

**IMPACT OF SYSTEM CHARACTERISTICS ON
THE USAGE OF ELECTRONIC HEALTHCARE
RECORDS AMONG JORDANIAN HEALTHCARE
PROFESSIONALS PERFORMANCE**

ALL'A MOHAMAD ABDELHAMID ALMOMANI

UNIVERSITI SAINS MALAYSIA

2024

**IMPACT OF SYSTEM CHARACTERISTICS ON
THE USAGE OF ELECTRONIC HEALTHCARE
RECORDS AMONG JORDANIAN HEALTHCARE
PROFESSIONALS PERFORMANCE**

by

ALL'A MOHAMAD ABDELHAMID ALMOMANI

**Thesis submitted in fulfilment of the requirements
for the degree of
Doctor of Philosophy**

January 2024

ACKNOWLEDGEMENT

قَالَ رَسُولُ اللَّهِ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ: (إِنَّ الْمَلَائِكَةَ لَتَضَعُ أَجْنِحَتَهَا لِطَالِبِ الْعِلْمِ رِضًا بِمَا يَصْنَعُ)

I would like to express my gratitude, first and foremost, to God, who enabled me to successfully complete my study and research. The word 'thank' is not sufficient to express my gratitude to God, the Almighty, the most gracious and merciful, for blessing, guiding, and strengthening me at every moment of my life. Through the grace of God, I have been able to turn my work on this thesis into an opportunity to serve students. During my work on it, I discovered happiness and passion in serving by providing insights that I hope have contributed, even if only in a small way, to helping them achieve their goals.

I am grateful to my main supervisor, Professor Dr. Ramayh Thurasamy, whose insightful comments widened my perspective and whose unfailing support assured me of my abilities. It was a great opportunity to work under his intellectual and valuable supervision.

Thanks are not enough to be given to my mother, Layali. My great-mother successfully educated me and sacrificed her life and happiness for my own, all in pursuit of my happiness and the realisation of my dream. I acknowledge her sincere efforts and patience invested in helping me finish my studies and become who I am now. I would also like to express my deep sentiments to my dear father, Mohammad, who patiently and lovingly sat beside me. Last but not least, special appreciation and heartfelt thanks to my loving brother, Yaarob, for his sincere help, support, encouragement, love, happiness, and inspiration throughout my research work and for uplifting me during this phase of life.

TABLE OF CONTENTS

ACKNOWLEDGEMENT.....	ii
TABLE OF CONTENTS.....	iii
LIST OF TABLES	ix
LIST OF FIGURES	xi
LIST OF ABBREVIATIONS	xii
LIST OF APPENDICES	xvi
ABSTRAK	xvii
ABSTRACT	xix
CHAPTER 1	1
INTRODUCTION.....	1
1.1 Background of the Study.....	1
1.2 Research Context	3
1.2.1 Overview of Jordan.....	3
1.2.2 ICT in Jordan	4
1.2.3 An Overview of the Healthcare Sector in Jordan.....	6
1.2.4 EHR in Jordan	8
1.2.5 EHR Implementation Globally	8
1.3 Problem Statement	10
1.4 Research Questions	12
1.5 Research Objectives	13
1.6 Research Scope	14
1.7 Significance of the Study	15
1.7.1 Theoretical Contributions	15
1.7.2 Practical Contribution	17
1.8 Definitions of Key Terms.....	18

1.9	Organisation of Chapters	20
CHAPTER 2 LITERATURE REVIEW		22
2.1	Introduction	22
2.2	Overview of EHR.....	22
2.2.1	The Evolution of Health Records.....	22
2.2.2	EHR Definitions.....	23
2.2.3	Benefits of EHR to Healthcare Delivery.....	24
2.2.4	Barriers of EHR	25
2.3	A Review of Technology Acceptance Theories at the Individual Level.....	26
2.3.1	Technology Acceptance Model (TAM).....	26
2.3.2	UTAUT (Unified Theory of Acceptance and Use of Technology).....	41
2.4	A Review of Technology Success Theories.....	53
2.4.1	DeLone and Mclean Information System Success Model (DMISM).....	54
2.4.2	Task-Technology Fit (TTF)	63
2.5	Gaps of Research	67
2.5.1	Theoretical Gaps	67
2.5.2	Knowledge Gaps	70
2.5.3	Traits of Jordanian People.....	75
2.6	Identifying Variables of Study	76
2.7	Theoretical Gaps and the Proposed Model for Closing the Gaps	93
2.8	Coverage of Identified Characteristics in Previous Studies	94
2.9	Research Model Development	96
2.10	Healthcare Professionals’ Performance and Hypotheses Development	100
2.10.1	Background of Healthcare Professionals’ Performance	100
2.10.2	Importance of Healthcare Professionals’ Performance.....	102
2.10.3	Healthcare Professionals’ Performance in Healthcare Context ...	103

2.10.4	The Relationship between Emotional Trust and Actual Usage ...	103
2.10.5	The Relationship between Perceived Behavioural Control and Actual Usage	106
2.10.6	The Relationship between Social Factors and Actual Usage.....	107
2.10.7	The Relationship between Perceived Usefulness and Emotional Trust	109
2.10.8	The Relationship between Perceived Ease of Use and Emotional Trust	111
2.10.9	The Relationship between Facilitating Conditions and Emotional Trust	114
2.10.10	The Relationship between Data Confidentiality, Integrity, Availability and Emotional Trust.....	115
2.10.11	The Relationship between Actual Usage and Healthcare Professional's Performance	118
2.10.12	Emotional Trust (Mediator)	119
2.11	Conceptual Framework	121
CHAPTER 3 RESEARCH METHODOLOGY		124
3.1	Introduction	124
3.2	Research Design.....	124
3.3	Research Approach	125
3.4	Research Philosophy	126
3.5	Research Methodology	128
3.6	Data Collection Method	129
3.7	Population of the Study	131
3.8	Sampling Unit	132
3.9	Sampling Frame	132
3.10	Sampling Method and Sample Size	133
3.11	Questionnaire Design.....	136
3.12	Operationalisation of Constructs.....	137
3.13	Construct Measurement	138

3.13.1	Emotional Trust.....	138
3.13.2	Perceived Behavioural Control	139
3.13.3	Social Factors.....	140
3.13.4	Perceived Usefulness	141
3.13.5	Perceived Ease of Use.....	142
3.13.6	Facilitating Conditions.....	142
3.13.7	Data Confidentiality	143
3.13.8	Data Integrity	144
3.13.9	Data Availability	145
3.13.10	Actual Usage	146
3.13.11	Healthcare Professionals' Performance	146
3.14	Common Method Bias	147
3.14.1	Survey Design.....	148
3.14.2	Temporal Separation.....	149
3.14.3	Harman's Single Factor Test.....	150
3.14.4	Marker Variable	151
3.15	Questionnaire Translation	152
3.16	Pre-Testing: Procedure and Results	153
3.17	Data Collection	158
3.18	Preparing Data for Analysis	162
3.18.1	Measurement Items and Coding	163
3.18.2	Data Screening and Cleaning.....	163
3.18.3	Errors.....	163
3.18.4	Missing Data	164
3.18.5	Outliers.....	164
3.18.6	Data Normality.....	164
3.19	Descriptive Statistics.....	165

3.20	Assessing Data Using PLS Path Model	166
3.20.1	Assessment of Measurement Model	167
3.20.2	Assessment of Structural Model	169
3.21	Summary	172
CHAPTER 4 DATA ANALYSIS AND RESULTS.....		173
4.1	Introduction	173
4.2	Data Screening	173
4.2.1	Testing for Errors	174
4.2.2	Identifying Missing Data	175
4.2.3	Identifying Outliers	175
4.2.4	Testing for Data Normality	175
4.3	Common Method Bias	176
4.4	Descriptive Statistics	177
4.4.1	Response Rate	177
4.4.2	Demographic Profile	178
4.4.3	Mean Scores, Standard Deviation Scores and Orders.....	179
4.5	Data Analysis	183
4.5.1	Measurement Model Assessment.....	184
4.5.2	Structural Model Assessment.....	186
4.6	Summary of Findings.....	197
CHAPTER 5 DISCUSSION AND CONCLUSION		199
5.1	Introduction	199
5.2	Summary of Main Findings	199
5.3	Discussion of Findings.....	203
5.3.1	The Relationship between Emotional Trust and the Actual Usage of EHR	203
5.3.2	The Relationship between Perceived Behavioural Control and Actual Usage	204

5.3.3	The Relationship between Social Factors and the Actual Usage of EHR.....	206
5.3.4	The Relationship between the Technological Characteristics and the Emotional Trust.....	207
5.3.5	The Relationship between Organisational Characteristics and Emotional Trust.....	211
5.3.6	The Mediating Role of Emotional Trust between the Technological Characteristics and Actual Usage	213
5.3.7	The Mediating Role of Emotional Trust between the Organisational Characteristics and Actual Usage	214
5.3.8	The Relationship Between the Actual Usage and the Performance of Healthcare Professionals.....	217
5.4	Theoretical Contribution	218
5.5	Practical Implications.....	220
5.6	Limitations and Future Directions of the Study	224
5.7	Conclusion	226
REFERENCES.....		228
APPENDICES		
LIST OF PUBLICATIONS		

LIST OF TABLES

	Page
Table 2.1 Construct Descriptions (TAM2)	29
Table 2.2 Construct Descriptions (TAM-3)	29
Table 2.3 Summary of Previous Studies of EHR Technology	32
Table 2.4 Summary of UTAUT Component Theories.....	42
Table 2.5 UTAUT Constructs and Definitions	43
Table 2.6 Summary of Previous Studies of EHR Technology	46
Table 2.7 Constructs Descriptions of DMISM Model	55
Table 2.8 Constructs Descriptions	56
Table 2.9 Summary of Previous Studies of EHR Technology	57
Table 2.10 Constructs Descriptions of TTF Theory	64
Table 2.11 Summary of Previous Studies of EHR Technology	65
Table 2.12 Theoretical Gaps	93
Table 2.13 Coverage of Variables from Previous Studies	94
Table 3.1 Comparison of Inductive Reasoning and Deductive Reasoning.....	125
Table 3.2 Strata for the Sampling.....	135
Table 3.3 Emotional Trust Measurement Items	139
Table 3.4 Perceived Behavioural Control Measurement Items.....	140
Table 3.5 Social Factors Measurement Items	140
Table 3.6 Perceived Usefulness Measurement Items.....	141
Table 3.7 Perceived Ease of Use Measurement Items	142
Table 3.8 Facilitating Conditions Measurement Items	143
Table 3.9 Data Confidentiality Measurement Items	144
Table 3.10 Data Integrity Measurement Items.....	144
Table 3.11 Data Availability Measurement Items	145

Table 3.12	Actual Usage Measurement Items.....	146
Table 3.13	Healthcare Professionals' Performance Measurement Items.....	147
Table 3.14	Ex-ante and ex-post Controls	148
Table 3.15	Social Desirability Measurement Items	151
Table 3.16	Experts Panel Feedback Group 1	156
Table 3.17	Experts Panel Feedback Group 2	157
Table 3.18	Experts Panel Feedback Group 3	158
Table 3.19	Number of Samples in Each Region	161
Table 4.1	Mardia's Multivariate Skewness and Kurtosis	177
Table 4.2	Influence of MV on Constructs (Std Beta, Std Error, t-value, p-value).....	176
Table 4.3	Std Beta, Std Error, t-value, p-value of Constructs without MV	177
Table 4.4	Response Rate of Data Collection.....	178
Table 4.5	Respondent's Demographic Information	179
Table 4.6	Level Table of Value and Ranges	180
Table 4.7	Overall Mean and Standard Deviation of the Study's Variables	181
Table 4.8	Mean and Standard Deviation of the Study's Variables	183
Table 4.9	Loadings, Cronbach's alpha (α), Internal Consistency, CR, and AVE.....	185
Table 4.10	Results of Discriminant Validity by HTMT	189
Table 4.11	Structural Path Analysis Result.....	189
Table 4.12	Path Coefficients and Hypotheses Testing of the Mediating Relationships	194
Table 4.13	Coefficient of Determination Result R^2	195
Table 4.14	PLS predict Assessment.....	195
Table 4.15	Variance Inflation Factor (VIF)	196
Table 4.16	Summary of Hypotheses' Results	197

LIST OF FIGURES

	Page
Figure 1.1 Jordan Global Ranking.....	5
Figure 1.2 Ranking of Arab Countries	5
Figure 1.3 Jordan's Expenditures Relative to GDP	7
Figure 2.1 Basic Concept Underlying User Acceptance Models	27
Figure 2.2 Original Technology Acceptance Model (TAM).....	27
Figure 2.3 Proposed TAM2-Extension of the Technology Acceptance Model	28
Figure 2.4 Technology Acceptance Model 3 (TAM)	30
Figure 2.5 Integrated Technology Acceptance Model 3 (TAM3).....	31
Figure 2.6 UTAUT Model.....	44
Figure 2.7 UTAUT 2 Model.....	46
Figure 2.8 Information System Success Model.....	55
Figure 2.9 Updated Information System Success Model	56
Figure 2.10 Task-Technology Fit Model.....	64
Figure 2.11 Hofstede's Jordanian Traits.....	76
Figure 2.12 Theory of Planned Behaviour	97
Figure 2.13 The Conceptual Framework.....	123
Figure 3.1 The Flow of Research Design	130
Figure 3.2 Sample size calculation G-power.....	136
Figure 3.3 Direct and Indirect Effects Between Two Variables.....	171
Figure 4.1 PLS Algorithm Results	190

LIST OF ABBREVIATIONS

AD	Administration
ANX	Computer Anxiety
ASI	Access to Shared Information
AU	Actual Usage
AVA	Availability
AVE	Average Variance Extracted
BI	Behavioural Intention
CBHA	Cloud Based Health Awareness
CDSS	Computerised Decision Support Systems
CEXP	Computer Experience
CI	Confidence Interval
CIA	Confidentiality, Integrity, Availability
CIN	Continuance Intention
CMB	Common Method Bias
CMS	Center for Medicare and Medicaid Services
CMV	Common Method Variance
CNF	Confidentiality
COMS	Computer Skills
CPLY	Computer Playfulness
CPOE	Computerized Physician Order Entry
CPROE	Computerised Provider Order Entry
CQ	Communication Quality
CR	Composite Reliability
CSE	Computer Self-Efficacy
C-TAM/TPB	A combined Technology Acceptance Model and Theory of Planned Behaviour
CulOrin	Cultural Orientation
DMISM	DeLone & Mclean Information System Success Model
DocPat	Doctor-Patient Relationship
DP	Data Privacy
DQ	Data Quality
DS	Data Security
EE	Effort Expectancy
E-health	Electronic Health
EHR	Electronic Health Record
EHS	Electronic Health Solutions
EMOT	Emotional Trust
EMRs	Electronic Medical Reports
ERP	Enterprise Resource Planning
F2	Effect Size
FC	Facilitating Conditions
GD	General Data
GDP	Gross Domestic Product
HAB	Habit
H	Hypothesis
HDE	Humanitarian Data Exchange

HER	Electronic Health Records
HM	Hedonic Motivation
HTMT	HeteroTrait- MonoTrait
IBM-SPSS	Statistical Analysis of Social Science
IC	Information about Change
ICT	Information and Communication Technology
ICU	Intensive Care Unit
IDT	Innovation Diffusion Theory
IE	Information Exchange
II	Individual Impact
IMG	Image
INC	Internal Consistency
IND	Individual
INFI	Information Integrity
INFS	Information Sharing
INTG	Data Integrity
IP	Individual Performance
IQ	Information Quality
IS	Information Systems
ISSM	Information System Success Model
IT	Information Technology
ITE	Staff IT Experience
JDS	Department of Statistics
JR	Job Relevance
KMS	Knowledge Management Systems
LL	Lower Level
LM	Linear Model
MAE	Mean Absolute Error
MIS	Management Information Systems
MM	Motivational Model
MoDEE	Ministry of Digital Economy and Entrepreneurship
MoH	Ministry of Health
MPCU	Model of Personal Computer Utilisation
MRs	Medical Records
MV	Marker-Variable Technique
NB	Net Benefits
OI	Organisational Impact
OQ	Output Quality
ORG	Organisational
ORS	Organisational Support
OU	Objective Usability
Ownship	Ownership Type
PACS	Picture Archiving and Communications System
PatCar	Patient Care
PBC	Perceived Behavioral Control
PC	Privacy Concerns
PE	Performance Expectancy
PEC	Perceived External Control
PENJ	Perceived Enjoyment
PEOU	Perceived Ease of Use

PHAJ	Private Hospitals Association Jordan
PI	Performance Impact
PINV	Personal Innovativeness
PIT	Perceived Institutional Trust
PIT	Personal Identity
PLPR	Perceived Legal and Privacy Risk
PLS-SEM	Partial Least Squares Structural Equation Modeling
PN	Professional Norm
POR	Perceived Overall Risk
PR	Perceived Risk
PSC	Perceived Security Concern
PTH	Perceived Threat
PU	Perceived Usefulness
PV	Price Value
Q ² predict	Predictive Model Assessment
R ²	Coefficient of Determination
RCH	Resistance to Change
RD	Result Demonstrability
RMS	Royal Medical Services
SAT	Satisfaction
SCT	Social Cognitive Theory
SDG	Sustainable Development Goals
SEC	Security
SEM-VB	Structural Equation Modeling—Variance Based
SEXP	HIS Experience
SF	Social Factors
SI	Social Influence
SN	Subjective Norm
SQ	System Quality
SupQul	Support Quality
SYS	System
TAM	Technology Acceptance Model
TI	Technical Infrastructure
TMS	Top Management Support
TPB	Theory of Planned Behaviour
TPS	Technical Performance Satisfaction
TR	Trust
TRA	Theory of Reasoned Action
TRN	Training
TTF	Task-Technology Fit
UB	Use Behaviours
UC	Use of Computers
UL	Upper Level
UP	User Productivity
UPR	User Performance
UR	User Resistance Behaviour
USE	Intention to use/Use
UsrBack	User Background
UTAUT	Unified Theory of Acceptance and Use of Technology
VIF	Variance Inflation Factor

VLN
 β

Voluntariness
Path Coefficient

LIST OF APPENDICES

APPENDIX A	QUESTIONNAIRE
APPENDIX B	EXAMPLE OF A LIST PREPARED DURING COLLECTING QUESTIONNAIRES
APPENDIX C	SPSS RESULTS OF DATA OUTLIERS DETECTION
APPENDIX D	SPSS RESULTS OF DATA NORMALITY
APPENDIX E	SPSS RESULTS OF THE CMB – TOTAL VARIANCE EXPLAINED
APPENDIX F	PLS PREDICTION RESIDUALS
APPENDIX G	LIST OF SAMPLE NAMES

**KESAN CIRI-CIRI SISTEM TERHADAP PENGGUNAAN REKOD
PENJAGAAN KESIHATAN ELEKTRONIK DALAM KALANGAN
PRESTASI PROFESIONAL PENJAGAAN KESIHATAN DI JORDAN**

ABSTRAK

Banyak laporan menyoroti penggunaan teknologi yang terbelakang di Jordan dibandingkan dengan negara-negara Arab lainnya dan rata-rata global, dengan kesenjangan penelitian yang signifikan dalam pemahaman penggunaan catatan kesehatan elektronik di kalangan profesional kesehatan, yang menuntut penyelidikan terhadap faktor-faktor yang memengaruhi penggunaannya, terutama di sektor publik Jordan. Penelitian ini memperluas teori perilaku terencana dengan menggabungkan faktor-faktor kepercayaan kognitif dan emosional, dengan faktor-faktor kognitif yang diidentifikasi adalah persepsi kegunaan, kemudahan penggunaan, kondisi yang memfasilitasi, kerahasiaan data, integritas data, dan ketersediaan data. Selain itu, penelitian ini juga menguji peran kepercayaan emosional sebagai mediator antara faktor-faktor kepercayaan kognitif dan penggunaan sebenarnya dari sistem. Selain itu, penelitian ini memperkenalkan konsep kinerja profesional kesehatan dalam teori perilaku terencana. Penelitian kuantitatif ini menggunakan desain pemisahan temporal potong lintang dengan metode sampel berstrata dan mengincar para profesional kesehatan yang mengandalkan sistem catatan kesehatan elektronik di 33 rumah sakit publik yang berafiliasi dengan Kementerian Kesehatan Jordan. Sebanyak 459 kuesioner dianalisis menggunakan model persamaan struktural PLS. Hasil dari penelitian ini menunjukkan bahwa kepercayaan emosional adalah faktor pengaruh terkuat terhadap penggunaan catatan kesehatan elektronik di Jordan. Faktor-faktor sosial juga memengaruhi penggunaan sistem tersebut, sedangkan kontrol perilaku

yang dirasakan tidak memiliki efek pada penggunaan sistem di kalangan profesional kesehatan Jordan. Selain itu, semua faktor kognitif yang diidentifikasi memiliki pengaruh signifikan terhadap kepercayaan emosional kecuali untuk persepsi kemudahan penggunaan. Selanjutnya, kepercayaan emosional menjadi mediator dalam pengaruh kondisi yang memfasilitasi, integritas data, dan ketersediaan data terhadap penggunaan catatan kesehatan elektronik di kalangan profesional kesehatan Jordan, sedangkan tidak ada efek mediasi pada pengaruh kegunaan yang dirasakan, kemudahan penggunaan yang dirasakan, dan kerahasiaan data terhadap penggunaan catatan kesehatan elektronik. Selain itu, penggunaan sistem memiliki pengaruh signifikan pada kinerja profesional kesehatan di sektor publik Jordan. Penelitian ini memperkenalkan panduan bagi sektor publik di Jordan mengenai kebijakan dan strategi yang ada untuk meningkatkan penggunaan catatan kesehatan elektronik oleh profesional kesehatan di rumah sakit publik. Selain itu, hasil penelitian ini dapat bermanfaat bagi 33 rumah sakit Kementerian Kesehatan, 14 rumah sakit Layanan Medis Kerajaan, dan dua rumah sakit pendidikan di Jordan.

IMPACT OF SYSTEM CHARACTERISTICS ON THE USAGE OF ELECTRONIC HEALTHCARE RECORDS AMONG JORDANIAN HEALTHCARE PROFESSIONALS PERFORMANCE

ABSTRACT

Numerous reports highlight Jordan's lagging technology usage compared to other Arab nations and the global average, with a notable research gap in understanding electronic health records usage among healthcare professionals, necessitating an investigation into the factors affecting their usage, especially in the Jordanian public sector. This study extended the theory of planned behaviour by incorporating cognitive and emotional trust factors, with the identified cognitive factors being perceived usefulness, ease of use, facilitating conditions, data confidentiality, data integrity, and data availability. In addition, current study examined the role of emotional trust as a mediator between the cognitive factors of trust and the actual usage of the system. Furthermore, it introduced the concept of healthcare professionals' performance within the theory of planned behaviour. This quantitative study employed a cross-sectional temporal separation design with the stratified sampling method and targeted healthcare professionals who rely on the electronic health records system in 33 public hospitals affiliated with the Jordanian Ministry of Health. A total of 459 questionnaires were analysed using partial least squares structural equation modelling. The results of this study revealed that emotional trust was the strongest influencer on the use of electronic health records in Jordan. Social factors also influenced the use of the system, while perceived behavioural control had no effect on the usage of the system among Jordanian healthcare professionals. In addition, all identified cognitive factors had significant

influences on emotional trust except for perceived ease of use. Furthermore, emotional trust mediated the influence of facilitating conditions, data integrity, and data availability on the usage of electronic health records among Jordanian healthcare professionals, while there was no mediating effect on the influence of perceived usefulness, perceived ease of use, and data confidentiality on the usage of electronic health records. Moreover, the usage of the system had a significant influence on the performance of healthcare professionals in the Jordanian public sector. This research introduced guidelines for the public sector in Jordan regarding their existing policies and strategies to improve the usage of electronic health records by healthcare professionals in public hospitals. Furthermore, the results of this study could benefit 33 Ministry of Health hospitals, 14 Royal Medical Services hospitals, and two educational hospitals in Jordan.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

In the 21st century, where digital technologies connect everyone, information and communication technology (ICT) plays an imperative role in improving the quality of several aspects of the business world and people's daily lives. As a result, various sectors are attempting to reap the full benefits of ICT by utilising new technologies to innovate existing systems and transform traditional business practices to enhance society's growth, well-being, and economy. The use of technology in the medical industry began over 50 years ago to improve the health quality (Alghamdi, 2015). In recent decades, the medical industry has evolved with the implementation of health information systems that provide comprehensive coverage of medical care in developed countries, such as e-health systems.

Electronic health (E-health) refers to the use of technology to perform a wide range of healthcare functions. Information technology (IT) in healthcare services is used to collect, save, process, send, and retrieve patient information. E-health solutions range from simple applications that manage the history of patients' notes to more extensive electronic health records (EHR) system, which serve as the hub of all E-health solutions. E-health systems encompass a variety of versions, including, but not limited to; Computerised Decision Support Systems (CDSS), Computerised Physician Order Entry (CPOE), Bar-Code, Picture Archiving and Communications System (PACS), Computerised Provider Order Entry (CPOE) and many others (Dahleez et al., 2020; Salahuddin & Ismail, 2015).

The electronic health records system is a digital version of a patient's health record that was previously on paper. EHR systems allow the sharing of data with other healthcare organisations, such as specialists, pharmacies, medical imaging facilities, laboratories, emergency facilities, and clinics. However, the sharing of information with multiple organisations raises security concerns among users of EHR systems. Therefore, the information contained in these records should be kept private and only accessible to authorised individuals (Tanwar et al., 2019).

The success of EHR implementation varies greatly across healthcare industries, especially in developing countries, which face challenges with their healthcare systems due to economic and administrative factors (Alsharo et al., 2020). Such factors include infrastructure quality (Alsharo et al., 2020; Sood et al., 2008) and resistance to using the technology (Alsharo et al., 2020; Ahlan & Ahmad, 2014). Like other E-health systems in developing countries, Jordan's EHR systems faces several challenges, including quality of services, keeping pace with medical technology (Al-Tarawneh, 2019), and low IT usage rate in hospitals (Global Innovation Index, 2022; Network Readiness Index, 2022).

Therefore, it is a crucial need to examine further of these EHR systems from the perspective of the current challenges they are facing. However, in developing countries, not only does EHR encounter challenges, but ICT as a whole is not well recognised. The next section will explain the state of ICT in developing countries, especially in Jordan.

1.2 Research Context

Within this section, a multifaceted exploration unfolds, commencing with a comprehensive portrayal of Jordan, followed by an intricate examination of the ICT landscape within the Jordanian context. Subsequently, the focus shifts to an in-depth analysis of the healthcare sector in Jordan, with particular attention directed towards the nuanced domain of EHR implementation within the country. Lastly, this scholarly discourse broadens its horizons to encompass the global ambit, delving into the intricate web of strategies and approaches for the worldwide implementation of EHR systems.

1.2.1 Overview of Jordan

Jordan, officially known as ‘The Hashemite Kingdom of Jordan’, is a developing Arab country that is considered the heart of the Middle East. Jordan shares borders with Iraq in the north, Saudi Arabia in the east and south, and Syria in the north. It also shares borders with Palestine, the Dead Sea and the Red Sea in the west. Jordan is a country with many contradictory characteristics. Some positive examples: first, it is a haven of peace and stability compared to neighbouring Middle Eastern countries. Second, Jordan's population is mainly youth (62%), with a literacy rate of 95% (Department of Statistics [JDS], 2021). Third, Jordan's 23 universities enrol approximately 200,000 students, with an additional 20,000 enrolling in universities abroad (Private Hospitals Association Jordan [PHAJ], 2023). Finally, Jordan is at the forefront of medical tourism among Arab countries due to its superior medical reputation, its superior performance over neighbouring Arab countries, and its central regional location (Al-Tarawneh, 2019).

On the other hand, Jordan has limited natural resources, considerable budget deficiencies, and is significantly dependent on foreign assistance (JDS, 2021). Furthermore, Jordan has recently faced several international and regional pressures in terms of refugee operations from neighbouring countries, which have posed challenges and burdens on hospitals and their facilities, especially those under the Ministry of Health (MoH). Therefore, there has been governmental pressure and public demand to develop and improve healthcare services (Al-Tarawneh, 2019). This pressure has required an evaluation of the entire healthcare delivery model and the development of viable alternative solutions. Consequently, the Jordanian government has begun taking significant steps to implement EHR in Jordanian hospitals (Al-Rawajfah & Tubaishat, 2017).

1.2.2 ICT in Jordan

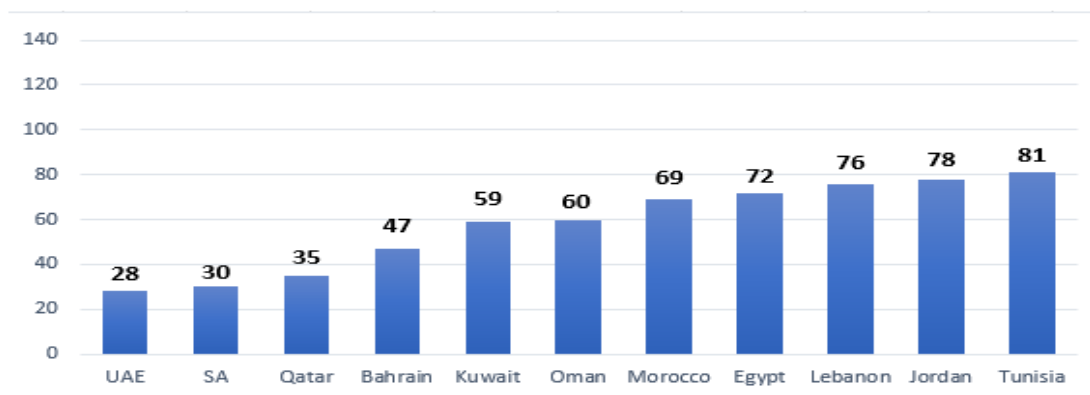
ICT has played an important role in shaping globalised operations in all aspects of life. Accordingly, most developed countries have been successful in implementing IT in their industries. On the contrary, there is a huge gap in developing countries associated with the availability and usage of information systems (IS). According to the Network Readiness Index (2022), Jordan was ranked 72nd out of 134 countries in technology readiness based on its performance in four distinct pillars: Technology, People, Governance, and Impact (see Figure 1.1). Jordan was ranked 78th in terms of technology use, and as a result, Jordan was ranked 81st in terms of technological impact (Network Readiness Index, 2022).



Source: Network Readiness Index (2022)

Figure 1.1 Jordan Global Ranking

Jordan's ranking stands at number 10 out of the 11 Arab countries in terms of technology usage compared to its neighbours (see Figure 1.2). Regarding the usage of government technology, the government sub-pillar under the people pillar has the lowest average of 30.91, followed by the companies' sub-pillar at 52.47 and individuals at 46.01 (Network Readiness Index, 2022). Furthermore, 34.7% of government organisations use computers for work purposes (JDS, 2021). Therefore, to improve service quality and reduce costs, government institutions must increase their use of ICTs.



Source: Network Readiness Index (2022)

Figure 1.2 Ranking of Arab Countries

Jordan ranked 42nd in future technology despite low economic development and inadequate resources, indicating that additional opportunities to better use technology more efficiently are emerging (Network Readiness Index, 2022). Furthermore, an essential goal is to maximise the effect of technology usage on the economy, which is now extremely low at 35.14, improve the quality of life, which is currently low at 60.69, and increase the contribution of the Sustainable Development Goals (SDG), which is currently low at 57.22 (Network Readiness Index, 2022). Moreover, the economic effect of communications and computers was recorded at 4.2% (Humanitarian Data Exchange [HDE], 2021).

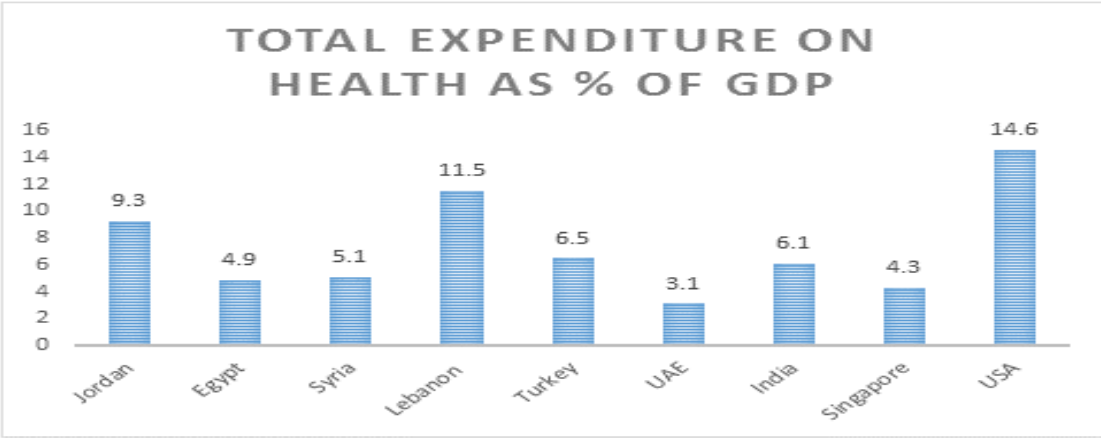
1.2.3 An Overview of the Healthcare Sector in Jordan

Jordan is considered a highly attractive country globally for health investments, serving as a gateway to the Middle East. These investments can include the medical and pharmaceutical sectors, the sales of medical equipment, biomedical research and production, as well as the production and sale of products originating from the Dead Sea. Additionally, Jordan's workforce is a valuable asset, boasting a large number of physicians, with over 28,000 in total (PHAJ, 2023). Board-certified physicians from the United Kingdom, Canada, the United States, and other European nations make up the vast majority of the physicians. In addition, there is an increasing team of experienced nurses in patient care. Furthermore, the government actively encourages the healthcare industry in Jordan through the Jordan Investment Borough (PHAJ, 2023).

Jordan's health sector has a competitive cost structure, providing medical services to the Middle East and North African markets at a lower-risk platform. The country's success can be attributed to its emphasis on developing high-quality

healthcare, which accounts for 9.3% of its Gross Domestic Product (GDP). Jordan's healthcare spending is among the highest of other countries, as illustrated in Figure 1.3. These expenditures include the improvement of medical facilities and equipment and the provision of the necessary training for healthcare providers, all of which enhance the medical services provided to non-Jordanian and Jordanian patients (MedXJordan, 2023).

Jordan's healthcare sector is divided into three primary service providers, each with its own administration, staff, budget, and centres. These providers include the Ministry of Health (MoH) of the Jordanian government, which operates 33 public hospitals and two educational hospitals, the Royal Medical Services (RMS) of the Jordan Armed Forces, which operates 14 hospitals, and the private sector (Aljaafreh, 2020; Sharikh et al., 2020).



Source: MedXJordan (2023)

Figure 1.3 Jordan's Expenditures Relative to GDP

According to JDS (2021), the total number of hospitals in all service providers in Jordan is 118. Jordan's doctor-to-patient ratio is 28.6 doctors per 10,000 people on average, which is one of the highest ratios in the world. Additionally, there

are 32 nurses and 17.8 pharmacists for every 10,000 people. Finally, there are 10.4 dentists for every 10,000 people (PHAJ, 2023). The Ministry of Health employs 34,459 medical professionals and related personnel serving most of Jordan's population, including physicians, dentists, pharmacists, and nurses (Ministry of Health [MoH], 2022).

1.2.4 EHR in Jordan

EHR system provides creative solutions for hospitals' profile systems to mitigate the problems related to information (Rasmi et al., 2018). In 2009, His Majesty King Abdullah Bin Al-Hussein launched the "Hakeem programme," which was the first EHR initiative in Jordan. The programme aimed to use public sector hospitals and healthcare centres (Electronic Health Solutions [EHS], 2020). Healthcare professionals use it to provide excellent service quality, improve transaction productivity, reduce costs in Jordan's health facilities (Aljaafreh, 2020), improve the health economy, and reduce spending growth (Ahlan & Ahmad, 2014; Alsharo et al., 2021; Davis et al., 2007).

1.2.5 EHR Implementation Globally

The nationwide adoption of an EHR system aims to facilitate the seamless accessibility of patients' medical records for healthcare professionals across the country. This technological advancement concurrently streamlines patients' access to a comprehensive spectrum of healthcare services, encompassing pharmacies, medical facilities, laboratories, imaging centres, and medical practitioners (World Health Organization [WHO], 2016). Unquestionably, the introduction of EHR systems has instigated a transformative paradigm shift within the medical and healthcare sectors,

facilitating the conversion of traditional paper-based medical records into electronic formats, as underscored by Al-Azzam et al. (2023).

In 2020, healthcare costs in the United States constituted approximately 18.8% of the GDP, while France, the United Kingdom, and Canada, allocated 12.2%, 11.9%, and 11.7% of their GDP to healthcare, respectively. In contrast, healthcare spending in economically challenged nations exhibited notable variability. Egypt allocated 4.4% of its GDP to healthcare. Similarly, the percentage of GDP devoted to healthcare in India, Pakistan, Nigeria, and Malaysia stood at 3%, 3%, 6.2%, and 4.1%, respectively (Knoema, 2023). Advanced nations typically demonstrate a higher inclination towards the adoption and effective usage of EHR systems when compared with their less developed counterparts. This outcome aligns with expectations, as the widespread implementation of EHR systems frequently relies on various pivotal factors, encompassing the availability of a skilled workforce, a robust technical infrastructure, supportive government policies, and adequate financial resources (Al-Azzam et al, 2023).

Previous empirical research has shown that the successful integration of health information technology (HIT) within healthcare settings requires careful planning of workplace procedures and operations. It is crucial that such integration does not disrupt workflow, and healthcare professionals should exhibit proficiency in using the technology and its applications (Aityassine et al., 2021; Al-Alwan et al., 2022; AlHamad et al., 2022; Casey et al., 2016; Wang et al., 2018). Conversely, limited access to HIT may hinder healthcare providers' treatment times and overall productivity, potentially resulting in reduced healthcare availability (Alolayyan et al., 2022; Gibbons, 2011). Affordable access to healthcare remains a significant

challenge for numerous medically underserved individuals residing in sparsely populated areas (Hardeman & Kahn, 2020; Russell et al., 2013). HIT systems are particularly susceptible, with data integrity governed by stringent privacy regulations and subject to continuous scrutiny due to their widespread utilisation (Al-Azzam et al., 2019). Jin and Chen (2015) assert that the adoption of HIT represents a critical global health concern, encompassing resource requirements, system quality, equity, and cost-effectiveness, which confront most nations on an international scale.

1.3 Problem Statement

Multiple reports indicate that technology usage in Jordan lags behind other Arab nations and the global average (Network Readiness Index, 2022; Global Innovation Index, 2022). Furthermore, there is a notable dearth of research regarding EHR usage among healthcare professionals in Jordan, a crucial area of inquiry given their pivotal role in healthcare delivery and its impact on service quality and outcomes. To ensure the effective integration of EHR systems in healthcare settings, it is imperative to investigate the factors influencing their usage among healthcare professionals in the public sector in Jordan while also considering the workplace characteristics specific to the Jordanian context.

Healthcare professionals, often dealing with sensitive information and daily patient interactions, may harbour reservations and distrust towards EHR systems (Alsharo et al., 2020). Importantly, Hofstede Insights (2023) highlights a considerable degree of uncertainty avoidance among Jordanians, indicating their aversion to workplace risks. Consequently, promoting EHR usage in this context hinges on building trust in the system and enhancing healthcare professionals' perceived control over EHR usage. Therefore, it is crucial to investigate individual

factors, such as emotional trust and perceived behavioural control, as these factors significantly impact the usage of EHR among healthcare professionals in Jordan.

Im et al. (2011) suggest that countries with higher power distance and a collectivist culture are more influenced by social factors in their technology usage decisions, relying on others' opinions. Jordan, characterised by high power distance and collectivism, as indicated by Hofstede Insights (2023), sees healthcare professionals operating within hierarchical structures, displaying a strong commitment to their workplaces. Consequently, hospital senior management's influence could play a significant role in promoting EHR usage among these professionals. Therefore, it is crucial to investigate the social factors influencing EHR usage by healthcare professionals in Jordan.

In the context of EHRs, trust is a vital element for their effective usage in healthcare settings, as affirmed by various studies (Esmaeilzadeh, 2020; Enaizan, Eneizan, et al., 2020; Enaizan, Zaidan et al., 2020). Consequently, there is a significant need to investigate the factors that impact emotional trust in the use of EHRs. Technological characteristics like perceived usefulness and perceived ease of use, along with organisational characteristics such as facilitating conditions, data confidentiality, integrity, and availability, have consistently emerged as pivotal factors in technology usage within developing countries. These attributes have also been identified as precursors to trust in prior research. Therefore, a comprehensive examination of these factors is essential to comprehending their influence on the usage of EHR systems in Jordan.

Using technology in government institutions is pivotal for enhancing both individual and organisational performance, as indicated by Isaac, Abdullah, et al.

(2019). According to the data from the Ministry of Digital Economy and Entrepreneurship (MoDEE, 2022), the total IT revenue reached USD 2.3 billion, reflecting a 5% increase from 2017. Given that EHR systems are presently employed in most public hospitals, with others in the process of implementation, it is imperative to investigate the performance impact of EHR usage. Such research could significantly contribute to improving the usage of EHR systems and proposing novel procedures for the public sector.

The current literature reveals several significant research gaps in the context of EHR usage. These gaps include a lack of exploration into the relationship between cognitive and emotional dimensions of trust in EHR usage, limited studies addressing the mediating role of emotional trust in connecting cognitive trust with system usage during EHR usage, and a dearth of research on the influence of security on emotional trust within EHR usage. Additionally, there is insufficient attention given to the impact of EHR usage on the performance of healthcare professionals in Jordan, with a surprising absence of studies applying the theory of planned behaviour (TPB) to the context of EHR usage in Jordan. These research gaps present a valuable opportunity to advance the current understanding of EHR usage and its implications in the Jordanian healthcare landscape.

1.4 Research Questions

- RQ1:** What influence does healthcare professionals' emotional trust have on their actual usage of EHR in Jordanian public hospitals?
- RQ2:** What is the influence of perceived behavioural control on the healthcare professionals' actual usage of EHR in Jordanian public hospitals?

- RQ3:** What is the influence of social factors on the healthcare professionals' actual usage of EHR in Jordanian public hospitals?
- RQ4:** What is the influence of technological characteristics (perceived usefulness, perceived ease of use) on the emotional trust of healthcare professionals in Jordanian public hospitals?
- RQ5:** What is the influence of organisational characteristics (facilitating conditions, data confidentiality, data integrity, data availability) on the emotional trust of healthcare professionals in Jordanian public hospitals?
- RQ6:** Does the emotional trust of healthcare professionals mediate the relationship between the technological characteristics perceived usefulness, perceived ease of use) and the actual usage of EHR in Jordanian public hospitals?
- RQ7:** Does the emotional trust of healthcare professionals mediate the relationship between the organisational characteristics (facilitating conditions, data confidentiality, data integrity, data availability) and the actual usage of EHR in Jordanian public hospitals?
- RQ8:** To what extent does the actual usage of EHR affect the performance of healthcare professionals in Jordanian public hospitals?

1.5 Research Objectives

- RO1:** To examine the influence of healthcare professionals' emotional trust on their actual usage of EHR in Jordanian public hospitals.
- RO2:** To examine the influence of perceived behavioural control on healthcare professionals' actual usage of EHR in Jordanian public hospitals.
- RO3:** To examine the influence of social factors on healthcare professionals' actual usage of EHR in Jordanian public hospitals.

- RO4:** To examine the influence of technological characteristics (perceived usefulness, perceived ease of use) on the emotional trust of healthcare professionals in Jordanian public hospitals.
- RO5:** To examine the influence of organisational characteristics (facilitating conditions, data confidentiality, data integrity, data availability) on the emotional trust of healthcare professionals in Jordanian public hospitals.
- RO6:** To test the mediating effect of the healthcare professionals' emotional trust on the relationship between the technological characteristics (perceived usefulness, perceived ease of use) and the actual usage of EHR in Jordanian public hospitals.
- RO7:** To test the mediating effect of the healthcare professionals' emotional trust on the relationship between organisational characteristics (facilitating conditions, data confidentiality, data integrity, data availability) and the actual usage of EHR in Jordanian public hospitals.
- RO8:** To examine the impact of EHR actual usage on the performance of healthcare professionals in Jordanian public hospitals.

1.6 Research Scope

This quantitative research is primarily focused on public hospitals, specifically those affiliated with the MoH, comprising a total of 33 hospitals. The Royal Medical Services and educational hospitals were excluded due to their separate administrative structures. Furthermore, the significant population served by MoH hospitals factored into this decision. The private sector was not taken into account, as the implementation of EHR is not a standard practice in their healthcare facilities. This study delves into the individual level, targeting healthcare

professionals, including physicians, dentists, pharmacists, nurses, and allied medical practitioners who rely on the EHR system in their daily tasks. Furthermore, this study employs a cross-sectional temporal separation design as the basis for comprehending the problem of the study and establishing the intricate relationships among the variables under investigation.

1.7 Significance of the Study

This study provides significant contributions to the literature on EHR usage and healthcare professionals' performance in Jordan, both in terms of theory and practical applications. The following sections outline the theoretical and practical contributions of this study.

1.7.1 Theoretical Contributions

The present study carries several noteworthy theoretical implications. Firstly, it conducts a comprehensive review of the existing literature on EHR technology usage, illuminating previously overlooked aspects that could aid future studies in identifying gaps within technology models.

Furthermore, this study introduces a fresh perspective by amalgamating cognitive and emotional trust factors within a technological context. Beaudry and Pinsonneault (2010) have contended that emotions wield significant influence over the adoption of technologies, and rely solely on cognitive factors which may fall short of explaining all the antecedents of behaviour. Consequently, this research delves into the impact of both cognitive and emotional trust on EHR technology use,

enriching current comprehension, particularly in societies like Jordan, characterised by high-power distance cultures.

A third substantial contribution lies in the extension of the TPB by Ajzen (1991) to encompass cognitive and emotional trust factors, building upon the research of Komiak and Benbasat (2006). Additionally, the study incorporates cognitive factors such as perceived usefulness, perceived ease of use, facilitating conditions, and the information technology security model (CIA) proposed by Dehling and Sunyaev (2014) that contain confidentiality, integrity, and availability as dimensions of security, particularly within the healthcare context. This model significantly advances the current understanding of how trust dimensions impact the usage of EHR systems among healthcare professionals, suggesting that emotional trust mediates the relationship between cognitive trust factors and EHR usage.

A fourth theoretical contribution of this study lies in its focus on the ramifications of technology usage in developing countries, addressing a crucial area that prior research has underscored but not thoroughly explored. While previous studies predominantly centered on measuring the actual use of the system as the primary outcome, this study introduces the individual performance construct proposed by Delone and McLean (1992) into the TPB. This creates a comprehensive model that enhances the current understanding of technology usage.

Lastly, this research addresses the intricacies of the healthcare environment by introducing a comprehensive model that scrutinises the impact of system characteristics on EHR usage among healthcare professionals in Jordan. This holistic approach aims to bridge a gap where previous research often concentrated on specific system usage characteristics while neglecting other critical factors pivotal to

understanding technology utilisation in healthcare settings.

1.7.2 Practical Contribution

This study presents a multifaceted contribution with significant implications. Firstly, it provides an up-to-date assessment of EHR usage in Jordan, offering valuable insights for practitioners to evaluate the current state of EHR implementation in the country. The second practical contribution of this study lies in its expected findings, which will elucidate how healthcare professionals' emotional trust impacts their usage of EHRs in hospital settings. These findings hold the potential to enhance professionals' performance, ultimately leading to the delivery of high-quality patient services and alleviating pressure on Jordan's public hospitals. Despite the necessity of EHR technology, healthcare professionals have displayed reluctance in its adoption, which could be attributed to various factors, such as the sensitive nature of the information shared among healthcare providers, inadequate training and technical support, and the absence of dedicated IT departments in hospitals.

Thirdly, the study is poised to yield results that can serve as valuable guidelines for the Jordanian public sector, enabling them to assess their existing policies and strategies for enhancing EHR usage among professionals in public hospitals. This potential impact extends to the 33 hospitals affiliated with the Ministry of Health, the 14 hospitals under the Royal Services, and the 2 educational hospitals in Jordan. Moreover, taking security concerns into account during EHR adoption could prove advantageous for the entire healthcare industry. This approach will elevate awareness of current practices, foster trust, encourage EHR usage, and potentially inspire the private healthcare sector to adopt these systems. It will also

serve as a reference point for hospitals to refine their current practices related to healthcare professionals, ultimately enhancing the quality and quantity of EHR data. This, in turn, can position hospitals to gain a competitive edge and pursue international opportunities.

1.8 Definitions of Key Terms

The terms commonly used in this thesis are described as follows:

- a) **Actual Usage:** the extent to which healthcare professionals believe that the implementation of EHR is appropriate for their work (Bossen et al., 2013).
- b) **Availability:** the ability to access the features of computing and information systems that manage data, as well as the security mechanisms that safeguard system information (Sattarova Feruza & Kim, 2007).
- c) **Confidentiality:** the prohibition of unauthorised users from reaching, utilising, and displaying needed information about the system (Sattarova Feruza & Kim, 2007).
- d) **Data Integrity:** ensuring that data and information are not altered or modified and authorisation is required to modify them (Sattarova Feruza & Kim, 2007).
- e) **Electronic Health Records:** an electronic version of historical patient information saved over time that contains critical clinical and managerial data relevant to a patient (Centre for Medicare and Medicaid Services [CMS], 2023).
- f) **Emotional Trust:** the level of confidence and comfort in using EHRs to share patient information with other healthcare professionals (Esmaeilzadeh, 2020).

- g) Facilitating Conditions:** the degree to which a healthcare professional believes that there is assistance, support, and information material when they encounter difficulties or barriers in using the EHR (Teo, 2010).
- h) Healthcare Professionals:** physicians, pharmacists, nurses, dentists, and allied medical professionals who work in the healthcare sector to provide medical services to patients (National Data Catalogue [NDC], 2023).
- i) Healthcare Professionals' Performance:** the extent to which desirable results were achieved by healthcare professionals (Dahleez et al., 2020).
- j) Individual Characteristics:** a psychological process that impacts an individual's behaviour in attaining experiences (Hurriyati, 2005, as cited in Werang, 2018).
- k) Organizational Characteristics:** the equity and uniformity of member interests, which hold significance within cooperative structures (Hansmann, 1996, as cited in, James & Sykuta, 2005).
- l) Perceived Behavioural Control:** the healthcare professional's belief in their ability to control personal or external factors that might help or hinder their behavioural performance (Ajzen, 1991).
- m) Perceived Usefulness:** the extent to which healthcare professionals believe that using EHR will help them achieve their job objectives and improve their performance in a hospital setting (Davis, 1989).
- n) Perceived Ease of Use:** the degree to which healthcare professionals believe that the use of EHRs is effortless and uncomplicated and that they can navigate the system without much effort (Davis, 1989).
- o) Social Factors:** the extent to which healthcare professionals perceive the importance of using an EHR for the service provider (Thompson et al., 1991).

- p) Social Characteristics:** the perceived influence to either take or avoid a specific behavioural choice (Lu, Yao, et al., 2005).
- q) System Characteristics:** the inherent features and attributes of a system that play a crucial role in shaping the system's functionality and effectiveness (Dori et al., 2019).
- r) Theory of Planned Behaviour:** a behaviour theory that explains and predicts an individual's behaviour based on attitudes and beliefs (Ajzen, 1991).
- s) Technological Characteristics:** the attributes and capabilities of technology that are determined by their design (Cheng, 2015).

1.9 Organisation of Chapters

This study consists of five chapters, and its framework is as follows:

Chapter 1 represents a short overview of the research and its problems. This chapter also describes the research questions, objectives, scope, significance, and definitions of important terms. The end of the chapter explains the organisation and structure of the thesis.

Chapter 2 conducts a review of relevant theories, models, and frameworks, as well as the dependent variable within the relevant context. In addition, this chapter aims to define the constructs for creating the research model and developing the research model and hypotheses.

Chapter 3 explains the research methodology and design. The chapter covers the research paradigm that is pertinent to the study, the research design, the

development of the survey questionnaire, the technique for sampling, the sample size, the process for collecting data, and the techniques and tools used for data analysis.

Chapter 4 presents the results of the data analysis. This includes the response rate and the demographic profile of the participants, as well as a descriptive analysis conducted using Statistical Package for the Social Sciences (IBM-SPSS). Additionally, the data was analysed using partial least squares (PLS). The validity and reliability of the measurement model were evaluated, and the structural model was analysed to determine the significance of the path coefficients and to test the hypotheses.

Chapter 5 presents the study's primary findings, discussed in the preceding chapter concerning the study's research objectives. The chapter also covers the study's contributions, conclusions, and recommendations for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter commences with an exploration of the background, definitions, and advantages of EHRs. Subsequently, it evaluates several theories and models related to the adoption and usage of EHRs, including the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Task-Technology Fit (TTF), and DeLone and Mclean Information System Success Model (DMISM). Additionally, this chapter addresses research gaps and conducts a literature review focused on the identification of characteristics, formulation of hypotheses, and conceptual models relevant to EHR.

2.2 Overview of EHR

This section offers a comprehensive review of EHRs, covering their historical evolution, definitions, advantages, and challenges. Additionally, the existing body of literature explores the various interpretations of EHRs, their benefits in the healthcare context, and the impediments linked to their adoption and usage.

2.2.1 The Evolution of Health Records

The historical development of health records can be traced back to the 1920s when healthcare professionals began documenting patient care, treatments, and complications using medical records (MRs), which were predominantly paper based at the time (Evans, 2016; Vries, 2020). The transition to computerization in healthcare commenced in 1966 with the introduction of the first computer system in

an intensive care unit (ICU). Over the past 45 years, significant advancements in computer data storage capabilities have greatly benefited various aspects of healthcare technology, including EHRs. The concept of today's EHR systems began to take shape in the late 1960s and early 1970s (Osawe, 2019). The subsequent decades, particularly the 1980s and 1990s, witnessed notable innovations and opportunities for EHR advancement. For instance, the first voice recognition system for medical records was developed in 1982 (Vries, 2020). In the early 1990s, there was a rapid surge in technological advancements and system developments, leading to the commercialisation of EHRs (Osawe, 2019). EHR technology has remained closely intertwined with technological progress and is poised to evolve further in sync with future technological developments.

2.2.2 EHR Definitions

The EHR, as defined by Yamada (2008), is described as a longitudinal electronic record that emerges from healthcare meetings, encompassing a broad spectrum of patient health information, including demographics, issues, progress notes, vital signs, medications, immunisations, laboratory data, medical history, and radiology reports. Additionally, the EHR functions to automate the workflow of clinical patient data, generate a comprehensive record of patient encounters, and support various activities related to healthcare services, either directly or indirectly, through interfaces that facilitate quality management, decision-making, and outcome reporting (Yamada, 2008). In alignment with this, the CMS (2023) provides a definition of the EHR as an electronic repository of historical patient information that accrues over time, housing crucial clinical and managerial data that pertain to each

patient. For the purposes of this study, the CMS (2023) definition of the EHR was adopted as the working description.

2.2.3 Benefits of EHR to Healthcare Delivery

Based on the definitions of EHR, the main benefits of EHR can be summarised as follows:

- 1- Cost reduction: The financial benefits of EHR are not easily quantifiable but exist in terms of financial improvements and reductions of business expenses (Hillestad et al., 2005; Orji, 2016). Using the EHR allows savings in radiology tests, fewer billing errors, lower drug costs, and improved financial reimbursements (Orji, 2016; Wang et al., 2003).
- 2- Increased healthcare access: Using an EHR can result in accurate and up-to-date information about patients that is accessible from various locations (Orji, 2016). Communication, coordination, measurement, and care management are key capabilities of using EHR (Hillestad et al., 2005). Additionally, prescription orders, insurance filing, follow-up reminders, and web resources related to patient treatment procedures can all benefit from the use of EHR technology (Orji, 2016).
- 3- Error reduction: The use of EHR in the healthcare system can reduce errors and losses that were previously caused by redundant paperwork, medical errors resulting from adverse drug events, and billing errors (Ambinder, 2005). Furthermore, the EHR can eliminate redundant diagnostic tests, reduce adverse event rates, and increase patient safety (Orji, 2016). Also, EHR can reduce operating expenses and improve the