completely which were: Organizational Leadership, User Involvement, Training, High Cost, User-Patient Relationship, and Resistance to New Technology, User Autonomy, Users Background of Computers, Ease of Use and Usefulness.

Finally, a five-point Likert response format (ranging from "strongly agree = 5" to "strongly disagree = 1") was adopted on the original five-point scale format. This was based on the management team's experience with previous surveys, which indicated that the five-point format would reduce the frustration level of the respondent healthcare professionals, and would thereby increase the response rate and the quality of the responses (Babakus and Mangold, 1992). Table 3.4 lists the codes and descriptions for PU, PEOU, attitude towards using EMRs and BI. These variables are based on Davis (1989).

3.8.3 Questionnaire Design

The questionnaire comprises eight pages and is attached in Appendix C. The first page briefly describes the research, objectives, instructions, definition of key terms and contains a statement regarding the consent of the participant in completing and returning the survey.

2.1 Users -Patient Relationship (Morton,2008)	UPR 1	1. The patient's confidence in the healthcare professional will increase if the patient sees the healthcare professional using computer-based technology as a diagnostic aid.
	UPR 2	2. Using the EMR system threatens the healthcare professional's credibility with his/her patients (R).
	UPR 3	3. Using the EMR system reduces the patient's satisfaction with the quality of healthcare he/she receives (R) .
	UPR 4	4. Overall, using the EMR system is interfering with the effectiveness of the user-patient interaction.
2.2 User Background of computer (Alanazy, 2006)	UBC 1	1. I have the required skills to use the computer.
	UBC 2	2. I do not know how to use a computer and would rather have someone else do the computer-related work for me (R).
	UBC 3	3.Iam willing to improve my computer literacy through proper training so as to be more efficient in my work.
	UBC 4	4. My computer literacy encourages me to use EMR system.
2.3 Users Autonomy (Morton, 2008)	UA 1	1. Using the EMR system is increasing the hospital administration's ability to control and monitor the healthcare professional practices and decision-making.
	UA 2	2. Using the EMR system may result in legal or ethical problems for the healthcare professional.
	UA 3	3. Using the EMR system may threaten the healthcare professional and professional privacy (R) .
	UA 4	4. Using the EMR system may limit the healthcare professional autonomy in making clinical decisions or judgments (R).
	UA 5	5.Overall, the healthcare professional attitude about using the EMR system may be negatively affected as a result of the increased control and monitoring of his/her clinical practices and decision-making (R).
	UA 6	Overall, the healthcare professionals attitude about using the EMR system may be negatively affected as a result of the security, legal and/or ethical concerns

		associated with using the EMR system (R).
2.4 Resistance to New Technology (Alanazy, 2006)	RNT 1	1. I like to adopt new and emerging technologies as long as they are proven to provide an increase in quality and efficiency.
	RNT 2	2. I like to keep myself informed and up to date on the most recent medical technological advancements in my field.
	RNT 3	3. I consider technophobia (fear of using technology) to be a problem in implementing EMR system among healthcare professional (R).
	RNT 4	4. The emergence of new techniques for electronic medical file system needs time and training to learn (R).

(R): Reverse Coding

There are eight variables of OF and ICF factors as clearly shown in Table 3.5.The researcher aims to study the relationships of the eight variables to PU and PEOU separately. The eight variables are: Organizational Leadership, User Involvement, Training, Cost, User-Patient Relationship, and Resistance to New Technology, User Autonomy and Users' Background of Computers. The researcher's goal is the validation of whether or not the relations between each variable are significant prior to their testing in the OF and ICF composite factor. Significant variables are tested in the OF and ICF composite factor after which they are accepted as a part of the OF and ICF variables. If they are found to be insignificant, then they are excluded from the composite factor. The research model needs to be refined in order to present the relationships among independent and dependent variables. The arrow indicates the relationships among the tested variables beginning from independent to dependent variables. The relationships

among the independent variables are labeled from one to thirteen: thirteen implies the number of hypotheses to be formulated from the research model shown in Figure 3.2.

3.8.4 Demographics of Study Population and Research Sampling

Judgment sampling involves the choice of subjects who are in the best position to provide the information required: also judgment sampling may curtail the generalizability of the findings (Sekaran, 2003). However, it is the table sampling method for obtaining the type of information that is required from very specific pockets of people who alone possess the needed facts and can give information sought. In business settings and particularly for market researches, only leaders who are very knowledgeable are included in the sample. Enlightened views and knowledge constitute a rich data source. Judgment sampling calls for special efforts to locate and gain access to the individuals who do have the requisite information (Sekaran, 2003).

Judgment sampling is suitable for the present study which took the target sample from healthcare professionals in the King Abdullah University Hospital (Government hospital) and Jordan Hospital (private hospital). These two Jordanian hospitals were selected because these hospitals pioneered in full implementation of EMRs in Jordanian hospitals and they have a good command and level of expertise in implementation of EMRs. Unequal data sampling is also carried out for convenience, e.g. when it is expedient to collect data from only one or more levels, disregarding the others. Both hospitals are located in different places in Jordan that cover some parts of Jordan: northern and central regions of Jordon and were targeted in the questionnaire. This variety and diversification would increase the stability of the sample because they can

reflect a clear representation of all hospitals in Jordan as well as the overall attitudes towards using EMRs.

The questionnaire was formulated in such a way to collect information regarding the hypotheses described in this chapter. The questionnaire targets four groups of healthcare professionals who work in the Jordanian hospitals as specified above. The targeted healthcare professionals are respectively: physicians, nurses, pharmacists, and laboratory staff. The purpose of choosing the groups lies in the fact that each group generally deals with a significant part of EMRs; therefore, each of them provides a valuable insight into the intricate workings as a whole. (Ahyagna, 2009).

3.8.5 Calculation of Sample Size and Response Rate

In order to carry out the aims of the research, respondents were represented by healthcare professionals chosen from two hospitals in different parts of Jordan. All of the participants were eligible to participate owing to their experience of EMRs in their respective hospitals as the government and hospital policies made it compulsory to have full implementation and use of EMRs in the hospitals concerned. Nevertheless, the researcher made sure that respondents fulfilled the following two criteria: (1) they must possess at least three months' experience of EMRs use in the hospitals; and (2) their area of work should encompass both the outpatient and inpatient settings. The respondents' initial IT skills were not made a part of the above criteria.

Therefore, after considering the selection criteria, the researcher identified 235 healthcare professionals in KAUH that included: 80 physicians, 126 Nurses, 9 Pharmacists and 20 Laboratory Staff. At JH, there were 78 healthcare professionals

including: 30 physicians, 42 Nurses, 2 Pharmacists and 4 Laboratory staff, who were eligible to be involved in this study and were considered as a valid population. Table 3.6 shows how the researcher calculated the sample size in detail for each hospital based on number of healthcare professionals for each hospital.

Table 3.6 Summary of Sampling Size in KAUH and JH

Name Of Hospital	**No. of Population (P)**	**Physician P= 615**	**Nurses P= 933**	**Pharmacists P= 64**	**Laboratory P=132**	**Total of Sample (S)**
1.The King Abdullah Universiti Hospital	1311	*P= 450 S = 80	P=700 S = 126	P = 51 S = 9	P=110 S= 20	235
2. Jordan Hospital	433	P= 165 S=30	P=233 S=42	P= 13 S= 2	P= 22 S=4	78
Total	1744	110	168	11	24	313

* **Example**: sample of physicians in KAUH

Rate = Total of Population of any group / Total of Population for all groups

= 615/1744

= 35% Rate for the group of physicians

Number of physicians = Rate*313 according to (Sekaran, 2003)

= 35 %*313=110 Number of all physicians who will be respondents

* Number of sample (physicians) for every group

= 450 /615*110

= 80 sample of physicians in KAUH

The number of samples was identified using the method suggested by Sekaran (2003). According to Sekaran (2003), if the population was 1700, then the sample size should be a minimum of 313 as shown in Table 3.7. However, in anticipation of a low response rate from the healthcare professionals, the researcher decided to increase the sample size for KAUH and JH to up to 344 (313+ (313*10%)), the researcher distributed 344 questionnaires to the respondents to get more returned and usable questionnaires from healthcare professionals. The researcher used the simple random method, as suggested by Sekaran (2003). The actual questionnaires were distributed to the healthcare professionals after revising the pilot questionnaires. The participants were given a month to complete the questionnaires.

Table 3.7 Size Sample for Given Population Size

N	S
1500	306
1600	310
>1700	**313**
1800	317
1900	320

Source: Sekaran (2003)

N= is population size ***S***=is sample size

In the present research, content validity is supported and validated during the pre-test and the pilot test. The questionnaires were distributed to academic domain experts where by most of them have extensive experience with EMRs. They were requested to provide their feedback and comments regarding the questionnaire's quality. These included four PhD students and nine lecturers from Universiti Utara Malaysia (UUM) (five Professors

and four Associate Professors). The questionnaire was modified to reflect the feedback received from all groups.

For most types of statistical data, sample size is imperative and for factor analysis, at least five cases are needed for each variable (Sekaran, 2003). In addition a sample numbering 100 is acceptable although a sample numbering 200+ is more preferable (Sekaran, 2003). Sekaran's (2003) rule of thumb and factors affecting decisions of sample size guided the present study. These factors are as follows:

1. Sample size should be more than 30 and less than 500 to be effective in most researches.
2. The degree of precision needed.
3. The risks involved for the prediction of a certain degree of precision.
4. The number of variability comprises the population.
5. The cost, time constraints, and the population size.
6. No sample statistics is going to be exactly the same as the population parameter, no matter how sophisticated the probability sampling design may be.
7. A large sample size is only effective if it is coupled with an appropriate sampling design.

The sample size taken in the present research was considered just right as the cases available numbered 213. For the purpose of getting a high degree of response from the healthcare professionals, they were asked to answer the survey questions and the results were collected after one month. To reiterate, 344 questionnaires were distributed to healthcare professionals working in two hospitals in Jordan. The questionnaire contains

criterion factors adopted from previous studies. According to (Hair, Anderson, Tatham, and Black,1998), response rate is considered as the percentage of the aggregate questionnaires mailed and were completed and sent back by the respondents.

In this study, attempts were made to increase the response rate through reminding the respondents by telephone calls and self visits as suggested by Sekaran, (2003). As a result of these efforts, out of 344 questionnaires distributed personally by hand to the respondents in hospitals, 251 respondents responded and returned the questionnaires making a response rate of 73%. Out of these, 38 questionnaires were discarded from analysis because they were not completely filled. Eventually, 68 questionnaires were deleted because the average use per day of EMRs was less than one hour, which indicated their usage so low and 145 questionnaires were used for further analysis, making a valid response rate of 42%. This response rate is excellent considering that Sekaran (2003) argued that a response rate of 30% is acceptable for surveys. Table 3.8 shows the response rate and the usable questionnaires for this study.

Table 3.8 Summary of Response Rate

Number of Distributed Questionnaires	344
Unreturned	93
Uncompleted	38
Returned and usable questionnaires	213
Responds have using EMRs Less than one hour	68
Response Rate (145\344)	42%

The precision of the study is judged according to how close is the result to the characteristics of the population. Precision is considered to be a function of the

variability degree in the sampling distribution of the sample mean. This variability is considered as the standard error and generally speaking, the smaller the population variation, the smaller the error size, implying the importance of a moderate size. Appendix D presents the value of standard error between .101 and .962, indicating variation and the homogeneity of the population.

3.8.6 Face Validity

Face validity represents the extent of the healthcare professionals' belief in the relevancy of the questions to the main target of inquiry. Face validity is supported by the pre-testing and pilot testing of the questionnaire. A total of ten reviewers were requested to give their comments and opinions regarding the questionnaire's quality and enhancement. From the reviewers of the questionnaire and pilot test participants feedback, both reported that the questions were appropriate for the topic. No one complained that the questionnaire contained items that were irrelevant to using EMRs implementation or sample types. Based on the comments, the questionnaire's quality was validated.

Almost all healthcare professionals in the selected hospitals have a good command of English. Therefore, it is normally expected that the participants can fully understand the questionnaire items and respond to them correctly with relative ease. However, the researcher was quite alert and mindful of the fact that some of the staff might not be able to show a competent command of understanding the questionnaire items. Usually, questionnaire items can pose certain difficulties of understanding due to the language precision used and hence affecting the accuracy and precision of response required.

Therefore, the questionnaire was translated via a procedure of double-back translation. First the English version was translated into the Arabic language by two professional translators as shows in Appendix A. Later the Arabic version was re-translated into the English language by a different professional translator. The original English version was then compared with the re-translated English version to check for consistency in the translation. Appendix C shows the research questionnaire in both languages. Furthermore, the researcher visited all hospitals in Jordan which have full implementation of EMRs for gathering data. As the first step, the researcher contacted the directors and managers in order to get permission for conducting the research after getting approval from the research department of the KAUH and JH as shown in Appendix A. The researcher sent an official letter to the hospital directors seeking to acquire permission to conduct this study in their hospitals and to request permission to collect data from these hospitals. As the second step, they were informed that participation into the research study is optional and they were assured that they can abstain or withdraw from participation at any time. Also, the participants' anonymity were ensured and preserved.

3.8.7 Construct Validity

According to Hair, Black, Babin and Anderson (2009), construct validity is the extent to which a measurement corresponds to theoretical concepts (constructs) concerning the phenomenon under study. Also, construct validity is defined by Sekaran (2003) as the degree to which operationalization of a construct adequately represents what is meant by theoretical account of the construct being measured. In this study, the construct validity

examined how well the theoretical rationale underlying the measurements can be obtained by using factor analysis test (see section 4.5.1).

3.8.8 Convergent Validity

Convergent validity is defined by Hair et al. (2009) as "*the extent to which the construct is positively correlated with other measures of the same construct*" (p. 239). In this study, convergent validity was used to establish construct validity. It evaluated the degree to which two measures of the same concept are correlated. In addition, convergent validity was conducted through factor analysis in order to obtain a more in-depth judgment of the dimensionality of the construct under study (Hair et al., 2009). The researcher conducted an exploratory factor analysis to deeply examine the factor structure of the items instrument. The results show that the items selected in this study have achieved convergent validity.

3.8.9 Discriminant Validity

According to Hair et al. (2009), discriminant validity is "*the extent to which the construct does not correlate with other measures that are different from it*" (p. 239). Therefore, high discriminant validity is evidenced by a uniqueness of statistical construct and captures some phenomenon that other measures do not. According to Kline (1998), discriminant validity is presented when cross-correlations between indicators measuring different factors are moderately strong (see section 4.5.3).

3.8.10 Pre-Test

Pre-testing is a step of research development that assists in ensuring the instrument's face validity and content validity. As mentioned earlier, the survey was distributed to university officials who are experts in EMRs models, methodology, research design, statistical analysis and questionnaire writing. Furthermore, postgraduate lecturers from the IT departments also contributed to the questionnaire's review and provision of feedback for revision and modification.

The process was repeated many times which took time and stretched the instrument's development into three months. The feedback taken from the individuals led to additional literature review regarding various aspects of EMRs model, survey design as well as methodology.

3.8.11 Pilot Test

During the pilot study, the researcher made it a point to carry out discussions with the respondents regarding any ambiguities of the questionnaire including its wording and translation. Soon after, a reliability test for each instrument was carried out through the data collected in the pilot study.

Based on Swenson and Wretman's (1992) study, around 2-10 percent of the total population is appropriate to be considered in the pilot-test of the questionnaires. Hence, in accordance with the population size of the present research which is 313, the researcher distributed 31 questionnaires for the pilot-test. In this regard, the pilot study was conducted at the KAUH. The researchers choose this hospital because it had full

implementation of EMRs and this hospital is popular in the Middle East. The questionnaires were given to a sample of healthcare professionals -31 respondents were chosen comprising ten physicians, thirteen nurses, four pharmacists and four laboratory staff. The healthcare professionals were given three days to complete the questionnaires, upon collecting back the questionnaires; they were checked and revised by the researcher for any inadequacy that may have emerged when the respondents answered the items. After that, the data was analyzed using SPSS version 18 for reliability. Table 3.9 below shows the reliability coefficient (Cronbach's alpha) for multiple used items in the pilot study, where each construct shows Cronbach's alpha readings of acceptable values of above .60 (Coakes and Steed, 2003). A reliability value for all the constructs were in the range from 0.72 to 0.89. This indicated that all constructs have internal acceptable consistency.

Table 3.9 Reliability Coefficient for Multiple Items in Pilot Study

Variable name	**No. of items**	**Cronbach's Alpha Pilot/(n = 31)**
Organization Leadership	7	.86
User Involvement	5	.75
Training	4	.89
High Cost	5	.81
User Patient Relationship	4	.74
Users Background of Computer	4	.72
Resistance to New Technology	4	.85
User Autonomy	6	.74
Ease of Use	6	.78
Usefulness	6	.83
Attitude Towards Using	4	.76
Behavioral Intention	4	.80
Total	59	

3.8.12 Survey Administration

The questionnaire employed was printed and healthcare professionals were requested to answer the questions and on completion, they were required to submit the completed questionnaire by hand for the purpose of a successful rate of response. Sekaran (2003) argued that personal administration of questionnaires generally leads to the following productive results: the collection of the completed responses in a short duration, clarification of respondents' ambiguities, introduction and clarification of the research topic as well as the motivation of respondents and it is a cheap and fastest approach in collecting data.

Conclusively the questionnaire in this research satisfied all the requirements that it was an effective instrument including: suitability of design and layout, professional appearance, clarity of wording with just the right length. The fulfillment of these requirements enabled the respondents to tackle the questionnaire in an average time of seventeen minutes as evidenced from the pilot testing.

3.9 Data Handling

After, the questionnaires were revised, it is distributed to a total of 344 healthcare professionals working in KAUH and JH after which the respondents were given a month to fill in the questionnaires. In the fourth week, some of the respondents were reminded of the questionnaires through phone calls. At the end of the fourth week, the researcher personally collected the questionnaires from the hospital and managed to collect 251 responded questionnaires with a response rate of 73%.

3.9.1 Data Coding

Items in the questionnaire were coded by using two or three initial letters that named the factors, followed by the questionnaire numbering. The data coding would prevent the researcher from making mistakes while manipulating the data, it would make the meaning of coding easy to understand. It will also make it easy to refer back to the questionnaire as shown in Table 3.4 and 3.5.

3.9.2 Data Screening and Treatment

Thirty-eight questionnaires out of 251 were exempted from the analysis as they were incomplete. A total of 68 questionnaires were these exempted due to the low average use of EMRs daily, implying low usage. Finally, only 145 questionnaires were utilized in the analysis with a response rate of 42%.

Following the review of questionnaire for analysis, data screening was conducted in two phase. First, error detection in data entry was carried out through the use of frequency table that shows odd scale measurements if data does not fall into the scale management of 1-5. Second, the variable normality was assessed through the boxplot method and tests of skewness and kurtosis were conducted.

The boxplot was utilized as opposed to histogram as the data volume was not considerable; merely 213 observed cases were obtained in the two hospitals. In the assessment of variable normality, the researcher succeeded in identifying cases of outlier and after these cases were deleted, only 134 data remained from both hospitals.

Outliers are considered as variables that exist outside the normal level of scores (Hair et al., 2009), possess low squared multiple correlation with the rest of the variables, and low correlations with all significant factors (Coakes and Steed, 2009) . These outliers should be deleted from the analysis, if required, in order to sustain the data analysis precision. Nevertheless, if the number of outlier cases are few, nearer to the boxplot whiskers line and may have no significant impact on the mean value of the variable, then they may remain (Hair et al., 2009) in the variable.

Additionally, the variables normality assessed by the boxplot method was tested for skewness and kurtosis and the consideration was such that skewness with a value of lower than 1.0 is normal (Hair et al., 2009). The assessment outcome will be presented in the next chapter Four. Following the confirmation of the data's freedom from considerable outlier cases, the missing values were replaced by the observed variables' mean value.

3.9.3 Composite Factors

The relevant factors composite scores were calculated. The composite score is referred to as the mean value of the variables belonging to each individual factor (Coakes and Steed, 2009). In the present study, the composite factors computed include Organizational Factors comprising Organizational Leadership, Users' Involvement, Training and Cost, also Individual Characteristics comprising Users - Patient Relationship, User Background of Computer, User Autonomy and Resistance to New Technology, Perceived Ease of Use, Perceived Usefulness, Attitude Toward Using and

Behavioral Intention to Use. Chapter Four, section 4.2.4 presents the normality tests of skewness and kurtosis conducted on the composite factors of the data transformation.

3.9.4 Reliability and Validity of Measurement Items

The items reliability and validity to the actual data collected were measured. The questionnaires reliability was tested through Cronbach's Alpha value, while the item measurements in the questionnaire were validated by the correlation matrix and factor analysis.

134 usable questionnaires were used in factor analysis with deletion of outliers. The factor analysis was utilized in the identification of underlying factors or the EMR user acceptance instrument's dimensional composition. Worded differently, the factor analysis was utilized to test the internal consistency and reliability of the questionnaire items (Sekaran, 2003) and the researcher was able to allocate a considerable number of variables to the relevant construct variables.

Coakes and Steed (2009) recommend that the following steps are followed in deleting items in sequence of factors analysis: (1) Items that display a measure of sampling adequacy (MSA) of less than .500 in the anti-image matrix should be deleted, (2) Items loading with another item should be deleted, (3) Items with loadings lower than .3 should be deleted. (4) Double loaded items or those that are complex should be deleted as they may result in issues in output interpretation. This normally occurs when the factor score is greater than or equal to 0.500 over a single factor, (5) an item not related to the other items within a factor should be removed, (6) The Kaiser-Meyer-Olkin

(KMO) measure should indicate a sample adequacy of more than 0.6; this measure determines whether or not partial correlations are small among factors.

Moreover, factor extraction was utilized in the determination of the number of factors required for data representation. The Exploratory Factors Analysis (EFA) was utilized to extract the variables as presented in the next chapter. It is considered as the most widely used method of variable construction (Coakes and Steed, 2009).

3.9.5 Data Analysis

Data analysis was conducted through the use of simple Linear Regression Techniques. First, Analysis of Variance (ANOVA) was used to conduct an assessment of particular relations between two or more on two factors that are justified by the study's hypotheses. Second, the Multiple Regression and Stepwise are utilized in the assessment of the overall model and the effect of individual variables in the determination of the actual user satisfaction. The Stepwise or Multiple Regression is selected for the best outcome produced by their suitability to the studied theory. These methods enabled the researcher to statistically control the influences of the variables in the mode in an attempt to examine each variable's unique contribution.

The correlation (R) between two variables shows the linearity relation measurement between two variables (Coakes and Steed, 2009). The variables' significant relation was tested to determine the statistical significance through the use of significant value with a 95% level of confidence. According to Hair et al. (2009), the correlation level presenting a significant value of around 0.1 and lower than 0.3 is considered as a small correlation while those with 0.3 or less than 0.5 is considered as a medium correlation and finally,

those higher than 0.5 is considered as a great correlation. The Statistical Package for Social Science (SPSS) Ver. 18.0 was utilized in the present study as the data analysis software.

3.10 Conclusion

The present chapter exhibits and lays down the development and validation of the instrument used, therefore satisfying the requirement of the quantitative approach of this study. A survey questionnaire was the instrument employed to collect data from healthcare professionals including physicians, nurses, pharmacists and laboratory staff in different hospitals; individuals numbering a total of 134 (145 – 11 cases of outliers) healthcare professionals. These two hospitals (King Abdullah University Hospital and Jordan Hospital), one public and one private hospital, were selected because they pioneered full implementation of EMRs in Jordan. Suitable measures were created as items which were then pre-tested. This was followed by the measurement of content and face validity which were pilot tested, evaluated and refined. This step involved the analysis and the approximate assessment of sample data for their validity and reliability. This was followed by the painstaking task of the adjustment of scales items through their deletion, addition and rewording where necessary. The present chapter also explains the research methodology in detail comprising procedures, process, and guidelines ensuring the suitability of this kind of research.

The method of questionnaire survey was utilized in the present study to test the developed healthcare professionals' acceptance model of EMRs implementation. The discussion portion of the study was carried out for the clarification of particular information that is ambiguous. Data collected was then analyzed through the Analysis of

Variance (ANOVA) and Multiple Regression Analysis using SPSS Ver. 18.0. The outcome of the hypotheses testing validate if the tested factors are to be included in the developed healthcare professionals' acceptance model of EMRs implementation.

CHAPTER FOUR
DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter contains the data analysis and results of the findings of the research. The data analysis is divided into the analysis of the participating respondents through descriptive statistics in order to guarantee data quality, the exploratory factor analysis, correlation analysis and also the analysis to choose the structural model for the purpose of higher order constructs. Finally, examinations of the other factors that influence the implementation of EMRs through multiple regressions were carried out supported by content analysis of open-ended question of the factors.

4.2 The Data Quality

4.2.1 Data Inspection

Inspection and review of the data was carried out through data analysis to ensure its suitability for analysis. The steps suggested by Hair et al. (1998) were carried out comprising missing data patterns, adherence to statistical assumptions, identification of outliers and a review of skewness and kurtosis.

4.2.2 Visual Inspection

A visual inspection of the data was the first step and it revealed that some items show that the medical staff unintentionally made reverse coding; after answering some questions they reversed and changed their answers according to the proper scale

mirrored by the questionnaire. Not a single item was taken out as the items that were not answered did not exceed 30% as suggested by Jobber (1991): thus, all the items were considered for use.

4.2.3 Missing Data

The researcher then searched for missing data and addressed these accordingly based on the suggestions by (Sekaran, 2003). Missing data refers to the number of factors having missing data for each individual; in the present study's data, four cases indicated missing data for items one, two, fifteen and seventeen representing 10 precent, 13 percent, 18 percent and 21 percent of the total data respectively which is 30 percent below the cutoff. In addition, missing data also comprised the number of cases that showed missing data for each variable; in the present study, one variable has missing data in three cases, representing 0.19 percent of all cases (4/213) which is insignificant because out of 213 cases across 60 variables, a mere three items were missing for reasons unexplainable, which made up to 0.19 percent of the total data. Missing data was not found to be a problem and was completed based on the mean substitution computation method (where missing data can be completed by filling them with the average data from the complete data cases) (Hair, et al., 2009).

4.2.4 Normality Assessment

Normality assessment of the data was carried out, as this type of assessment is an assumption for various multivariate techniques including multiple regressions. Factor analysis focused on the detection of outliers and linearity, and regarding univariate normality. The main tests carried out were on kurtosis and skewness with interval and

ratio scale data. If the kurtosis and skewness equal to zero, then normality is validated. A positive skewness represents a positive skew, while a positive kurtosis represents a peaked distribution, while negative skewness value represents a negative skew, and a flatter distribution for negative kurtosis values.

Various multivariate statistical techniques were used to identify normal distribution such as multiple regression, and descriptive statistics like the measure of central tendency and variability were important for factor analysis (Hair, et al., 1998; Sekaran, 2003). In addition to the above tests, descriptive statistics were carried out for normality violation signs.

The descriptive analysis of all items and the frequency distribution of all Likert scaled items are presented in Appendix C, clarifying the normality plot. The data skewness was found to be negative and the descriptive statistics are listed in Appendix C. It shows that all the factors were tapped on a five-point scale having 1 as the minimum scale referring to the respondents' disagreement with the item. The minimum and maximum scale ensures that out-of-range entries were not made. All the variables mean was distributed between 3.00 and 3.66 on a five-point scale; an above average mean indicating the average satisfaction of most of the respondents.

Descriptive statistics for the outliers test was done to indicate the conversion of standardized scores as well as checking for values > 2.5 for small samples and > 3 or 4 for large samples (Hair, et al., 1998; Sekaran, 2003). Moreover, Z-scores inspections allow identification of outlying cases, a step important for data screening. Scores

indicating greater than +3 and less than -3 were marked as outliers (Hair, et al., 1998; Pallant, 2001).

An examination of outliers was then carried out and according to Hamid (2006), four reasons can be attributed to outlier cases. The first refers to incorrect data entry, which in the present research were only a few and these were noted and corrected. The next reason refers to the inclusion of missing values and the third results from sampling error where cases do not represent the intended population. The final reason refers to the extreme combination of values throughout the variables.

As suggested by Hair et al. (1998), univariate outliers were detected through an investigation of each variable and later three univariate outliers were identified as extreme cases, i.e. either they agreed strongly or disagreed strongly on the interval scaled systems. The fact that the study was investigating healthcare professionals, the above was expected and was considered as a normal occurrence as respondents tend to be emotional towards the chosen factors (Hair, et al., 1998). Consequently, the cases were accepted and kept as it was normal for outliers to occur. If these cases were excluded, this might affect the generalizability of the study sample (Coakes and Steed, 2003).

Outliers were examined by case. The results are summarized in Table 4.1 although several outliers were detected, the data was considered acceptable because of the very small percent (2.5 percent) of cases with multiple outliers. Hair et al. (1998) cautioned against eliminating outliers because of generalizability reasons unless the outliers are considered indicative of erroneous data. Multivariate normality was determined by

inspecting scatter plots after ensuring that univariate normality was acceptable. The data was inspected based on the above guidelines and was considered satisfactory for analysis (Hair et al. 1998; Sekaran, 2003).

Table 4.1 Outliers List

(> 3 and <-3 standard deviations)	
Case#	Count of outliers
15	3
18	2
22	1
31	1
51	1
63	2
68	3
70	1
103	3
122	1
167	1

4.3 Respondents' Profile

Distribution of the questionnaires among the sample study was carried out and for this research, the samples were of healthcare professionals, chosen because they are believed to have an influence regarding the implementation of EMRs in hospitals. The respondents provided their personal information including gender, age, education level, work place, experience in using EMRs in their work and average usage per day of EMRs implementation.

Table 4.2 shows that 53.7 percent of the respondents were females and this indicates the dominance of female employees as healthcare professionals more than males at 46.3

percent. More than half of the respondents (85.8 percent) were between the ages of 35-50; 14.2 percent were between the ages of 20-35. In terms of healthcare professionals, this indicates that the majority of the respondents have had considerable working experience.

Table 4.2 Respondents Profile Summary

	Gender	**Frequency**	**Percent**
Valid	Male	62	46.3
	Female	72	53.7
	Total	134	100.0
	Age	Frequency	Percent
Valid	20-35	19	14.2
	35-50	115	85.8
	More than 50	0	0
	Total	134	100.0
	Qualification	Frequency	Percent
Valid	Master and above	19	14.2
	Bachelor	106	79.1
	Diploma	9	6.7
	Total	134	100.0
	Career	Frequency	Percent
Valid	Physicians	49	36.6
	Nurses	60	44.8
	Pharmacists	13	9.7
	Laboratory	12	9.0
	Total	134	100.0
	Job Place	Frequency	Percent
Valid	The King Abdullah University Hospital	90	67.2
	Jordan Hospital	44	32.8
	Total	134	100.0
	Experience	Frequency	Percent
Valid	3 to 12 months	33	24.6
	13 to 24 months	28	20.9
	More than two years	73	54.5
	Average use per day of EMRs	Frequency	Percent
Valid	One to less than 4 hours	95	70.9
	4 hours to 10 hours	26	19.4
	Over 10 hours	13	9.7
	Total	134	100.0

Table 4.2 also shows education level of the respondents whereby 79.1 percent are Bachelor degree holders, 14.2 percent are Master degree holders and 6.7 percentare Diploma holders. Healthcare professionals' careers in hospitals are as follows, nurses (44.8 percent), physicians (36.6 percent), pharmacists (9.7 percent) and laboratory staff (9.0 percent). The breakdown of the respondents according to hospitals is: 67.2 percent are working at KAUH and 32.8 percent in JH. Healthcare professionals who responded to these questionnaires, on average, had more than two years' experience: 54.5 percent, 3 to 12 months: 24.6 percent and 20.9 percent of 13 to 24 months. The average time of using EMRs in their work per day is 70.9 percent, one to less than 4 hours, 19.4 percent, 4 hours to 10 hours and over 10 hours were 9.7 percent. This clearly indicates that healthcare professionals in this sample could represent the opinions of subjects who are in the position to provide the information required by this research.

4.4 Exploratory Factor Analysis

The validity testing for this research was established through (1) correlation analysis to establish convergent and discriminant validity, and (2) factor analysis, a multivariate technique which establishes the conceptual dimensions that are defined and indicates which item is suitable for each individual dimension to establish construct validity as suggested by (Hamid, 2006). In addition, Coakes and Steed (2003) claimed that factor analysis is an exploratory technique that summarizes the variables' structure of asset. Of the factor extraction, the most widely and constantly used method is principal components analysis.

Analysis of the items used in the instrument was analyzed for their dimensionality. Hence, Exploratory Factor Analysis (EFA) was carried out through the principal components method. This was followed by the Principal Components Factor Analysis (PCFA), which sets up uncorrelated linear combinations of the observed variables. The first component always exhibits the possession of maximum variation, while the ones following it display gradually decreasing portions of the variation, linked together. PCFA is normally used to determine the initial factor solution and can also be used in a singular correlation matrix (Hair, et al., 1998).

The analysis was carried out for the purpose of leaving out items which are not guaranteed to be a part of the hypothesized dimension. Most researchers (Sekaran, 2003) followed the following steps in leaving out the items in sequence.

1. Items displaying a measure of sampling adequacy (MSA) of < .500 in the anti-image matrix were left out. This type of correlation matrix possesses the negatives of the partial correlation coefficients while the anti-image covariation matrix has the negatives of the partial covariations. Majority of the off-diagonal elements in a good factor model is normally small. The sampling adequacy measure for a variable is located on the diagonal in the anti-image correlation matrix with an acceptable level of more than .5.
2. Items loading with any other item are left out. In the present study, the factor matrix of loadings was used to interlink between the items and factors.
3. Items with loadings exhibited as < .3 were left out while pure items with loadings exhibited as .3 or more on a single factor were kept.

4. Double loaded items or complex items were left out because they cause problems in interpreting output. This happens when the factor score is >=.500 on more than a single factor.

5. An item was removed on a particular factor where it was not related to the other items within that factor.

6. The study displayed a significant result of the Barlett test of sphericity: a test of sphericity that determines if the correlation matrix is an identity matrix which would lead to the inappropriateness of the factor model. The Kaiser-Meyer-Olkin measure indicated a greater than .6 sampling adequacy: a measure that determines if partial correlations among factors are small.

The final results consequently list the iterations of item analysis and evaluation. On performing the PCFA with Varimax rotation, it displayed to be supporting the initial construct and discriminant validities. The result of the analysis caused eighteen items to be dropped with one factor that was KMO below than .6, three items were found to be double loaded, while eight items were loaded < .500 and eight items were loaded on the wrong factor. Table 4.3 below indicates the dropping of these items.

Table 4.3 Items Dropped During Exploratory Factor Analysis

Higher Level Dimension	**Item Dropped (in order dropped)**	**Reason for Dropping**
Organizational Leadership 3 out of 7 dropped.	Organizational Leadership 2,4,6	Loaded in wrong factor Would not load (loading < .500).
User Involvement out 2 of 5 dropped.	User Involvement 2,5	Would not load (loading < .500).
Training out 1 of 4 dropped	Training 3	Double loaded Would not load (loading < .500).
High Cost 2 of 4 dropped	High Cost 3,4	Double loaded

User Patient Relationship 1 of 4 dropped	User Patient Relationship 1	Would not load (loading < .500).
User Background of Computer 4 of 4 (dropped)	User Background of Computer (All the factors)	KMO below than .6
Resistance to New Technology 1 of 4	Resistance to New Technology 2	Would not load (loading < .500).
User Autonomy 3 of 6 dropped	User Autonomy 1.2.3	Would not load (loading < .500).
Ease of Use 2 of 6 dropped	Ease of Use 4.5	Loaded in wrong factor
Usefulness 2 of 6 dropped	Usefulness 4.5	Loaded in wrong factor
Attitude 1 of 4 dropped	Attitude 3	Loaded in wrong factor
Behavioral 1 of 4 dropped	Behaviora l	Loaded in wrong factor

All items were loaded on the appropriate factors with loading typically above .500 (greater than the recommended .500 minimum), as a result of dropping the items in Table 4.3 above.

4.4.1 Reliability Test

The term reliability is synonymous with stability and consistency displayed by the instrument when measuring concepts and assessing the suitability of measure (Coakes and Steed, 2003; Hair, et al., 1998; Pallant, 2001; Sekaran, 2003). In this study, internal consistency tests the degree of inter-correlation among items. Accordingly, the most widely used measurement of internal consistency is by Cronbach's alpha coefficients that indicate the average correlation of the items comprising the scale (Hair, et al., 1998). Pallant (2001) further argued that most researchers support the fact that new

measure scales should have reliabilities of at least .60 and alpha of at least .70. However, (Sekaran, 2003) suggested that alpha should at least be .80. Table 4.4 exhibits the reliability test results and indicates the number of items comprising each variable.

Table 4.4 Reliability Analysis

Factors	Cranbach's Alpha Before Factor Analysis	Number of Items before Factor Analysis	Number of Items after factor Analysis	Cranbach's Alpha after Factor Analysis
Organization Leadership	.846	7	4	.989
Users Involvement	.631	5	3	.886
Training	.781	4	4	.882
High Cost	.767	4	3	.936
User-Patient Relationship	.959	4	3	.974
Resistance to New Technology	.836	4	3	.889
User Background	.709	4	dropped	dropped
User Autonomy	.744	6	3	.901
Ease of Use	.769	6	4	.792
Usefulness	.788	6	4	.950
Attitude to Use	.848	4	3	.870
Behavioral Intention	.890	4	4	.890

After factor analysis, the above new measure scales were proven to be reliable as clearly shown in Table 4.4. The Cronbach's alpha value for every variable was from .792 to

.989, indicating their high validity and appropriateness for further analysis. Resistance to change and limited access were two factors which had already been dropped during the analysis.

4.5 Validity Testing

The scales were pronounced reliable through the use of Cronbach's alpha (Table 4.4). The revised concept was further examined for its validity and reliability. In section 3.8.6 and 3.8.7, the content and face validity have already been explained therefore, in this chapter only the construct validity, convergent validity, discriminant validity and statistical conclusion validity are explained.

4.5.1 Construct Validity

Construct validation deals with inferences of validity regarding unobserved variables in the form of the construct; having its basis on the observed variables which are presumed indicators (Pallant, 2001). Construct validity was carried out by tackling the following questions: whether the correct constructs have been chosen for the purpose of phenomenal explanation and whether the constructs have been suitably operationalized to represent the constructs? These particular questions are impossible to be wholly determined as it will not substantiate the notion that constructs are valid and have been properly operationalized.

A number of different procedures can be carried out to study construct validity comprising discriminant and convergent validities (Clark and Watson, 1995), despite the above dilemma. Support for construct validity is manifested only during that time

when high correlations are exhibited between the same construct's measures making use of different methods (convergent validity) and when low correlations between different constructs' measures are displayed. In line with the notion, the following sections investigate construct validity through convergent as well as discriminant validity.

4.5.2 Convergent Validity

Convergent validity is the type of validity that shows whether there is a relationship between individual scale items. Therefore, in line with the process, it has been claimed that convergent validity can be tested with the help of principal components for EFA. Convergent validity finds out if the associations linking the same factor scales are greater than zero, or high enough to carry out discriminant validity tests (Kerlinger and Lee, 2000). Table in Appendix E shows of indicates convergent validity through data showing the entire loadings from principal component factor analysis as >= .500, similar to what was suggested (Kerlinger and Lee, 2000). This indicates that the items chosen in the study have achieved convergent validity.

4.5.3 Discriminant Validity

Discriminant validity determines the degree of correlation between different constructs. Low correlations are present if individual constructs are unique and hence possess various dimensions. As a result, correlation matrix approach and EFA can both examine construct validity for determining convergent or discriminant validity (Aladwani and Palvia, 2002). After examining the expletory factors loading correlation matrix, the results revealed that .586 is the lowest within-factor correlation. These correlations are higher than zero (P <0.000) and large enough to proceed with discriminant tests as

supported by Hair et al (1998). Discriminant validity was examined by observing the frequency of an item's correlation with items belonging to other factors in comparison to the items of its own variable (Hair, et al., 1998). For example, the least within-factor correlation for training is .535, and in addition, no other correlation of training with items of other factors is > 0.833, therefore, the violation is considered as none. (Doll and Torkzadeh, 1988) argued that this number should be less than 50 percent. Since the result showed no violation for comparisons, therefore the present study is said to have achieved discriminant validity.

4.5.4 Statistical Conclusion Validity

Statistical conclusion validity is considered to be a statistical inference issue dealing with the reasons behind the conclusions in light of the relationships displayed by the data (Aladwani and Palvia, 2002; Doll and Torkzadeh, 1988). Data analysis for this study was carried out through normal procedures and the results support the statistical conclusion validity.

4.6 Correlation Analysis

The purpose of this type of analysis is to explain the relationship between two continuous variables. This can also be used in cases when the researcher attempts to define important factors related to a problem (Cook and Campbell, 1979). It is appropriate for interval and ratio-scale factors and is widely used as the measure of linear relationship. Its co-efficient differs from values of -1 to +1; the value showing how strong the relationship is and the sign (- or +) shows whether the correlation is positive or negative. (Cook and Campbell, 1979) proposed that the least value of

substantive regression coefficients is 0.05, even though in the cases of substantive correlations, they opt for a critical value of 0.10 and higher ($r > 0.10$). Correlations ranging between -1.0 and +1.0 bring up the requirement as to whether any correlation discerned between two factors is significant or not, (i.e. if its occurrence is by chance or its highly probable that it has an actual existence).

One of the many aims of the questionnaire is the provision of data for hypothesis testing. Therefore, calculations were carried out for mean values and matrix of inter- correlations among the research constructs. It was found that the average response of the target sample regarding the implementation of EMRs has been taken as the measure of perception about EMRs, attitude toward EMRs and behavioral intention to use EMRs. In other words, in cases where the attitude toward EMRs and behavioral intention to use EMRs' mean value rating reveals a positive and significant relation with research constructs, then the totai 14 hypothesis is considered validated.

Table 4.5 below shows also that some hypothesized relationships are not supported such as user's autonomy on perceived usefulness. Support can be discerned for organization leadership, training and new technology on ease of use of the actual EMRs. In addition, support can also be discerned for user involvement, user-patient relationship on PU, PEOU and PU on attitude toward using EMRs, perceived usefulness and attitude on BI, and BI on actual use of EMRs were also supported. User background of computers have not been dealt with as this factor was dropped during the FA. Despite this fact, the influence of responsiveness upon implementation of EMRs was shown to be significant, which is aligned with the hypothesis provided.

Table 4.5 Summary of Correlation of Variables

NO	Hypothesis	Supported	Correlation	Reason
1.	Organization Leadership →Ease of Use	Yes	.755 (**)	Positive
2.	User Involvement → Ease of Use	Yes	.672(**)	Positive
3.	Training →Ease of Use	Yes	.446(**)	Positive
4.	Cost → Ease of Use	Yes	.730(**)	Positive
5.	User-Patient Relationship→ Usefulness	Yes	.969 (**)	Positive
6.	Users Autonomy → Usefulness	No	.101	Negative
7.	User Background → Usefulness	Dropped	-	Construct Dropped
8.	New Technology → Ease of Use	Yes	.645 (**)	Positive
9.	Ease of Use→ Usefulness	Yes	.693 (**)	Positive
10.	Ease of Use→ Attitude Using	Yes	.500(**)	Positive
11.	Usefulness→ Attitude Using	Yes	.719(**)	Positive
12.	Attitude Using →Behavioral Intention	Yes	.686(**)	Positive
13.	Organizational Factors→ Usefulness	Yes	.766(**)	Positive
14.	Individual Factors → Ease of Use	Yes	.635(**)	Positive

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

Table 4.6 shows a significant positive relationship present between the independent and dependent factors displayed at $p<0.01$ level. The criteria question is used as the dependent variable in the regression analysis. All factors affected the EMRs implementation as the independent variable indicating that the factor is represented by all scale items within it.

Table 4.6 Correlations Matrix

	OL	UI	TR	CO	UPR	RNT	UA	PEOU	PU	BI	ATU	ICF	OF
OL	1.000												
UI	.881**	1.000											
TR	.630**	.721**	1.000										
CO	.851**	.736**	.339**	1.000									
UPR	.846**	.731**	.255**	.943**	1.000								
RNT	.712**	.768**	.288**	.790**	.815**	1.000							
UA	.053	-.029	-.089	.138	.109	.013	1.000						
PEOU	.755**	.672**	.446**	.730**	.686**	.654**	.032	1.000					
PU	.848**	.710**	.275**	.944**	.969**	.782**	.101	.693**	1.000				
BI	.783**	.656**	.247**	.821**	.877**	.719**	.185**	.652**	.842**	1.000			
ATU	.625**	.574**	.208**	.749**	.743**	.496**	.095	.500**	.719**	.686**	1.000		
ICF	.758**	.697**	.234**	.872**	.890**	.839**	.463**	.635**	.859**	.817**	.630**	1.000	
OF	.927**	.873**	.725**	.791**	.753**	.639**	.044	.703**	.766**	.680**	.586**	.679**	1.000

**Correlation is significant at the .01 level (2-tailed).

4.7 Multiple Regression Analysis

This type of analysis provided the researcher with different outcomes that helped in answering the research questions and in hypothesis testing. It gave relative contribution to every single factor and revealed which of the factors were the best predictor of an outcome. For instance, R^2 indicates the ability of a set of factors (organization leadership, cost, training, resistance to new technology and user involvement) to foresee a particular outcome (PEOU).

R^2 has a standard value = 1 indicating a perfect linear relationship between the dependent and independent variables. If R^2 value is 0, it indicates that there is an absence of linear relationship between the dependent and independent variables. In the model used in the present study, R^2 in the first step of analysis regression model is .617 (see Table 4.7), conveying that contingency factors (organization leadership, cost, training and new technology) are responsible for the explanation of .617 percent of the variation in the PEOU.

Additionally, the statistical significance of the model is assessed through ANOVA as shows in Table 4.7. The result shows a rejected null hypothesis with p = 0.000. This indicates that the model is a good to study of the relationship between Perceived Ease of Use and all the factors.

4.7.1 Hypothesis Testing

This section discusses the identification and the comparison of the independent variables' strength of predicting the dependent variable. It attempts to distinguish

those factors that are able to predict the dependent variable with the *B* value. This is where the interest of the present research lies.

In Table 4.8, all the factors have a significant effect upon PEOU in the model as listed with organization leadership heading the list out of all the other independent factors. As for the other variables, the degrees of their significant and positive effect on Ease of Use of EMRs are arranged in descending order as follows: Organization leadership, User Involvement, Training, Cost, and Resistance to New Technology.

Table 4.7 ANOVA Significance of Overall Multiple Regression Relationship

R Square (R^2)	F	Sig
.617	63.117	**.000**

From Table 4.8, these results in the common expression of the multiple regression equation as: PEOU in the model = .518 Organization Leadership +.280 User Involvement + .142 Training +.252 Cost +.277 Resistances to New Technology + .188.

Table 4.8 Multiple Regression Analysis for Perceived Ease of Use

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**.188**	.183	.306
1. Organization Leadership	**.518**	.144	**.000**
2. User Involvement	**.280**	.152	**.019**
3. Training	**.142**	.068	**.037**

4. Cost	**.252**	.112	**.026**
5. Resistance to New Technology	**.277**	.095	**.004**
Dependent Variable: Perceived Ease of Use.			

This results were supported by the results of the open-ended question, as presented in Appendix F, which shows that the highest percentage of the complaints in both of hospitals was related of the organizational factors of the EMRs implementation, " Lack of Support ", the highest percentage was about 45% of lack support from the organizational leadership, lack of financials support and high cost of EMRs to learn and installation was 33%, 17% was about inadequate training, poor and low the communications between organizational leadership and healthcare professionals with regards to software of EMRs was about 5%. In, sum can be concluded that organizational factors were the major factors that affected of EMRs implementation at both of hospitals in Jordan.

Based on Table 4.10, only User-Patient Relationship is significant at p = 0.000, but User Autonomy is not significant. However, when refer to Table 4.9, the R^2 shows a very high value at 0.939.

Table 4.9 ANOVA Significance of Overall Regression Relationship

R Square (R^2)	F	Sig
.939	1537.31	**.000**

Table 4.10 Multiple Regression Analysis for Perceived Usefulness

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**.483**	.076	**.000**
1.User Patient Relationship	**.875**	.016	**.000**
2.User Autonomy	**.005**	.017	**.767**

Dependent Variable: Perceived Usefulness.

The next step to get new model by excluding User Autonomy as show in Table 4.12, User-Patient Relationship is significant at p = 0.000 and the common expression of the regression equation can be written as: PU of EMRs =.874 User Patient Relationship + .468. A check on refer to Table 4.11 the R^2 value shows that the value stays the same as shows in Table 4.9. This indicates that 93.9 percent of variation in Perceived Usefulness is determined by User Patient Relationship.

Table 4.11 ANOVA Significance of User Patient Relationship by Regression Relationship

R Square (R^2)	**F**	**Sig**
.939	3088.614	**.000**

Table 4.12 Regression Analysis between User Patient Relationships and usefulness

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**.468**	.055	**.000**
User Patient Relationship	**.874**	.016	**.000**

Dependent Variable: Perceived : Usefulness

Next, we investigate on the relationship between Ease of Use and PU. Table 4.13 shows the R^2 value by 0.480 which explain that only 48.0 percent of the variation in Perceived Ease of Use is detained by Perceived Usefulness. However, the Perceived Ease of Use from the ANOVA test shows a significant value with p = 0.000. Thus we can say that the model which represent the relationship between Perceived Ease of Use and Perceived Usefulness is still a good model even through with a low R^2 value. The test shows that there is a significant positive relationship with with B = 0.699 between Perceived Ease of Use and Perceived Usefulness.

Table 4.13 ANOVA Significance of Ease of Use by Regression Relationship

R Square (R^2)	**F**	**Sig**
.480	184.344	**.000**

Table 4.14 shows the third step of the linear regression between Ease of Use and PU. The test as the relationship between the two variables shows that these significant relationship. In light of the results indicated, the regression equation can be written

Table 4.16 Regression Analysis between Ease of Use and Usefulness on Attitude Toward Using

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**.976**	.194	**.000**
1- Usefulness	**.756**	.072	**.000**
2- Ease of Use	**.004**	.073	**.960**

Dependent Variable: Attitude Toward Using

The next step to get new model by excluding Perceived Ease of Use as show in Table 4.18 Perceived Usefulness is significant at p = 0.000 and the common expression of the regression equation can be written as: Attitude Toward Using of EMRs =.857 Perceived Usefulness + .979. A check on refer to Table 4.17 the R^2 value shows that the value stays the same as shows in Table 4.15. This indicates that 51.9 percent of variation in Perceived Usefulness is determined by Attitude Toward Using.

Table 4.17 ANOVA Significance of Usefulness by Regression Relationship

R Square (R^2)	**F**	**Sig**
.517	214.176	**.000**

Table 4.18 Regression Analysis between Usefulness on Attitude Toward Using EMRs

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**979**	.081	**.000**
Usefulness	**.857**	.052	**.000**

Dependent Variable: Attitude Toward Using

The fifth step involved the investigation of linear regression between Attitude Toward Using and BI to using EMRs. R^2 value = .470 showed that Attitude Toward Using of EMRs explains 47.0 percent of the variation in BI and shows a significant affects on the EMRs (see Table 4.19).

Table 4.19 ANOVA Significance of Attitude Toward to Use by Regression Relationship

R Square (R^2)	**F**	**Sig**
.470	177.328	**.000**

In Table 4.20 shows Attitude Toward Using displays a significant value at p = 0.000 confirming the presence of a positive significant relationship between Attitude Toward Using EMRs and BI. Therefore, the regression equation can be written as BI = +.686 Attitude Toward Using + 815.

Table 4.20 Regression Analysis between Attitude Toward Using EMRs and BI

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**.815**	.185	**.000**
Attitude Toward to Use	**.676**	.051	**.000**

Dependent Variable: Behavioral Intention

In Table 4.21 R^2 value = .666 shows Organizational Factors explains 66.6 percent variation in Usefulness.

Table 4.21 ANOVA Significance of Organizational Factors by Regression Relationship

R Square (R^2)	**F**	**Sig**
.666	263.116	**.000**

The sixth step of the analysis of the regression model involved the testing of the linear regression between Organizational Factors (Organization Leadership, User Involvement, Training and Cost) with Usefulness of EMRs. Table 4.22 shows a significant positive relationship between the variables with p = 0.000, thus indicates that Usefulness is contributes in explaining Usefulness. Thus, based on the results, the regression equation is Usefulness = +.663 Organizational Factors + 1.105.

Table 4.22 Regression Analysis between Organizational Factors and Usefulness

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**1.105**	.144	**.000**
Organizational Factors	**.663**	.041	**.000**

Dependent Variable: Usefulness

These results were supported by the results of the open-ended question, as presented in Appendix F, which shows that 100% of the complaints in both of hospitals were related of the organizational factors of the EMRs implementation. In sum can be concluded that organizational factors (Organization Leadership, User Involvement, Training and Cost) were the major factors that affected of EMRs implementation at both of hospitals in Jordan.

In Table 4.23 R^2 value = .400 shows Individual Characteristic Factors explains 40.0 percent variation in Ease.

Table 4.23 ANOVA Significance of Individual Factors by Regression Relationship

R Square (R^2)	**F**	**Sig**
.400	65.536	**.000**

Table 4.24 shows the final step of the analysis of the regression model involving the testing of the linear regression between Individual Characteristic Factors (including User-Patient Relationship, Resistance to New Technology and User Autonomy) with

Ease of Use of EMRs. Also, in Table 4.24 shows p = 0.000, reveals that Individual Characteristic Factors positively related to Ease of Use. Thus, based on the results, the regression equation is Ease of Use = + .810 Individual Characteristic Factors + 2.345.

Table 4.24: Regression Analysis between Individual Factors and Ease of Use

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**2.345**	.208	**.000**
Individual Factors	**.810**	.070	**.000**

Dependent Variable: Ease of Use

4.7.2 Summary of Hypotheses Testing

The relationship between factors such as Organization Leadership, User involvement Training, Cost, Resistance to New Technology and PEOU were established through multiple regression analysis. The model established the predictor variables' reasonable influence on PEOU with $R^2 = 0.617$ and p = 0.000. PEOU was further shown to be significantly and positively affected by all the variables. The predictor factors, User-Patient Relationships effect on PU was found to be significantly related with p = 0.000, discounting User Autonomy. Multiple regression analysis on PEOU and PU proved that the relationship between the two variables are significant with p = 0.000. In addition, the analysis also proved that the relationship between PU and Attitude Toward Using EMRs is significant (p =0.000) while the other variable

PEOU was found to be not significant with Attitude Toward Using EMRs (p =0.960). Furthermore, the relationship between Attitude Toward Using EMRs and BI gave p = 0,000 indicate that the relationship is significant, while the analysis also proved that there is a relationship between Organizational Factors and PU was significant with p = 0.000, while the relationship between Individual Characteristic Factors and PEOU showed significance in the relationship with p =0.000.

4.8 Important Factors

In order to answer the first question, a stepwise regression was used, where the number of independent variables entered and the order of entry are determined by statistical criteria generated by the stepwise procedure. This section of the output shows which of the variables statistically significant predictors of the dependent variable are. The most important factor is found to be Organizational Leadership with B = .829 and p =0.005 as shows in Table 4.25. In Table 4.26 shows the coefficient of determination for this relationship is R^2 = .571.

The results of the open-ended questions (see Appendix F) showed that 45% of the respondents complained about the lack support of organizational leadership were major complaints from the respondents in both hospitals. The open-ended question analysis showed that the highest percentage of complaints were related to the organizational leadership.

Table 4.25 ANOVA Significance of Most Important Factor by Stepwise Regression

R Square (R^2)	F	Sig
.571	265.842	**.000**

Table 4.26: Stepwise Regression Analysis of Most Important Factor

Model	Unstandardized Coefficients		
	B	**Std. Error**	**Sig.**
(Constant)	**.498**	.174	**.000**
Organizational Leadership	**.829**	.051	**.005**

4.9 Hypotheses and Model Evaluation

To recap, the following are the research hypotheses that are discussed in the present study. This section shows insignificant and significant positive relationship present between the independent and dependent factors displayed at p >.05 level.

- **Organizational Factors Hypotheses:**

Hypothesis 1: Organizational Leadership has a significant relationship to Perceived Ease of Use.

The result in Table 4.8 shows a positive and significant relationship between organization leadership and PEOU (p =.000). Therefore, the result concludes that this is enough evidence to show that this is a relationship between Organizational Leadership and Perceived Ease of Use.

Hypothesis 2: Users Involvement has a significant relationship to Perceived Ease of Use.

The result in Table 4.8 shows a positive and significant relationship between user involvement and PEOU (p =.019). Therefore, the result concludes that this is enough

evidence to show that this is a relationship between Users Involvement and Perceived Ease of Use.

Hypotheses 3: Training has a significant relationship to Perceived Ease of Use.

The result in Table 4.8 shows a positive and significant relationship between training and PEOU (p = .037). Therefore, the result concludes that this is enough evidence to show that this is a relationship between Training and Perceived Ease of Use.

Hypothesis 4: Cost has a significant relationship to Perceived Ease of Use.

The result in Table 4.8 shows a positive and significant relationship between cost and PEOU (p =.026). Therefore, the result concludes that this is enough evidence to show that this is a relationship between cost and Perceived Ease of Use.

- **Individual Characteristic Factors Hypotheses:**

Hypothesis 5: Users-Patient relationship has a significant relationship to Perceived Usefulness.

The result in Table 4.10 shows a positive and significant relationship between user-patient relationship and PU (p= .000). Therefore, the result concludes that this is enough evidence to show that this is a relationship between Users-Patient relationship and Perceived Perceived Usefulness.

Hypothesis 6: User's Computer Background has a significant relationship with Perceived Ease of Use.

This factor is already dropped in the factor analysis step, because older individuals tend to have unfavorable attitudes toward computer use (Dyck, 1994; Laguna and

Babcock, 1997). In Table 4:2 of this research, most senior healthcare professionals are not of an advanced age and all the respondents have more than one year of using EMRs implementation; this might explain why most of the responders considered this to be not a barrier.

Hypothesis 7: User autonomy has a significant relationship to Perceived Usefulness.

The result in Table 4.10 shows that there is an insignificant relationship between user autonomy and PU (p = .767). Therefore, the result concludes that this is not enough evidence to show that this is a relationship between User autonomy and Perceived Usefulness.

Hypothesis 8: Resistances to New Technology has a significant relationship to Perceived Ease of Use.

The result in Table 4.8 shows a positive and significant relationship between resistances to new technology and PEOU (p =.004). Therefore, the result concludes that this is enough evidence to show that this is a relationship between Resistances to New Technology and Perceived Ease of Use.

- **Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using and Behavioral Intention to Use:**

Hypotheses 9: Perceived Ease of Use has a significant relationship to Perceived Usefulness.

The result in Table 4.14 shows a positive and significant relationship between PEOU and PU (p = .000). Therefore, the result concludes that this is enough evidence to

show that this is a relationship between Perceived Ease of Use and Perceived Usefulness.

Hypotheses 10: Perceived Ease of Use has a significant relationship to Attitude Toward Using.

The result in Table 4.16 shows insignificant relationship between PEOU and attitude to use (p = .960). Therefore, the result concludes that this is not enough evidence to show that this is a relationship between Perceived Ease of Use and Attitude Toward Using.

Hypotheses 11: Perceived Usefulness has a significant relationship to Attitude Toward Using.

The result in Table 4.16 shows a positive and significant relationship between PU and attitude toward using EMRs (p = .000). Therefore, the result concludes that this is enough evidence to show that this is a relationship between Perceived Usefulness and Attitude Toward Using.

Hypotheses 12: Attitude Toward Using has a significant relationship to Behavioral Intention to Use.

The result in Table 4.20 shows a positive and significant relationship between attitude to use and BI (p =.000). Therefore, the result concludes that this is enough evidence to show that this is a relationship between Attitude Toward Using of RMRs and Behavioral Intention to Use.

Hypotheses 13: The Organizational Factors have a significant relationship to Perceived Usefulness.

The result in Table 4.22 shows a positive and significant relationship between Organizational Factors and PU (p = .000). Therefore, hypothesis the result concludes that this is enough evidence to show that this is a relationship between Organizational Factors and Perceived Usefulness.

Hypotheses 14: The Individual Characteristic Factors have a significant relationship to Perceived Ease of Use.

The result in Table 4.24 shows a positive and significant relationship between Individual Characteristic Factors and PEOU (p = .000). Therefore, hypothesis the result concludes that this is enough evidence to show that this is a relationship between Individual Characteristic Factors and Perceived Ease of Use.

Table 4.27 and Figure 4.1 summarize the results of the research findings related to the strength of the relationships and the assumption of the hypotheses.

Table 4.27 Summary of Hypotheses

Hypothesis	B	Significant	Result
H1	.518	.000	Significant
H2	.280	.019	Significant
H3	.142	.039	Significant
H4	.252	.026	Significant
H5	.875	.000	Significant
H6	-	-	Dropped
H7	.005	.676	Not Significant
H8	.277	.004	Significant
H9	.699	.000	Significant

H10	.004	.960	Not Significant
H11	.756	.000	Significant
H12	.676	.000	Significant
H13	.663	.000	Significant
H14	.810	.000	Significant

In agreement with the hypothesis, the results revealed that various organizational factors namely organization leadership, user involvement, training, cost and resistance to new technology, displayed a significant relation with PEOU of EMRs implementation. Added to this is the result that individual characteristics, for instance, user-patient relationship, also exhibit a significant relationship on PU with the exception of user autonomy. PEOU has a significant effect on PU but in contrast, PEOU has an insignificant with attitude toward using, PU has a significant with attitude toward using. Additionally, attitude has a significant effect on BI, organizational factors have a significant relationship on PU and in turn individual characteristic factors have a significant effect on PEOU.

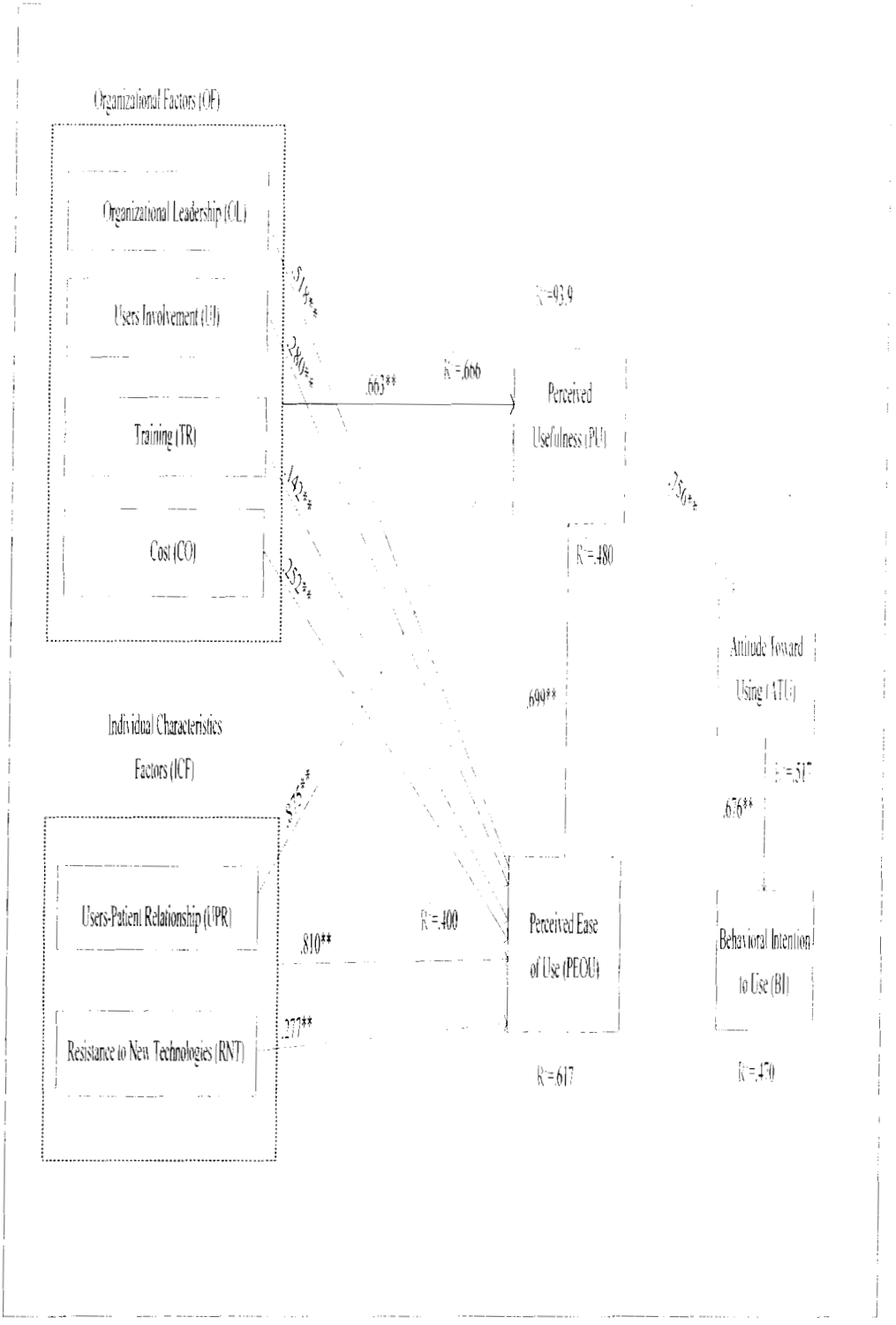

Figure 4.1 Summary of Hypotheses and Research Model

4.10 Conclusion

The chapter explained the analysis of data with the use of exploratory factor analysis, correlation analysis and examined other factors influencing the EMRs implementation through multiple regression and research constructs. A final model was developed and proposed which successfully fit the data. The results of the study support the prior findings that stated that technology acceptance model can be a useful tool in evaluating post-implementation and EMRs actual use by healthcare professionals in Jordanian hospitals.

The contextual factor constructs supported the hypothesized relationships among organizational, individual characteristics factors and TAM factors (Perceived Ease of Use and Perceived Usefulness). Research objective achieved and the majority of factors affecting EMRs implementation were revealed which include organization leadership, user involvement, training, cost, user- patient relationship and resistance to new technology.

CHAPTER FIVE
DISCUSSION OF RESULTS

5.1 Introduction

The aim of this study is to find the factors affecting the implementation of EMRs in Jordanian hospitals. This chapter discusses the results of the findings in light of the hypotheses; the affect of organizational factors, as well as individual factors regarding the implementation of EMRs emphasizing on the thorough evaluation of the study results, followed by a discussion on the results from descriptive statistics and Multiple Regression Analyses that are related and supported by the content analysis of open-ended question of the factors related to the variables in the research model. In chapter Two, certain obstacles were listed down as major hindrance to the effective implementation of EMRs in certain countries, but this might be different in Jordan and these are therefore discussed in this chapter.

5.2 Organizational Factors that Affect EMRs Implementation

The current study has included pertinent contextual factors into the TAM, for the purpose of studying organizational factors. The respondents have hands on experience with the EMRs at the time of data collection as shows in Table 4.2 in section 4.3 and they provided their perceptions regarding organizational leadership, the significant costs tied to its implementation, involvement of the user as well as sufficient and effective training as shows in the results of the open-ended question, as presented in Appendix F.

5.2.1 Organization Leadership

The implementation of EMR requires organizational leadership as it provides the necessary time and resources (Compeau and Higgins, 1995). The analysis outcome shows a positive relationship between organizational leadership and PEOU (H1) as shown in Table 4.8, section 4.7.1. In addition, the regression relationship between organizational leadership and PEOU was reported to be statistically significant at p =.000, with B at .518. Consistent with Aldosari's (2003) result, the amount of variance (R2) in organizational leadership due to its relationship with PEOU was 61.7 percent as shows in Table 4.7 in section 4.7.1.

The findings from the open-ended questions (Appendix F) revealed that 45% of the total respondents were not satisfied with the organizational leadership support they are getting; major complaints from the hospitals were confined to this matter. In addition, the analysis of the findings revealed organizational leadership to have the greatest percentage of complaints with B-.829 and p = 0.005 as depicted in Table 4.25. The coefficient dimensions for this relationship is R^2 = .571 indicating that this factor holds the key to explaining the variance of EMRs implementation. In other words, organizational leadership has a great influence in EMRs implementation in Jordanian hospitals. Lack of support from organizational leaders may negatively affect the perception of the healthcare professionals' use of EMRs and eventually impact the degree of their acceptance of EMR implementation.

The finding implies that organizational leadership capacity that is ineffective will enable barriers to arise during the EMR implementation and the ignorance of

healthcare professionals and hospital members to support the decision of the organizational leadership will lead to their resistance and their negative perceptions of EMR usage. As a result, no effort will be expended to enhance the system's performance. This positive relationship is also present in other studies such as, Dansky et al. (1999).

In the present study's findings, the significant relationship between organizational leadership and PEOU is clearly manifested. Healthcare professionals with varying experience display the same attitude to EMRs use. For instance, those who have 3-12 months of experience constitute only 33 users, which accounts for a low 24.6 percent of the overall use as shows in Table 4.2 in section 4.3.

According to them, there is a huge expectation of organizational leadership to step up and ensure the availability of sufficient workstations, provide training and support and to solve technical problems in a timely fashion. In addition, the respondents also expect organizational leadership to acknowledge their feedback of system use. This will assist in explaining the relationship between organization leadership and user involvement, as well as organization leadership and training.

Moreover, going back to Table 4.2, it is obvious that on a daily basis, the frequency of EMRs use by majority of the respondents (70.9 percent) is reported to be merely one to less than 4 hours which shows less utilization of EMRs in the hospitals. This can be explained by Morton's (2008) study which revealed a significant relation between organizational leadership and PEOU. The result in Morton's study and the present study owe themselves to lack of organizational leadership. In other words,

the perceived success or failure of EMRs is related to organizational leadership in both prior to and during system implementation.

However, in the current study, the relationship between organizational leadership and PU was not hypothesized because of lack of support from prior literature regarding their relationship (Morton, 2008).

In, sum as organizational leadership influences the PEOU, it in turn, influences PEOU. For instance, if EMRs in hospitals are proven to be accessible, stable and user-friendly, then healthcare professionals will intend to use them. The organizational infrastructure comprises IT infrastructure and IS/IT department. The EMRs PEOU would hinge on whether organizational leadership organizes the IT infrastructure in such a way that it facilitates EMRs whether in the IS or IT department and provides the necessary support.

Therefore, it is important that organizational leadership manifests a willingness to constantly learn and search for new knowledge and ideas to become role models for healthcare professionals. This will increase the latter's PEOU and perception to participate in EMRs implementation and use. Organizational leadership should also convey necessary knowledge regarding EMRs to healthcare professionals to keep their morale on the high and to create a culture facilitating sharing, learning and creation.

5.2.2 User Involvement and Participation

User involvement is regarded by some researchers (Lorenzi and Riley, 2000; Lorenzi, et al., 1997), as important to the suitable system's selection and implementation as this can encourage them to feel at ease with the system and its usage. The same scenario is manifested in the findings of the present research where respondents stressed on the importance of user's involvement in the EMRs implementation. As mentioned, the present research is conducted in a healthcare context involving the IS department who are accountable to top management for clinical affairs, and healthcare professionals comprising head of the clinical IS and a committee comprising active and well known callable individuals.

The findings concerning user involvement are displayed in Table 4.8, section 4.7.1. According to this Table, a positive significant relationship exists between user involvement and PEOU (H_2), with an overall regression relationship as statistically significant at p=.019, and B at .280 between these two variables. Additionally, consistent to Aldosari's (2003) and Morton's (2008) findings, the amount of variance (R^2) in user involvement owing to its relation with PEOU is 61.7 percent as shows in Table 4.7 in section 4.7.1.

The findings from the open-ended questions (see Appendix F) revealed that 5% of the total respondents complained of lack of users' involvement in EMRs implementation in both hospitals. Poor and low communications exist between organizational leadership and healthcare professionals regarding EMRs software

implementation. This implies the lack of healthcare professionals' involvement in EMRs software implementation which was considered to be a crucial issue.

In other words, the results imply that users' participation or involvement in system selection is imperative as they are more knowledgeable of the clinical workflow and the system should match their practice techniques. Their non-involvement in the system selection is obvious from the way they were concerned about the computerized documentation and the structured data entry templates, which is consistent with Morton's (2008) study.

Based on the frequency of use, as shown in Table 4.2, section 4.3 it is obvious that respondents with only a few months' experience do not often make use of EMRs as their EMRs frequency use only constituted 24.6 percent of the overall use. In addition, the highest average use of EMRs was reported at only 1 to less than 4 hours out of 24 hours making up only 70.9 percent of the total hours. This implies that the sample study has not been involved in the EMRs implementation or their involvement is limited. With increased involvement during implementation, a corresponding increase in PEOU will follow which will increase the number of frequent usage.

On the other hand, the present study assumed the respondents' conviction of the EMRs' advantages; that is why they displayed an inclination to the selection of a user-friendly system (Morton, 2008). This obvious direct relationship showed that healthcare professionals' attitudes were impacted by their non-involvement or lack of involvement in the EMRs implementation.

Users will only perceive ease of use when they are involved in the system's design, training, and implementation process, and their computer self-efficacy and cognitive style are kept in consideration. Their involvement will lead to acceptance which will contribute to the general implementation process (Anderson, 1997; Ash, et al., 2000; Ilie, Van Slyke, Parikh, and Courtney, 2009; Roach, et al., 2004;). In addition to this section, researchers such as Liebhaber, et al., (2009); Lorenzi and Riley, (2000); Lorenzi, et al., (1997) have shown that oversight of the development of user ownership is a crucial factor which often leads to system failure.

It appears that the healthcare professionals in this case, trusted the ability of their leadership to choose the suitable system satisfying their requirements. The respondents however desired for professionals to guide them in training since they possess a clearer picture of the clinical workflow. Despite the extensive findings, there are still some other assumptions that need to be kept in mind while using IT in the promotion of user's involvement and participation.

5.2.3 Training and Substrate to Learning

Pioneering researches dedicated to EMRs have attempted to measure physicians' perceptions regarding training after implementation. Among the studies, Aaronson et al. (2001) revealed that user's perceptions of sufficient training relates to PU. In another study, Gadd and Penron (2001) carried out a survey involving physicians six months after EMRs was implemented. The results revealed that 23 percent of the physicians stated their dissatisfaction concerning insufficient training. The physicians' negative perceptions were related to an overall decrease in EMRs

usefulness and satisfaction. This is further emphasized by (Lee, Kozar, and Larsen, 2003) who revealed an increased dissatisfaction of physicians regarding physician order entry system, who undertook training compared to those who did not. Furthermore , Brookstone (2004) showed that training issues are significant with regards to computer expertise (novice to advanced) and to the high costs of training and the absence of management support.

In the current study, a significant relation is found between sufficient training and PEOU (H_3) as exhibited in Table 4.8, section 4.7.1 with the overall regression relationship between the two as statistically significant at p= .037, and the B at .142. In Table 4.7 in section 4.7.1 shows the amount of variance (R^2) in training explained through its link with PEOU is 61.7 percent, a finding consistent with the above studies and the relationship exhibited by sufficient training and organizational leadership.

The findings from the open-ended questions (see Appendix F) revealed that 17% of the respondents included insufficient training of EMRs implementation as their complaints in both hospitals stemming from lack of organizational leadership. This shows that lack of training of EMRs implementation is one of the many issues being faced in the healthcare environment.

Generally speaking, users stress to a great extent on training as it has a strong influence on their attitude. In the study, the significant relation was assumed because of the prior experience of the EMRs users. In other words, those who are proficient

and had experience in using EMRs are more inclined to use them or perceive the ease of use of EMRs while those with less experience perceive otherwise.

As clearly shown in Table 4.2 in section 4.3 users having the least experience (3-12 months), constitute a mere 33 percent of EMRs usage. Also, majority of EMRs usage per day was reported only at a minimal of one to less than four hours. This implies the user's inexperience of EMRs and their lack of training.

In sum, there is no doubt that training significantly increases the costs of EMRs implementation as it involves software costs, training fees, trainer compensation and renting of venue. On top of this, staffs who are being trained request for overtime entailing additional costs particularly when training is not carried out during working hours. Therefore, organizations having limited budget will not be able to afford to provide training classes.

5.2.4 High Cost of EMRs Implementation

EMRs implementation entails great costs particularly in the first installation. Appropriation of funds from the capital has to be carried out by healthcare institutions when they decide to implement EMRs. Due to the high cost, not every organization can afford to implement EMRs from the beginning as this would represent a financial burden on the organization. For this reason, and because of the uncertainty of the expected benefits, some companies hesitate to make a move.

In the current study, the relationship between high cost and PEOU (H_4) was reported to be significant as shown in Table 4.8, section 4.7.1 with an overall regression

relationship between the two factors as statistically significant at p= .026, and the B at .252. The amount of variance (R^2) in cost because of its relationship with perceived ease of use is 61.7 percent as shows in Table 4.7 in section 4.7.1 which implies that healthcare professionals in Jordan were convinced that EMRs implementation cost is greater than the benefits it will later provide; a finding consistent with previous studies (Lee, et al., 2003). From the above, it is reasonable to state that it is not a surprise for healthcare professionals to list cost as the second most significant barrier of EMRs implementation.

The findings from the open-ended questions (see Appendix F) revealed a high percentage (33%) of complaints from the respondents regarding the high cost of EMRs implementation. The respondents cited lack of financial support and high cost of EMRs training and installation. This adds high cost to the many factors that impact EMRs implementation in the context of Jordanian hospitals.

In the current study, it is obvious that high costs of EMRs implementation influence the users' PEOU. The respondents were reported to complain about certain features of the EMRs that had limited options of EMRs as shows in Appendix F. A More expensive EMRs may have included the options that were mentioned by the respondents but as organizational leadership cannot afford to buy them, they opt for second best. This lowered PEOU which is clear in the majority of user's limited utilization of the EMRs (one to less than 4 hours a day) as depicted in Table 4.2, section 4.3.

High implementation cost and PEOU is reported to have a significant relation implying that when the organizational support for the high costs is lacking, they may not be able to afford the latest or the most user-friendly systems and therefore issues will arise that will prevent the users from feeling a heightened PEOU. The high costs of implementation are attributed to software costs, cost of hardware, networking (including Internet Service Providers), infrastructure, installation of operating system and training (Dansky, et al., 1999; Miller and Sim, 2004; Murphy, et al., 1998; Poon, et al., 2004; Pourasghar, 2009), and the acquisition of which will increase the overall costs which the hospitals may not be able to afford (Alanazy, 2006).

On the other hand, Wang et al. (2003) tackled EMRs implementation and its financial gains. According to them, the level of EMRs implementation directly influences the financial gains or losses. In most cases, the cost of inception is greater than the potential gain in which case, the hospitals hesitate to replace paper-based charts (Wang, et al., 2003). Nevertheless, when the system is used to replace charts and other activities like drug checks, it is probable to have a net gain over five-years.

5.3 Individual Factors affecting EMRs Implementation

The research used individual factors as a part of the TAM which involved some other factors such as user-patient relationship, user autonomy and resistance to new technology of EMRs implementation.

5.3.1 User Patient Relationship

The respondents indicated their refusal of the disturbance in their relationship with their patients even it means barring the EMRs from their examination theaters. This particular finding contradicts other prior researches . In the most notable research depicting contradiction with the present study, Gadd and Penrod (2000, 2001) claimed that issues regarding patient-physician rapport arose both before and after EMRs implementation. Also, (Miller and Sim, 2004; Poon, et al., 2004; Satinsky, 2004) studies revealed that EMRs facilitates smooth workflows free of negative impacts upon doctor-patient relationship particularly when it comes to rapport, quality of care, and privacy.

The finding of the present study exhibits a highly significant relation between user-patient relationship and PU as shown in Table 4.10, section 4.7.1 with the overall regression relationship between the two factors as p= .000, and the B at .875. Table 4.9 in section 4.7.1 shows the amount of variance (R^2) in user-patient relationship because of its relation with PU is 93.9%, a finding contradictory to prior literature. The finding implies users-patient relationship influences the professional's decrease in ease of use. In other words, user-patient relationship is a co-variant of user autonomy; a finding consistent with Morton (2008) and (Aaronson, et al., 2001; Dansky, et al., 1999; Detmer and Friedman, 1994; Wager, et al., 2005).

The overall finding depicts that respondents consider EMRs just to be slightly advantageous to healthcare with training and access to up-to-date information as the top most advantageous aspect of EMRs implementation. It was notable that

healthcare professionals having prior training and knowledge of informatics concepts were more inclined towards computer use in health care.

The attitude of majority of the respondents towards the usefulness of EMRs can be depicted in the results of their frequent use of EMR which is minimal. Majority of the respondents use EMR one to less than four hours a day which is a mere 70.9 percent of the total usage (Table 4.2, section 4.3). This is because healthcare professionals in Jordan consider EMRs as a barrier to user-patient relationship and therefore, they do not find EMRs useful. In other words, user-patient relationship is significantly related to PU.

In sum, the reason behind low perception of EMRs usefulness in Jordan is trustworthiness between healthcare professionals and patients. The patients have to explain their illness or injuries in clear terms to healthcare professionals while the latter need to keep the information confidential at all times. But the presence and use of EMRs in the examination theater adds another dimension to this relationship that users as well as patients are not prepared to accept.

5.3.2 User Autonomy

Healthcare professionals depend on their autonomy and their authority in their decision making. Therefore, even in cases when EMRs can support their decisions made on their own volition, they hesitate to leverage their usefulness as some of them perceive EMRs advances both as a challenge and a threat to their authority.

EMRs advances may well weaken their autonomy and as consequence, EMRs implementation may carry significant negative effects (Morton, 2008).

However, the findings of the present study depicted an insignificant relationship between user autonomy and PU (H_7) as clearly shown in Table 4.10, section 4.7.1 with overall regression relationship between user autonomy and perceived usefulness as statistically significant at p = .767 and the B at .005. The amount of variance (R^2) in user autonomy explained because of its relation with perceived usefulness is 93.9 percent as shows in Table 4.9; a finding consistent with Morton's (2008) and Wei and Chiao's (2010) study, indicating that healthcare professionals are not exposed to actual medical decision-making process and were therefore merely reporting their perceptions.

Therefore, the present study conjectures that healthcare professionals perceive EMRs to be merely databases and not as systems replacing their decision making power and thus, they do not feel threatened by them. This result is contrary to Aldosari (2003) who reached mixed conclusion of a strong negative relation between autonomy and PU but at the same time, a significant relation between autonomy and PEOU and PU. Moreover, this result also contradicts with other prior studies' findings of the relationship between user autonomy and PU (Gadd and Penrod, 2001). This validation is taken by Gadd and Penrod (2000) further by explaining the perceptions of the system's impact on user autonomy before and after implementation.

The level of healthcare professionals' oversight based on their decisions differed from one individual to another which is mainly based on documentation, which was

immediately rectified by the responsible physician. There were no cases whereby the provider had to rectify a colleague's formal oversight and the healthcare professionals worked autonomously. Healthcare providers had no difficulty accepting their individualized autonomous ways but view it as just unique styles of operating.

5.3.3 Resistance to New Technology

The reasons behind user resistance to new technology including EMRs are various. A framework classifying the various types of user resistance to innovations have been proposed based on the source of resistance. PEOU is one of the main sources of resistance to innovations. It is considered as one's perception of ease of use related to the adoption decisions of the innovation, in this case, the decision to accept EMRs.

In order to counteract resistance, habit can be utilized. Habit is the current practice that one routinely does. Therefore, in order to reduce healthcare professionals' resistance to EMRs implementation, organization leadership must assess the sources of resistance and develop habits to counter them.

Moreover, EMRs' clear benefits should be made obvious to healthcare professionals (Anderson, 1997; Ash, et al., 2000) and this explains why systems often fail owing to lack of management support and resistance to new technology of healthcare professionals (Lorenzi, et al., 1997). The American Medical Association carried out a survey in 2001, which revealed that only 13 percent of the physicians were

convinced of EMRs benefits to medicine and medical practice (Pearsaul, 2002). Also, EMRs' successful implementation has been related to clinical processes enhancement and clinical issues solution through IT (Doolan, et al., 2003). Moreover, EMRs' acceptance can also be facilitated by clarifying physicians' needs as opposed to predicting benefits (Guthrie, 2001) and for sustainable use of EMRs, ongoing evaluation and modification of the healthcare professionals feedback is crucial (Doolan, et al., 2003).

In the present study, analysis of results revealed a significant relation between resistance to new technology and PEOU (H_8) as shown in Table 4.8, section 4.7.1 with the overall regression relationship between the two factors as statistically significant at p= .004, and the B at .277. The amount of variance (R^2) in resistance to new technology because of its relationship with PEOU is 61.7 percents as shows in Table 4.7 in section 4.7.1; a result consistent with previous studies (Gadd and Penrod, 2001) but inconsistent with (Detmer and Friedman, 1994; Gadd and Penrod, 2000; Gardner and Lundsgaarde, 1994).

Healthcare professionals in Jordan perceive the adoption of new technology as a positive thing as it enhances quality and efficiency. The findings show that these professionals are even inclined to modify their workflow for EMRs implementation as long as this means the achievement of quality and efficiency enhancement. However, most of the respondents to the questionnaire are not inclined to adopt new technologies although they believe others in their caliber may think differently. Most

of them are even afraid to use technology as a tool to assist them in the workplace. This disinclination is depicted in their frequency of use and hence PEOU.

This can be further clarified by highlighting the frequency of use of majority of the respondents of EMRs. Judging from the figures in Table 4.2 in section 4.3, it can be stated that majority of the respondents resist the use of new technology as they only use EMRs one to less than four days a day constituting only 70.9 percent of the total daily usage.

In sum, it can be concluded that healthcare professionals are in agreement of their negative perception of EMRs implementation because of the challenges they face in dealing with new technology. These issues pose extra work and time on training and hence, resistance to new technology is one of the barriers of EMRs implementation.

5.4 Perceived Ease of Use

The present study's hypothesis 9 is supported as PEOU of EMRs was found to have a positive impact on PU (H_9) of EMRs implementation. The outcome is shown in Table 4.14, section 4.7.1, where the overall regression relation between the two factors is statistically significant at p= .000 with B at .699; a value consistent with Sachidanandam, (2006). Also, in Table 4.13 in section 4.7.1 the amount of variance (R^2) in PU explained because of its link with PEOU is 48 percent. A finding consistent with prior TAM studies. Among them, Davis (1993) noted direct significant positive effect of PEOU on PU with a β value at.665. Davis et al. (1989) hypothesized that PEOU is one of the antecedents to PU in addition to the effects of

external variables. Several TAM studies confirmed this hypothesis and found PEOU as antecedent to PU (Miller and Sim, 2004; Morton, 2008; Poon, et al., 2004; Ash, 1997).

In the present study, the ease of use of EMRs implementation is antecedent to usefulness of EMRs implementation which is consistent with Morton's (2008) research of physicians, where PEOU was found to have a significant relationship with PU and to be the strongest predictor. The results also supported an insignificant direct relationship between PEOU and attitude toward using (H_{10}) as depicted in Table 4.15 in section 4.7.1, the amount of variance (R^2) in PEOU because of its relationship with attitude toward using is 51.7% with the standardized regression coefficient or the B at .004 and p=.690 indicating a direct insignificant effect of PEOU on attitude toward using as shows in Table 4.16 in section 4.7.1, which contradicts TAM's theoretical model although similar prior studies have also displayed an insignificant relation (Alanazy, 2006). Chau and Hu (2002) attribute the result to the skills of physicians in operating technical medical equipment and in grasping new concepts.

The healthcare professionals in Jordan do not display PEOU to EMRs; therefore, they do not find EMRs implementation useful. This is evidenced by the low frequency of use of EMRs (with majority users only utilizing at a frequency of less than four times a day). Their low perception of ease of use is clarified by their comments about the strict formats of EMRs.

In sum, a review of literature shows that PU has a high probability of influencing user's attitude compared to PEOU. Based on the respondents of the study's opinion, this notion is supported. However, the mediating impact of PEOU should not be overlooked as it is showed to be the strongest predictor of PU in the model. This is stated by Davis (1989) who said that a user's perception of the system's user-friendliness impacts the attitude of the user. The differences in PEOU can be explained by organization leadership, high cost, training, and resistance to new technology.

5.5 Perceived Usefulness

Based on TAM, PU is hypothesized to be related to attitude towards EMRs use and to be its greatest predictor. The findings of the study reveal that hypothesis 11 is supported as it states that PU of EMRs has a significant positive impact on attitude toward using EMRs (H_{11}). The results are exhibited in Table 4.16, section 4.7.1. Moreover, the overall regression relation between the two factors is statistically significant at p = .000, and the B at .756; a results consistent with (Alanazy, 2006; Groll, 2006; Hu et al., 1999; Morton, 2008; Sachidanandam, 2006;) . The amount of variance (R^2) in PU because of its relationship with attitude toward using is 51.7% with the standardized regression coefficient or indicating a direct significant positive effect of PU on attitude toward using as show in Table 4.15 in section 4.7.1.

The healthcare professionals in Jordan overall do not find EMRs significantly useful in their profession as mentioned before, and therefore, this affects their attitude to use EMRs which is depicted with minimal frequency (1-4 times a day constituting

70.9 percent of the total usage). The findings are consistent with Morton's (2008) findings. The factors used in the present study include TAM factors of attitude to use EMRs, BI and actual use of EMRs.

5.6 Attitudes Toward Using

Among the objectives of the present study is to determine the attitudes of healthcare professionals towards the adoption and implementation of EMRs as depicted in Table 4.20. The findings revealed a significant positive influence of attitudes towards using EMRs upon BI (H_{12}). Moreover, the findings showed an significant relation between and attitude towards using and BI but a significant one between PU and attitude towards using, the outcome is shown in Table 4.20, section 4.7.1 where the overall regression relation between the two factors is statistically significant at p= .000 with B at .676; a value consistent with Sachidanandam, (2006). The amount of variance (R^2) in PU explained because of its link with BI is 47 percent as shown in Table 4.19 in section 4.7.1.

The suitability of BI in the context is however questionable because EMRs are transaction processing systems having mandatory usage. Therefore, EMRs mandatory usage represents a basic level needed for job performance beyond voluntariness. This is often true for large multi-functional information technologies. Previous literature acknowledges perceived voluntariness as imperative in the acceptance and use of technology. Moreover, even if usage is mandatory, effective use of EMR will lead to organizational benefits as opposed to merely selective usage

as the value of EMRs lie in its effective and efficient usage. Thus, it is suitable to study BI to use technology even in mandatory usage.

In the context of Jordan's healthcare system, the measurement of overall attitudes towards EMRs use was revealed to be positive with a few respondents showing a negative attitude towards EMRs implementation but overall, the responses showed an encouraging inclination for EMRs implementation which can be attributed to positive experience with EMRs.

The results revealed that respondents were mainly displeased with EMRs because of the lack of support from organizational leadership, resistance to new technology, cost, training, user involvement and user-patient relationship. In other words, the healthcare professionals' negative attitude to accept EMRs lies in the objective and logical reason that eliminates intuition in the realm of medical practice and that depersonalizes computers in the examination theater (Morton, 2008). This negative attitude to use affects their BI towards EMRs.

Furthermore, the findings showed a significant relation between PU and attitude and between attitude and BI and between BI and actual use. It can therefore be assumed from the findings of the study that if healthcare professionals perceive EMRs as useful in their jobs, they will display a positive BI towards it and they will eventually be inclined to use it. In the context of Jordan, the healthcare professionals in Jordan are convinced of the EMRs usefulness and hence their attitude towards using it is positive and they show this in their BI and their eventual actual usage. But according to Table 4.2 in section 4.3, the usage of EMRs four times a day. Therefore, it can be

assumed that the healthcare professionals, due to other factors, are not fully convinced of the EMRs usefulness and hence they do not show positive BI and only use EMR to a lesser degree.

However, a definitive significant relationship was not reached in the relationship between PEOU and BI but a strong relationship was instead shown implying that users may be inclined to use EMRs when they perceive its usefulness but only when its use does not pose any problems, i.e. the system is easy to use or it is user-friendly.

5.7 Organizational Factors

Among the objectives of the study is the examination of the relations between organizational factors and PU (H_{13}). Four organizational factors were identified in the previous studies which are included in the present study; Organization Leadership, User Involvement, Training and Cost. The findings support hypothesis 13 as the organizational factors of EMRs were reported to have a significant positive influence on PU of EMRs implementation.

The findings presented in Table 4.22 in section 4.7.1 show the overall regression the relation between organizational factors and PU is statistically significant at $p < .001$, with B at .663. In Table 4.21 in section 4.7.1 shows the amount of variance (R^2) was reported to be at 66.6 percent indicating a direct significant positive effect of organizational factors on perceived usefulness.

It is evident from the results of the open-ended questions (see Appendix F), that the highest percentage of complaints from the respondents of both hospitals came was in

regards to organizational factors. The results show 45% for lack of support from organizational leadership, 33% for lack of financials and high cost of EMRs, 17% for inadequate training and 5% for poor and low communication between organizational leadership and healthcare professionals when implementing EMRs software.

From the above, it can be stated that impacts to EMRs implementation in both hospitals in Jordan were largely attributable to organizational factors.

In prior researches, the organization factors reported to bar the adoption of EMRs are; organization leadership, user involvement, training and cost. In the U.S., President Obama backed the former President, Bush's Executive Order 13335, and thus, healthcare organizations are mandated to adopt EMRs by 2014 indicating that these issues may have a probable impact on the individual's attitude toward EMRs (Hewitt, 2009).

5.8 Individual Characteristic Factors

In order to achieve the third objective of the study, the researcher examined the link between individual characteristic factors and PEOU (H_{14}). Three individual characteristic factors were included in the study; user patient relationship, resistance to new technology and user autonomy. All the individual characteristic factors except user autonomy had a significant positive influence on PEOU (H_{14}); the results of which are shown in Table 4.24, in section 4.7.1. The overall regression relationship between individual characteristic factors and perceived ease was

reported to be statistically significant at p< .000, with B at.810. The amount of variance (R^2) was found to be 40 percent as shows in Table 4.23 in section 4.7.1 and the standardized regression coefficient indicating a direct significant positive influence of the individual characteristic factors on PEOU.

5.9 Important Factors

In an attempt to achieve the first objective of the study, the findings identified the most important factor perceived by healthcare professionals in Jordan to lead to the improvement of EMRs implementation in the healthcare organizations. The most crucial factor among all the factors is organizational leadership with B = .829 and p =.005 as listed in Table 4.25 in section 4.8. The coefficient dimension for the relationship is R^2 = .571 indicating that organizational leadership is the most significant dimension that explains the variance in EMRs implementation.

This finding is evidenced by the results of the open-ended questions (see Appendix F) implying that organizational leadership is cited by the respondents as the source of most complaints in both hospitals. Lack of support from leadership registered the highest percentage which relates to lack of financial support and cost, insufficient training and poor communication between organizational leadership while implementing EMRs software. To conclude, organizational leadership is the most crucial factor impacting EMRs implementation in the context of Jordanian hospitals. Moreover, researchers are of the consensus regarding this factor hindering the EMRs implementation in Saudi Arabia (Alanazy, 2006), which is as close to the context of Jordan. These factors are organizational leadership, awareness high cost and

resistance to new technologies. Some of the above factors were adopted in the present study.

Morton (2008) also utilized TAM to indentify the significant factors that may contribute to EMRs acceptance by physicians. The findings revealed organizational leadership. The results of Morton's (2008) study are consistent with the present findings. According to him, IT and HIM professionals should encourage physician participation in planning, promotion and facilitation of training programs as they not only provide the desired flexibility, organizational leadership, timing and structure of training programs, but they also assist in promoting initial and sustained EMRs acceptance (Morton,2008).

The physicians on the other hand will provide the leadership aspect and organizational leadership must provide physical assets, such as hardware, software and workspace (Morton, 2008). In addition to the above factors, adequate technical support and cooperation are also pertinent aspects in EMRs successful implementation (Morton, 2008).

EMRs implementation in Jordanian hospitals takes a considerable number of years and therefore, it is only logical that hospital administration contribute to the smooth transition through support from organizational leadership, training and facilitation of users' involvement. In this day and age, EMRs is considered as a common instrument in a hospital administration utilized to improve outcomes and eliminate malpractice. This justifies the Jordanian government's appropriation of a significant

CHAPTER SIX
CONCLUSION

6.1 Introduction

The present study attempted to investigate the organizational and individual characteristics factors affecting EMRs implementation in Jordanian's hospitals. This chapter concludes the thesis contributions, discusses on the limitations of the study and the recommendation for further studies. Finally, concluding remarks regarding the research is presented.

The general objective of the present study was to determine the factors impacting the EMRs implementation in Jordanian hospitals based on the TAM. The acceptance of EMRs by the healthcare professionals is significant as the issue lies in the fact that they have not fully utilized the EMRs in the context of Jordanian hospitals. The systems were ignored or rejected receiving only slight acknowledgement from healthcare professionals. Related factors hold the core reason of the healthcare professionals' dissatisfaction of the systems and led to their de-motivation which may result in some of them shifting to other hospitals having paper based on conventional systems. The hospitals will then eventually lose these workers' expertise and as a consequence, the hospitals may have to spend some more money in training new recruits who are totally ignorant of EMRs. If this situation arises, then the quality of healthcare services will decrease.

Hence, it is imperative that the healthcare professionals' model must be developed in a way that it is capable of identifying the factors impacting EMRs implementation in Jordanian hospitals as evidenced by statistics. Moreover, it is imperative that empirical evidence should support the hospital IT management's rationale behind the appropriation of budge for EMRs implementation. There should also be strong evidence to support the need of EMRs enhancement on the basis of the identified weaknesses to be brought to the attention of EMRs developers and vendors.

Based on the literature review, two main factors may impact EMRs implementation. These factors include organizational factors comprising organizational leadership, users' involvement, training and cost, also individual characteristics comprising users-patient relationship, user background of computer, user autonomy and resistance to new technology. According to the identified factors, the researcher succeeded in developing a model presenting the relationships between them.

The research using model of TAM then underwent testing in two major hospitals in Jordan that fully implemented EMRs, the King Abdullah University Hospital (Government hospital) and Jordan Hospital (Private hospitals). The above hospitals were selected as case studies for the purpose of providing a significant level of variance as well as generalization.

The following Sections 6.2.1 to 6.2.3 summarize the study, followed by the relevancy of each stage of the research process.

6.1.1 Review of Factors Affecting of Implementation EMRs

A thorough review of literature provided an in-depth understanding of EMRs and the various kinds of HIT for the purpose of investigating the key role in EMRs. HIT is critical in the enhancement of healthcare services as well as in medical performance as evidenced by various electronic systems namely, EMRs EHR and CPOE. These systems basically lead to the enhancement of communication between medical users, and these systems improve medical services as well as the overall medical records of the organization.

In the first stage of the study, the definition of EMRs, the functions as viewed from users' and patients' point of view, the potential tasks in healthcare sectors improvement, EMRs Types, characteristics, Functionalities and advantages were discussed. Moreover, the EMRs unique feature that distinctively sets it apart from other traditional operational systems which are being used in healthcare system was explored in detail.

This stage entailed the explanation of some theories and models revolving around technology acceptance model. Additionally, the far reaching characteristics of TAMs presented an array of domain specific elements within individual domains laid down in a chronological order relating to the model's development to the present and its transformation in between.

Based on the EMRs implementation process explored in the thesis, it was noted that the users had a great impact on the organization's infrastructure. However, challenging factors that hindered the implementation were numerous and these

included: organizational and individual characteristic factors. It was due to some of these factors that EMRs implementation in Jordan had not been utilized in a successful way because of limited usage these systems.

The first stage also presented the explanation of the factors that affected EMRs which were considered crucial to its creation and purpose of usage. The researcher went through previous TAM researches to determine the factors possessing a statistical affect on EMRs implementation.

6.1.2 Development of Research Model Based on TAM

Review of literature presented various researchers' dedication to explore EMRs use from the user's point of view. It also revealed the gap that existed in studies dedicated to the EMRs implementation impact in Jordanian context. Accordingly, a detailed review of the existing literature revealed the suitability of TAM to be used and fourteen hypotheses were devised in an attempt to answer the research questions. From fourteen hypotheses, eleven of them were dedicated to the user's overall perception of the EMRs implementation, while hypothesis twelve was related to user attitude with BI of use; hypothesis thirteen was related to organizational factors with PU and the final hypothesis was related of individual characteristic factors with PEOU.

Also, this stage involves the determination of the research methodology consisting of procedures, processes and guidelines compounding the type of research

appropriateness, and items measurement were tested followed by pilot testing, evaluation of content, face validity and data handling.

6.1.3 Validation of the Model

The third stage concerned with the validation of the model used quantitative approach. Accordingly, a survey questionnaire was developed for the purpose of data collection from 134 healthcare professionals including physicians, nurses, pharmacists and laboratory staff at two Jordanian hospitals. In addition, suitable items measurement were tested followed by pilot testing and evaluation of content and face validity. The next step concerned the approximate assessment of sample data for their validity and reliability followed by the adjustment of scales items through necessary deletion, addition and rewording. Also the model of this research was validated in the final stage through hypothesis testing and comparing the results with other researches.

In addition, the contextual factor constructs also evidenced the hypothesized links among the following: organizational and individual characteristic factors using TAM factors (PEOU and PU). The current study attempted to carry out an investigation of the antecedents of EMRs actual use by Jordanian healthcare professionals using statistics by SPSS Ver. 18.0.

By quantifying the variables to be measured, the data obtained in the study can be submitted to statistical analysis. The outcome of the analysis, in turn, enables us to make a statistical statement, and such statement is the evidence needed to settle the

research questions. Probabilistic statistical statements are much more accurate than an untested and unsupported belief. This explains why in this study, the research questions need to be answered. In this study, regression analysis and stepwise analysis are appropriate statistical techniques to use in answering the research questions supporting by content analysis of Open-Ended Questions, as regression analysis allows assessment of the impact of single or multiple factors as implied by the following research questions:

1. What are the important factors that affect the implementation of EMRs in Jordan's healthcare environment?
2. What are the significant factors that affect the implementation of EMRs as perceived by healthcare professionals in Jordan?
3. What are the relationships between organizational and individual characteristic factors with PEOU and PU?
4. What is the base model that describes the factors affecting EMRs implementation in hospitals in Jordan?

In order to answer the first question, a stepwise analysis was used, where the number of independent variables entered and the order of entry are determined by statistical criteria generated by the stepwise procedure. The most important factor is found to be Organizational Leadership with B = .829 and p = 0.005. The result shows the coefficient of determination for this relationship is R^2 = .571. This indicates that Organizational Leadership is the most important dimension in explaining the variance of EMRs implementation in Jordanian hospital.

In order to answer the second research question, several regression analyses supporting by content analysis of Open–Ended Questions were required. It was revealed that there were relationships of the organizational factors such as organization leadership, user involvement, training, resistance to new technology and cost having a significant relationship with PEOU of EMRs implementation (H_1, H_2, H_3, H_4 and H_8); in this study, the amount of variance (R^2) in these factors explained by its relationship with PEOU was 61.7 percent. Additionally, individual characteristic factors like user-patient relationship revealed a significant relationship with PU of EMRs implementation (H_5 and H_7), except for user autonomy; in this study, the amount of variance (R^2) in these factors explained by its relationship with PU was 93.9 percent.

Moreover, results showed that PEOU had a significant impact on PU (H_9), the amount of variance (R^2) in PEOU explained by its relationship with PU was 48.0 percent; while PEOU on the contrary had an insignificant impact on attitude toward use and PU had a significant impact on attitude toward use (H_{10} and H_{11}); the amount of variance (R^2) in PEOU and PU explained by its relationship with attitude toward use was 51.7 percent. .Furthermore, attitude toward use has significant impact on BI (H_{12}), the amount of variance (R^2) in attitude toward use explained by its relationship with BI was 47 percent.

Also, to answer the third research question, the results show the relationships between organizational factors (including Organization Leadership, User Involvement, Training and Cost) with PU (H_{13}), the amount of variance (R^2) in

organizational factors explained by its relationship with PU was 66.6 percent. The relationships between individual characteristic factors (User Patient Relationship, Resistance to New Technology and User Autonomy) with PEOU (H_{14}), the amount of variance (R^2) in organizational factors explained by its relationship with perceived usefulness were 40 percent. Also, the results of present research explain the important factors that affect EMRs implementation.

Finally, as shown in Figure 4.1 to answer the fourth question based on the results, it can be concluded that the factors that constituted the healthcare professionals acceptance model of EMRs implementation from the organizational factors were organization leadership, user involvement, training, and cost; from the individual characteristic factors, they were user-patient relationship and resistance to new technology. This model was constructed based on the findings of situations in which EMRs was mandated for all the healthcare professionals. The combination of some of the external factors from the perspectives extended the original TAM.

However, the contribution value could not be generalized in the model because the results show the variances in these two environments. This happened because the UI of EMRs in both hospitals were different, and these systems were also provided by the same vendors.

The validation of the model was done through SPSS Ver. 18.0 that was based on hypothesis testing, as discussed in the previous section.

6.2 Contributions

The current study attempted to explore the factors impacting the EMRs implementation in Jordanian hospitals and the link between organizational, and individual characteristic factors, and BI to use EMRs in Jordanian hospitals and thus it opened the door for the possibility of more research.

The most significant contribution of the present study is that to the TAM's theoretical knowledge. The study's model is an extension of TAM model comprising of external factors and PEOU and PU. The findings are expected to improve the theoretical knowledge on the topic particularly its relation to TAM and application in the Jordanian Health Informatics domain. The study also improved the classic TAM by introducing organizational and individual factors which initially merely comprised of PU and PEOU based on a social perspective.

The present study contributed to the literature concerning health informatics particularly to the healthcare professional model of EMRs implementation in the context of Jordanian hospitals. In addition, the study also contributed to the Jordanian Ministry of Health (MOH) for its invaluable evaluation of the healthcare professionals' acceptance of EMRs in Jordanian hospitals or for that matter, any hospital whether private or public, in which EMRs use has been mandated. The research outcome can be utilized to improve the existing EMRs and these can be used in the evaluation, utility and identification of factors impacting EMRs implementation in Jordanian public hospitals.

Moreover, practitioners should also seek the assistance of healthcare professionals in planning and promoting continuous and flexible training programs as desired by the respondents which will result in sustained EMRs of healthcare professionals acceptance in Jordanian hospitals. HIM professionals should don on a cloak of multi-tasking, playing the role of liaison between IT and clinicians, organizers and providers of training classes and contacts for issues' resolution.

Every pertinent professional should play his or her part for optimal outcome; healthcare professionals should provide leadership, management should provide assets like hardware, software and workspace and technical support, HIM and IT professionals should provide cooperation with clinicians and users to promote sustainable EMRs adoption in Jordanian hospitals .

Consequently, because EMRs have now become significant for every hospital administration which strives for enhanced outcome and eradication of malpractice, the Jordanian government should take the important step to allocate necessary financial budget to public hospitals and facilitate private hospitals' quick implementation of EMRs throughout Jordan.

6.3 Limitations of the Study

The present study focused only on one healthcare system and considered the results as generalizable to a certain number of populations where the sample was taken from. Therefore, this may not be an accurate depiction of attitudes. In addition, the geographic division of Jordan may also affect EMRs perceptions as some individuals

coming from different geographic locations were expected to display different attitudes. Another limitation of the study was the use of a generic survey in the collection of data. Surveys are useful for collecting quantitative data but they do not facilitate for an in-depth study and inquiry into the given issue. Moreover, the small sample size was also a limitation which owes itself to a small number of individuals' willingness to participate.

Another limitation of the present study was the study of only those factors that affect the implementation of EMRs. Based on this issue, future research can attempt to find out the influence of EMRs implementation.

Also, the present study was limited to two major Jordanian healthcare facilities; therefore, the researcher recommends that an expansion of research to include other middle and small sized healthcare facilities could be carried out and other neighboring countries can be included in a future similar study. Furthermore, EMRs implementations are concentrated on general EMRs and not any particular kinds of it. Thus, an opportunity is available for future researchers to look into properties, advantages and issues linked to certain EMRs software packages.

Finally, The EMRs was used by different levels of healthcare professionals. This study only considered four groups of healthcare professionals. Therefore, the replication of this work in other settings and sample groups as medical records staff and administrative staff will be necessary to understand how well these findings can be generalized.

As the study was conducted at a single point in time, it would be necessary to repeat it as a longitudinal study. This requirement is due to the fact that user perception can evolve over time as the user gains more experience and exposure. The repetition of the study may help stabilize the healthcare professionals' beliefs.

6.4 Direction for Future Research

The present research concentrated on user groups only in a few healthcare systems. Future studies can take it from where the present research ends and proceed to focus on a larger group, user interviews and observations which will provide a clear and comprehensive picture of healthcare professionals' needs. Additionally, future research can also concentrate on a particular main user group in one healthcare system such as healthcare professionals or nurses and other administrative staff. Moreover, the EMRs acceptance model can also be tested in the future in a different venue to find out the various attitudes in different settings. Future research can even take the study a step further and apply it on non-academic healthcare professionals and in venues which mandates EMRs utilization and the model can be tested in non-mandatory health organizations such as other hospitals.

The study aimed at studying the situation in EMRs post-implementation, thus, a pre-implementation situation can also be explored to determine whether the displayed behaviors after the implementation has been accurately predicted. In addition, to a pre-implementation survey, a supplementary qualitative data collection strategy may be carried out like interviews, observations and discussions with focus groups to get an in-depth insight to the issues.

Most of the findings from the present research were concerned with the perceptions of healthcare professionals regarding factors that affect actual system use. Future research can also tackle the study in another angle by conducting a pre-implementation usability study for a comprehensive outlook on the EMRs overall influence on the healthcare professionals' or nurses' duties and performance.

Furthermore, future studies can also explore the research by carrying out a retrospective research examining the features that are most often used and not used. A comparison of the different specialties utilization and customization of the documentation templates is another area of study that could be explored as the different specialties generally have different ways of utilizing the system. A look at these differences of use may lead to a unique customization that will better serve the users.

Future studies can also look into the comparison, for example, between the use of templates in the light of data entry formats like narrative documentation, digital dictation or data capture through handheld devices. The results of these studies can be made by EMRs vendors and healthcare systems that normally deal with issues of data entry. The researcher is of the opinion that a measure of pre-implementation is a gateway to assessing system readiness for EMRs adoption. However, constant and continuous evaluation would be required to find out EMRs affect on users and its influence on patient care.

6.5 Summary

The main aim of the present study was to carry out an empirical study of the EMRs implementation in Jordanian hospitals coupled with the challenges entailed. In addition, the study attempted to explore the factors affecting the implementation. Four groups of healthcare professionals contributed to the study including physicians, pharmacists, nurses and laboratory staff, working in two major Jordanian hospitals namely KAUH and JIT. The present study is successful in achieving the research objective which is primarily to investigate factors impacting the EMRs implementation in Jordanian hospitals and the development of the study's model. The present study extended TAM to achieve its objectives as TAM is a popular model that has been validated by considerable statistical analyses. The outcome generated by TAM can be utilized as statistical evidence for decision makers to base and justify their decisions on including the MOH of Jordan and healthcare organizations in their attempts to develop strategic plans for healthcare professionals and to maximize the effective implementation of EMRs. The outcome can also contribute to the EMRs software developers' knowledge of enhancing the existing EMRs on the basis of the software's weaknesses highlighted by the study.

The present research also presented data collection from two Jordanian hospitals through the research models which must be analyzed in order to present the strengths and weaknesses of EMRs implementation in these health institutions.

Moreover, the present research contributes to the health informatics domain particularly to the knowledge of user acceptance of EMRs implementation in health

institutions. The empirical backing implies that the user acceptance factors of EMRs implementation encompass organizational factors such as organizational leadership, training, cost, resistance to new technology, user involvement, as well as individual factors such as user-patient relation with PU and PEOU. These findings facilitated the development of the extended TAM.

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Appendix A

Letters of Jordan Hospitals

Private Hospitals Association P/A جمعية المستشفيات الخاصة

Date : April 8th, 2010

Ref. : 1736

Messrs.
University Utara Malaysia
Attn.: Dr. Wan Rozaini & Mr. Bilal

Dear Sirs,

Referring to your email sent on April 08th,2010 about Mr. Bilal Nasar PhD Study .

We would like to inform you that the Specialty Hospital is using the electronic medical record partially in our medical record department.

Please note that some hospitals in Jordan started to use this technology recently.

Regards,

Dr. Fawzi Al Hammouri
Chairman
Private Hospitals Association

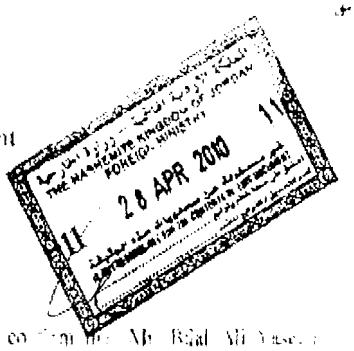
THE HASHEMITE KINGDOM OF JORDAN
FOREIGN MINISTRY
28 APR 2010

جمعية المستشفيات الخاصة
Private Hospitals Association

phai@nets.jo البريد الالكتروني : فاكس : هاتف : الاردن عمان
P.O.Box 930186 Amman 11193 Jordan Tel.: 962 6 5668562 Fax : +962 6 5697425 E mail: pha@nets.jo
http://www.pha-jo.com

General Director Office

Dr Wan Rozaini Bt Sheik Osman
Associate Professor, Director
ITU-UUM ASP CoE for Rural ICT Development
University UTARA MALAYSIA
Malaysia



Dear Dr Wan Rozaini ,

Referring to your letter of 1 May 2010 in which you co[illegible] Mr. Bilal Ali Yaseen Al-Nassar, is currently studying for PhD at [illegible] University Utara Malaysia, and researching to explore *Barriers of the implementation for electronic medical record (EMR) in the developing countries*.

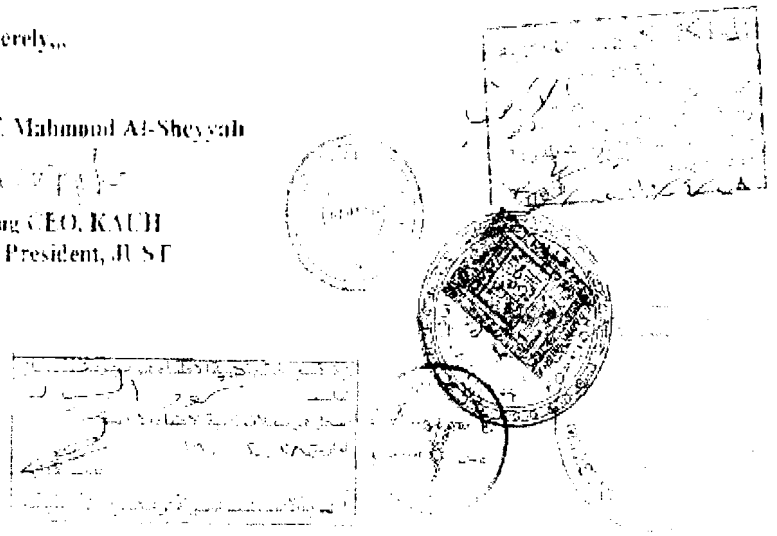
We are pleased to allow [illegible] Bilal Ali Yaseen Al-Nassar to conduct his research in our hospital for the purpose mentioned above.

Hoping that you will provide us with the final results of the research.

Sincerely,,,

Prof. Mahmoud Al-Sheyyab

Acting CEO, KAUH
Vice President, JUST



مـــركـــز الخالـــــــدي الطبـــي

AL KHALIDI MEDICAL CENTER

University UTARA Malaysia
Director of ITU-UUM ASP COE for ICT development
Information technology building
Assoc. Dr. Wan Rozaini Binit Sheik Osman

10April 2010

THE HASHEMITE KINGDOM OF JORDAN
FOREIGN MINISTRY
28 APR 2010

Dear Mrs. Miss. Mr

Hello Sir .

According to your letter dated 8 April 2010,

Our hospital Applying Archiving Electronic System for Medical Record.

"and Paper Medical Record"

Thank You

Director of Medical Record

Dr. Hassan Mahasneh

Medical Records

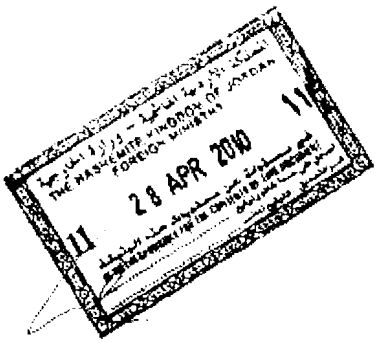
P.O. Box 5355 Amman 11183 Jordan

website: www.kmc.jo

E-mail: info@kmc.jo

مستشفى الأردن
JORDAN HOSPITAL

Dr. Wan Rozani Binti Sheik Osman
Director
ITU-UCM ASP Col. For Rural ICT Development
Information Technology Building
Universiti Utara Malaysia
06010 UUM Sintok
Kedah Darul Aman
Malaysia.



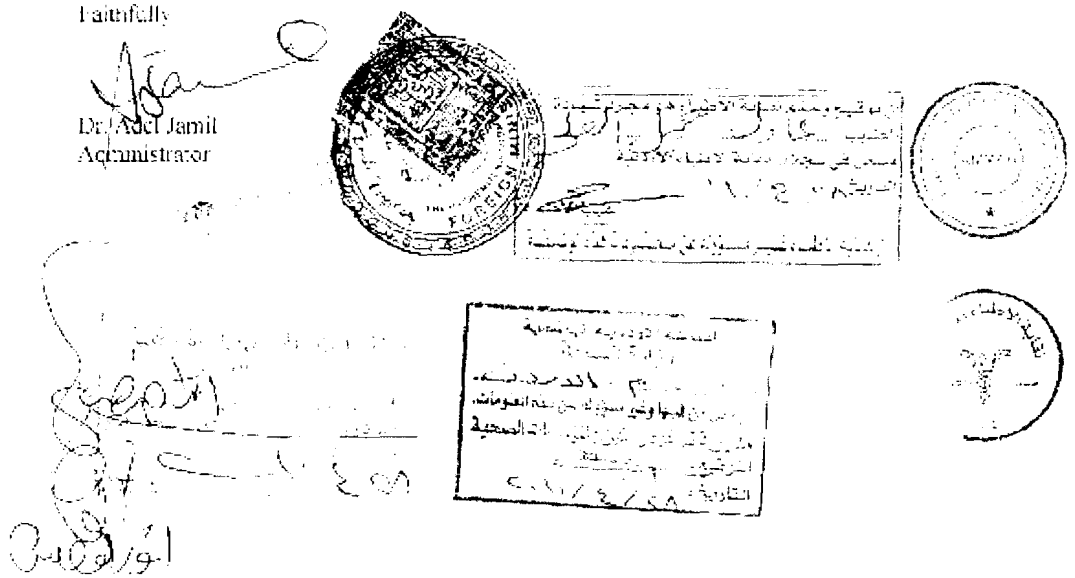
Dear Dr. Wan

Referring to your letter dated 8 April 2010 concerning implementation of electronic Medical Process in Jordan hospital , I Would like to inform you that we implement this system.

Best Regards

Faithfully

Dr. Adel Jamil
Administrator



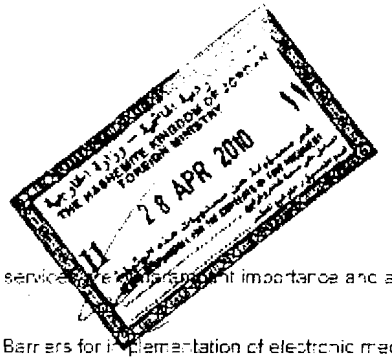
شارع الملكة نور - ص.ب ٥٢٠٢٤٨ عمان ١١١٥٢ الأردن
Queen Nour Street Tel. 5608050 - 5608030 - Fax. 5607575 P.O.Box 520248 Amman 11152 Jordan
e-mail : jorhos@jordan-hospital.com

Istishari Hospital

Istishari Hospital

Dr. Wan Rozaini Binti Sheik Osman
Director
ITU-UUM ASP CoE for Rural ICT Development
Information Technology Building
University Utara Malaysia

12.04.2010



Dear Sir / Madam

The continuous improvement in patient and health care quality services is [illegible] importance and an integrated part of the Istishari Hospital vision.

We are pleased to be part of the Ph.D. research topic entitled "Barriers for implementation of electronic medical records in Jordan" that your esteemed university is undertaking. We would like to inform you that at the Istishari Hospital we are starting to partially implement the electronic medical records system for our inpatients. Thanks you for contacting the Istishari Hospital to support your qualitative research and we look forward to assist you in your future endeavors in this field.

Should you need any additional assistance or have any questions please do not hesitate to contact us.

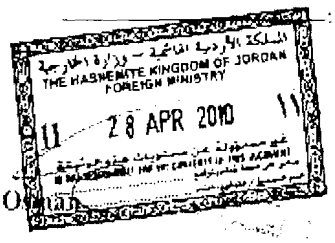
Regards

Dr. Mazen Albashir MD, M.SC, MRCP
Director General and CEO
Istishari Hospital
Amman, Jordan

Wadi Saqra Kiridi street, Tel: 962-6-5001000, Fax: 962-6-5698833,
P.O. Box: 830151 – 11183 Amman – Jordan, Email: ceo@istishariihospital.com

مستشفى الجامعة الأردنية
Jordan University Hospital

Ref. JUH/13/115
21/4/2010
الرقم
التاريخ
Date:



Assoc. Prof. Dr. Wan Rozaini Binti Sheik Osman
Director
ITU-UUM ASP CoE for Rural ICT Development
Information Technology Building
Universiti Utara Malaysia

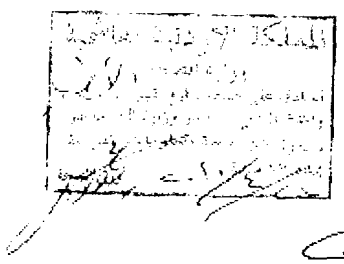
Dear Sir,

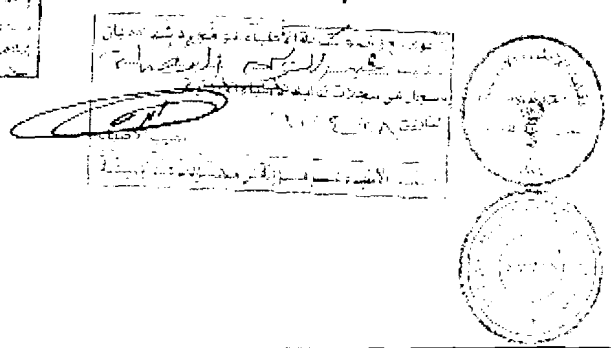
Subject : Bilal Ali Yaseen Al nassar

With regard to your inquiry about the use of the electronic medical record in the Jordan University Hospital, I would like to inform you that the hospital uses the electronic medical record partially in about 80% percent and uses the manual medical record as full usage 100%.

Sincerely yours,

Vice President for Scientific Research, Higher Studies & Quality
General Director / Jordan University Hospital
Prof. Dr. Abdelkarim Al-Qudah





DAJ

تلفون ٥٣٥٣٤٤٤ - فاكس ٥٣٥٣٣٨٨ - صندوق بريد ١٣٠٤٦ - عمان - الأردن
Tel. 5353444 Fax 5353388 - P.O.Box 13046 - Amman - Jordan

General Director Office
مكتب المدير العام
ص.ب (٦٣٠٠٠١) اربد (٢٢١١٠) الأردن
فاكس: ٧٠٩٥٧٧٧ (٢ ٩٦٢)
هاتف: ٧٢٠٠٦٠٠ (٢ ٩٦٢)

Ref. 1315 / 301
Date: [illegible]

الرقم :
التاريخ : هـ
الموافق : م

Dr. Wan Rozaini Bt Sheik Osman

Associate Professor , Director

ITU- UUM ASP CoE for Rural ICT Development
University UTARA MALAYSIA
MALAYSIA

Dear Dr. Wan

In reference to your letter. Dated 14 December 2011 , concerning implementation of electronic medical record system in our hospital.

We like to confirm to you that MR. Belal yaseen Alnasaar has completed the data collection from King Abdullah University Hospital. and hoping to get a copy of the published work.

I hope this cooperation will open many future avenues between our institutions.

Sincerely,,,

Dr.Ziad A.Elnasser

CEO KAUH

Tel.: (962-2) 7200600 Fax: (962-2) 7095777 P.O.Box: (630001) Irbid (22110) Jordan Email: kauh@just.edu.jo

مستشفى الأردن
JORDAN HOSPITAL

Date : January 08. 2012

Dr. Wan Rozaini Binit Sheik Osman
Director
ITU-UUM ASP CoE For Rural ICT Development
Information Technology Bulding
Universiti Utara Malaysia
06010 UUM Sintok
Kedha Darul Amman
Malaysia.

Dear Dr. Wan

Referring to your Letter dated 14 December 2011 concerning implementation of Electronic Medical Record System (EMRs) in our hospital.

We like to confirm to you that **Mr. Bilal Ali Yaseen ALnsaar** has been visited and collected the Data from the Jordan Hospital and hoping that you will provide us the final results of the research.

Best regards.

Dr. Adel Jamil
Administrator

JORDAN HOSPITAL ADMINISTRATION

Administrative Dep. Shyma Taha

شارع الملكة نور هاتف ٥٦٠٨٠٣٠ - ٥٦٠٨٠٣٠ - فاكس يلي ٥٦٠٧٥٧٥ ص.ب ٥٢٠٢١٨ عمان - الأردن
Queen Nour Street Tel 5608080 - 5608030 - Fax. 5607575 P.O.Box 520218 Amman - Jordan
E-mail jorhos@jordan-hospital.com

بسم الله الرحمن الرحيم

AL KINDY CENTER ED.

RAMTHA – AL WEHDA ST.

TEL. 7385293

مركز الكندي الثقافي للكمبيوتر

الرمثا – شارع الوحدة

تلفون ٧٣٨٥٢٩٣

Date: 22- Dec- 2011

Dear Dr. Wan Rozini

Universiti Utara Malaysia

We are pleased to confirm you of your Questionnaire, the Al kindy Center have translated the questionnaire about your study of factors that affecting the implementation of Electric Medical Records System (EMRs) in Jordanian Hospitals by two professionals translators.

Appendix B

The Original Items of Questionnaire with Initial Cronbach's Alpha

Section 1: Demographics **(Haslina, 2009)**

Name **(optional)**:

Contact No. (Hand Phone/ Office):

Employee ID

Email **(optional):**

Please choose one of the following answers: **(Alanazy, 2006)**

1. What is your gender?

☐ Male ☐ Female

2. What is your age group?

☐ Under 35 years ☐ 35 - 50 years ☐ Over 50 years

3. What is your education level?

☐ Master and Above ☐ Bachelor ☐ Two Years' Diploma

☐ High School or below

3. Which hospital do you work at?

☐ The King Abdullah University Hospital (KAUH)

☐ Jordan Hospital

4. Which healthcare professional group do you belong to?

☐ Physicians ☐ Pharmacists ☐ Nurses

☐ Laboratory Officer

Section 2: Experience of using EMR system **(Haslina, 2009)**

5. How long you have been working on EMR system

☐ 3 to 12 months ☐ 13 to 24 months (one year)

☐ More than two years

7. On the average, how much time do you spend per day on this EMR system

☐ Less than one hour ☐ One to less than 4 hours

☐ 4 hours to less 10 hours ☐ Over 10 hours

	Usefulness Cronbach's Alpha Initial (0.78)	Source of Adoption
8.	Using EMR system in my job would enable me to accomplish tasks more quickly.	(Davis et. al 1989)
9.	Using EMR system would improve my job performance.	
10.	Using EMR system in my job would increase my productivity.	
11.	Using EMR system would enhance my effectiveness of my job.	
12.	Using EMR system would make it easier to do my job.	
13	I would find EMR system useful in my job.	
	Ease of Use **Cronbach's Alpha Initial (0.83)**	
14.	Learning to operate EMR system would be easy for me.	(Davis et. al 1989)
15.	I would find it easy to get EMR system to do what I want it to do.	
16.	My interaction with EMR system would be clear and understandable.	
17.	I would find EMR system to be flexible to interact with.	
18.	It would be easy for me to become skillful at using EMR system.	
19.	I would find EMR system easy to use.	
	Organizational Leadership **Cronbach's Alpha Initial (0.86)**	

20.	Top management provided funding and other resources for infrastructure.	**(Morton, 2008)**
21.	Top management emphasize to employees the importance of EMR system to the hospital's success.	
22.	The EMR system project is important to top management.	
23	Top management is involved in the implementation of the EMR system.	
24.	Top management provided the training that is needed in order to use the EMR effectively.	
25.	I have easy access to resources to help me in understanding and using the EMR system.	
26.	Management expects me to use the EMR system.	
	Users Involvement **Cronbach's Alpha Initial (0.75)**	
27.	My involvement during the EMR system implementation phase is a must.	**(Morton, 2008)**
28.	My involvement during the EMR system implementation phase is effective.	
29.	My involvement during the EMR system implementation phase makes the EMR system more useful to me.	
30.	My involvement during the EMR system implementation phase makes the EMR system easier to be used.	
31.	Overall, my involvement during the EMR system implementation phase will positively affect my attitude about using	

	the EMR system.	
	Training **Cronbach's Alpha Initial (0.89)**	
32.	The training I receive on the EMR system will be adequate for me to perform my tasks.	**(Morton, 2008)**
33.	The EMR system training is useful to me.	
34.	The EMR system training makes it easier for me to use this technology.	
35.	The training provided was comprehensive.	
	Cost **Cronbach's Alpha Initial (0.81)**	
36.	I consider EMR system to be useful in my field but think that the costs for a full implementation may be too expensive.	**(Alanazy, 2006)**
37.	I think that EMR systems are a useless expenditure of money and that any benefits that they may have are outweighed by their high costs.	
38.	The costs of EMR system implement are higher than the expected budgets.	
39.	It is reasonable to spend money for a high cost system due to the upgrade of technology and quality of work for a long-term period.	
40.	EMR's high cost of investment is justified as it enhances the operations and increases the quality of work.	
	Users -Patient Relationship **Cronbach's Alpha Initial (0.75)**	

41.	The patient's confidence in the healthcare professional will increase if the patient sees the healthcare professional using computer-based technology as a diagnostic aid.	**(Morton, 2008)**
42.	Using the EMR system threatens the healthcare professional's credibility with his/her patients.	
43.	Using the EMR system reduces the patient's satisfaction with the quality of healthcare he/she receives.	
44.	Overall, using the EMR system is interfering with the effectiveness of the user-patient interaction.	
	User Background of computer Cronbach's Alpha Initial (0.72)	
45.	I have the required skills to use the computer.	**(Alanazy, 2006)**
46.	I do not know how to use a computer and would rather have someone else do the computer-related work for me.	
47.	I am willing to improve my computer literacy through proper training so as to be more efficient in my work.	
48.	My computer literacy encourages me to use EMR system.	
	Users Autonomy Cronbach's Alpha Initial (0.74)	
49.	Using the EMR system is increasing the hospital administration's ability to control and monitor the healthcare professional practices and decision-making.	

50.	Using the EMR system may result in legal or ethical problems for the healthcare professional.	**(Morton, 2008)**
51.	Using the EMR system may threaten the healthcare professional and professional privacy.	
52.	Using the EMR system may limit the healthcare professional autonomy in making clinical decisions or judgments.	
53.	Overall, the healthcare professional attitude about using the EMR system may be negatively affected as a result of the increased control and monitoring of his/her clinical practices and decision-making.	
54.	Overall, the healthcare professional attitude about using the EMR system may be negatively affected as a result of the security, legal and/or ethical concerns associated with using the EMR system.	
	Resistance to New Technology Cronbach's Alpha Initial (0.85)	
55.	I like to adopt new and emerging technologies as long as they are proven to provide an increase in quality and efficiency.	**(Alanazy, 2006)**
56.	I like to keep myself informed and up to date on the most recent medical technological advancements in my field.	
57.	I consider technophobia (fear of using technology) to be a problem in implementing EMR system among	

	healthcare professional.	
58.	The emergence of new techniques for electronic medical file system needs time and training to learn.	
	Attitude Towards Using **Cronbach's Alpha Initial (0.76)**	
59.	Using EMR system is a good idea.	**(Davis et. al 1989)**
60.	Using EMR system is a wise idea.	
61.	I like the idea of using EMR system.	
62.	Using EMR system would be pleasant.	
	Intention to Use **Cronbach's Alpha Initial (0.80)**	
63.	I intend to use EMR system in my work.	**(Davis et. al 1989)**
64.	I intend to use EMR system every day.	
65.	Using the EMR system for handling my work transactions is something I would do	
66.	I would see myself using the EMR system for handling my work transactions.	

Comments / Suggestion :

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.....

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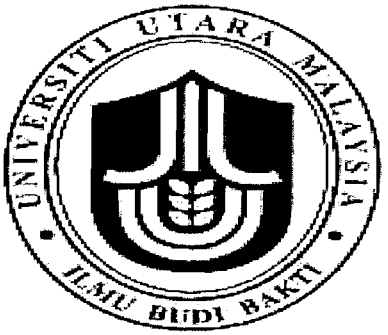
Signature of Respondent:.....

Stamp if available:



University Utara Malaysia

Dear participant

I am a PhD research student from the Information Technology Department (CAS) Universiti Utara Malaysia, Malaysia. Currently I am in the process of collecting data for my dissertation entitled "The factors effecting the implementation of Electronic Medical Record System (EMRs) in Jordanian hospitals".

As a healthcare professional, your assistance is very important to my study and I do hope you can take a few minutes of your valuable time to fill in this questionnaire. Rest assured that your privacy and confidentiality will be fully respected as this questionnaire was designed in such a way as to be completely anonymous. Should you need any further assistance with completing this questionnaire, do not hesitate to contact me. I am very grateful for your participation in this survey and for your commitment and dedication to the healthcare services in Jordan.

Thanking you very much for your cooperation,

Sincerely,
Bilal Ali Yaseen AL Nassar
University Utara Malaysia at Malaysia
E-mails: bllnssr75@yahoo.com / s91457@student.uum.edu.my
Hand phone number: 0787266661

Please note that for the purpose of this questionnaire, the terms Computer-based Patient Record (CPR), is smellier to the term Electronic Medical Record system (EMRs).

Section 1: Demographics

Name (**optional**):

Contact No. (Hand Phone/ Office):

Employee ID

Email **(optional):**

Please choose one of the following answers:

1. What is your gender?

☐ Male ☐ Female

2. What is your age group?

☐ Under 35 years ☐ 35 - 50 years ☐ Over 50 years

3.What is your education level?

☐ Master and Above ☐ Bachelor ☐ Two Years'Diploma

☐ High School or below

4.Which hospital do you work at?

☐ The King Abdullah University Hospital (KAUH)

☐ Jordan Hospital

5.Which healthcare professional group do you belong to?

☐ Physicians ☐ Pharmacists

☐ Laboratory Officer ☐ Nurses

Section 2: Experience of using EMR system (**Haslina, 2009**)

6.How long you have been working on EMR system

☐ 3 to 12 months ☐ 13 to 24 months (one year)

☐ More than two years

7.On the average, how much time do you spend per day on this EMR system

☐ Less than one hour ☐ One to less than 4 hours

☐ 4 hours to less 10 hours ☐ Over 10 hours

Section 2 – Factors Affecting EMR System Adoption

Please answer all questions by referring to the following scale. You can circle or underline your answer. There is only one answer for a question.

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

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Usefulness					
8.	Using EMR system in my job would enable me to accomplish tasks more quickly.	1	2	3	4	5
9.	Using EMR system would improve my job performance.	1	2	3	4	5
10.	Using EMR system in my job would increase my productivity.	1	2	3	4	5
11.	Using EMR system would enhance my effectiveness of my job.	1	2	3	4	5
12.	Using EMR system would make it easier to do my job.	1	2	3	4	5
13	I would find EMR system useful in my job.	1	2	3	4	5
	Ease of Use (Davis et. al 1989)					
14.	Learning to operate EMR	1	2	3	4	5

	system would be easy for me.					
15.	I would find it easy to get EMR system to do what I want it to do.	1	2	3	4	5
16.	My interaction with EMR system would be clear and understandable.	1	2	3	4	5
17.	I would find EMR system to be flexible to interact with.	1	2	3	4	5
18.	It would be easy for me to become skillful at using EMR system.	1	2	3	4	5
19.	I would find EMR system easy to use.	1	2	3	4	5
	Organizational Leadership	1				
20.	Top management provided funding and other resources for infrastructure.	1	2	3	4	5
21.	Top management emphasize to employees the importance of EMR system to the hospital's success.	1	2	3	4	5
22.	The EMR system project is important to top management.	1	2	3	4	5
23	Top management is involved in the implementation of the EMR system.	1	2	3	4	5
24.	Top management provided	1	2	3	4	5

	the training that is needed in order to use the EMR effectively.					
25.	I have easy access to resources to help me in understanding and using the EMR system.	1	2	3	4	5
26.	Management expects me to use the EMR system.	1	2	3	4	5
	Users Involvement					
27.	My involvement during the EMR system implementation phase is a must.	1	2	3	4	5
28.	My involvement during the EMR system implementation phase is effective.	1	2	3	4	5
29.	My involvement during the EMR system implementation phase makes the EMR system more useful to me.	1	2	3	4	5
30.	My involvement during the EMR system implementation phase makes the EMR system easier to be used.	1	2	3	4	5
31.	Overall, my involvement during the EMR system implementation phase will positively affect my attitude about using the EMR	1	2	3	4	5

	system.					
	Training					
32.	The training I receive on the EMR system will be adequate for me to perform my tasks.	1	2	3	4	5
33.	The EMR system training is useful to me.	1	2	3	4	5
34.	The EMR system training makes it easier for me to use this technology.	1	2	3	4	5
35.	The training provided was comprehensive.	1	2	3	4	5
	Cost					
36.	I consider EMR system to be useful in my field but think that the costs for a full implementation may be too expensive.	1	2	3	4	5
37.	I think that EMR systems are a useless expenditure of money and that any benefits that they may have are outweighed by their high costs.	1	2	3	4	5
38.	The costs of EMR system implement are higher than the expected budgets.	1	2	3	4	5
39.	It is reasonable to spend money for a high cost system due to the upgrade of technology and quality of work for a long-term	1	2	3	4	5

	period.					
40.	EMR's high cost of investment is justified as it enhances the operations and increases the quality of work.	1	2	3	4	5
	Users -Patient Relationship					
41.	The patient's confidence in the healthcare professional will increase if the patient sees the healthcare professional using computer-based technology as a diagnostic aid.	1	2	3	4	5
42.	Using the EMR system threatens the healthcare professional's credibility with his/her patients.	1	2	3	4	5
43.	Using the EMR system reduces the patient's satisfaction with the quality of healthcare he/she receives.	1	2	3	4	5
44.	Overall, using the EMR system is interfering with the effectiveness of the user-patient interaction.	1	2	3	4	5
	User Background of computer					
45.	I have the required skills to use the computer.	1	2	3	4	5
46.	I do not know how to use a	1	2	3	4	5

	computer and would rather have someone else do the computer-related work for me.					
47.	I am willing to improve my computer literacy through proper training so as to be more efficient in my work.	1	2	3	4	5
48.	My computer literacy encourages me to use EMR system.	1	2	3	4	5
	Users Autonomy					
49.	Using the EMR system is increasing the hospital administration's ability to control and monitor the healthcare professional practices and decision-making.	1	2	3	4	5
50.	Using the EMR system may result in legal or ethical problems for the healthcare professional.	1	2	3	4	5
51.	Using the EMR system may threaten the healthcare professional and professional privacy.	1	2	3	4	5
52.	Using the EMR system may limit the healthcare professional autonomy in making clinical decisions or judgments.	1	2	3	4	5
53.	Overall, the healthcare	1	2	3	4	5

	professional attitude about using the EMR system may be negatively affected as a result of the increased control and monitoring of his/her clinical practices and decision-making.					
54.	Overall, the healthcare professional attitude about using the EMR system may be negatively affected as a result of the security, legal and/or ethical concerns associated with using the EMR system.	**1**	**2**	**3**	**4**	**5**
	Resistance to New Technology					
55.	I like to adopt new and emerging technologies as long as they are proven to provide an increase in quality and efficiency.	**1**	**2**	**3**	**4**	**5**
56.	I like to keep myself informed and up to date on the most recent medical technological advancements in my field.	**1**	**2**	**3**	**4**	**5**
57.	I consider technophobia (fear of using technology) to be a problem in implementing EMR system among healthcare professional.	**1**	**2**	**3**	**4**	**5**

58.	The emergence of new techniques for electronic medical file system needs time and training to learn.	1	2	3	4	5
	Attitude Towards Using					
59.	Using EMR system is a good idea.	1	2	3	4	5
60.	Using EMR system is a wise idea.	1	2	3	4	5
61.	I like the idea of using EMR system.	1	2	3	4	5
62.	Using EMR system would be pleasant.	1	2	3	4	5
	Intention to Use					
63.	I intend to use EMR system in my work.	1	2	3	4	5
64.	I intend to use EMR system every day.	1	2	3	4	5
65.	Using the EMR system for handling my work transactions is something I would do.	1	2	3	4	5
66.	I would see myself using the EMR system for handling my work transactions.	1	2	3	4	5

Comments / Suggestion :

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.....

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Signature of Respondent:.....

Stamp if available:

Universiti Utara Malaysia

أنا طالب دكتوراه من كلية تكنلوجيا المعلومات فى جامعة ماليزيا الشمالية. وأنا في مرحلة لجمع البيانات لدراستي والتي بعنوان" العوامل التي لها تأثير على تنفيذ نظام السجلات الطبية الإلكترونية فى الأردن " والتي تستخدم فى الوقت الحالي فى بعض المستشفيات الأردنية والمعروفه باسم السجلات الطبية الإلكترونية .

وكونك واحد من أحد الكوادر فى هذة المستشفى سواء كادر طبي اوإداري ومساعدتك لي فى غاية الأهمية فى دراستي فاسمح لي بدقائق من وقتك الثمين لإملاء هذا الاستفتاء. وكن متأكد أن الخصوصية والسرية سيكونان لهذا الإستبيان ولا يحق لأحد الاطلاع عليه ما عدا الباحث عند وقت التحليل. واذا كان هنالك اي تساؤل أو عدم وضوح فى هذا الاستبيان لا تتردد بالإتصال مع الباحث فى أي وقت . وأنا ممتنٌ جداً لإشتراكِكَ في هذا المسح وإلتزامِكَ وتكريسِكَ بالعمل فى خدمات العنايةِ الصحيةِ في الأردن.

وأشكر الجميع لحسن التعاون

الباحث : بلال علي ياسين النصار

رقم موبايل :0787266661

البريد الكتروني: s91457@student.uum.edu.my
bllnssr75@yahoo.com

ألقسم ألاول

الأسم (أختياري) :

رقم ألهاتف (موبايل أو المكتب) :

ألرقم ألوظيفي :

ألايميل(أختياري) :

ألرجاء أختر أحد الأجابات التالية:

١. الجنس

☐ ذكر ☐ أنثى

٢. العمر

☐ بين ٣٥-٥٠ عام ☐ أقل من ٣٥ عام ☐ فوق ٥٠ عام

٣.المستوى الاكاديمي

☐ ماجستير فما فوق

☐ بكالوريس

☐ دبلوم

☐ ثانوية عامه أو أقل

٤.في اي مستشفى تعمل ؟

☐ مستشفى الملك المؤسس عبد الله الثاني

☐ مستشفى الاردن الخاص

٥.ما هى وظيفتك؟

☐ طبيب

☐ ممرض

☐ صيدلأني

☐ موظف مختبرات (موظف فى المختبرات طبية او فى غرف الأشعة)

ألقسم ألثاني : ألخبرة بشأن أستخدام نظام ألملفات الطبية الإلكترونيه

٦. منذ متى وأنت تستخدم نظام الملفات الطبية الإلكترونيه ؟

☐ من ثلاثة شهور الى أثنى عشر شهر

☐ من ثلاثة عشر شهر الى أربع وعشرين شهر (عام

☐ أكثر من سنتان

٧. كم من ألوقت يومياً فى عملك تستخدم نظام الملفات الطبية الإلكترونيه ؟

☐ أقل من ساعة

☐ من ساعة الى أقل من أربع ساعات

☐ من أربع ساعات الى أقل من عشر ساعات

☐ أكثر من عشر ساعات

ألقسم ألثالث :العوامل التي تؤثر على تطبيق نظام الملفات الطبية الألكترونية

ألرجاء الأجابة على كل الأسئله التالية وضع دائره حول اجاية واحدة فقط التي تراها مناسبة برأيك الشخصي .

غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
١	٢	٣	٤	٥

		غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
	الفائدة للنظام	١	٢	٣	٤	٥
٨.	أن استخدامي لنظام الملفات الطبية الإلكترونيه يعطيني اكثر سيطرة على اعمالي اليومية.	١	٢	٣	٤	٥
٩.	استخدامي لنظام الملفات الطبية الإلكترونيه يسمح لي بانجاز مهامي واعمالي بسرعة	١	٢	٣	٤	٥
١٠.	استعمالي لنظام الملفات الطبية الإلكترونيه يحسن تاثيري العام فى تنفيذ أعمالي	١	٢	٣	٤	٥
١١.	استخدامي لنظام الملفات الطبية الإلكترونيه يمكنني من اداء اعمالي بسهوله	١	٢	٣	٤	٥
١٢.	استخدامي لنظام الملفات الطبية الإلكترونيه يحسن نوعيه عملي فى تقديم العناية الأفضل للمرضى	١	٢	٣	٤	٥
١٣.	ان نظام الملفات الطبية الإلكترونيه مفيد لمزاولة الأعمال اليوميه لجميع الموظفين عن طريقة.	١	٢	٣	٤	٥
	سهولة الإستعمال					
١٤.	التعلم لكيفية استعمال نظام الملفات الطبية الألكترونيه سهل جدا .	١	٢	٣	٤	٥
١٥.	من ألسهل ألحصول على ما أريد ألقيام بة عند استعمال نظام الملفات الطبية الألكترونيه .	١	٢	٣	٤	٥
١٦.	النظام المعقد للملفات الطبية الإلكترونيه يمكن ان تثبت فوائد غير ملموسة اكثر من الفوائد التي يلمسها المستخدمين .	١	٢	٣	٤	٥
١٧.	تفاعلي اثناء العمل مع نظام الملفات الطبية الإلكترونيه واضح وسهل ومفهوم .	١	٢	٣	٤	٥
١٨.	أتوقع ان اصبح ماهر فى استخدام نظام الملفات	١	٢	٣	٤	٥

	الطبية الإلكترونيه.					
١٩.	ان نظام الملفات الطبية الإلكترونيه سهل الإستخدام .	١	٢	٣	٤	٥
	دعم ادارة عُليا					
٢٠.	تدعم الأدارة العليا (المدراء الكبار) بتمويل ومصادر اخرى للأنظمة الملفات الطبية الإلكترونيه.	١	٢	٣	٤	٥
٢١.	الأدرة العليا (المدراء الكبار) تلعب دور فى توضيح للموظفين (الطبي والغير طبي) اهمية أستخدام نظام الملفات الطبية الألكترونية فى نجاح ألمستشفيات.	١	٢	٣	٤	٥
٢٢.	ان مشاريع انظمة الملفات الطبية الإلكترونيه مهمة للأدرة العليا	١	٢	٣	٤	٥
٢٣.	الأدره العليا لها دور كبير فى تطبيق نظام الملفات الطبية الإلكترونيه فى المستشفى.	١	٢	٣	٤	٥
٢٤.	تزود الأدارة العليا التدريب الكافي للكوادر من اجل استخدام نظام الملفات الطبية الإلكترونيه بمهارة عالية.	١	٢	٣	٤	٥
٢٥.	لدي سهولة الوصول الى الموارد لمساعدتي لفهم استخدام نظام الملفات الطبية الإلكترونيه	١	٢	٣	٤	٥
٢٦.	الأدارة تتوقع مني أستخدام نظام الملفات الطبية الإلكترونيه	١	٢	٣	٤	٥
	إشراك ومشاركة المستخدمين					
٢٧.	مشاركتي خلال مرحلة التنفيذ لنظام الملفات الطبية الإلكترونيه أمر لا بد منة .	١	٢	٣	٤	٥
٢٨.	مشاركتي خلال مرحلة التنفيذ التنفيذ لنظام الملفات الطبية الإلكترونيه فعالة.	١	٢	٣	٤	٥
٢٩.	مشاركتي خلال مرحلة التنفيذ لنظام الملفات الطبية الإلكترونيه يجعل ألنظام أكثر فائدة بالنسبة لي.	١	٢	٣	٤	٥
٣٠.	مشاركتي خلال مرحلة التنفيذ لنظام الملفات الطبية الإلكترونيه جعل ألاستخدام أسهل.	١	٢	٣	٤	٥
٣١.	مشاركتي خلال مرحلة التنفيذ توثر ايجابا نحو موقفي حول استخدام نظام الملفات الطبية الإلكترونيه.	١	٢	٣	٤	٥

	التدريب					
٣٢.	التدريب المقدم لي على كيفيه استخدام نظام الملفات الطبية الإلكترونيه ملائم لان اقوم بمهامي.	١	٢	٣	٤	٥
٣٣.	التدريب على كيفيه استخدام نظام الملفات الطبية الإلكترونيه مفيد جدا لي.	١	٢	٣	٤	٥
٣٤.	التدريب على كيفيه استخدام نظام الملفات الطبية الإلكترونيه يجعل عملي اكثر سهولة باستخدام هذة التقنية.	١	٢	٣	٤	٥
٣٥.	التدريب متوفر لدينا بشكل كامل.	١	٢	٣	٤	٥
	تكلفة العالية					
٣٦.	أعتقد ان نظام الملفات الطبية الإلكترونيه مهم فى حقل عملي ولكن التكلفه لتطبيق الكامل لهذا النظام عاليه جدا	١	٢	٣	٤	٥
٣٧.	أعتقد أن نظام الملفات الطبية الإلكترونيه هو هدر للمال وأن اي فائدة يجنيها لا تقابل (لا تقارن) بكلفتة العالية	١	٢	٣	٤	٥
٣٨.	تكلفة تنفيذ نظام الملفات الطبية الالكترونية اعلى بكثير من الميزانيات المتوقعة.	١	٢	٣	٤	٥
٣٩.	جودة عمل نظام الملفات الطبية الإلكترونيه وانفاق المال على تطبيق هذا النظام ذو الكلفة العالية يبررة الفائده المرجوه منه على المدى الطويل .	١	٢	٣	٤	٥
٤٠.	الإستثمار المرتفع فى نظام الملفات الطبية الإلكترونيه لة ما يبرره حيث يؤدي الى تحسين وتطوير جودة العمل .	١	٢	٣	٤	٥
	العلاقة بين المرضى والمستخدمين					
٤١.	ثقة المريض في زيادة الرعاية الصحية المهنية سوف يزيد المريض ثقة في الرعاية الصحية المهنية باستخدام التكنولوجيا المرتكزة على الحاسوب كأداة مساعدة في التشخيص.	١	٢	٣	٤	٥
٤٢.	باستخدام نظام الملفات الطبية الإلكترونيه يهدد مصداقية الرعاية الصحية المهنية مع المرضى	١	٢	٣	٤	٥
٤٣.	باستخدام نظام الملفات الطبية يقلل الارتياح	١	٢	٣	٤	٥

	للمريض مع توعية الرعاية الصحية.					
٤٤.	باستخدام نظام الملفات الطبية تتدخل مع فعالية للتفاعل المستخدمين والمريض.	١	٢	٣	٤	٥
	خلفية المستخدمين عن الكمبيوتر					
٤٥.	املك المهارات المطلوبه لإستعمال الكمبيوتر	١	٢	٣	٤	٥
٤٦.	انا لا املك الخبرة عن كيفية استخدام الكمبيوتر وافضل ان يكون هنالك شخص لة خبره باستخدام الكمبيوتر وان يقوم بجميع اعمالي اليومية التي اقوم وتستلزم أستخدام الكمبيوتر.	١	٢	٣	٤	٥
٤٧.	انا ارغب فى تحسين المامي(خبرتي) بالكمبيوتر من خلال التدريب الصحيح لكي يكون أكثر كفاءة فى عملي.	١	٢	٣	٤	٥
٤٨.	المامي (خبرتي) بالكمبيوتر تشجعني على استخدام نظام الملفات الطبية الإلكترونيه.	١	٢.	٣	٤	٥
	الاستقلالية للمستخدمين					
٤٩.	استخدام نظام الملفات الطبية الإلكترونيه هو زيادة قدرة ادارة المستشفى لمراقبة ورصد من الرعاية الصحية الممارسات المهنية وصنع القرار.	١	٢	٣	٤	٥
٥٠.	إن استخدام نظام الملفات الطبية الإلكترونيه نتيجة للمشاكل قانونية أو أخلاقية للمختصين بالعناية الطبية.	١	٢	٣	٤	٥
٥١.	إن استخدام نظام الملفات الطبية الإلكترونيه يهدد الخصوصية الرعاية الصحية المهنية والسرية للمستخدمين.	١	٢	٣	٤	٥
٥٢.	إن استخدام السجل الصحي الإلكتروني يحد من الحكم الذاتي الرعاية الصحية المهنية في اتخاذ القرارات أو الأحكام السريرية.	١	٢	٣	٤	٥
٥٣.	موقف المستخدمين حول استخدام نظام الملفات الطبية الإلكترونيه تتأثر سلبا نتيجة لزيادة الرقابة ورصد الممارسات فى الحالات السريرية وصنع القرار.	١	٢	٣	٤	٥
٥٤.	موقف المستخدمين حول استخدام نظام الملفات الطبية الإلكترونيه تتأثر سلبا نتيجة للأمن والقلق	١	٢	٣	٤	٥

	من الناحية القانونية و / أو الأخلاقية المرتبطة باستخدام نظام الملفات الطبية الإلكترونيه .					
	المقاومة وعدم الرغبة باستخدام التكنلوجيا الجديدة					
٥٥.	انا أرغب بظهور تقنيات جديدة بالرغم من انها تزود بالكفاءة والنوعية	١	٢	٣	٤	٥
٥٦.	ارغب بإطلاع نفسي والحديث على اخر تقدم تقني طبي فى مجال حقل عملي.	١	٢	٣	٤	٥
٥٧.	اعتقد ان الخوف من استخدام التكنلوجيا يؤدي الى مشكلة فى تطبيق استخدام نظام الملفات الطبية الإلكترونيه بين موطفي الرعاية الصحية	١	٢	٣	٤	٥
٥٨.	ان ظهور تقنيات جدديده لنظام الملفات الطبية الإلكترونيه يحتاج للوقت والتدريب للتعلم على كيفية استعمال النظام .	١	٢	٣	٤	٥
	الموقف نحو تبني نظام الملفات الطبية الالكترونية					
٥٩.	الاستخدام لنظام الملفات الطبية الإلكترونيه فكرة جيدة .	١	٢	٣	٤	٥
٦٠.	الاستخدام لنظام الملفات الطبية الإلكترونيه فكرة حكيمة .	١	٢	٣	٤	٥
٦١.	أنا على رغبة باستخدام نظام الملفات الطبية الإلكترونيه	١	٢	٣	٤	٥
٦٢.	أستخدام نظام الملفات الطبية الإلكترونيه ممتع .	١	٢	٣	٤	٥
	نية نحو الاستخدام					
٦٣.	أود أستخدام نظام الملفات الطبية الإلكترونيه فى عملي .	١	٢	٣	٤	٥
٦٤.	أود أستخدام نظام الملفات الطبية الإلكترونيه فى كل يوم .	١	٢	٣	٤	٥
٦٥.	باستخدام نظام الملفات الطبية الإلكترونيه أستطيع معالجة معاملات أعمالي وأي شيء أود القيام به.	١	٢	٣	٤	٥
٦٦.	أود أن أرى نفسي استخدم نظام الملفات الطبية الإلكترونيه لمعالجة معاملات أعمالي.	١	٢	٣	٤	٥

تعليقات وأقتراحات :

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ألتوقيع.....

ألختم .....

Appendix C

The Questionnaire

Quantitative Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
OL1	134	2.00	5.00	3.4478	.649	.75161	-.089	.209	-.330	.416
OL2	134	1.00	5.00	3.2388	.765	.88580	-.094	.209	-.768	.416
OL3	134	1.00	5.00	3.1567	.105	1.21923	-.305	.209	-.843	.416
OL4	134	1.00	5.00	3.2388	.765	.88580	-.094	.209	-.768	.416
OL5	134	1.00	5.00	3.4104	.727	.84259	-.670	.209	.989	.416
OL6	134	1.00	5.00	3.4328	.673	.77990	-.642	.209	1.427	.416
OL7	134	1.00	5.00	3.4701	.684	.79178	-.592	.209	1.421	.416
UI1	134	2.00	4.00	3.2836	.641	.74199	-.511	.209	-1.023	.416
UI2	134	2.00	5.00	3.4925	.587	.67996	.173	.209	-.178	.416
UI3	134	2.00	5.00	3.4179	.647	.74892	-.096	.209	-.353	.416
UI4	134	2.00	5.00	3.3657	.699	.80917	-.160	.209	-.630	.416
UI5	134	2.00	5.00	3.6493	.696	.80653	-.061	.209	-.480	.416
TR1	134	1.00	5.00	3.2313	.101	1.16924	-.319	.209	-.695	.416
TR2	134	1.00	5.00	3.1940	.962	1.11367	-.525	.209	-.173	.416
TR3	134	1.00	5.00	3.3731	.957	1.10822	-.616	.209	-.050	.416
TR4	134	1.00	5.00	3.3507	.931	1.07785	-.667	.209	.104	.416
CO1	134	2.00	5.00	3.5224	.587	.67963	.210	.209	-.215	.416
CO2	134	2.00	5.00	3.4925	.676	.78277	-.070	.209	-.383	.416
CO3	134	2.00	5.00	3.1343	.747	.86530	.230	.209	-.758	.416
CO4	134	1.00	5.00	3.2313	.717	.83093	.101	.209	-.262	.416
CO5	134	2.00	5.00	3.4627	.623	.72191	.010	.209	-.234	.416
UPR1	134	2.00	5.00	3.4254	.673	.77921	-.135	.209	-.441	.416
UPR2	134	2.00	5.00	3.4254	.673	.77921	-.135	.209	-.441	.416
UPR3	134	2.00	5.00	3.4254	.673	.77921	-.135	.209	-.441	.416
UPR4	134	2.00	5.00	3.4254	.673	.77921	-.135	.209	-.441	.416
UBC1	134	2.00	5.00	3.4478	.649	.75161	-.089	.209	-.330	.416
UBC2	134	1.00	5.00	3.0746	.746	.86387	.139	.209	-.736	.416
UBC3	134	1.00	5.00	3.1343	.805	.93222	.010	.209	-.602	.416
UBC4	134	1.00	5.00	3.2910	.685	.79306	.071	.209	-.005	.416
RNT1	134	2.00	5.00	3.4328	.665	.77019	-.122	.209	-.403	.416
RNT2	134	1.00	5.00	3.5970	.757	.87676	-.268	.209	-.263	.416
RNT3	134	2.00	5.00	3.5299	.641	.74279	.008	.209	-.280	.416
RNT4	134	2.00	5.00	3.5373	.675	.78191	-.030	.209	-.376	.416
UA1	134	2.00	5.00	3.5373	.675	.78191	-.030	.209	-.376	.416
UA2	134	2.00	5.00	3.4478	.674	.78105	-.112	.209	-.415	.416
UA3	134	2.00	5.00	3.4254	.673	.77921	-.135	.209	-.441	.416
UA4	134	2.00	5.00	3.4179	.689	.79754	-.178	.209	-.521	.416
UA5	134	2.00	5.00	3.3881	.770	.89199	.054	.209	-.738	.416
UA6	134	1.00	5.00	3.4701	.783	.90687	-.156	.209	-.511	.416

PEOU1	134	2.00	5.00	3.2388	. 719	.83332	.238	.209	-.479	.416
PEOU2	134	2.00	5.00	3.3507	. 815	.94398	-.050	.209	-.997	.416
PEOU3	134	2.00	5.00	3.3358	. 669	.77502	.220	.209	-.252	.416
PEOU4	134	2.00	5.00	3.4925	. 684	.79232	.163	.209	-.401	.416
PEOU5	134	1.00	5.00	3.0970	. 770	.89164	-.063	.209	-.589	.416
PEOU6	134	1.00	5.00	3.2537	. 804	.93138	-.076	.209	-.152	.416
PU1	134	2.00	5.00	3.4254	. 673	.77921	-.135	.209	-.441	.416
PU2	134	1.00	5.00	3.1940	. 665	.77049	.051	.209	-.042	.416
PU3	134	2.00	5.00	3.1567	. 685	.79334	.170	.209	-.535	.416
PU4	134	2.00	5.00	3.4478	. 649	.75161	-.089	.209	-.330	.416
PU5	134	2.00	5.00	3.4776	. 605	.70141	.081	.209	-.193	.416
PU6	134	1.00	5.00	3.4552	. 683	.79107	-.174	.209	.513	.416
BI1	134	1.00	5.00	3.2910	. 784	.90798	-.796	.209	.532	.416
BI2	134	1.00	5.00	3.1567	. 740	.85712	-.818	.209	.732	.416
BI3	134	1.00	5.00	3.2910	. 784	.90798	-.796	.209	.532	.416
BI4	134	2.00	5.00	3.3955	. 661	.76599	.002	.209	-.366	.416
ATU1	134	2.00	5.00	3.4478	. 649	.75161	-.089	.209	-.330	.416
ATU2	134	1.00	5.00	3.6642	. 748	.86662	-.273	.209	-.190	.416
ATU3	134	1.00	5.00	3.4179	. 713	.82534	-.589	.209	.855	.416
ATU4	134	1.00	5.00	3.6642	. 748	.86662	-.273	.209	-.190	.416
Valid N (listwise)	134									

Appendix D

Descriptive Statistics of Respondent's Characteristics

Gender for Healthcare Professionals

		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid	Male	62	46.3	46.3	46.3
	Female	72	53.7	53.7	100.0
	Total	134	100.0	100.0	

Age for Healthcare Professionals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-35	19	14.2	14.2	14.2
	115	85.8	85.8	100.0	115
	>50	0	0	0	100.0
	Total	134	100.0	100.0	

Qualification for Healthcare Professionals

		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid	>Master and above	19	14.2	14.2	14.2
	Bachlar	106	79.1	79.1	93.3
	Deploma	9	6.7	6.7	100.0
	High School or below	0	0	0	100.0
	Total	134	100.0	100.0	

Career for Healthcare Professionals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Phystion	49	36.6	36.6	36.6
	Nurss	60	44.8	44.8	81.3
	Pharmacists	13	9.7	9.7	91.0
	Lab Technicians	12	9.0	9.0	100.0
	Total	134	100.0	100.0	

Job place for Healthcare Professionals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	The King Abdullah University Hospital	90	67.2	67.2	67.2
	Jordan Hospital	44	32.8	32.8	100.0
	Total	134	100.0	100.0	

Average using per day of EMRs for Healthcare Professionals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	One to less than 4 hours	95	70.9	70.9	70.9
	4 hours to 10 hours	26	19.4	19.4	90.3
	Over 10 hours	13	9.7	9.7	100.0
	Total	134	100.0	100.0	

Appendix E

Analysis of Multiple Regressions

KMO and Bartlett's Test

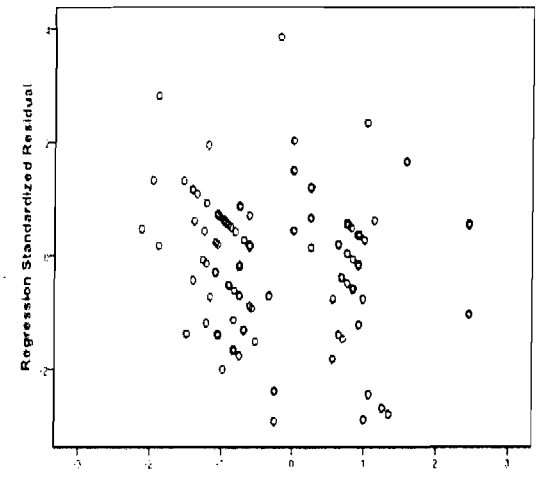
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.862
Bartlett's Test of Sphericity	Approx. Chi-Square	2941.582
	df	55
	Sig.	.000

	Factor Loading	Anti-Image
Usefulness		
1. Using EMR system in my job would enable me to accomplish tasks more quickly.	.972	.776
2. Using EMR system would enhance my effectiveness of my job.	.968	.732
3. Using EMR system would make it easier to do my job.	.943	.886
4. I would find EMR system useful in my job.	.766	.943
Ease of Use		
1.I would find it easy to get EMR system to do what I want it to do.	.570	.733
2. My interaction with EMR system would be clear and understandable.	.549	.684
3. I would find EMR system to be flexible to interact with.	.612	.839
4. I would find EMR system easy to use.	.681	.804
Organizational Leadership		
1. Top management provided funding and other resources for infrastructure.	.968	.677
2. The EMR system project is important to top management.	.925	.881
3. Top management provides the training that is needed in order to use the EMR effectively.	.951	.660
4. Management expects me to use the EMR system.	.800	.930
Users Involvement		

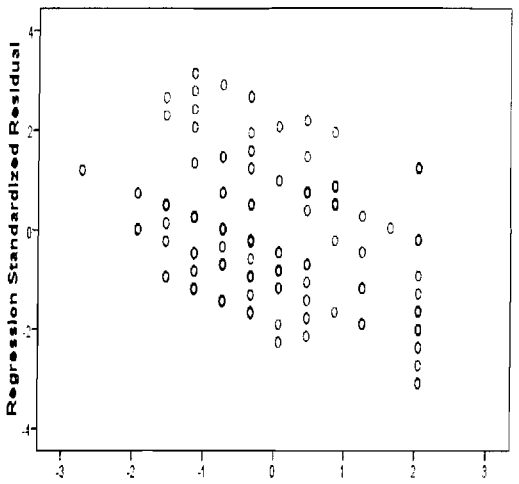
1. My involvement during the EMR system implementation phase is a must.	.906	.822
2. My involvement during the EMR system implementation phase makes the EMR system more useful to me.	.961	.654
3. My involvement during the EMR system implementation phase makes the EMR system easier to be used.	.974	.607
Training		
1. The training I receive on the EMR system will be adequate for me to perform my tasks.	.833	.568
2. The EMR system training makes it easier for me to use this technology.	.774	.571
3. The training provided was comprehensive.	.535	.775
Cost		
1. I consider EMR system to be useful in my field but think that the costs for a full implementation may be too expensive.	.807	.810
2. I think that EMR systems are a useless expenditure of money and that any benefits that they may have are outweighed by their high costs.	.873	.748
3. EMR system high cost of investment is justified as it enhances the operations and increases the quality of work.	.942	.665
Users -Patient Relationship		
1. Using the EMR system threatens the healthcare professional's credibility with his/her patients.	.972	.605
2. Using the EMR system reduces the patient's satisfaction with the quality of healthcare he/she receives.	.959	.576
3. Overall, using the EMR system is interfering with the effectiveness of the user-patient interaction.	.798	.748
Users Autonomy		
1.Using the EMR system may limit the healthcare professional autonomy in making clinical decisions or judgments.	.920	.680
2.Overall, the healthcare professional attitude about using the EMR system may be negatively affected as a result of the increased control and monitoring of his/her clinical practices and decision-making.	.890	.823
3. Overall, the healthcare professional attitude about using the EMR system may be negatively affected as a result of the security, legal and/or ethical concerns associated with using the EMR system.	.904	.720
Resistance to New Technology		
1. I like to adopt new and emerging technologies as long as they are proven to provide an increase in quality and efficiency.	.970	.920
2. I consider technophobia (fear of using technology) to be a problem in implementing EMR system among healthcare professional.	.710	.590

3.The emergence of new techniques for electronic medical file system needs time and training to learn.	.767	.600
Attitude Towards Using		
1. Using EMR system is a good idea.	.698	.627
2. I like the idea of using EMR system.	.831	.584
3. Using EMR system would be pleasant.	.831	.619
Behavioral Intention to Use		
1. I intend to use EMR system every day.	.538	.751
2. Using the EMR system for handling my work transactions is something I would do.	.792	.643
3. I would see myself using the EMR system for handling my work transactions.	.901	.597

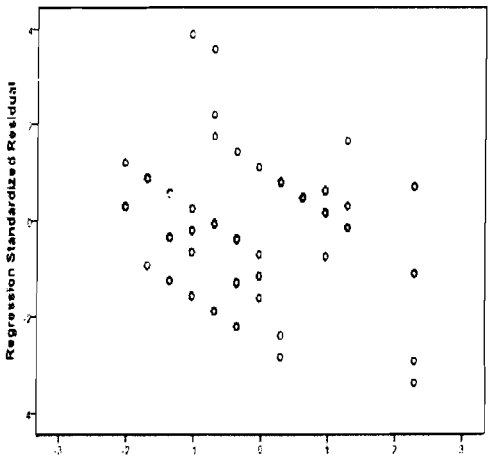
	Rotated Component Matrix[a]										
	Component										
	1	2	3	4	5	6	7	8	9	10	11
PU 1	.972										
PU 4	.968										
PU 5	.943										
PU 6	.766										
PEOU 2		.570									
PEOU 3		.549									
PEOU 4		.612									
PEOU 6		.681									
OL 1			.968								
OL 3			.925								
OL 5			.951								
OL 7			.800								
UI 1				.906							
UI 3				.961							
UI 4				.974							
TR 1					.833						
TR 2					.774						
TR 4					.535						
CO 1						.807					
CO 2						.873					
CO 5						.942					
UPR 2							.972				
UPR 3							.959				
UPR 4							.798				
RNT 1								.970			
RNT 3								.710			
RNT 4								.767			
UA 3									.920		
UA 5									.890		
UA 6									.904		
ATU 1										.698	
ATU 2										.831	
ATU 4										.831	
BI 2											.538
BI 3											.792
BI 4											.901



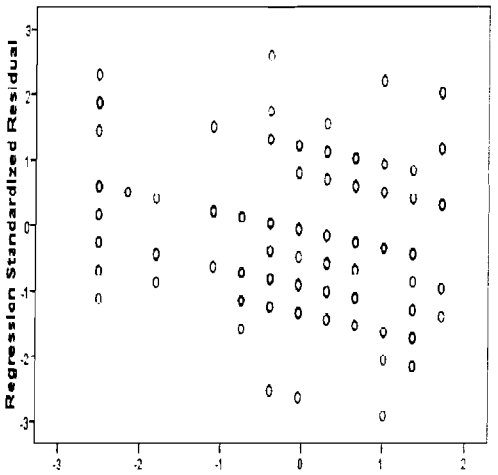
OL, UI, TR, CO and RNT with PEOU



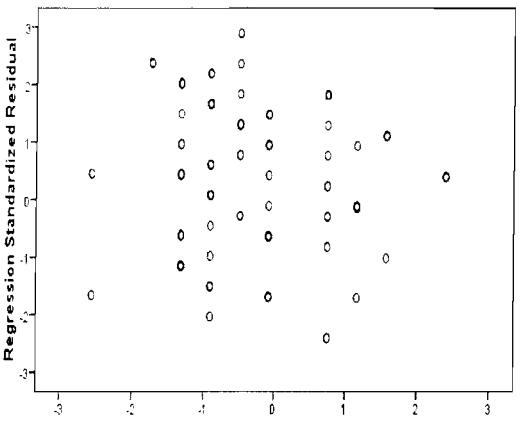
UPR and UA with PU



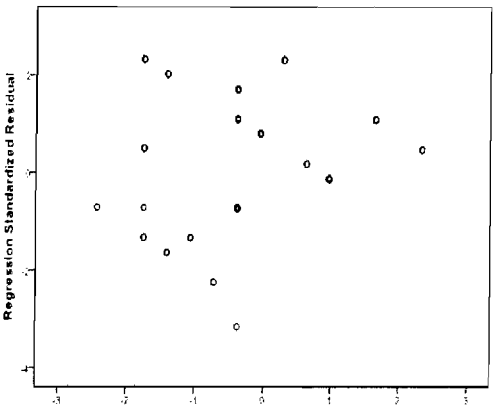
PEOU with PU



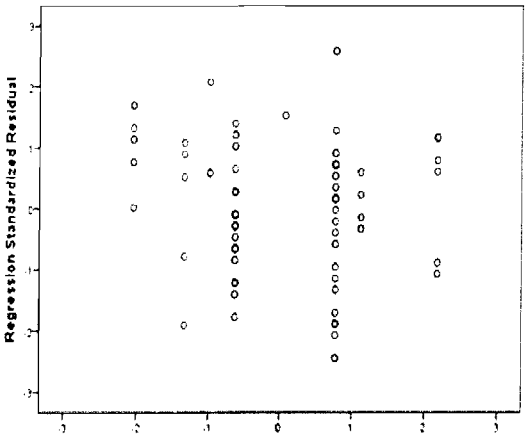
PEOU and PU with ATU



ATU with BI



OF with PU



ICF with PEOU

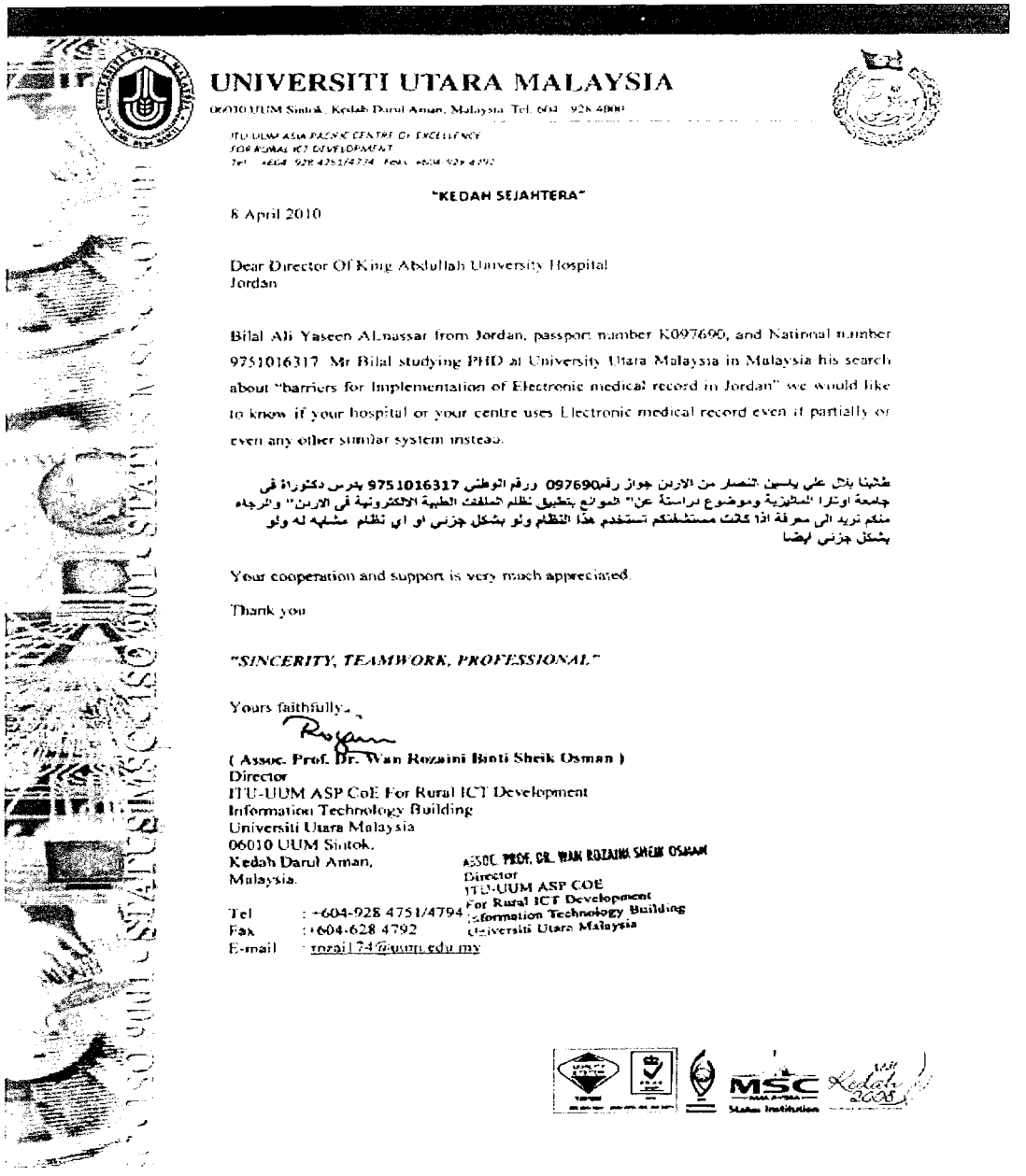
Appendix F

Results on Open –Ended Questions – Content Analysis

Identified Problems	King Abdullah University Hospital (KAUH) and Jordan Hospital (JH)	
Organizational Factors	**Frequency**	**Percentage out of 94 Respondents**
Training : 1. Inadequate training.	16	17%
Organizational Leadership: 1. Lack support from the organizational leadership.	42	45%
Cost : 1. Lack of financials support (limited options of EMRs). 2. High costs of EMRs to learn and installation.	31	33%
Users involvement : 1. Poor and low communications between organizational leadership and healthcare professionals with regards to software of EMRs.	5	5%
Total	94	100%

Appendix G

Letters of Universiti Utara Malaysia



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ITU-UUM ASIA PACIFIC CENTRE OF EXCELLENCY
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Tel : +6604 928 4751/4794 Fax: +6604 928 4792

"KEDAH SEJAHTERA"

8 April 2010

Dear Director Of King Abdullah University Hospital
Jordan

Bilal Ali Yaseen ALnassar from Jordan, passport number K097690, and National number 9751016317 Mr Bilal studying PHD at University Utara Malaysia in Malaysia his search about "barriers for Implementation of Electronic medical record in Jordan" we would like to know if your hospital or your centre uses Electronic medical record even if partially or even any other similar system instead.

عثمنا بلال علي ياسين النصار من الاردن جواز رقم097690 ورقم الوطني 9751016317 يدرس دكتوراة في جامعة اوتارا الماليزية وموضوع دراستة عن" الموانع بتطبيق نظام السلفت الطبية الالكترونية في الاردن" والرجاء منكم تريد الى معرفة اذا كانت مستشفاكم تستخدم هذا النظام ولو بشكل جزئي او اي نظام مشابه له ولو بشكل جزئي ايضا

Your cooperation and support is very much appreciated.

Thank you

"SINCERITY, TEAMWORK, PROFESSIONAL"

Yours faithfully,

(Assoc. Prof. Dr. Wan Rozaini Binti Sheik Osman)
Director
ITU-UUM ASP CoE For Rural ICT Development
Information Technology Building
Universiti Utara Malaysia
06010 UUM Sintok,
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ASSOC. PROF. DR. WAN ROZAINI SHEIK OSMAN
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Information Technology Building
Universiti Utara Malaysia

UNIVERSITI UTARA MALAYSIA

06010 UUM Sintok, Kedah Darul Aman, Malaysia. Tel: 604 - 928 4000

25 July 2010

Director
Jordan Hospital

Amman, Jordan

Dear Sir

PERMISSION TO COLLECT DATA

This is to confirm that Mr Bilal Ali Yaseen ALnassar, Matric Number 91457, passport number K097690, and National number 9751016317, is a PhD student in University Utara Malaysia. He is currently doing a research in "Factors Affecting the Implementation of Electronic Medical Record in Jordan Hospitals". Mr Bilal will be expected to do his field work as part of the fulfilment of his study.

We would appreciate it if you could provide him the information needed about the Electronic Medical Record system that you are using in your hospital. The data collected will be treated confidentially and be used only for academic purposes.

Thank you for your cooperation.

بلال علي ياسين النصار من الاردن جواز رقم097690 ورقم الوطني 9751016317 يدرس دكتوراة فى جامعة اوتارا الماليزية وموضوع دراسة عن" العوامل التي تؤثر بتطبيق نظام الملفات الطبية الالكترونية فى المستشفيات الاردن" والرجاء من حضرتكم تزويدنا ببعض المعلومات عن نظام الملفات الطبي المستخدم في مستشفاكم .

شاكرين حسن تعاونكم

Sincerely

(Prof. Madya Dr Wan Rozaini Bt Sheik Osman)
Director
ITU-UUM ASP CoE For Rural ICT Development
Bangunan Teknologi Maklumat
Universiti Utara Malaysia
06010 UUM Sintok, Kedah Darulaman
Malaysia
Office Fax: 04-9284753
Office Tel: 04-928 4794
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ASSOC. PROF. DR. WAN ROZAINI SHEIK OSMAN
Director
ITU-UUM ASP COE
For Rural ICT Development
Information Technology Building
Universiti Utara Malaysia

QUALITY SYSTEM SIRIM

MSC MALAYSIA Status Institution

UUM
Universiti Utara Malaysia 06010 UUM Sintok, Kedah Darul Aman, Malaysia. Tel: 604 - 928 4000

14 December 2011

Prof. Abdullah Malkawi

King Abdullah University Hospital

Jordan-Irbid

Dear Prof. Abdullah Malkawi

Referring to your letter dated 7 June 2009 concerning Implementation of Electronic Medical System (EMRs) in your hospital.

I like to confirm that King Abdullah University Hospital has been selected for the study. I would appreciate if you allow me to collect the data. The data collection would be used only for academic propose.

Thank you for your kind cooperation

Assoc. Professor Dr.Wan Rozaini Sheik Osman
Asia Pacific Center of Excellence for Rural ICT Development
Universiti Utara Malaysia
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MSC MALAYSIA Status Institution

UUM
Universiti Utara Malaysia (P.O. Box 10, UUM Sintok, Kedah Darul Aman, Malaysia. Tel: 604 - 92 8 4000)

14 December 2011

Dr. Adel Jamil

Jordan Hospital

Jordan- Amman

Dear Dr. Adel Jamil

I refer to your letter dated 28 March 2011 concerning Implementation of Electronic Medical System (EMRs) in your hospital.

I like to confirm that Jordan Hospital has been selected for the study. I would appreciate if you allow me to collect the data. The data collection would be used only for academic propose.

Thank you for your kind cooperation

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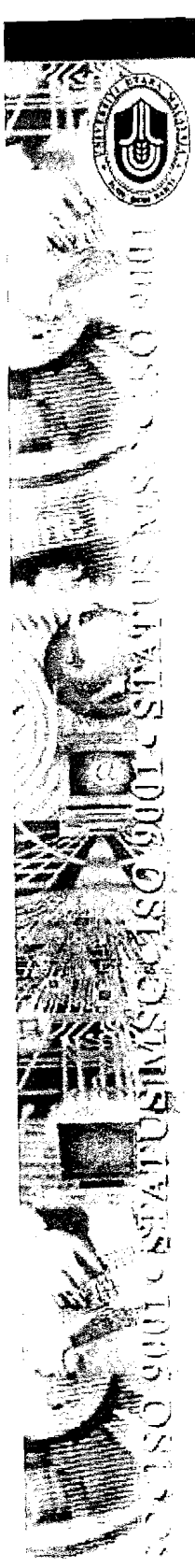
MSC MALAYSIA Status Institution



UNIVERSITI UTARA MALAYSIA

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ITU-UUM ASIA PACIFIC CENTRE OF EXCELLENCE
FOR RURAL ICT DEVELOPMENT
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"KEDAH SEJAHTERA"

8 April 2010

Dear Director of Jordanian Royal Medical Services
Amman

Bilal Ali Yaseen ALnassar from Jordan, passport number K097690, and National number 9751016317. Mr Bilal studying PHD at University Utara Malaysia in Malaysia his search about "barriers for Implementation of Electronic medical record in Jordan" we would like to know if your hospital or your centre uses Electronic medical record even if partially or even any other similar system instead

طلبنا بلال علي ياسين النصار من الاردن جواز رقم097690 ورقم الوطني 9751016317 يدرس بكتوراة في جامعة اوتارا الماليزية وموضوع دراسته عن" الموانع بتطبيق نظام الملفات الطبية الالكترونية في الاردن" و نرجاء منكم نريد الي معرفة اذا كانت مستشفتكم تستخدم هذا النظام ولو بشكل جزئي او اي نظام مشابه له ولو بشكل جزئي ايضا

Your cooperation and support is very much appreciated.

Thank you

"SINCERITY, TEAMWORK, PROFESSIONAL"

Yours faithfully,

(Assoc. Prof. Dr. Wan Rozaini Binti Sheik Osman)
Director
ITU-UUM ASP CoE For Rural ICT Development
Information Technology Building
Universiti Utara Malaysia
06010 UUM Sintok,
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"KEDAH SEJAHTERA"

8 April 2010

Dear Dr Fawzi Hammouri
President
Board of Directors of Private Hospitals in Jordan
Amman
Kingdom of Jordan

Bilal Ali Yaseen ALnassar from Jordan, passport number K097690, and National number 9751016317, Mr Bilal studying PHD at University Utara Malaysia in Malaysia his search about "barriers for Implementation of Electronic medical record in Jordan" we would like to know if your hospital or your centre uses Electronic medical record even if partially or even any other similar system instead.

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Your cooperation and support is very much appreciated.

Thank you.

"SINCERITY, TEAMWORK, PROFESSIONAL."

Yours faithfully,

(Assoc. Prof. Dr. Wan Rozaini Binti Sheik Osman)
Director
ITU-UUM ASP CoE For Rural ICT Development
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FOR RURAL ICT DEVELOPMENT
Tel: +604-928 4751/4794 Fax: +604-928 4792

"KEDAH SEJAHTERA"

8 April 2010

Dear Director of King Hussein Cancer Centre
Jordan-Amman

Bilal Ali Yaseen ALnassar from Jordan, passport number K097690, and National number 9751016317. Mr Bilal studying PHD at University Utara Malaysia in Malaysia his search about "barriers for Implementation of Electronic medical record in Jordan" we would like to know if your hospital or your centre uses Electronic medical record even if partially or even any other similar system instead.

طالبنا بلال علي ياسين النصر من الاردن جواز رقم097690 ورقم الوطني 9751016317 يدرس دكتوراة في جامعة اوتارا الماليزية وموضوع دراستة عن" الموانع بتطبيق نظام الملفات الطبية الالكترونية في الاردن" والرجاء منكم نريد الى معرفة اذا كانت مستشفتكم تستخدم هذا النظام ولو بشكل جزئي او اي نظام مشابه له ولو بشكل جزئي ايضا

Your cooperation and support is very much appreciated.

Thank you.

"SINCERITY, TEAMWORK, PROFESSIONAL"

Yours faithfully,

Rozaini

(Assoc. Prof. Dr. Wan Rozaini Binti Sheik Osman)
Director
ITU-UUM ASP CoE For Rural ICT Development
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ASSOC. PROF. DR. WAN ROZAINI SHEIK OSMAN
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For Rural ICT Development
Information Technology Building
Universiti Utara Malaysia

MSC Status Institution

Kedah 2005

Appendix H

Letter of Statistics Analysis

UUM
Universiti Utara Malaysia

Pusat Pengajian Sains Kuantitatif
College of Arts and Sciences
Universiti Utara Malaysia
06010 UUM Sintok
Kedah Darul Aman, Malaysia
Tel: (604) 928 6901/6904/6909/6915
Faks: (604) 928 6906
http://www.cas.uum.edu.my

Pusat Pengajian Sains Kuantitatif (SQS)

"KEDAH SEJAHTERA"

UUM/CAS(SQS/P-27

1 Julai 2012

Prof. Madya Dr. Wan Rozaini Bt Sheik Osman
Pengarah
ITU-UUM CoE For Rural ICT Development

Melalui:

Prof. Madya Dr. BidinYatim
Head
SQS Statistical Consulting

DR. SUZILAH BINTI ISMAIL
Head of Department
Mathematics & Statistics
School of Quantitative Sciences
UUM College of Arts and Sciences
Universiti Utara Malaysia

Yang Berusaha Dr.

PENGESAHAN PERKHIDMATAN PERUNDINGAN BERSTATISTIK

Adalah dimaklumkan pelajar berikut:

Nama : Bilal Ali Yaseen Alnassar
Tajuk Tesis : Factors affecting the implementation of electronic medical records system inJordanian Hospitals.

telah mendapat perkhidmatan perundingan berstatistik sebanyak 3 kali daripada saya bagi penambahbaikan bab hasil kajian beliau.

Sekian, harap maklum.

"ILMU, BUDI, BAKTI"

Saya yang menjalankan tugas

(PROF. MADYA DR. SHARIPAH SOAAD SYED YAHAYA)
Consultant
SQS Statistical Consulting