“A Qualitative Examination of Employee Adaptation Responses to Mandatory Health Information Technology in Saudi Arabia: A Coping Theory Perspective”.

By

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A Thesis Presented to the Dublin City University
in Fulfilment of the Thesis
Requirement for the Award of Doctor of Philosophy (PhD)

School of Business

April 2024

DECLARATION

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy, is entirely my own work, and that I have exercised reasonable care to ensure that the work is original and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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DEDICATION

I dedicate this to my parents, husband, children, siblings, close family, and friends.

ACKNOWLEDGEMENTS

I am grateful beyond words for the support I have received during my academic journey. I could continue expressing my appreciation, but I'll keep it brief.

I want to express my sincere gratitude to Professor Regina Connolly, my principal supervisor, for her unwavering support throughout my thesis. Her encouragement, motivation, patience, and extensive knowledge have been invaluable. With her expert guidance, I was able to complete this thesis.

Furthermore, I thank the Ministry of Health and all doctors who participated in this research. Their willingness to cooperate, share their experiences, and invest their time and effort has been invaluable. Thanks to their participation, I was able to conduct this research and draw insightful conclusions.

I would also like to express my gratitude to the Kingdom of Saudi Arabia, the University of Jeddah, the Ministry of Higher Education, and the Saudi Cultural Bureau in Dublin for the financial provision and education advice which enabled me to complete my PhD program. Additionally, I am sincerely grateful to Dr. Rasha Alruwili for her invaluable support and guidance.

Lastly, I would like to acknowledge the unwavering support of my beloved family and friends. Their encouragement and love have been an immense source of motivation throughout this journey. Their support has given me the strength to overcome the obstacles I faced during this research. I will always be grateful for their contributions to this dissertation.

PUBLICATIONS DEVELOPED FROM THE THESIS:

Abozenadah, Hanof., and Connolly, Regina. (2019). Towards an improved understanding of the factors influencing the successful implementation of an electronic immunization registry in Saudi Arabia. The 22nd Annual Irish Academy of Management Conference, *IAM Ireland 2019 Conference*. Maynooth University Business School, National University of Ireland Maynooth. https://iam2019.exordo.com/programme/presentation/136.

Abozenadah, Hanof., and Connolly, Regina. (2020). A Qualitative Examination of Employee Adaptation Responses to Mandatory Health Information Technology in Saudi Arabia: A Coping Theory Perspective. Participated at the *Irish Academy of Management 2020 Conference IAM2020*.

Abozenadah, Hanof., and Connolly, Regina. (2020). Understanding User Adaptation Responses to Health Information Technology Use in Saudi Arabia: A Coping Theory Perspective. *UK Academy for Information Systems 2020*. St Catherine's College, University of Oxford, UK. https://ebusiness.ncl.ac.uk/ukais/paper.php?id=6

Abozenadah, Hanof., and Connolly, Regina. (2022). A Qualitative Examination of Employee Adaptation Responses to Mandatory Health Information Technology in Saudi Arabia: A Coping Theory Perspective. *The Diana Women Digital Entrepreneurship Conference.* St. Patrick's College DCU Campus.

Abozenadah, Hanof., and Connolly, Regina. (2023). A Qualitative Examination of Employee Adaptation Responses to Mandatory Health Information Technology in Saudi Arabia: A Coping Theory Perspective. *DCUBS Doctoral Colloquium 2023*. Dublin City University, Dublin.

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Abstract

A Qualitative Examination of Employee Adaptation Responses to Mandatory Health Information Technology in Saudi Arabia: A Coping Theory Perspective

Hanof Abozenadah

Information systems can improve organizational productivity and efficiency, but their success is predicated on engaged user adoption. Most information technology (IT) acceptance research has focused on voluntary adoption concepts. However, increasingly, new IT usage in organizational contexts is explicitly mandated, leaving users without volitional control over their usage decisions. Such mandated imposition can engender a diverse range of emotional and behavioral user responses, some of which can impede IT adoption and organizational effectiveness. Despite this fact, little is known about employee adaptation responses to mandated IT use, the cognitive appraisal processes that predict the development of these responses, as well as whether, why and how they can transition over time.

This research answers calls to consider the role of emotions on IT use. It synthesizes two theoretic lenses to illuminate the multistage causal process that engenders diverse user responses to the recent mandatory implementation of a new health IT in public hospitals in Jeddah, Saudi Arabia. A framework harnessing the Transactional Model of Stress and Coping (TMSC) and Equitable Needs Fulfilment (ENF) theory guides the study and provides key propositions. Qualitative case studies involving detailed interviews with 38 doctors were conducted in three distinctively different medical care centres and one general hospital. Data was analyzed using thematic analysis and a deductive approach.

The research findings confirm a taxonomy of multivalent user responses that co-emerge during mandated IT implementation. Moreover, they illuminate three need fulfilment factors: self–development, Work performance, and Relatedness, showing how they motivate positive transition (or, in their absence, negative transition) of these responses over time. The findings also provide actionable insights for practitioners seeking to effectively augment IT adoption to leverage greater organizational value from these systems.

Chapter 1 Introduction

1.0. Research Background and Motivation

The Kingdom of Saudi Arabia (KSA) is undergoing enormous transformation because of shifting demographics, new technology implementation, and changes in economic realities (MoH, 2019a). This research takes place within the context of this broad cultural change and within a specific workplace context that is experiencing digital change, that of public hospitals. Specifically, it focuses on a new mandatory digital system named OASIS (incorporating an electronic patient record database) that has recently been introduced into public hospitals in Jeddah, the second-largest city in Saudi Arabia, in order to examine the factors that influence users' coping responses to that system.

Introducing new information technology can result in wide-ranging impacts for organisations and individuals. This is increasingly the case when their usage is a mandatory requirement for the user. However, making usage mandatory does not necessarily translate into willing acceptance and use of a technology or system. For example, employees may perceive new technologies differently to their managers or the information systems department. This can result in a variety of coping responses ranging from deviant or reluctant to compliant or fully engaged, with the latter being the desired outcome of those implementing these technologies. Understanding those responses, specifically the factors that influence their formation, as well as response transition from negative to positive engagement, is therefore critical for the success of organisations who seek to implement new technologies in order to increase resource and performance efficiencies whilst equally seeking to promote a positive workplace and retain engaged staff.

This dissertation starts by describing the study context (chapter two). This is important precisely because Saudi Arabia is a country that is undergoing significant change, culturally, socially and demographically. Chapter two situates the study in its context and describes the increased demands in terms of health requirements which this country is experiencing. That includes the significant social changes that have been taking place there and their current implications for government policy. To deal with such challenges, part of the government's annual budget has been devoted to a policy of improving public services in all governmental sectors. Section 2.2 further discusses *Vision 2030*, which is the policy roadmap for diversifying the country's economy and developing novel income sources that are separate from oil. Section 2.3 highlights the implications of *Vision 2030* for healthcare delivery. Finally, section 2.4 discusses the development of healthcare technology, which is one strategy that may be effective in improving the management and efficiency of handling of chronic diseases and the availability of resources.

In order to understand the factors which, influence technology adoption, and how these may influence employee adaptation outcomes, a review of the literature relating to the acceptance and adoption of new technology, including the process of its dissemination, and the factors predicting acceptance and adoption is undertaken (chapter three). This provides an overview of many of the core issues that are important to this study's focus on understanding factors that may influence resistance to, or rejection of, the OASIS system. As much of the technology adoption literature tends to focus on the individual's response through a binary lens, one where the end point is that the technology is either adopted or rejected by the individual, it does not adequately recognise varying levels of adoption response, whether and how they can transition and the cognitive and emotional processes which can influence that changing response. It also tends to assume agency and voluntariness of use on behalf of the adoptor. However, in the case of mandatory technology usage, something which has become

increasingly common in employment contexts, overt total rejection of a newly introduced technology is simply not possible.

Understanding employee resistance to the change which inherently accompanies the introduction of a new IT and how this manifest is therefore important and chapter four starts by drawing on the management and psychology literatures to illuminate the issues related to change and resistance to change relevant to this study. It discusses IT-related resistance, types and forms of resistance, and identifies a number of theories that can provide insight into resistance formation which guide the present study, specifically Coping theory and Equity theory, both of which can facilitate insights into the formation of resistance or adoption responses.

As organizations increasingly make use of newly introduced technologies mandatory, this means that employees often have to use adaptation strategies as they seek to navigate their response to such technologies alongside their desire for job security**.** In this regard, coping theory provides a highly relevant lens for this study, as it illuminates how the staged process through which users can evaluate and respond to the implementation of a new IT system, cognitively, affectively and the varying behavioural outcomes that can result from this process. Moreover, in providing a psycho-social lens for understanding those stages, coping theory expands our understanding of IT adoption showing that user response results from the end-users attempt to re-establish their sense of personal well-being. In this way, coping theory is useful to gain understanding as to what might predict different user responses when confronted with a new IT system.

Chapter four also concerns how such responses change over time, which is especially relevant to the present study since it concerns responses, and response transition, in a period well after the moment when OASIS was first made mandatory. Understanding those responses, specifically the factors that influence their transition from negative to positive engagement (or

negative regression), is critical for the success of organizations which seek to implement new technologies in order to increase resource and performance efficiencies, whilst equally seeking to promote a positive workplace and retain engaged staff. Chapter four therefore includes a discussion of theoretical frameworks that provide useful guidance for understanding such transitions, paying particular attention also to Equitable Needs Fulfillment theory. Recognizing that individuals can vary considerably in terms of their sensitivity to needs fulfilment, it discusses the role of equity sensitivity in influencing the individual's coping response and transition between responses.

Chapter five details the methodology employed in this study. The current study aims to examine users' coping responses in relation to a mandatory health information system called OASIS. In order to achieve this, it is first necessary to delineate the methodology that will be used. To this end, the methodology section underlines the research questions, research objective, research philosophy and justification, research design, research method and justification, data collection, sampling, and data analysis in order to document the method used in the completion of this study and demonstrate its reliability and validity.

The philosophical stance guiding this research is Critical Realism. Critical Realism, abbreviated as CR, is a research philosophy that differentiates the "real" world and the "observable" world. Critical realists assume that the "real" cannot be observed and exists free from human constructions, theories, and perceptions. The CR philosophical paradigm is the most appropriate guiding philosophy for my research as it emphasizes qualitative research. Secondly, CR accepts objective realities. Lastly, it accepts that reality is sometimes socially constructed and, accordingly, it assumes epistemic relativism. Correspondingly, this study is qualitative, accepts some objective realities, but recognizes that other realities are based on human experience.

The research method used in this study is qualitative (Creswell, 2013; DeFranzo, 2011; Mason, 2002). The reasoning behind the selection of qualitative research is because this study concerns an embryonic research area, and there is a need for deeper insight into 'why' and 'how' IT adoption responses vary and transition (explanation rather than just description). Furthermore, qualitative methodology gives a voice to interviewees (responses may differ according to culture), and enables examination of responses over a period of time – allowing them to reflect and explain the motivators of their transition responses. Therefore, this research method enables the researcher to gain insight into how people can change over time in their technology adoption response. The selection of qualitative research leads naturally to the adoption of case studies, which also are deemed appropriate for research seeking insight into questions of 'Why' and 'How' (Yin, 2003). Case studies will be conducted in three public hospitals in Jeddah, Saudi Arabia.

The study findings are detailed in chapter six. Chapter Seven then discusses the findings in terms of their relationship to the literature, outlining the core implications in terms of their advancement of our understanding of the factors influencing employee coping responses and how these can be more effectively managed. It details the study's contributions both to theory and to practice.

No research is without limitations and the thesis concludes with chapter eight which outlines the limitations which applied to this study, the implications of the same, and also proposes new avenues for research which arise from this work. The thesis structure is shown in Figure 1.0.

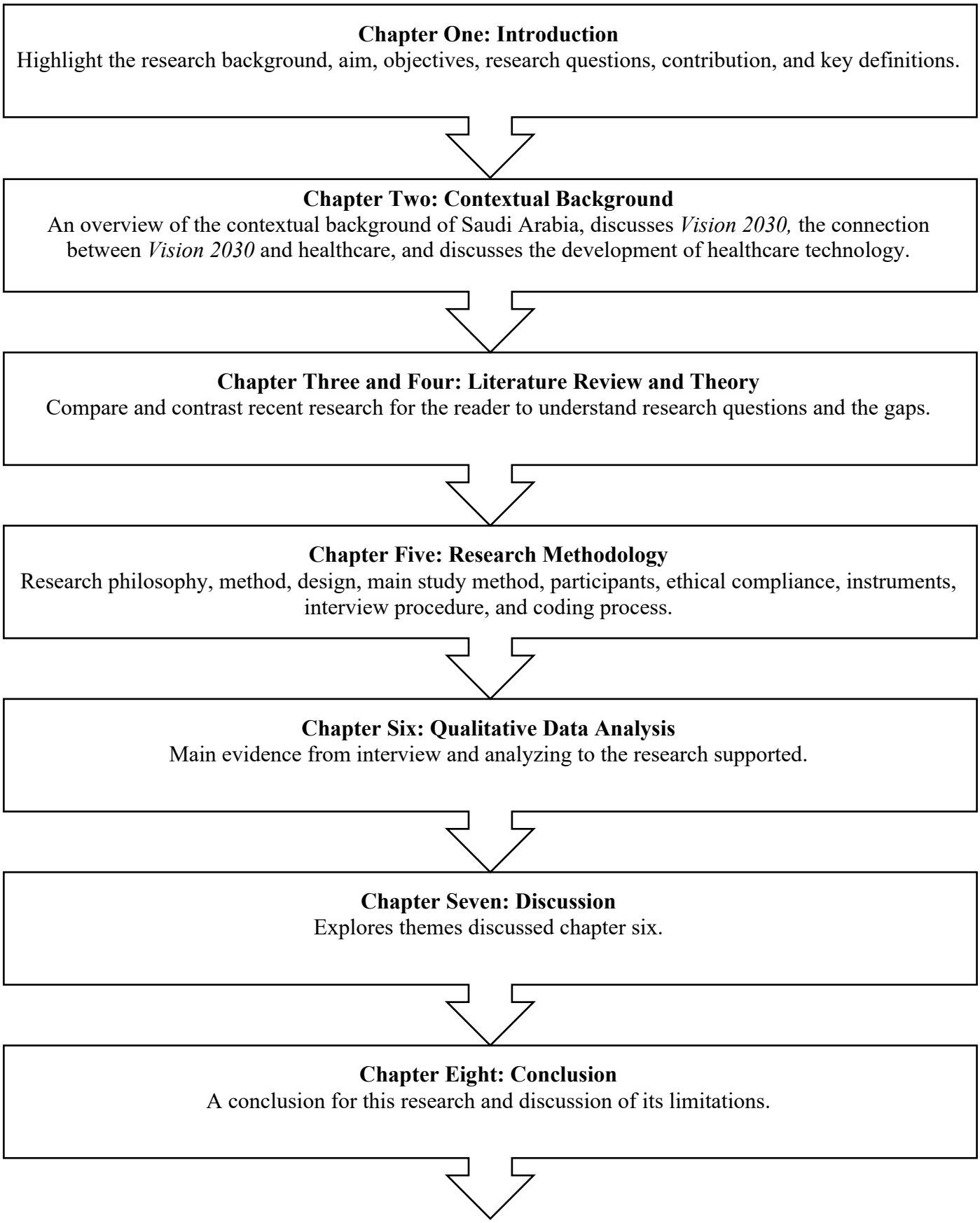


Figure 1.0 Chapter One: Thesis Structure.

1.1. Aim of Research

This research examines users' coping responses to the OASIS health information system, a system that has recently been introduced in hospitals in Jeddah, the second-largest city in Saudi Arabia. When any new technology is introduced within an organization, those who are expected to use it may exhibit varying degrees of *willingness* or *intention to use* it, manifesting as *acceptance* or *resistance* to the technology. This may be influenced by many factors such as how useful they think the technology is, whether it is socially acceptable to use it, how easy it is to use given their prior expertise, how far it delivers benefits in proportion to the effort required, and their personality traits including the individual's tendency to adopt or resist new things. In a voluntary situation, their actual *use/behavioral adoption* of the new technology (or *rejection* of it) is a reflection of these factors and their effect on the individual. However, if the new technology is imposed or *mandatory,* as is increasingly the case within workplace organizational contexts, employees are obliged to use/adopt these technologies, regardless of their beliefs or attitude towards those technologies, whether positive or negative. Consequently, in such a situation, the issue is not whether they will adopt the technology, but rather *how willingly* and *the extent* to which they will adopt it, typically described as their *adaptation response*. A potential variation of response is clearly possible, ranging from employees who use the technology minimally in order as to satisfy workplace requirements to those to fully engage and seek to maximally leverage all of its capabilities. The former response would potentially limit the benefits of this technology for the organisation. For example, in a hospital context, an older consultant who is somewhat technophobic might choose to delegate accessing OASIS features (such as patient results) to a junior doctor in his or her team so as to avoid engaging with the technology. The implications of that adaptation or 'coping' behaviour are not trivial, as the depth of expertise which that consultant could potentially bring to his or her interpretation of the data is not harnessed, limiting the positive

benefits which the technology and its sociomateriality can confer, with implications for patients and the organisation more broadly.

Much research has focused on adoption behaviors in a voluntary context where the individual has agency in relation to the use of the technology. However, the present study recognizes the changing workplace environment where employees are mandated to use new technologies in order to complete work tasks. Such an environment is characterized by a lack of agency and may result in a variety of work-around or coping responses. It is this coping response that this research focuses on, seeking to determine its causal factors in a hospital work environment and within the cultural framework of an evolving country. It recognizes that coping responses are not static and as people engage with technology over time, their coping response may change accordingly, both positively and negatively. However, what would cause such a progression or regression is undetermined and this research responds to calls from the literature (Bhattacherjee et al, 2018).to explore the factors which can motivate such transitions. The insights obtained from this research will advance understanding of the factors influencing employee behavioral responses to new mandatory technology implementations and illuminate how positive maximal employee engagement can be successfully achieved

1.2. Objectives

- The core objective of this study is to examine user coping responses to the mandatory introduction of the OASIS health information system in Saudi Arabia. Specifically:

1. To identify the nature of those coping responses and the factors that influence their formation, and;
2. To identify whether those coping responses can transition (either positively or negatively) over a period of time, and if so, to identify the interventions that may influence such transitions.

1.3. Research Questions

This informs the study research questions, which are:

- *What coping responses do employees exhibit in response to mandatory healthcare information system implementation in a Saudi Arabian context; and what factors influence the formation of these responses?*
- *Can users' coping responses transition (either positively or negatively) over a period of time, and if so, what factors influence those transitions?*

1.4. Contribution

The findings of this research will contribute to the body of knowledge in a number of critical areas. Firstly, extant research on technology adoption has emphasized voluntary usage contexts and little attention has been paid to mandatory technology adoption within organizational contexts, representing a gap in our understanding. Related to this is the fact that the dependent variable in much technology adoption research is predominantly adoption intention. However, in a mandatory adoption workplace context, such agency does not apply and the mandated behavioral outcome manifests through a variety of coping responses. Research on such outcomes is scant and what little does exist has employed samples obtained in a North American context. The current research provides insight into mandatory adoption of a health information system within Saudi Arabia, a rapidly developing country and as such provides a valuable window into the key drivers and processes that underpin different user coping responses as well as providing insight into the culture independence (or not) of those responses and their formation. Finally, there have been many calls for research into the factors that may predict changes in coping responses, whether progressive or regressive change. This study answers that call with a detailed and rigorous exploration of how those transitions are formed within a Saudi Arabian hospital workplace. It synthesizes both coping

theory and equitable needs fulfilment theory, using these joint guiding frameworks to elucidate the factors that underpin such transitions. Consequently, the study findings provide previously missing insights into how positive employee coping responses can be effectively fostered by organisations, identifying the interventions that can cause behaviours to transition from reluctant usage to fully engaged response, an outcome of significant value to practitioners seeking to achieve optimal usage of information technologies.

1.5. Definitions of Some Key Terms

- **Technology Adoption**: This is a term that is usually used in a behavioural sense to refer to embarking on the use of a new technology. Such use may be mandatory, or left to people to choose for themselves, dependent on their attitude to/acceptance of it. Adoption does not occur instantly, but follows a continuous process over several stages, leading to users being categorized into different groups such as early and late adopters (Runciman and Gordon, 2015).
- **Technology Acceptance**: Often used in an attitudinal sense, for people's positive intention or willingness to adopt/use an innovation. Often, however, acceptance and adoption are used in the same meanings.
- **Resistance to Technology**: This term, like *rejection*, may be used for non-acceptance and/or non-use of a particular new technology. However, it is also often used to refer to a general background personality characteristic/trait that some people have of being resistant to new technology, and maybe to change in general. It is associated with the perception of loss due to the innovative technology. Technological resistance in the particular sense occurs for many reasons, including resistance to technology as a personal trait (George, 2016).

- **Transition**: Transition is the process of an institution or person changing from one condition to the other. Transition is a broad term that in our case includes the change of services and of the hospital environment that are involved along with the introduction of the new technology itself. Transition demands vary based on the conditions and complexity involved in a particular situation (Nurs, 2020). It is therefore a broader concept than diffusion (Rogers, 2003), which concerns how an innovation spreads from person to person (but not within a person).
- **Health Information System (OASIS)**: is a hospital management information system (HMIS) used in Saudi Arabia and some nearby states that specializes in the operation and management of hospitals. It provides a wide range of clinical and non-clinical subsystems/modules, that can run independently or combined, to fit what is needed by hospitals of varying sizes. It includes a central database to store and manage patient records and the health care activities in the hospital. It employs modern web-based technology with cloud support (OASISSYS, 2019). While it provides many facilities for use by administrators, patients, and healthcare workers more broadly, the present study is concerned only with those functions of the HIS that hospital doctors would be expected to need or use.
- **Intervention**: An intervention in health care, as more generally, is defined as a deliberate activity or set of activities that are aimed at modifying a process or sequence of events in order to change the characteristics of the performance and the expected outcome (Benjamin et al, 2019). Almost all healthcare is concerned with interventions, through therapy, medicine or surgery, to improve the lives of patients. The present study however is concerned mainly with two other types of intervention. First, the introduction of new technology such as OASIS into the workplace is an intervention by the management in the working processes of the hospital. Second, there may be further

interventions to help deal with effects and problems that arise after that intervention, e.g., in the form of training sessions. They might be organised by Dept managers, IT managers etc. Finally, in some kinds of research (e.g., experimental or action research) the researcher also may intervene in order to see the effect of something: the present study however is not of that sort.

- **Coping Responses**: coping responses, often also termed strategies, are cognitive, behavioural and even affective efforts that people adopt to manage specific external or internal demands, such as innovations (Lazarus and Folkman, 1984). Coping responses can also be defined as the behavioural responses that people give when in confrontation.
- **Coping Theory:** The premise of coping theory is that users tend towards the particular coping responses that are likely to be most effective in reestablishing their sense of personal well-being (Lazarus and Folkman, 1984). This is regarded as further related to the level of control that the user perceives that he or she has over the technology once he or she has appraised it. Different ideas exist about types of coping responses that may be found. They tend to emphasize the role of emotional response to IT innovation.
- **(+)** Factors Influencing Positive Transitions Model.
- **(-)** Factors Influencing Negative Transitions Model.
- **Primary Appraisal**: is the first stage of the cognitive appraisal process, where individuals evaluate a situation as either an opportunity or a threat. An opportunity is perceived as a situation with the potential for positive outcomes, whereas a threat is seen as a situation that could result in harm or loss.
- **Secondary Appraisal**: is the second stage. It involves evaluating the level of control individuals have over the situation and the resources available to them. The level of control can be high or low, depending on the individual's perceived ability to influence the situation's outcome.

- **Engaged**: high control with an opportunity, individuals perceive that they have a high control over the event and the resources available to them.
- **Compliant**: low control with an opportunity, individuals perceive that they have a low level of control over the event but recognize the potential for gain.
- **Reluctant**: low control with a threat, individuals perceive low control over the event and few resources available.
- **Self-development** relates to career advancement and job security.
- **Equitable Work Performance** relates to whether the new technology helps the user work more efficiently and improves their ability to deliver good service without a disproportionate amount of extra effort being required.
- **Equitable Relatedness Fulfilment** is determined by whether the change enables the individual to build better communications with colleagues.

Chapter 2 Contextual Background

2.0 Introduction

The Kingdom of Saudi Arabia (KSA) – hereafter referred to as Saudi Arabia – is undergoing enormous social change as a result of shifting demographics and economic realities (MOH, 2019a). This research takes place within that context of change. Its focus is the adoption of digital technology in the healthcare sector of Saudi Arabia, specifically examining users' differing coping responses in relation to a mandatory health information system called OASIS, which has been recently introduced by the Ministry of Health (MOH) and owned by a private health management company.

This chapter has three main goals. The first goal is to describe the changing demographic and economic realities of the country and the social changes that they reflect: these create the conditions in which improvement of the delivery of healthcare is needed, e.g. through the implementation of OASIS. *The second goal* is to explain the ambitious *Vision 2030* plan and to outline its implications for the delivery of healthcare services in KSA, resulting in the introduction of OASIS. *Third,* in order to understand employees' (in this case, hospital doctors) responses to the introduction of new technology, one needs to obtain an understanding of the context in which those individuals operate, both prior and post introduction of the innovation, including the changes that have resulted from the introduction of new healthcare technology services.

The chapter starts (section 2.1) with an overview of the contextual background of Saudi Arabia and the significant social changes that have been taking place there. It begins by outlining the origins of these changes and their current implications for government policy.

To deal with such challenges, part of the government's annual budget has been devoted to improving public services in all governmental sectors. Section 2.2 therefore discusses *Vision 2030*, which is the roadmap for diversifying the country's economy and developing novel income sources away from oil. Its objective is to increase efficiency of public services while reducing public spending, within the three main themes of economy, society, and the nation's global ambitions.

Section 2.3 highlights the connection between *Vision 2030* and healthcare. The citizens' healthcare needs indicate that not only are the initiatives proposed in *Vision 2030* valuable, but they are urgently required. For example, the KSA Ministry of Health (MOH) has detected a sharp growth in chronic diseases which needs to be assessed in order to determine the future needs of the healthcare system (Alqahtani et al., 2017). The country's healthcare profile and that growth in chronic diseases, as well as the hospitals' number, capacity, and resources, are therefore discussed.

Finally, section 2.4 discusses the implementation of healthcare technology, which is one strategy that may be effective in improving the management and efficiency of handling of these chronic diseases and improving availability of resources. *Vision 2030's* implementation in the healthcare sector takes into consideration the country's demographic profile and the role that technology plays in everyday life. Some of the healthcare technology support initiatives which have been recently introduced into Saudi Arabia for that purpose are described in this section. The OASIS system and the ways in which it changes the workplace for hospital doctors is also discussed. Figure 1 depicts the structure of this chapter graphically.

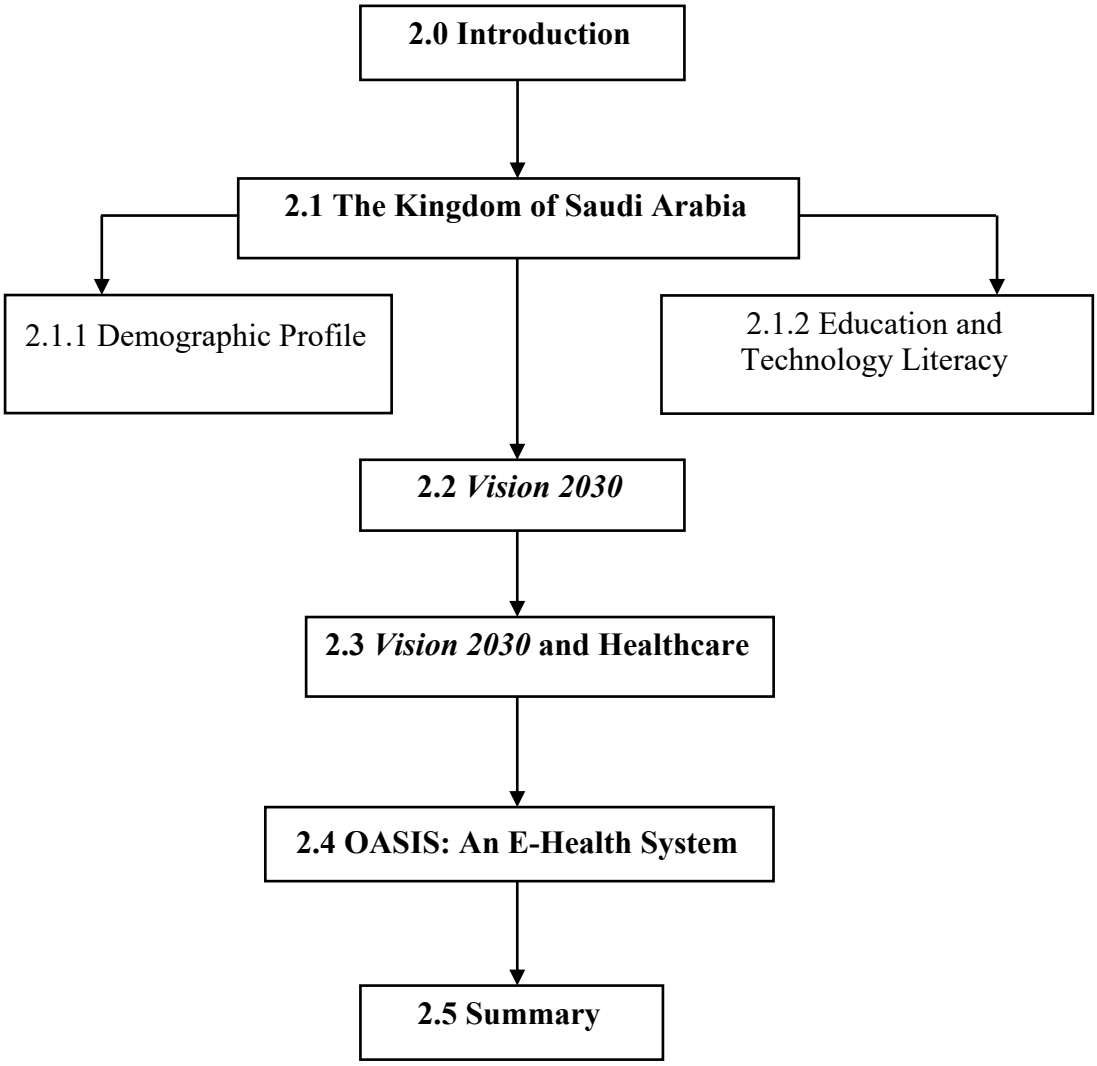


Figure 2.0 Chapter Two Structure.

2.1 The Kingdom of Saudi Arabia

Saudi Arabia lies at the intersection of three continents: Asia, Europe, and Africa (World Population Review, 2019). In terms of population, it is the 13th largest Muslim country in the world and the second-largest country in area in the Arab region (Alghamdi, 2016). It is a highly urbanised country that consists of 13 administrative districts. Islam is the religion of the majority of citizens, and Arabic is the national language. Riyadh is the capital city, with a population of 4.21 million people. The 2nd largest city in the country is Jeddah, with a population of 2.87 million people. Although it has a smaller population, Jeddah is notable for the fact that it serves as the main entry point to the two Islamic holy mosques of Medina and Mecca (World Population Review, 2019). KSA is the most visited country in the world by Muslims, receiving more than 3 million Muslim visitors per year, who come to visit these holy mosques as part of the Hajj pilgrimage and Umrah (Gardner, 2019). During times of the year that are sacred to the Muslim religion, such as Hajj[1], the number of visitors to the country rapidly and exponentially increases, placing significant strain on the country's services in general and on the health services of Jeddah in particular (Yezli et al., 2017). Those health services are already under strain due to a changing demographic profile, which will now be described in more detail.

[1] Hajj: means the pilgrimage to Mecca, Saudi Arabia's holiest city, which every adult Muslim must make at least once in their lives.

2.1.1 Demographic Profile

Over the previous two decades, the demographic profile of Saudi Arabia has undergone significant changes. In terms of gender breakdown, males comprise 57.4% of the population, while females comprise 42.6%. When the age profile of this demographic is examined in more detail, it can be seen that 60% of the population is under the age of 21 years, and approximately 2.93% of the population is over the age of 65 years (General Authority for Statistics, 2017). In addition, the country's population was 33.55 million in 2018, increasing to 34.14 million in 2019, indicating a population growth rate of 1.93% (see Figure 2.1 below) (GMI, 2019). This trajectory is expected to continue into the future and the United Nations anticipates that, by 2030, the country's population will have increased to 40 million individuals (United Nations, 2015).

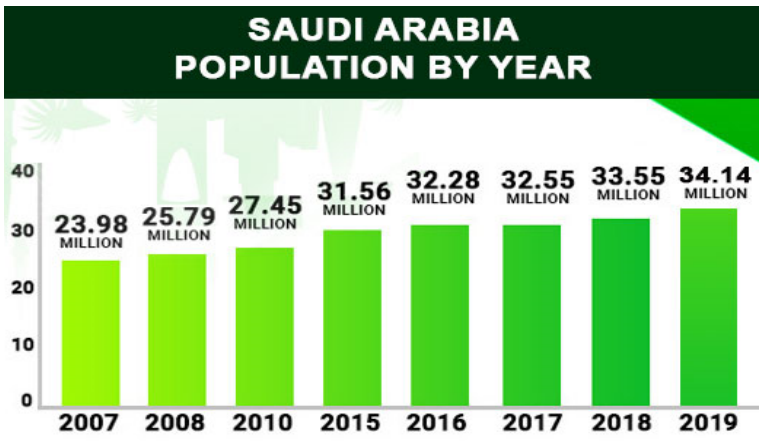


Figure 2.1. KSA Population Statistics as of 2019 (GMI, 2019).

One outcome of this increased population is that more, larger city hospitals will be needed, which, in order to be efficient, will need to be run and managed in the most efficient way possible, which today means employing digital technologies to speed data access, input and output processes in order to support staff and hospital operations more effectively.

In addition to Saudi Arabia's increasing population, the nature of evolving demographic changes has implications for the public services, such as healthcare, education and technology. For example, the percentage of older age categories is predicted to increase from 18% by 2020 (United Nations, 2015). This will result in increased need for geriatric healthcare including support for those seeking to manage their health conditions at home, which again highlights the importance of digital technologies which can transfer information between patient and healthcare providers.

According to Macrotrends.net (2020), in 2007 Saudi Arabia's life expectancy was 73.4 years. In comparison, the current life expectancy (in 2020) is 75.22 years, representing a 0.210% increase from 2007 figures. As mentioned in section 2.1, Riyadh and Jeddah are the most populated cities in the Kingdom, with a population growth rate of approximately 3% per year (Jeddah Chamber of Commerce, 2017). This increase in population combined with increased longevity is placing significant strain on public services, including the healthcare sector, a fact that has been recognised by the country's MOH (MOH, 2019b).

That strain is particularly evident in densely populated urban areas of the country. However, regardless of that fact, predictions suggest that the trend to urbanisation will continue, along with an increase in the older age population. One advantage of urban living is access to high-quality healthcare services. According to Sajjad and Qureshi (2018), there are 415 public hospitals, and 127 private hospitals based in large cities in Saudi Arabia. For example, King Faisal Specialty Hospital and Research Centre have three branches located in Riyadh, Jeddah, and Medina. This hospital specialises in heart conditions, adult oncology, organ transplantation, paediatric, haematology/oncology, neurosciences, and medical genetics (kfshrc.edu.sa, 2020). Also, other hospitals, including the Prince Abdul Majeed Dialysis Centre, King Fahad Hospital, King Abdul-Aziz University Hospital, and other hospitals with expertise in specific specialities are all located in large urban areas (Sajjad and Qureshi, 2018).

This concentration of health facilities and centres of excellence in cities is paralleled by increased educational and increased career options in these locations. It is understandable therefore that many people prefer to live in urban areas, but as the population ages and co-morbidities increase, this will accentuate the existing strain under which the healthcare system operates. Although one solution would be to build more hospitals with more doctors and more beds, there are resource constraints and a more effective solution is to manage the operating processes and human resources of existing hospitals more efficiently, through use of digital solutions.

2.1.2 Education and Technology Literacy

Although digital technologies present opportunities to make healthcare (and other services) more efficient, they can only be successful if end users are digitally literate. Against this background, the Saudi Government is seeking to increase country-wide digital literacy through targeted initiatives. This is necessary to ensure that not only highly educated people such as doctors, nurses and other healthcare delivery personnel will be equipped to use new healthcare systems, but also patients. One of these is the provision of broadband Internet which provides users with high-speed Internet to access e-services easily on their devices. Moreover, the Saudi Ministry of Education (MoE) has dedicated enormous resources to ensure that from elementary school through to college, students are supplied with high-quality educational resources to increase their digital literacy (Abdelatti et al., 2017). For example, the Saudi Arabian General Investment Authority (SAGIA) recently signed a cooperation agreement with schools in which it allocated USD $772 million to improve student training and use of computers (Spencer, 2016). In addition, the Ministry or Education (MoE) has developed an educational management information system called Noor, which all schools under the MoE's responsibility are now required to use. This advanced system is designed to manage all the

affairs of instructors and teachers as well as providing a communication portal for parents and pupils to discuss their classes, grades and assignments. Through the implementation of Noor, the Ministry is also able to manage and collect data regarding teaching, learning and assessment. In addition, the Noor system requires students to use iPads as an educational aid (MoE, 2019). According to a survey by Cambridge International (2018), almost half of Saudi students now use computers in the classroom, and 16.6% of them are using smartphones or tablets such as iPads. In private schools, students are now becoming more familiar with using systems such as Amazon's Alexa or Apple's Siri voice commands to research topics in the classroom (Cambridge International, 2018, p. 4). The inclusion of these programs and applications in primary and secondary schools are ensuring that students develop a high level of technological literacy.

As these initiatives, both in schools and at higher level, have been rolled out, increased levels of technology use are now evident throughout Saudi Arabian society. For example, among the country's total population of 34.14 million, 89% are active Internet users (DataReportal, 2019), while 68% use social media (Chaffey, 2019). This shows itself in how the population interacts with social media. For example, the DataReportal Network collected data relating to the Internet and social media use in the country, based on the findings of several studies and industry reports (DataReportal, 2019). It found that there has been an annual universal growth in the use of social media among Saudis of nearly 13%. The majority of these regular users of social media are citizens between the ages of 18 and 24 (GMI, 2019), and when it comes to their involvement with such social media platforms, there appears to be a clear preference for using Facebook, Instagram, YouTube, and the messenger service WhatsApp, followed by Twitter (KSA, 2017, p. 36). One implication of this increased digital literacy is that those entering the workplace are already familiar with digital technologies and habituated to their usage in a variety of settings. However, older generations will not have passed through

the educational system in its recent form and consequently may well not be as skilled and at ease with technology as younger people.

2.2 Vision 2030

For several decades, Saudi Arabia has been dependent on revenue from oil and oil-related products in order to grow its GDP. However, the ongoing USA-China trade wars have negatively impacted this oil sector, alongside the recent agreement by the Organization of Petroleum Exporting Countries, which resulted in a reduction in oil prices from mid-2019 to March 2020. As a result, oil revenue in the country is expected to decrease from 14.8% (SAR 602 billion) in 2019 to 12.6% (SAR 513 billion) in 2020 (Abusaaq, 2019). In response to this situation, the government is seeking to diversify the economy to reduce its continued reliance on oil. This is being achieved through investment in programs and initiatives that will lead to an improvement in the quality of life for citizens (Abusaaq, 2019), the stimulation of new businesses, and increased economic resilience. For this reason, rather than directing a significant chunk of its budget to oil-related projects, the government has dedicated 35.3% of its budget to improving public services and investing in education and healthcare. As shown in figure 2.2, this equates to a spend of 18.9% (SAR 193 billion) and 16.4% (SAR 167 billion) of the country's annual budget on education and healthcare respectively (Budget Report, 2019).

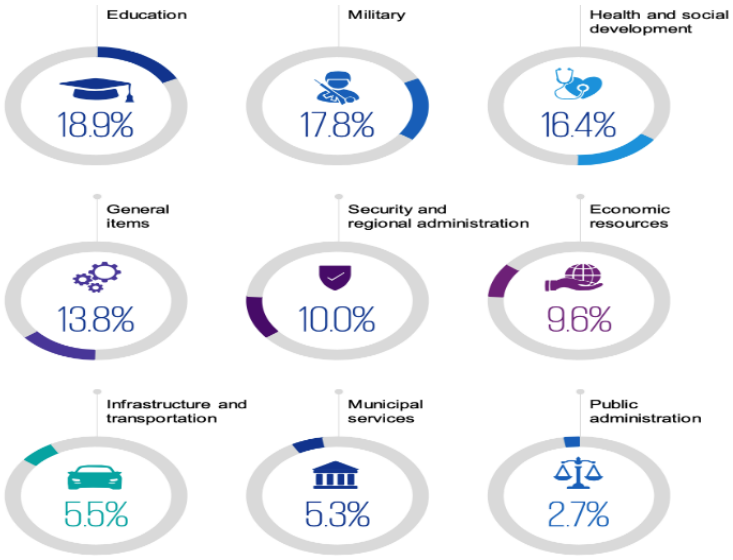


Figure 2.2. 2020 Expenditure by Sector, SR 1.02 trillion (Abusaaq,2019).

In addition, Saudi Arabia has allocated significant resources towards social welfare programs, totaling $27 billion since 2017 (Salloum, 2021). These initiatives aim to provide financial assistance to low-income Saudi households to help them deal with economic reforms' direct and indirect consequences. The government provides monthly cash transfers directly to their bank accounts. The Citizen Account Program, established in 2017 as part of the Saudi Vision 2030 plan, has disbursed over SR100 billion ($26.6 billion) to beneficiaries, playing a vital role in the country's economic transformation efforts. In the first half of 2021, the government's spending on social benefits increased by 51%, demonstrating its dedication to mitigating the negative effects of reform measures on its citizens (Salloum, 2021).

As part of its effort to increase economic resilience, the government formulated the National Transformation Program 2020, published on the 6th of June 2016, which sets out its objective to transform the country's economy and diversify its sources of income from the traditional emphasis on oil. The specifics of how this will be achieved are articulated in the strategy document, *Vision 2030*, which was launched on the 25th of April 2016 (Mohammed

and Alshuwaikhat, 2017). One of the main objectives of *Vision 2030* is to increase efficiency in the delivery of public services, increasing citizens' uptake of those services while reducing public expenditure, under the three primary themes of economy, society, and the nation's global ambitions. All three in some way favour the introduction of innovative technology into healthcare.

The first theme of *Vision 2030* focuses on the development of a thriving economy that makes efficient use of its currently available resources, thereby reducing public spending. Obviously, as already indicated, the aim of introducing digital technologies into healthcare is to achieve exactly that aim. The second theme outlined in *Vision 2030* is entitled 'Vibrant Society' and refers to the government's desire to ensure the well-being of citizens. The objectives within this theme focus on ensuring that individuals within Saudi society thrive by living in unity with the Islamic belief of moderation, having a strong sense of national identity and original cultural heritage, living in a safe environment with caring families, and benefitting from strengthened social and healthcare systems (KSA, 2017, p.17). In order to achieve these objectives, diverse initiatives will be implemented to encourage citizens to lead a healthy lifestyle. The government will be committed to optimising and better utilising public hospitals and healthcare clinics and to improving the quality of the available preventive and acute healthcare services. Again, the use of digital technologies in hospitals clearly plays a part in that. The third theme focuses on being an 'ambitious nation' that is based on an active, accountable, transparent, empowering, and high-performing government. In order to embrace transparency, government departments and bodies, including those in the healthcare sector, are updating their administrative practices and governance in order to meet international standards of accountability. The three themes of *Vision 2030* are shown in Figure 2.3.

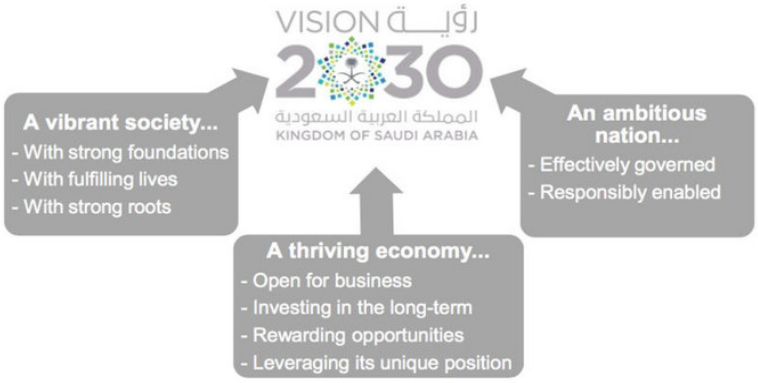


Figure 2.3. Summaries of themes highlighted in Vision 2030 (Arab News, 2016)

2.3 Vision 2030 and Healthcare Challenges

The MoH is the largest health service provider in the Kingdom, administering 60% of all healthcare needs in the public sector while the remaining 40% is shared between the private sector and governmental institutions such as the Ministry of Defence and the National Guard (Alatawi et al.,2020). Although the government is dedicated to making positive improvements, the quality of healthcare provision remains low. This is because of an increased demand for healthcare services combined with a shortage of doctors and nurses, a significant increase in population and longevity, and changing patterns of disease (Aljuaid et al., 2016). For the country to meet the objectives outlined in *Vision 2030*, it would need to have at least 710,000 healthcare professionals, requiring an increase of 360,000 professionals based on existing numbers, a challenging target to achieve. Whether this is attainable in that time period is questionable, particularly in light of other resource issues. For example, Saudi Arabia also lags behind the necessary bed capacity required due to its growing population and increasing life expectancy (Colliers International, 2018). At present, it has a 2.2 bed capacity, which compares unfavourably with the world average bed capacity of 2.7 per 1,000 population (see Figure 2.4). Moreover, capacity increase attempts are slow, with Alatawi et al. (2020) noting

that in 2016 there was a total of 274 hospitals providing 41,835 beds, and in 2017 this total had only increased to 282 hospitals providing 43,080 beds.

Compounding difficulties, since 2013, the prevalence of chronic diseases in Saudi citizens has increased sharply (Alqahtani et al., 2017). In fact, studies have shown (Saqib et al., 2017) that Saudi Arabia has the highest rates in the world of a number of chronic diseases and their related risk factors, with 1 in 4 adults being either obese or diabetic, in comparison to 1 in 20 adults in the UK (Diabetes in the UK, 2010). A third major disease affecting a large number of citizens in Saudi Arabia is cancer. The total number of cancer cases in 2018 in the country was 24,485 and 10,518 death cases. It is expected that the total numbers of new cancer occurrences will increase to 151,719 by 2025, and 30,718 citizens with cancer expected to die in the same year. Although the causes of cancer are multifactorial and can include genetics and the environment, early detection of all diseases is imperative for successful treatment. Despite this fact, researchers have claimed that a significant percentage of the population does not partake in routine medical check-ups, a fact that could affect the identification of symptoms during the early stages of the disease when treatment protocols are likely to be more effective (Alqahtani et al., 2017). Engaging with doctors and healthcare professionals on a more regular basis would allow for a diagnosis at an earlier, more treatable stage of the disease (Al- Kahil et al., 2019). However, based on the relatively few numbers of doctors per capita, digital technology may have a role to play in facilitating such engagement.

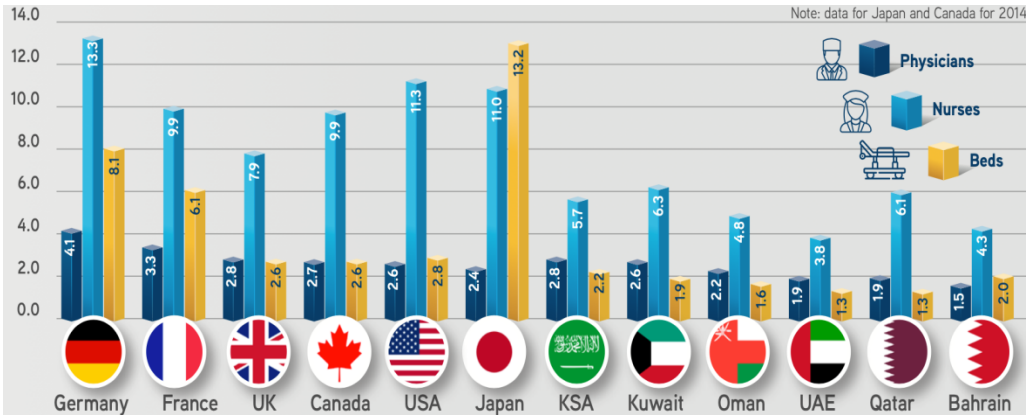


Figure 2.4. Key Healthcare Indicators Per 1,000 Population—2015 (Colliers International, 2018).

It is clear that the Saudi government is cognizant of the healthcare challenges that it faces and that it has the determination to improve the health and wellbeing of its citizens by expanding its healthcare services as outlined in *Vision 2030.* One of its strategies is to invest in e-health initiatives. It is aware that privatisation initiatives will take time to complete and recruitment of health professionals to the extent required to serve the increased population and changing demographics will be challenging. As a consequence, much will depend on the digital transformation of the health sector and whether this can create efficiencies, support independent living and provide more effective management of health conditions regardless of location.

Telehealth presents several advantages, such as increased accessibility despite geographical barriers and the Covid-19, ***but*** it ***also*** poses specific difficulties. Ho et al. (2023) have noted that while virtual visits can improve access to treatment, there are concerns that they may worsen health disparities. Similarly, Snoswell et al. (2021) have highlighted the potential benefits of telehealth in enhancing clinical care but cautioned that its effectiveness is contingent on appropriate usage. Shigekawa et al. (2018) emphasise the need for a thorough evaluation of factors such as modality, quality of evidence, population demographics, and timing of outcome measurements when assessing the efficacy of telehealth. Nonetheless,

numerous studies have demonstrated the advantages of telehealth for chronic illnesses, including psychotherapy as part of behavioural health and remote patient monitoring for an extensive range of conditions. The most consistent positive effect of telehealth has been observed in remote monitoring or communication and counselling for chronic illnesses like cardiovascular and respiratory diseases, resulting in improved outcomes such as reduced hospital admissions, enhanced quality of life, and reduced mortality rates (Totten et al., 2016). Investment in health information systems, termed e-health, is, therefore, critical to the success of the Saudi healthcare service system and its citizens.

2.4 OASIS: An E-Health System

E-health is defined by the WHO as the use of information communication technology (ICT) within the healthcare sector (MOH, 2020). One objective of *Vision 2030* is to leverage the capabilities of digital technology to facilitate improved healthcare services for citizens. Indeed, significant progress has been made regarding the provision of such technologies including health information systems and healthcare apps (MOH, 2020). One recent example of this is the health information system – simply referenced as 'OASIS'. This is a comprehensive large-scale system used to support the operation and management of hospitals through a broad spectrum of functions and modules, many of which extend beyond healthcare service provision. For example, it contains modules pertaining to accounting, human resources management, buildings and housekeeping, bed management, nursing management and pharmacy management functions, in addition to clinical support modules. The clinical and patient focused modules supported by OASIS enable access to patient medical records collated from across all hospitals, clinics and treatment facilities. Clinicians can view patient personal data and health profiles, appointments, medication, immunization, laboratory tests, radiology, documents, reports of vital signs, surgical procedures planned or completed, pathology reports, and hospital visits. They can also request tests, access results and update these records in real

time. Finally, clinicians can use the system to communicate with patients remotely via virtual calls. For their part, patients are also able to view their records and keep track of appointments via the system. In summary, OASIS provides specific benefits for clinicians and patients including:

(1) The patient database covers delivery of all public health care services. Hospital doctors can access patient healthcare records and track patients' conditions regardless of their locations. OASIS acts as a collective information database that stores patients' electronic health records and reports for a particular ministry of health hospital (nhic.gov.sa, 2020). Thus, if a patient first goes to a local public health centre, then to the general hospital, the health records will be shared between them.

(2) Doctors can schedule appointments and communicate virtually with their patients to provide the proper consultation at the right time as needed, for example, during the covid-19 pandemic.

The roll-out of the OASIS system in government hospitals was incremental, starting from as early as 2011. New functions were added to the system over periods of months, enabling pilot testing and revision. Initially doctors were not obliged to use the system, and many persisted with their existing manual data capture and filing methods. According to Shaker et al., (2020), in 2011, King Fahd General Hospital (KFGH) became the first hospital in Jeddah to employ the OASIS system to support the operation and management of health services. After that came Prince Abdul Majeed Dialysis Centre (PAMC), Marwa Urgent Care Centre (MUCC) and Rabwa Urgent Care Centre (RUCC). However, since implementation and usage of the system were voluntary at that time, doctors in these hospitals had the freedom to continue using their manual system/ paper records (e.g., paper records in filing cabinets or electronic material stored

on personal computers). Hard copies of medical records and X-ray images continued to be mailed between hospitals, resulting in many missing or incomplete records.

In March 2020, the MoH mandated the use of electronic system in all public hospitals and all healthcare providers working in hospitals received training on how to use the system to deliver health services. As not all paper-based patient history had been transferred to the system, doctors can still access the archive of non-electronic material, if necessary, with management permission. Clinicians can access the system from both office computers and tablets, using remote desktop to enter patient details. In addition, if they need to send details regarding patients being consulted between different ministry of health hospitals or clinics, they can use software called IHALAH which is one of the electronic programs implemented by MoH with the aim of providing all needs of transferring patients between health facilities in the regions of the Kingdom.

Level of access to the system and the ability to make changes or add information is determined by the healthcare worker's role and level of responsibility. For example, only the doctor who is consulted by the patient can access their details in order to preserve patient confidentiality, while a receptionist can use it to make appointments, but not to view patient records. The patient can access their health record by accessing OASIS via the hospital portal.

The software company which developed the OASIS system provides all hospital workers with comprehensive training to ensure proper healthcare information handling and delivery. The time, date, and type of training is organised via each hospital's IT department and delivered internally via workshops and zoom which teach the basic functions of the system, as well as the specific functions or icons that pertain to particular departments. A video channel was made available to each department containing additional informational content specific to their requirements. There is also an internal online feedback channel where users can flag

problems, they experience using OASIS and which are then resolved by the hospital IT department.

As noted, since the end of 2020, OASIS has been mandatorily employed in all public hospitals in Jeddah. Since that time, the Ministry of Health has sought to further enhance the benefits of the e-health service provision through development of apps that work in conjunction with the OASIS system. An example of this is the 'Seha' app which facilitates remote visual medical consultation between patients and doctors by enabling all Saudi citizens with a medical problem to obtain a free online consultation from an accredited physician, even if the patient is currently based outside of the country. Using this app, the patient and doctor can communicate through online chat, video call, email, or phone call. A second example is the 'E-prescription' app which authorises patients to obtain treatment from commercial pharmacies through advice from the MOH's remote channels. A third example is the 'Mawid' app. Patients can use this app to schedule or cancel any doctor's appointment at governmental primary medical clinics. Health professionals can also use this app to transfer any patient in a critical condition to the correct treatment hospital (MOH, 2019b). One final example is the vaccination reminder service. This app sends a message by phone or email to parents to remind them of the deadlines of necessary vaccinations against viruses, what type of vaccinations are available, and the date by which their child needs to take the immunisation (MOH, 2019b).

While the OASIS system and its complementary apps deliver clear benefits in relation to functionality, efficiency and transparency, the success of this system is dependent on its adoption. Although usage is mandatory, that does not necessarily translate into willing usage and the literature is replete with examples and empirical studies detailing employee resistance to new technology. These may manifest in adaptation behaviours and other coping responses. Whether this occurs in relation to the OASIS system and the factors that influence the form of those adaptation behaviours is the focus of this research. Responses to technology can change

over time and whether and how employee responses to the OASIS system transitions over time is also a focus of interest. Understanding those responses, specifically the factors that influence their formation and how these responses can be managed to achieve a positive outcome, is a complex yet worthwhile task that is necessary in order to ensure optimal usage of this technology and the success of future healthcare technology implementations.

2.5 Summary

This chapter has provided an overview of the contextual background to this study. Saudi Arabia is a rapidly developing country with a unique culture and a government that is keen to harness the benefits which digital technology can confer, in particular to support more effective delivery of the healthcare services that support the wellbeing of the country's population. The changing demographic and healthcare profile of the country and the strains under which the healthcare system operates makes such digital transformation an urgent issue. The OASIS health information system and its complementary apps have the potential to provide strong support in achieving digital transformation of hospital services and in improving healthcare outcomes for patients. However, the mandatory nature of its implementation will not necessarily translate into willing acceptance and maximal usage by clinicians and the literature has repeatedly demonstrated that employee resistance to new workplace technologies can take many nuanced forms or coping behaviours. Those responses, specifically their predictive factors and how they manifest and transition over time are the focus of this study. These issues will be examined in more detail in the following reviews of the literature.

Chapter 3 Literature Review – Technology Adoption

3.0 Introduction

As outlined in chapter 1, this study examines the mandatory implementation of a health information system named OASIS by public hospitals in Jeddah, the second largest city in Saudi Arabia. It seeks to investigate one group of users' coping responses to implementation of that innovation, the factors motivating both positive and resistant user responses, as well as the factors influencing transitions in responses over time. In doing so, it provides a counterpoint to the many studies of information systems adoption that focus on individuals' beliefs, attitudes and intent to adopt in contexts where innovation use is voluntary, but which also fail to consider the possibility that responses are not binary in nature even in a mandatory use context and that they may evolve over time. In order to understand these issues and their implications more fully, a critical review of the technology adoption literature is undertaken, starting in this chapter with a review of the literature that focuses on adoption, its process, the many factors affecting it, including people, the context of the innovation, and the technology itself. Section 3.1 describes the background of technology innovation research in general, into which the present study of a hospital management system fits. Section 3.2 considers influential analyses of the process of adoption of innovation as it occurs, which may or may not prove to be informative for the present study, which is predominantly located sometime after the innovation rather than while it could be said to be ongoing. People vary considerably in their reactions to new innovation and sections 3.3-3.5 discuss the characteristics of the adopter and how this can influence adoption response. Arguably it is the nature of those, and especially what they believe, that usually outweigh objective characteristics of the technology or the context into which it is introduced in their effect on adoption. Hence, we will expect such attitudes and perceptions to have explanatory power in the present study. Finally, 3.6 introduces

selected influential theoretical models of factors affecting adoption, whose ideas may expect to resonate in the analysis of the present study data. The structure of the chapter is shown in Figure 3.0.

Accordingly, the purpose of this chapter is to provide a critical review of the technology acceptance and adoption literatures, in order to glean insights that may assist this current study which is more in the area of resistance and rejection. This current study identifies the relevant core constructs, relationships and existing theories that have potential to guide examination of the factors that make affect user adaptation responses to the OASIS system. Every research situation is different, and the Saudi context will provide a unique contextual backdrop for investigating the culture independence of these constructs and their relationships.

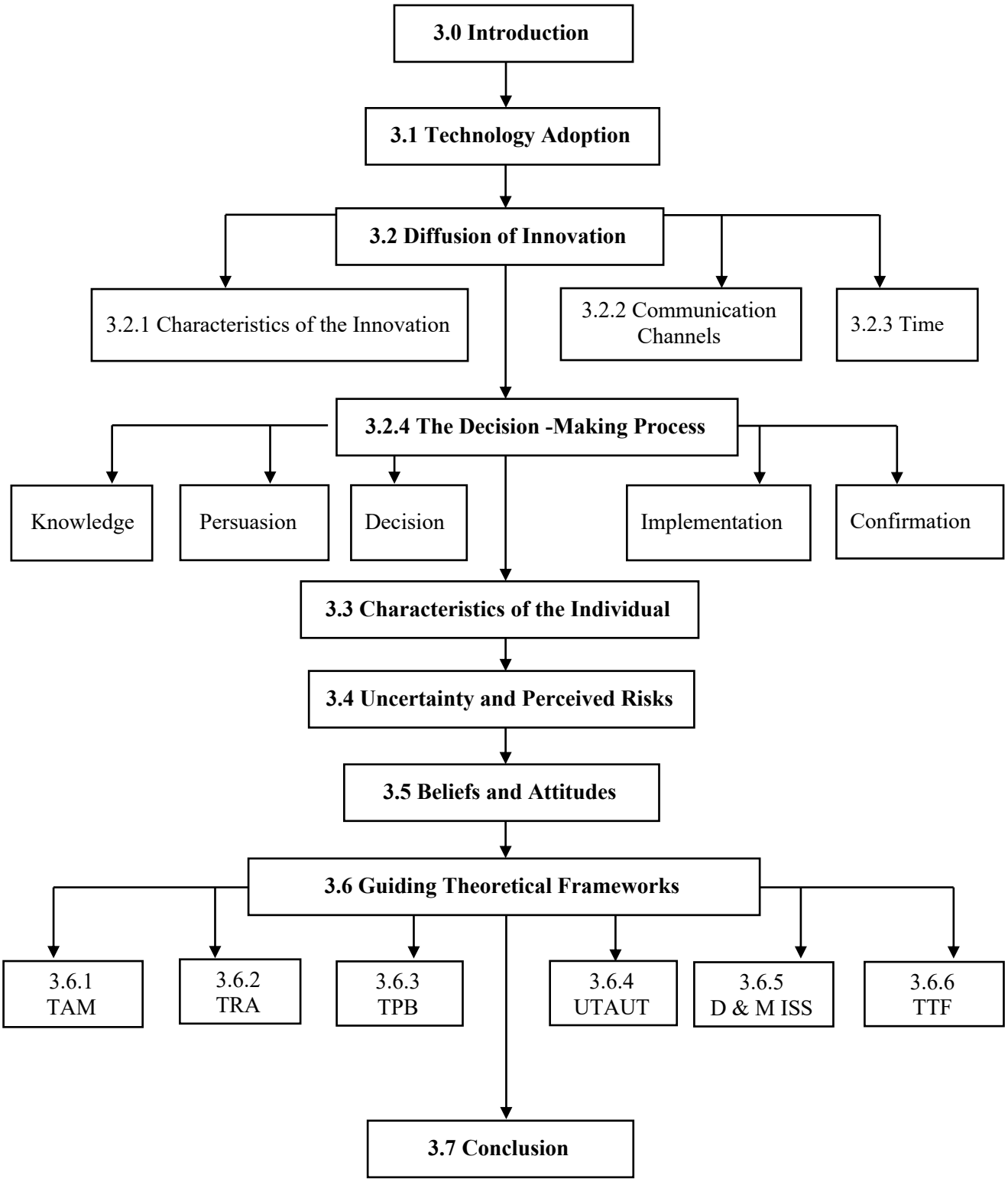


Figure 3.0. Chapter Three Structure.

3.1 Technology Acceptance and Adoption

Technology acceptance and adoption (TA) is a topic of enduring interest to numerous researchers across a wide variety of disciplines, including information systems, management, sociology, economics and psychology. In the Information Systems discipline, much research has been conducted examining innovation adoption from multiple perspectives ranging from a focus on factors influencing acceptance to (less often) those affecting rejection (e.g., Lai, 2016; Lai and Zainal, 2015; Lapointe and Beaudry, 2014; Dapp et al., 2012; Davis et al., 1989; Fishbein and Ajzen, 1974). For example, Dhagarra et al. (2020) examined innovation adoption in terms of factors that influence trust and adoption of new technology, while Orom et al. (2020) focused on factors influencing a negative outcome, including perception of risk and resistance to innovation. Much of this research focuses on technology adoption in highly specific contexts, a factor that can limit its generalisability. For example, Lai (2016) examines technology adoption in relation to an e-payment platform whilst others focus on online banking (Dissanayake and Nayanajith, 2019), e-commerce (Ward, Sipior, and Volonino, 2016), online shopping (Piarna and Fathurohman, 2020; Ashraf and Razzaque, 2015; Connolly and Bannister, 2007), or system adoption in public sector environments (Connolly et al., 2010). Adding to the complexity is the fact that the direction of these studies can vary considerably, whether focusing on the individual or the technology. One example of this, is the fact that much attention has been paid to the effects of characteristics of the individual (Weigel and Hazen, 2014; Talukdar, 2012; Venkatesh et al., 2003; Davis and Venkatesh, 2000; Ajzen, 1991; Rogers, 1983). For example, Lapointe and Beaudry (2014) examined IT user mindsets in their examination of factors influencing technology resistance, acceptance, and ambivalence. However, other research has focused on the characteristics of the technology (Adapa et al., 2018; Lian et al., 2014; Liu and Zhang, 2011; Boonstra and Broekhuis, 2010; Davis, 1986; Davis, 1989) with particular emphasis on perceptions of ease of use and perceived usefulness

(Davis, Bogazzi and Warshaw, 1989). In part, this variation in focus is a reflection of the fact that each researcher brings their own disciplinary lens to understanding technology adoption. Thus, researchers from the management discipline tend to focus on how technology adoption intersects with the organisation and impacts performance success. The precise nature of these investigations has varied considerably in terms of their direction and emphasis. Some have focused on the influence of organisational interventions. For example, Weigel and Hazen (2014) have identified the influence of incentives, managerial support, and training as key organisational factors influencing technology acceptance (or the lack of it). Others, such as Hoti (2015), have focused on the organisation's characteristics, examining how the factors influencing technology adaption vary according to the organisation's size. Adding to the complexity, those studies have also varied in the methodology employed, including qualitative, quantitative or mixed-method approaches (Creswell, J. W., 2013, Seale. C, 2011; DeFranzo, 2011; Mason, 2002).

For their part, sociologists tend to focus on the social context of the individual, examining how that can influence their behavioural response to new technology (Yousefikhah, 2017; Dahlin, 2014). An example of this is Lapointe and Beaudry (2014), who examined how an individual's social environment can influence their adoption and adaptation of new technology in their workplace. Their research shows that an individual's decision to accept a new technology in the workplace may result from peer influence rather than from a rational evaluation of the characteristics or usefulness of the innovation. Such influence is most effective when it comes from individuals whose opinions and beliefs are considered important (Lewis et al., 2003). That could potentially be peers in the workplace or in the individual's social network. Similarly, the work of Weigel and Hazen (2014) has shown that when peers and individuals in the same social network provide continuous feedback, encouragement, and support to other users, this increases the rate of adoption. Other researchers from the economics

discipline who have examined technology adoption, incline towards an analysis of demand and cost-benefit factors relating to markets, organisations, and society (e.g., David, 1985; Vergne and Durand, 2010; Arthur, 1989; Farrell and Saloner, 1985). Lastly, researchers from the psychology discipline tend to focus on the embedded characteristics of the individual and how these influence user responses. Much attention has been paid to psycho-social constructs such as trust and risk, examining how these influence technology adoption (e.g., Orom et al., 2021; Featherman and Pavlou, 2003; Mitchell, 1999; Angle, 1989; Cummings, 1965). An example of such research is that of Featherman and Pavlou (2003) who focus on negative utility measures (potential losses) due to the adoption of e-services. These researchers identify, operationalise, integrate and empirically test a number of these potential losses based on Perceived Risk Theory to propose a model for adoption of e-services.

The reason that technology adoption has received such interest from researchers across multiple disciplines derives from recognition of the value of technology in the modern world, in terms of its potential impact for organisations, individuals, and society. It reveals a rich mix of factors that have potential to influence its successful adoption, which we argue are equally relevant when considering negative outcomes, such as resistance and coping responses. What emerges from the literature is that understanding technology adoption requires a multi-faceted understanding of the relationship between the technology, individuals, and their organisational and social context.

Much of the adoption literature has focused on technology adoption within voluntary contexts (Bhattacherjee et al., 2018). However, as use of digital technology has become more normalized throughout society, its use has similarly become more embedded in organizations and in the delivery of government services. According to Staines et al., (2019), digital technologies enhance and assist the delivery of healthcare. Consequently, many new technologies, particularly those employed in public sector service delivery contexts, such as

hospitals, are either likely to become or have recently become mandatory for employees. This has implications for our understanding of technology implementation, not in terms of factors influencing user adoption, but in terms of factors influencing enthusiastic (or resistant) adoption. In the present study, as noted in Chapter 2, the innovation of interest (OASIS) was originally implemented in an optional capacity in hospitals (2011-2020), but since 2020, that implementation has become mandatory. Our interest in the present study relates to that second implementation phase.

In *mandatory* organisational adoption settings, users are required to use new technologies to fulfil their job functions, irrespective of their view of that technology or other inhibiting factors (Bhattacherjee et al., 2018). This results in them adopting the technology (in the behavioural sense of using it), although they may (attitudinally) still not fully accept it, and hence engage in a number of behavioural coping strategies in order to balance any cognitive dissonance. What is clear is that making technology usage mandatory does not imply that it will be willingly adopted or used to maximum effect, as intended by the organisation. In fact, although the literature on mandatory adoption of technology is limited, what does exist indicates that responses can vary substantially (Beaudry and Pinsonneault, 2010), ranging from limited adoption to continued resistance. Such outcomes, particularly those that are negative, are clearly worrying for management as they have the potential to influence organisational success. However, research on the factors, dynamics, and relationships that influence user adaptation responses in such mandatory organisational adoption contexts, as well as how these may vary according to cultural context variation, is remarkably limited, and consequently our understanding of what interventions are likely to be most effective in increasing that adoption remains equally incomplete. Furthermore, adoption research tends to focus on the time when IT innovation occurs, viewing this as a static outcome that does not change over time. Yet, as users become more familiar with a new technology, it is entirely possible that they may become

entrenched in non-optimal adaptation behaviours, or that they may progress or regress in their response to the technology. However, whether such transitions occur and the factors which may motivate them remains undetermined. For that reason, research on these issues, specifically user responses to new technology implementation in mandatory use contexts, as per the present study, is urgently required.

3.2 Diffusion of Innovation

In his 1983 book innovation diffusion, Rogers emphasises that group adoption of a new technology is rarely an overnight phenomenon, regardless of how helpful the functionality of the new technology may be. He describes diffusion as the process (1983: 11) through which an innovation is communicated through specific channels, over time, and among the individuals from a social system. He provides examples of innovations such as water boiling in Peruvian villages and the effectiveness of lemon juice to reduce scurvy in the British Navy, each of which has obvious value, but nonetheless experienced resistance. In recognising that adoption is a process, he provides a valuable acknowledgement of the potential role of external factors such as social influence and communication structures in influencing the adoption decision and the adoption rate (figure 3.1). This has been echoed by later researchers (Gattupalli et al., 2016), who note that the relationship between communication channels and the attributes of the innovations often interact to slow down or speed up the rate of adoption.

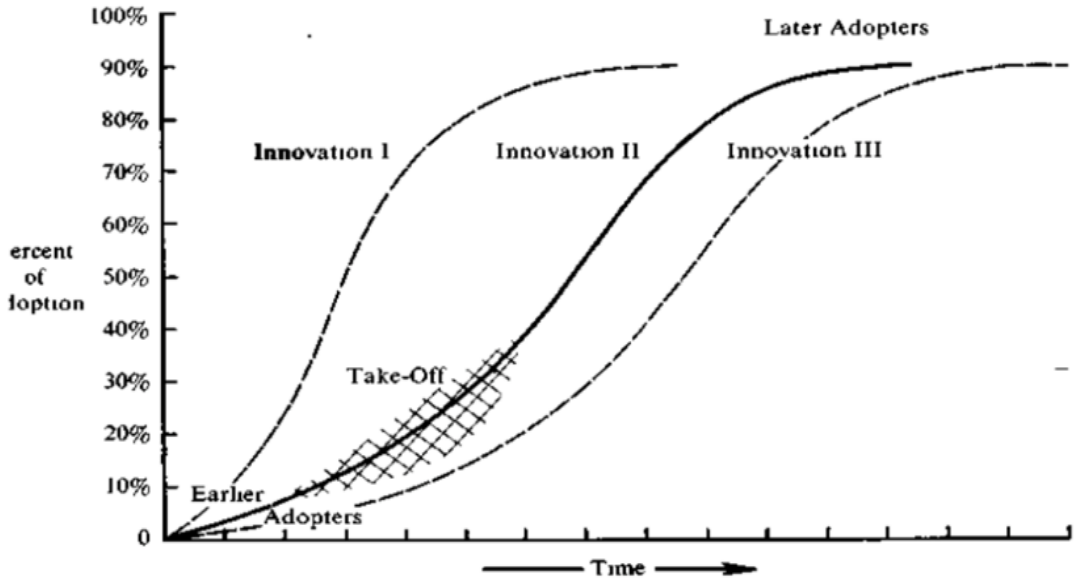


Figure 3.1. Diffusion Process According to Rogers (1983).

When an idea (or technology) is new to an individual or other unit of adoption, it is perceived as an innovation by them. It is this newness of an idea that determines how an individual reacts to it (Sahin, 2006). That perceived newness of an object, idea, or practice is not limited to new knowledge, because an individual may have known about an idea for quite a long time, but not yet considered its relevance and may not have developed a positive or negative attitude towards it. In the context of the present study, as detailed in chapter 2, when adoption of OASIS became obligatory in 2020, hospital doctors had indeed been aware of this technology for some years prior. However, usage was optional, and many did not consider using it and instead proceeded with their traditional usage of paper-based systems. In part this may be due to a lack of awareness of the characteristics and functionality of the technology and the benefits it would confer, which would outweigh any associated learning requirement. This is now discussed in more detail.

3.2.1 Characteristics of The Innovation Affecting Rate of Diffusion of Adoption

Rogers (1983) opines those innovations vary in rate of adoption according to how they are perceived. He suggests that the characteristics of an innovation, as perceived by the individual or social group (e.g., in the case of this research, hospital doctors who are mandated to use the OASIS system), are one factor that determines the rate or speed of adoption of that innovation. In this regard he makes an important distinction stating that it is the receivers' perceptions of the attributes of innovations, not the objective attributes as categorised by experts or development agents, that influence that rate of adoption. He proposes five perceived characteristics of innovations as influencing their satisfactory uptake. These are relative advantage, trialability, compatibility, observability, and complexity. Although each of these characteristics are conceptually unique from one another, they are partially interrelated. For example, innovations that are perceived to have a relative advantage may also be characterised by observability, compatibility, and trialability, but lack complexity. Rogers found that 49 – 87 percent of the variance in the adoption rate of new ideas can be explained by the adopter's perception of these five characteristics and later research (Moore and Benbasat, 1991) also confirms that these five attributes can provide a reliable prediction about the rate of adoption of an innovation. They will be considered in detail here because they may be equally influential in predicting the rate of change of resistance and rejection of innovation over time, and hence the incidence and persistence of coping responses.

The first of these characteristics, *relative advantage,* refers to the perceived degree of superiority of the new product as compared to its competitors (Rogers, 1983; Moore and Benbasat, 1991). This relative advantage can be seen in the product being more durable, affordable, environmentally friendly, or even economical in terms of power consumption than other products (Emani et al., 2018). In this study case, the hospital doctors are not really in a position to know what competitor digital hospital management systems exist and whether they

are better than OASIS, other than those few individuals who may have worked in an international hospital context that used other systems (e.g. in the USA). In the main, those responsible for developing and selecting OASIS as the standard system for Saudi Arabia should have considered its relative advantage over competitors.

The second innovation characteristic proposed by Rogers, *compatibility,* refers to how well the new product is perceived to blend into the users' life or work (Rogers, 1983). In other words, compatibility is a measure of how likely it is that the work or life of the user will need to change if the product is adopted, or conversely that it will support their existing way of operating. Consumers buying a new product frequently use existing knowledge, past experiences, and existing needs to assess the impact of the product on their lifestyles (Kant and Singh, 2018). In the case of the current research, the lack of adoption of the OASIS system prior to 2020 may indicate that hospital doctors already decided that the technology was not compatible with or would unduly disrupt their way of working. Furthermore, it has been found that a new product necessitating the purchase of additional products (e.g., a television set that requires a separately acquired device in order for a family to watch a movie (Moore and Benbasat, 1991) reduces perceived compatibility and increases the probability of adoption failure (Kant and Singh, 2018). In the present case, doctors do not have to buy any extra equipment themselves, but OASIS certainly has required them to alter their work habits compared with how they worked before it was imposed. This could be perceived as an incompatibility with their previous ways of operating.

The third perceived characteristic of an innovation relates to the *complexity* of the innovation. The higher the perceived complexity of a product, the lower the adoption rate becomes. Complexity relates to the difficulty that is associated with learning and using the product from the perspective of the prospective adopter. During the product design phase, designers should therefore consider the characteristics of the intended user and make necessary

modifications to ensure that the user can easily and independently adopt the innovation (Moore and Benbasat, 1991; Tanye, 2016). In the case of this research, OASIS was developed with input from hospital management but not involvement of intended users such as doctors or indeed nurses, receptionists, radiographers and so forth. As a result, it may have emerged in a form that is not as user friendly as it might be, and this complexity may have led to many doctors showing resistance to it.

The fourth characteristic proposed by Rogers is that of *trialability:* the ease with which the technological innovation can be made available to prospective users on a trial basis. At times this can be achieved through the issuance of free samples. For instance, with products such as software applications, users are usually given a seven-day or even a one-month free trial of the product. Such trialability has been shown to increase user adoption of the product (Tanye, 2016; Rogers, 1983). In the case of OASIS, the technology was provided to hospitals for optional use between 2011 and 2020, before the MOH adopted it as mandatory. However, that period was not used as a trial period in the usual sense, since at the end of that period users such as doctors were not allowed to choose whether to use it or not. Also, as far as is known, activities typical of a trial did not occur. No information was gathered during that period regarding how potential users such as doctors viewed the technology nor was feedback gathered from such users to help improve the program.

The final attribute is *observability,* which refers to the noticeable change that the new product will bring to the life of the potential adopter (Rogers, 1983). The more evident the benefits of the innovation, the more attractive the product will be to the adopter. This therefore implies that products which are perceived as being capable of bringing substantial positive impacts to the life of adopters are usually associated with higher rates of adoption. It is therefore advisable for innovators to ensure that the positive impacts of their products are communicated clearly, and benefits highlighted (Tanye, 2016). In this current research would imagine that

benefits of OASIS in terms of speed of access to patient information, the efficiency of paper-free operations, and the value of virtual consultation during COVID would be obvious. It seems however that these benefits were either was not apparent to all the hospital doctors or that other factors inhibited their understanding of the value of the technology and consequently inhibited their adoption response.

Further research by Moore and Benbasat (1991) proposes three more characteristics associated with effective diffusion of an innovation. These are image, result demonstrability, and voluntariness of use. According to these researchers, individuals may choose to adopt or reject an innovation based on factors related to its social approval: in this case, *image* refers to the degree to which the innovation alters the adopter's social status. In a hospital context this might be seen as related to status relative to other doctors or in the eyes of the hospital management. While management may wish for voluntary adoption of the OASIS system, such adoption is still likely to be of lesser importance than the individual's qualifications and extent of experience (e.g. whether they are interns, juniors, residents, or consultants). Moore and Benbasat (1991) propose that *result demonstrability* and *voluntariness of use* should also be considered as characteristics of an innovation that may influence its uptake. The former is the degree to which an individual innovation is easy to communicate to others. The latter entails the degree to which the innovation's adoption is optional. The absence of such voluntariness of usage may predict passive resistance on the part of the end user, thereby influencing extent of adoption. This is clearly pertinent in the case of OASIS.

Table 3.1 outlines the 8 characteristics of innovation proposed by Rogers (1983) and Moore and Benbasat (1991), showing the nature of their expected relationship to adoption of the OASIS system. By implication, these factors are also expected to affect the degree of resistance/rejection to the innovation and associated use of coping strategies, which are the main interest of this study.

Table 3.1. Factors Affecting Diffusion of Adoption of An Innovation

Innovation's Characteristics	Description	Expected Relationship to Adoption Diffusion of OASIS in this Current Study
Perceived Relative Advantage	The degree to which the innovation's standards are seen to exceed those of its precursor (Rogers, 1983), which includes judging the merits of the innovation's features functionality over those of the existing products or ideas (Moore and Benbasat, 1991).	Positively related
Perceived Compatibility	Apparent consistency of the new technology with the workstyle, experience and needs of potential adopters (Moore and Benbasat, 1991; Rogers, 1983).	Positively related
Perceived Complexity	The level of the innovation's apparent sophistication and difficulty that influences its use by the adopter (Moore and Benbasat, 1991; Tanye, 2016; Rogers,1983).	Negatively related
Perceived Trialability	The extent to which the innovation can be used on a trial basis during planning stages and prior to implementation/adoption (Rogers, 1983). This removes any uncertainty a prospective adopter has towards the innovation (Moore and Benbasat, 1991).	n/a because there was no trial of the type assumed
Perceived Observability	The visibility of the innovation's benefits (Rogers, 1983).	Positively related
Image	The magnitude of the innovation's effect on the adopter's image or social status (Moore and Benbasat, 1991).	Positively related
Result Demonstrability/ Communicability	The degree to which an individual innovation is easy to communicate to others (Moore and Benbasat, 1991).	Positively related
Voluntariness of use	The degree to which the adoption of an innovation is optional (Moore and Benbasat, 1991; Bozbay and Yasin, 2008).	n/a because there was no choice

3.2.2. Communication Channels and Innovation Diffusion

Result demonstrability relates to the fact that, once an innovation has been created, awareness of its benefits is diffused from person to person through communication channels. In particular, individuals frequently assess an innovation through the subjective evaluations of close peers who have rejected or adopted the innovation, rather than based on a scientific evaluation of merits (Sahin, 2006). Mass media channels are claimed to be the most effective channels in building initial awareness of a technological innovation. In contrast, interpersonal channels are most effective in establishing and shifting attitudes towards an innovation, consequently influencing the decision to reject or adopt the innovation (Zhang et al., 2015).

In the present study, initial awareness of OASIS was highlighted to hospital staff by management and information on the system was disseminated by email and at departmental meetings. It is possible that doctors may have discussed it informally amongst themselves over a period of time and their opinions may have been formed through feedback on the technology received from peers. However, whether that is the case, and more importantly, whether that influenced their attitudes towards the technology remains undetermined. One important point relevant to this issue is that of heterophily and homophily in terms of how this influences the success of communication channels in ensuring adoption. Heterophily is the extent to which a group of individuals differ in relation to social status, education, and beliefs. This lack of similarity can result in less trusted communication about the technology's characteristics, reducing its uptake's effectiveness. Homophily is the opposite of heterophily, and it is the degree to which the group of interacting individuals share similar characteristics, such as would be the case among hospital doctors in Saudi Arabia. Generally, communication regarding an innovation tends to be more successful when it takes place in a homophilous context with individuals who share the same characteristics (Murray, 2009).

3.2.3. Other Aspects of Diffusion

As has been previously stated, diffusion is a process (Rogers, 2003), wherein communication regarding an innovation takes place over a period of time. One of the strengths of diffusion research is the inclusion and measurement of a time component (albeit frequently through recall by respondents), rather than treating adoption or rejection of innovation as if they occur instantly and remain unchanged from that point forward. The present study recognises that time component through the fact that examines adoption response over a period of time, exploring the potential transitions in that response and its underlying motivating factors.

Aside from what has been covered above, the time component involved in diffusion includes three further aspects to study (Rogers, 1983). First, researcher have the rate of innovation adoption, typically measured by the number of potential users adopting the innovation over a given period of time. That is still an oversimplification of course in that it does not consider degrees of adoption within each person: people do not usually go instantly from complete rejection to full adoption. In the current study of OASIS, it is expected to find that many doctors are somewhere in between those extremes.

Second, there is the process of innovation-decision-making whereby a person moves from first knowledge of innovation to its acceptance or rejection. Last, each person or other adoption unit can be assessed according to their level of innovativeness when compared to other potential users of the innovation. For example, members of social systems vary considerably in terms of the individual level of innovativeness that they possess as a personality trait and in respect of particular innovations have been characterised as innovators, early adopters, early majority, late majority or laggards (Rogers, 1995). They are represented in the innovation adoption curve shown in Figure 3.2.

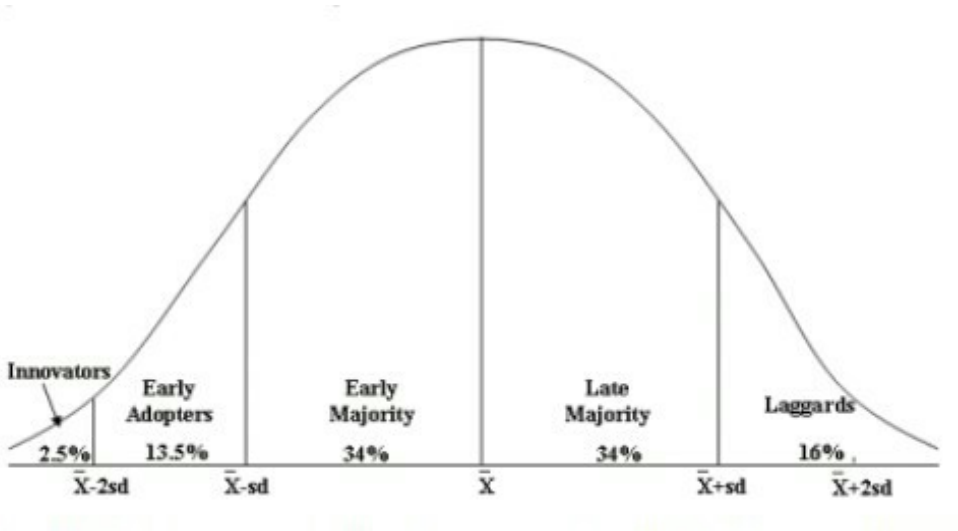


Figure 3.2. Innovation Adoption Curve (Rogers, 1995).

Rogers (1995) describes innovators as individuals who embrace change, love new ideas and are often the first to try them. Getting these kinds of people to adopt an innovation is therefore easy as little motivation is required, and they may adopt it immediately (Cui et al., 2009). The second grouping, described as the early majority, needs to be assured that the innovation will be effective, placing value on success stories that provide proof of this (Murray, 2009). The third group, the late majority, will only accept the innovation after most of the relevant population has successfully used it, so agents encouraging change must provide information on how many people have successfully adopted the innovation (Murray, 2009). Lastly, laggards are conservative in their attitudes and their opinions are therefore slow to adopt new products or services. They may however be more open to influence from other individuals or groups whom they trust. The present study, taking place some two years after OASIS became obligatory, will reveal whether that is supported, or whether there is an indefinitely long tail on the right-hand end of the distribution shown in figure 3.2, implying the presence of extreme laggards who resist adoption of an innovation. In summary, when studying adoption, it must be considered that not all individuals respond similarly when presented with an innovation, regardless of whether the adoption context is one that is voluntary or mandatory.

3.2.4 The Adoption Decision-Making Process

Rogers (1983) states that when organisations or individuals assess a new technology and decide on rejecting or adopting it into their ongoing practices, they do so by proceeding through an innovation-decision process. The perceived newness and the uncertainty around the newness of innovation makes this a distinctive form of decision making (Rogers, 2003), one that is cognitive and involves the stages of knowledge of the innovation, attitude formation (persuasion), decision-making, implementation and decision confirmation (such as full adoption or rejection of the innovation; Rogers, 1983). The process is shown in figure 3.3 below.

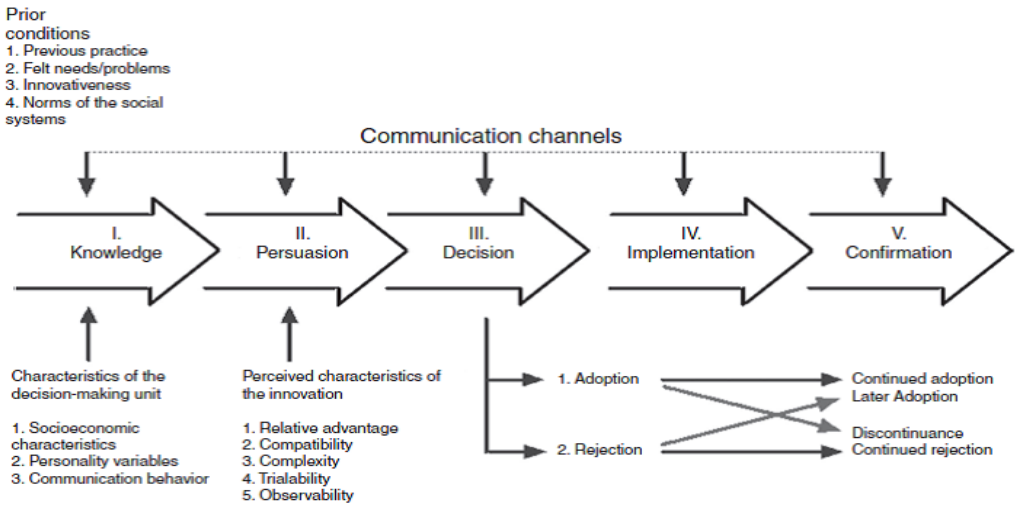


Figure 3.3. Decision Process for Innovation (Rogers, 1983, p.165).

Knowledge acquisition is seen as the first stage of the innovation-decision process. In this stage, an individual learns about the existence of a new idea and may seek information about it by asking critical questions about the nature and purpose of the idea. The individual seeks to understand what the innovation is and why and how it works (Awa et al., 2015). For example, in the case of OASIS, this would involve learning about the benefits of the system, why healthcare professionals trust it and why they use it, as well as any risk-associated factors. Rogers (2003) asserts that questions regarding the nature and purpose of the innovation

generate three types of knowledge which are described as *awareness-knowledge, how-to-knowledge,* and *principle-knowledge*. The former, *awareness-knowledge* denotes knowledge of the existence of innovation, which is an essential first stage as it can motivate an individual or social group to seek to acquire more insights about the innovation and accordingly adopt it (Rogers, 2003). Additionally, this knowledge motivates an individual or the decision-making unit to progress to other knowledge types. *How-to-knowledge* contains information related to how to use the new idea or innovation suitably (Sahin, 2006), which increases the chances of adoption. *How-to-knowledge* is an important variable in decision-making as it is critical for complex innovations. The third type of knowledge is *principal knowledge* (Sahin, 2006), which consists of information dealing with the performing principles underlying how the new technology works. Although an innovation may be adopted without *principal knowledge*, its adoption may then be easily discontinued due to innovation misuse or confusion regarding how it should be used. Once this stage of knowledge acquisition has been completed, it is followed by the persuasion stage. In the context of this current study, use of the relevant innovation (OASIS) will have been mandatory for at least two years, and it was previously available for a number of years prior to that, so doctors will have acquired adequate knowledge regarding its existence and functionality.

According to Rogers (1983), the *persuasion* stage is where the potential adopter develops a positive or negative attitude towards an innovation, one which directly or indirectly influences the rejection or adoption of it in actual use. It is the individual's knowledge regarding the innovation, which has been acquired from the previous stage, that shapes the adopter's attitude towards it, although other factors (such as the characteristics of the innovation) and the potential adopter's personal innovativeness may play a role in shaping that attitudinal response. For instance, when a hospital doctor learns about the OASIS system, how it can be used and its benefits, they start to form an attitude towards it. Thus, while Rogers

argues that the first stage of the innovation decision process is more about knowing, i.e., acquiring information, this persuasion stage is more about *feeling*, i.e., affect.

The newness of an innovation inevitably creates a level of cognitive uncertainty in the mind of the potential end user. To assuage that uncertainty, most individuals then seek subjective information about the innovation from their close peers, a fact that highlights the importance of the subjective assessment of peers and colleagues in comparison to that of experts (Rogers, 1983). It is this combination of the extent of uncertainty which the individual feels about the innovation combined with the social influence of influential peers and colleagues that affects the beliefs and the opinions of an individual concerning the innovation (Kaminski, 2011). In the context of OASIS, this points to the role of other doctors who are using the system and the need to factor in the importance of their opinion in influencing other potential users, rather than reliance on communications from IT managers or those involved in the system development.

At the next stage, which is *decision* stage, the decision-making unit may choose to entirely reject or entirely adopt the innovation (Gangwar et al., 2015). The context imagined here is one where the innovation is not mandatory. However, in the case of this study, hospital doctors currently are not free to totally reject the innovation behaviourally although they my still resist it attitudinally, as expressed through passive resistance mechanisms, such as workarounds. At this point, the value of trialability is regarded as more evident, as many adopters require an in-context trial before they will commit to adoption decisions (Kyratsis et el., 2012). Partial trials may speed adoption, but rejection during a partial trial is equally possible. It seems that the latter may have happened for some doctors in the period 2011-2020, when use of OASIS was optional (rather than a trial period in the usual sense). However, the adoption decision applies only superficially to the participants in the present study, since they have no alternative but to use OASIS i.e., they are not permitted to trial use of the system and

then decide not to adopt it (behaviourally). They are, however, still free to make a (cognitive or attitudinal) decision against using it.

A distinction has been made between two kinds of rejection decision. In 'active' rejection, a decision-making unit, (i.e., the person) either rejects the innovation immediately (without trialling), or it is possible that they may trial an innovation, then adopt it, but subsequently reject it (the discontinuance decision). In the second type of rejection, passive rejection, the decision-making unit, with high resistance to change as a personality trait (such as a laggard), does not consider adopting the new idea at all and rejection is therefore the default position for such individuals. Whilst little can be done to change personality traits, this does point to the importance of facilitating trails of an innovation as a support towards adoption decision making.

In the *implementation* stage, the innovation-decision process progresses from a cognitive exercise to an actual behaviour (Rogers, 1983). This usually assumes a voluntary adoption context. In the case of this research, the hospital doctor is required to comply (at least to some extent) behaviourally regardless of their attitudinal decision (what he/she chooses to do). Hence the decision-implementation transition is more accurately conceptualised as similar to a decisional fracture than a continuation of the process. This is therefore likely to result in some adaptation behaviours occurring as a form of passive resistance, e.g. in the form of a person using some features of OASIS that they are expected to use, but not others, and finding workarounds to substitute for some functional requirements, representing a coping response.

Within this stage is a process that Rogers termed *re-invention*. This is the process through which the use of an innovation is changed or modified by an individual during implementation, from what the promoters of the innovation had in mind (Rogers, 2003). At present there does not appear to be such re-invention with OASIS, but this study will include attention to whether this occurs. An example would be if a doctor has found a way of using

OASIS to provide some information or perform some tasks that the MOH and OASIS Company had not intended or thought of. The more versatile and adaptable an innovation is seen to be in such a way, the more likely it will be fully adopted (Kaminski, 2011).

Returning to the topic of uncertainty within these stages, when the innovation has been fully institutionalised and becomes a normal part of the individual or organisational routines and practices, the newness of the idea disappears, marking the end of the *innovation-decision making* process (Rush et al., 2019). In the case of this current research, it will be interesting to see if this stage has in fact been widely completed, given that at least two years have passed from the point of mandatory innovation. If a doctor is persisting with incomplete adoption, using various coping strategies, he/she may be in a sense stuck or 'fossilized' in a stage of incomplete implementation. The potential for this phenomenon as an adoption outcome has not been adequately examined in the existing literature.

At the *Confirmation* stage, the innovation-decision has been made, but the individual may still need to seek support for their decision because it could potentially be reversed if the individual is exposed to contradictory information about the innovation (Rush et al., 2019). The attitude of the decision-making unit and the support that they receive for their adoption decision will therefore determine whether such discontinuance takes place. Rogers (1983) highlights two types of discontinuance, which he terms 'replacement' and 'disenchantment' discontinuance. In the former, replacement discontinuance, an individual may reject the innovation in favour of what is perceived as a superior innovation, while in the case of the latter, disenchantment discontinuance, the innovation is rejected because the individual is not satisfied with the innovation's performance. In the mandatory situation of the present study, hospital doctors are not free to engage in either behavioural response. However, the present study will reveal if any doctors have beliefs or attitudes that are represented in either of those categories.

To conclude, this discussion indicates that an individual's attitude towards innovation, and their behavioural adoption of it, is not a static event. It is an ongoing process affected by many factors that, in order to reach its full conclusion requires reduction of uncertainty and other supports in order for a person to decide that adopting the innovation is the correct decision. Although a researcher has seen that Rogers description of this process (through its focus on voluntary adoption contexts) does not entirely accord with the current study context, this 'process-perspective' is valuable and contains important guidance in relation to user adoption of OASIS and how it can be supported so as to ensure that all the hospital doctors adopt it willingly and maximally.

3.3 Characteristics of the Individual

Each user of an innovation is a unique individual, and their characteristics can impact the uptake of the innovation (Rogers, 1983). Indeed, some such factors have already been mentioned or implied. As previously noted, (s*ection 3.2.3*) adopters can be broadly grouped into innovators, early adopters, early majority, late majority, and laggards, depending in part on the person's personality traits, either as being generally innovative or resistant to change. Other specific personal characteristics can also influence the individual's attitude towards innovation and their adoption decision. Some of these are demographic factors. For example, age, gender, academic qualifications, tenure, occupation category, and academic level have been shown (Garavand et al., 2016; Goswami and Dutta, 2015; Weigel and Hazen 2014; Scott et al., 2008) to influence innovation adoption. Similarly, p*ersonality traits,* including openness, agreeableness, and extraversion, have been shown to influence attitude and adoption behaviour (Rogers, 2003; Ryan and Gross, 2017). The level of *motivation* is also an important characteristic. For instance, if employees exhibit low morale in using a newly implemented technology, they may never fully utilise it (Agrwal et al., 2007). Managers wishing to intervene

to promote an innovation may seek to increase motivation in several ways, through reward-based systems or, where necessary, through training interventions that increase the individual's ability to use the system and become aware of its benefits (Agrwal et al., 2007).

User *self-efficacy* has also been shown to influence adoption intention (Kavandi and Jaana, 2020). This is their self-perceived qualities and skills which make it easier or harder for potential users to exploit a technological innovation. Organisations again may intervene to enhance individuals' abilities to use innovations by offering training and support (Profili et al., 2019). Additionally, users may have *cognitive characteristics* related to perceptions, expectations, intentions, and attitudes. More specifically, this includes effort expectancy, and performance expectancy (Phichitchaisopa and Naenna, 2013) and perceived usefulness (Garavand et al., 2016; Talukdar, 2012; Venkatesh and Davis, 2000; Igbaria et al., 1996). Those concern how easy to use and how useful they expect the innovation to be. These phenomena influence the ease, likelihood, and extent of adoption. Furthermore, users may have *experiential and emotional characteristics* that are relevant, such as their cognitive interpretations of innovations (Bhattacherjee et al., 2018), prior experience and training (Kavandi and Jaana, 2020, Venkatesh and Davis, 2000; Talukdar, 2012) or even their enjoyment of the innovation, sometimes called 'hedonic motivation' (Venkatesh and Davis, 2000; Talukdar, 2012; Igbaria et al., 1996). Knowing about these individual characteristics can help develop an intervention strategy to promote innovation. For instance, organisations can increase users' self-efficacy by offering training and support to improve their ability to use implemented innovations. They can enhance employees' connectedness through the provision of seminars and workshops since connectedness also influences innovation adoption. Table 3.2 summarises pertinent studies which show the effects of individual characteristics on innovation adoption.

Table 3.2. Influence of Individual Characteristics on Innovation Adoption.

Author	Type of Study	Core Findings About Effects of Individual Differences
Rogers (1983)	Literature review of 508 diffusion studies.	Individual characteristics differ between people, and this affects the rate of uptake of innovations.
Bhattacherjee et al. (2018)	An empirical study of 47 interviewees.	Innovators see the opportunities provided by their innovation. Other individuals are likely to adopt it when the innovation is clearly explained and supported by evidence.
Talukder (2012)	An empirical study about technology adoption, with a sample 2,270 administrative and academic staff using online questionnaires.	This study explored how the following contribute to technology adoption: promotion of personal image, perceived usefulness, enjoyment of use, the prevalence of training and support, incentives, and prior experience with innovations.
Venkatesh and Davis (2000)	Four longitudinal field studies on innovation uptake, comprising a total of 156 respondents.	The uptake of innovation is influenced by the innovation's perceived ease of application, image, and norm.
Kavandi and Jaana, (2020).	A systematic review of information technology adoption studies.	Factors such as price/cost, perceived usefulness, ease of use, social influence, self-efficacy, security, socio- demographic variables (education, gender, and age), experience and training, intrinsic technology quality, and facilitating conditions all have a significant influence on information technology adoption by seniors.
Igbaria et al. (1996).	471 professionals and managers in sixty-two companies were interviewed to test a motivational model of microcomputer usage.	Perceived usefulness is a motivating factor in the adoption of innovations.
Garavand et al., (2016).	A systematic review of studies on adoption of technology, acceptance and use of IT in medicine from databases such as Google Scholar, Web of Science, Science Direct, and Emerald were conducted to investigate factors influencing technology adoption.	This study confirmed factors such as ease of use, social impact, facilitating conditions, usefulness, behaviour and attitude of users as important in influencing the use of health information technologies adoption.

Scott et al. (2008).	An empirical study with a sample of 153 physicians.	The adoption of innovation is related to the years of experience (tenure of occupation), and motivation.
Phichitchaisopa and Naenna (2013).	Data were collected from 400 healthcare representatives using structured questionnaires to examine the adoption of healthcare information technology.	This study confirmed that effort expectancy, performance expectancy, facilitating conditions all have a significant effect on technology adoption.

3.4. Uncertainty and Perceived Risk

The literature recognises that uncertainty, newness and risk can inhibit technology adoption (Bhatti, A., Saad, S., and Gbadebo, S. M., 2018). Uncertainty refers to the number and probability of alternatives perceived by a person (Rogers, 1983). It may be understood as a lack of predictability that motivates a person to search for knowledge, rather than immediately adopt the innovation or reject it. Multiple causes of uncertainty exist. For example, users may experience uncertainty if they do not understand how to use the system's software or hardware. That uncertainty may then mean that they do not immediately decide to adopt the new system, but instead first seek training. That view complements the view expressed earlier (Table 3.1) that the complexity of the system directly affects diffusion of the innovation, and that the individual's lack of knowledge and self-efficacy directly affects adoption of an innovation.

Newness is a factor that may also contribute to the user's uncertainty regarding an innovation. Its effect is that it may motivate the individual to seek knowledge against which the innovation can be evaluated. This process of innovation evaluation followed by further information seeking usually involves assessing the new system in terms of its functionalities and benefits, as compared to previous systems (Rogers, 1983). For example, in this view when encountering the new OASIS system, the user (doctor) will be aware that one of the stated benefits of the technology is that it will reduce the time taken for processing patient

information. However, he/she may initially be uncertain, thinking perhaps that it could be slow in practice due to a poor internet connection in the hospital, or that full patient information may not be provided by the system. In this case, the innovation-evaluation information is the assessment of uncertainty about the expected consequences of the OASIS system. Again, this all complements the view of newness presented earlier, which was that in some people it triggers a rejection response due to their trait resistance to change.

One other cause of uncertainty emphasised in the literature is the perception of risk. That risk is associated with potential losses, which are the potential consequences of undesirable actions (Cunningham, 2005). Generally, these perceived risks can be categorised as performance or social risks (Gerber et al., 2016). Performance risks are centered on the consumers' concerns about whether or not the innovation will perform as required, and can also include product value, service value, benefit shortfall, requirement shortfall, and product failure (National Academy of Sciences, 2017). In respect of OASIS, that could include a doctor's concern that the system was not tested enough before imposition or that all historical patient data in other formats was not in fact digitalized and entered into the database, meaning that a decision would be taken based on incomplete information, leading to fatal errors due to lack of credibility of the data. Furthermore, doctors might worry about security of the technology, i.e. that patients' confidential records could be easily hacked.

Social risk encompasses issues related to peer influence and normative influence, specifically whether the individual's peers approve or disapprove of the individual using the system. This can work both ways in the sense that the employee's peers may not approve use of the system and to do so would be to risk social ostracization from that peer group, but equally they may approve use of the system and if the individual does not confirm, that may also result in social loss. Some researchers have suggested that additional categories of risk should be considered, including financial, physical, Psychosocial, safety and time loss (Cunningham,

1967; Jacoby and Kaplan, 1972). Psychosocial risk includes the perceived negative image that some people may associate with the use of technology and the loss it may present to their self-image. For example, if an individual were to use the OASIS system, but the system provided faulty data upon which a poor medical decision was made which impacted patient health, that would represent a psychosocial loss for the doctor concerned, negatively impacting their self-image and positioning in relation to their peers. In the context of the OASIS system, time loss risk might be significant for some doctors, if they think that they will need to spend an excessive amount of time learning to use the system. These risks and their potential relevance to the successful adoption of the OASIS system are detailed in the table below.

Table 3.3. Perceived Risks and the OASIS System.

Risks	**Relevance to the OASIS System**	**Authors**	**Relevant to Hospital Doctors Using OASIS?**
Psychosocial risk - the perceived negative image that some people may associate with the use of technology, generated either independently by themselves or by others.	Risks associated with OASIS adoption may include felt loss of autonomy, loss of power, increased monitoring, and tracking.	Cunningham, 1967; Jacoby and Kaplan, 1972; Chopdar, et al., 2018, Cresswell et al., 2017, Caffaro, et al., 2018.	Yes
Performance risk - the potential that the technology will not deliver the value that is required.	Healthcare professionals may have concerns that the technology will not function correctly and may cause them to miss essential details related to a patient's health condition or may not store information accurately.	Chopdar, et al., 2018, Cresswellet al., 2017, Caffaro, et al., 2018.	Yes
Physical risk - reflects the safe usage of the technology.	Both healthcare professionals and patients interacting with the technology may feel unsafe when they have little information concerning how the technology works and whether it presents any health risk to users.	Cunningham, 1967; Jacoby and Kaplan, 1972; Cresswellet al., 2017, Caffaro, et al. 2018.	Yes

Time loss - the individual's concern about time usage while using new technology.	This is exemplified by healthcare professionals in public hospitals' concerns about switching from a traditional system to a mandatory electronic system quickly.	Cunningham, 1967; Jacoby and Kaplan, 1972; Chopdar, et al., 2018, Cresswell et al., 2017.	Yes
Financial risk - loss of monetary investments associated with the adoption of an innovation.	Resistance to OASIS's usage would represent a financial loss for the company invested in the technology.	Cunningham, 1967; Jacoby and Kaplan, 1972; Connolly et al., 2012.	No
Safety risk - errors that threaten the protection and security of the system.	This loss is associated with software damage like viruses that can harm the OASIS system.	Cunningham, 1967 Jacoby and Kaplan, 1972; Chopdar, et al., 2018.	Yes

3.5 Beliefs and Attitudes

The literature provides ample evidence that beliefs and attitudes regarding an innovative technology can determine its acceptance to rejection (and hence, ensuing adaptation). The great majority of the variables affecting adoption that have been reviewed above were worded as subjective 'perceived....' attributes, rather than objective ones, and hence they are types of belief. Beliefs and attitudes are related. For example, Fishbein and Ajzen (1977) assert that attitudes result from the beliefs that the individual holds. However, beliefs are not a homogeneous factor as they can vary in form. For example, Rowe et al. (2016) and Ajzen (1991) distinguish between three general types of beliefs, which are *behavioural, control,* and *normative* beliefs – each of which influence decision-making in relation to innovation adoption or rejection.

The first of these, *behavioural beliefs,* are beliefs about the likely outcomes of a behaviour (Darley et al., 2010) and result in a favourable or unfavourable attitude towards a particular behaviour (Arafat et al., 2018). As previously discussed, those beliefs can include perceived risks and can potentially lead to innovation resistance. In contrast, when it is perceived that an innovation may provide a positive outcome, the innovation is likely to be

adopted quickly. The second type of belief, *control beliefs*, are beliefs that the individual may have about the presence of factors that may promote or hinder the performance of the behaviour, such as their own ability to influence what is happening (Ajzen, 2002). Control beliefs also include perceptions of behavioural control (Arafat et al., 2018). In the context of OASIS, healthcare professionals who believe that they can use this software without much difficulty (i.e., they have confidence in their self-efficacy) are more likely to adopt it. Thirdly, *normative beliefs* relate to the degree to which people believe that other people who are important to them think they should or should not perform a particular behavior (Darley et al., 2010), creating a sense of social pressure to similarly conform (Arafat et al., 2018). These beliefs are particularly influential in relation to their effect on behavioural intention and outcome (Seth et al., 2020). For example, in the case of OASIS, it is possible that some doctors may feel pressure to use the technology from Management, but social pressure from their peers to limit that usage to basic functions only. This may mean that a healthcare professional who is held in high regard by his or her peers, and who believes the system cannot be used to improve or maintain communication with patients, may persuade his or her peers to not use that system (Montano and Kasprzyk, 2015). There are two main types of social influence, *explicit* and *implicit*, both of which require consideration in the context of this study as either may affect the attitudes of potential OASIS users. *Explicit social influences* are spoken or written rules, and they demand conscious individual compliance and obedience (Graf-Vlachy and Buhtz, 2017). Instructions from management to doctors (since 2020) stating that OASIS use is obligatory fall in this category. *Implicit social influence* refers to influence that shapes an individual's attitude towards an object and which is formed automatically without conscious awareness. Generally, they are picked up unknowingly from others, but may nonetheless facilitate either favourable or unfavourable thoughts, actions, and feelings towards a social object (Diamantopoulos et al., 2017). For instance, a new doctor who is shadowing a more

experienced mentor doctor may observe how the mentor uses OASIS to perform specific functions and imitate this usage behaviour without any conscious decision to do so. In the main, this operates through the formation of attitudes, some of which are implicit, involuntary and unconscious attitudinal responses (Hong et al., 2021), whilst others are explicit attitudes, of which the individual is aware. The present study, like most in this area, is necessarily confined to the latter since it relies on self-report data, and participants cannot self-report implicit attitudes because they are not aware of them. The benefit of this discussion and its relevance to the current research lies in the fact that it highlights the importance of beliefs and their role in influencing the formation of attitudes, which in turn influence behavioural intentions (acceptance) and behavioural responses such as technology adoption or resistance (Ajzen and Fishbein, 1974; Sheeran, 2002). Understanding those beliefs and providing appropriate information to address concerns is therefore critical to achieving a successful, maximal adoption of any new technology. The importance of beliefs and their effect on attitude formation and behavioural outcome is reflected in a number of theoretical frameworks, which are now discussed.

3.6 Guiding Theoretical Frameworks

A number of socio-psychological intention theoretical frameworks provide useful insights for guiding examinations of technology adoption. In particular, the Technology Acceptance Model (in its three iterations), Theory of Reasoned Action, Theory of Planned Behaviour and more comprehensive developments such as the Unified Theory of Acceptance and Use of Technology (UTAUT) highlight a number of constructs and relationships that have potential to effect adoption outcome and therefore may need to be considered when an institution attempts to introduce a mandatory system. For that reason, they merit attention and

are now discussed in the context of their value for this study's examination of adaptation to the OASIS health technology system.

3.6.1. Technology Acceptance Model

One simple yet robust framework that has been adopted to explain user acceptance of IT is the Technology Acceptance Model, hereafter referred to as TAM (Venkatesh and Davis, 1986). This model proposes that two main variables: perceived usefulness (PU) and perceived ease of use (PEOU) influence intention to use a technology. The first variable, that of perceived usefulness, refers to the potential user's belief that adopting the new technology will improve individual work performance (Lai, 2017). The second variable, perceived ease of use, refers to the belief that the technology can be used without much strain or effort. These belief variables are similar to relative advantage and perceived complexity (table 3.1). The model has been employed in a multitude of different contexts including marketing, tourism, and medicine (George et al., 2019; Suresh et al., 2016; Nguyen et al., 2020), and over time a number of other variables have been added to it (Suresh et al., 2016). The model is shown in figure 3.4. Its value to this discussion lies in the fact that it points to the need to consider the perceived usefulness and ease of use of the OASIS system as potential influences on the individual's attitude towards the system.

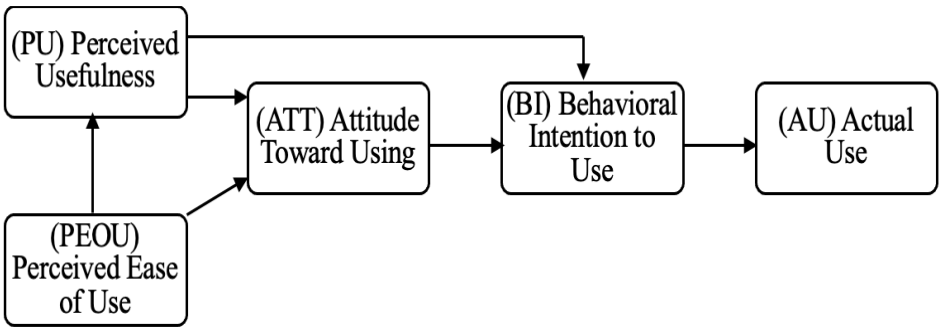


Figure 3.4. TAM 1 – (Davis, Bagozzi and Warshaw, 1989, p.985).

Subsequently the authors of this model, Venkatesh and Davis, recognised the need to incorporate additional determinants of usage intention and perceived usefulness. This more refined model was named TAM2 and comprises *cognitive instrumental processes* and *social influence processes* (Venkatesh and Davis, 2000). The first of these, *cognitive instrumental processes* include PEOU, output quality, result demonstrability, and job relevance. Output quality relates to how well a technological innovation carries out a task (Venkatesh and Davis, 2000). Result demonstrability is the capacity to impute gains from the use of a new system, while job relevance refers to the users' assessment of compatibility between the new technology and their job. The final component included in this updated model, *social influence processes,* refers to interactions between three social forces that affect individual opportunities to reject or adopt a new system. These three social forces are: *voluntariness*, or the extent to which adoption is seen as optional; *subjective norm*, or the belief that other important people will reject or adopt the technology; and *image*, or extent that adoption will be seen as elevating one's social status (Venkatesh and Davis, 2000). The last echoes 'normative beliefs' discussed above and the expansion of the number of determinants within the model better equipped it for modelling real-world IT settings (Lai, 2017). These cognitive instrumental processes are particularly relevant in the context of this study and this model therefore provides guidance for their inclusion in data collection. At a later point, Venkatesh and Bala further refined their model (TAM3), dividing the determinants of PEOU into two groups: anchor and adjustment determinants (Nikolopoulos et al., 2018). The anchor determinants include computer self-efficacy, perception of external control, computer anxiety, and computer playfulness, whereas adjusting determinants include perceived enjoyment and objective usability. This model, TAM3, was tested in a practical IT implementation context, and it was found that users' experiences of and concerns around using a technology, as well as their disbelief in the usefulness of the technology, were associated with PU and PEOU, and

influenced behavioural intention (BI) (Nikolopoulos et al., 2018). The value of TAM and each of its subsequent refinements to the current study lies in the fact that the models emphasise the central importance of beliefs regarding the consequences of using a technology and their influence on the individual's adoption behaviour, including resistance to adoption and the associated adaptations that result from that resistance in a mandatory usage context. They indicate the need to consider the importance of beliefs relating to perceived usefulness and perceived ease of use as a potential factor influencing adoption of OASIS, along with all the other factors mentioned above. However, these technology adoption models do not take into account some other factors that equally affect behavioural intention and outcome. For that reason, consideration of other more inclusive models is worthwhile.

3.6.2 The Theory of Reasoned Action

Another theory of particular value to this discussion is the Theory of Reasoned Action (TRA). This model was developed in 1980 by Martin Fishbein and Icek Ajzen to examine the individual's primary motivations that predict intention and precede actual behaviour. Specifically, it proposes that the individual's behavioural beliefs, including their evaluation of outcome, influence their attitude towards a technology. It also proposes that normative beliefs and motivation to comply influence subjective norms (which thus embody social influence). It is this combination of attitude and subjective norm that influences intention and actual behaviour. Figure 3.5 illustrates the TRA positing that intention precedes actual behaviour and that behavioural intention (BI) results from the combined effect of *attitudes towards the behaviour* and *subjective norms* (Montano and Kasprzyk, 2015).

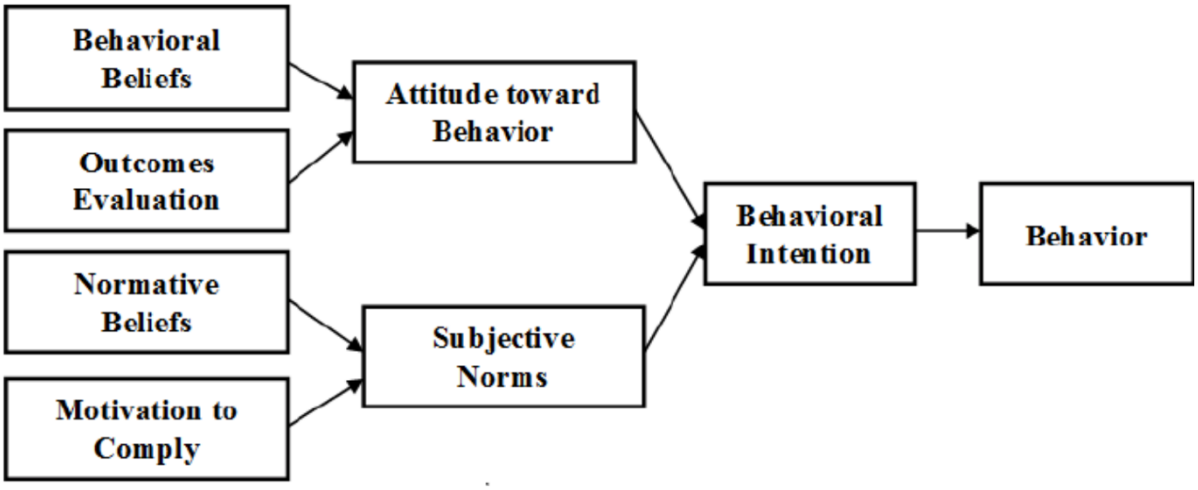


Figure 3.5. The Theory of Reasoned Action (Ajzen and Fishbein, 1980).

A particular advantage of this model is that it separates out behavioural beliefs and outcome evaluations as influences on attitude formation: this contrasts with other models where behavioral beliefs were defined in terms of evaluation of outcomes. For instance, the strength of an individual's belief that they are capable of using a technology can influence their attitude towards adopting that technology. Likewise, the evaluation of outcomes, i.e., the potential positive or negative effects of a behaviour can also influence attitudes (Sarver, 1983). For example, if a breast cancer consultant believes that mammograms, while unpleasant for the patient, effectively and accurately detect signs of cancer, then they will be more willing to personally utilise, and encourage their colleagues to use, mammogram technology. Thus, behavioural belief and outcome evaluations influence attitude formation towards behaviour. Outcome evaluations are usually perceived dichotomously-either positively or negatively, whereas attitudes towards a specific behaviour can be positive, neutral, or negative.

A second predictive factor proposed in this model, *subjective norms,* is an equally important determinant of intentional behaviour. These norms reflect the social pressure exerted by individuals or groups on the individual's behaviour, specifically their intention to perform a behaviour or not to perform it (Montano and Kasprzyk, 2015). In this model, that pressure

and its influence are conceptualised through *motivation to comply* and *normative belief*, both of which influence whether the person will adhere to social pressure by enacting the behaviour or resist social pressure to enact the behaviour if it is considered unacceptable (Sheppard et al.,1988). The combined influence of both of the factors central to this model, attitudinal and subjective norms, influence behavioural intention, a causality that has been confirmed by Moore and Benbasat (1991). The TRA is helpful in understanding the factors that influence individual performance of specific behaviours. Because of its broad nature, the theory can apply to numerous contexts and has been frequently employed in technology adoption research (e.g., Lai, P. C., 2017; Aldas-Manzano, et al., 2009; Bagozzi, 2007). Rather than exclusively focusing on the perceived characteristics of an innovation and beliefs regarding same, it includes a more holistic consideration of outcomes evaluation, normative beliefs and the individual's motivation to comply, all of which have potential to influence behavioural intention.

An important point to note however is that the model assumes that behaviour is *volitional,* that is that individuals can choose their behaviour (whether to adopt or reject a technology) whenever they wish. However, in the current study, the OASIS system is mandatory for health professionals to use, and the model does not deconstruct adoption behaviour to reflect potential variation in adoption outcome in such as context, including minimal or resistant adoption. Furthermore, the word *reasoned* in the name of the model implies that people always favour or disfavour something based on some sort of rational calculation of pros and cons. That again is debateable and does not take account of affective personality traits like resistance to change which may not be regarded as rational.

3.6.3 The Theory of Planned Behaviour

Although the previously discussed adoption models provide valuable assistance to progressing our understanding of the factors that can influence technology adoption, they overlook one important factor which is the question of the individual's perception of their level of control or ability to engage in a behaviour, and which may influence their decision to use a technology. The Theory of Planned Behaviour, proposed by Icek Ajzen (1991) and shown in Figure 3.6, acknowledges the importance of this factor in influencing behavioural outcomes.

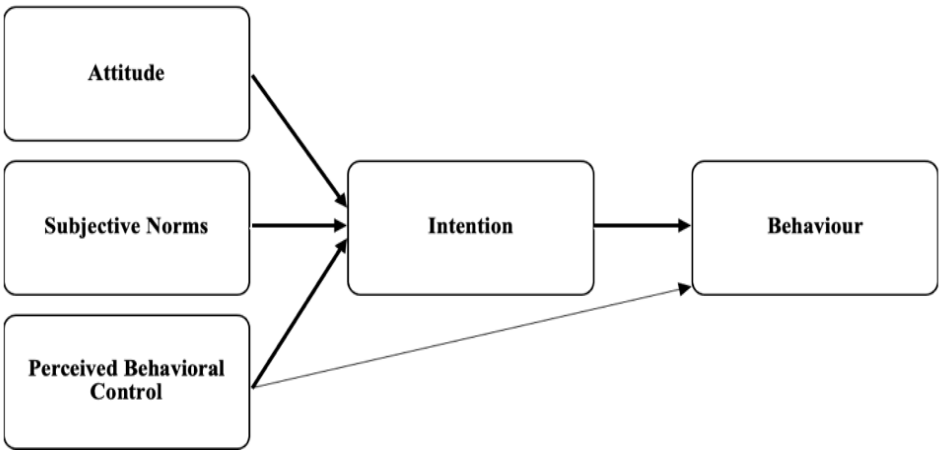


Figure 3.6. The Theory of Planned Behaviour (Ajzen, 1991).

This theory proposes that three main factors, *attitudes, subjective norms,* and *perceived behavioural control,* can act together to shape behavioural intentions (Ajzen, 1991). The first of these, *attitude,* represents a person's subjective assessment of a behaviour as positive or negative. This may include previously discussed beliefs such as perceived usefulness, amongst others. The second is *normative influence,* which represents the individual's beliefs regarding the level of approval that a behaviour will receive from significant or hierarchically powerful people around them. Such people may include parents, peers, colleagues, or even society more generally (Greene, 2017) (see 3.5). For instance, if a more senior colleague in a hospital changes their reluctant attitude towards using OASIS and decides to accept it, then another more junior individual is likely to similarly change their

attitude towards the system in order to gain that senior colleague's approval or to avoid their disapproval. As a consequence, subjective norms regarding a behaviour may influence changes in attitude towards an innovation. Thus, there is a bidirectional, causal relationship between subjective norms and attitudes. The third element in this model is *perceived behavioural control (PBC).* Ajzen (2006) describes *PBC* as consisting of twin beliefs – the first being beliefs regarding self-efficacy and the second being the individual's beliefs of the agency that they have over the behaviour. The factors that determine the *PBC* of individuals include access to required resources and opportunities to succeed in the behaviour. For instance, people find it easy to perform behaviours when they have received adequate training and when the context affords support for doing so. In the context of the OASIS system, this would point to the importance of appropriate training for doctors on usage of the technology. The TPB has received wide application as indicated in various studies that investigate human behaviour in different fields (e.g. Schifter and Ajzen, 1985; Ajzen and Fishbein, 1980). For example, it has been used in fields as diverse as healthcare (Hagger et al., 2019; Aldrich, 2015); education (Teo and Lee, 2010); business (Kuiken, 2015); advertising and public relations (Teo and Lee, 2010). One limitation of this model is that while it considers the individual's *belief* in their agency (PBC), it does not consider *actual* agency – which is equally important, as in many cases technology adoption has now become mandatory. For that reason, voluntariness of use, which refers to whether or not a behaviour is mandatory, has become progressively more important in light of the pervasive adoption of technology in organisations. Furthermore, the role of unconscious affective variables like resistance as a trait again finds no clear place. Consequently, the relevance of perceived agency (PBC) is open to contention. Notwithstanding that fact, each of the theories considered so far points to a number of important factors that may affect individuals' intention to adopt technology. One theory that aggregates

the constructs that comprise these theories and provides a more inclusive examination of influence pathways is the Unified Theory of Acceptance and Use of Technology.

3.6.4 The Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT), shown in Figure 3.7, provides a comprehensive overview of the influence of multiple constructs on technology adoption success. It highlights the role that *effort expectancy* (EE)*, performance expectancy* (PE), *social influence* (SI), and *facilitating conditions* (FC) play in determining the adoption of a technology (Venkatesh et al., 2003). In the context of OASIS, this indicates that the success of its adoption will be heavily influenced by how much effort doctors anticipate is required to use the system (effort expectancy, EE), how effective the system will be in producing required results, such as speedy access to comprehensive patient data (performance expectancy, PE), the degree to which peers, such as doctors, embrace the use of the system (social influence, SI), and how well the hospital and infrastructure support use of the system through training (facilitating conditions, FC). Later versions of UTAUT also include *hedonic motivation* (i.e. sheer enjoyment of using the IT innovation). A particular strength of this model is that it also recognises the influence of demographic features such as gender and age, and, especially relevant to the present study, it recognises voluntariness of use. The latter is an essential consideration in the context of this study because OASIS is mandatory, a fact that may influence the success of its adoption. These variables are however presented not as direct influences on behavioral intention and use, but as moderating variables (Figure 8). For instance, one effect of age is represented in the diagram as being that it will influence the effect of effort expectancy on intention to use OASIS (acceptance), which will be greater or less depending on the technology adaptor's age. Similarly, the effects of the fact that OASIS use is not voluntary include that it is expected to alter the effect of social influence on its acceptance.

One might speculate that that could take the form that, because use of OASIS is obligatory for all hospital doctors (imposed from above), the effect on a doctor's willingness to use it of what other doctors say or do is less relevant. This current study will show whether in fact that proves to be the case. It could be that in respect of adaptation (which is not explicitly considered in the UTAUT model), the mandatory nature of OASIS actually makes doctors pay more attention to what other doctors do.

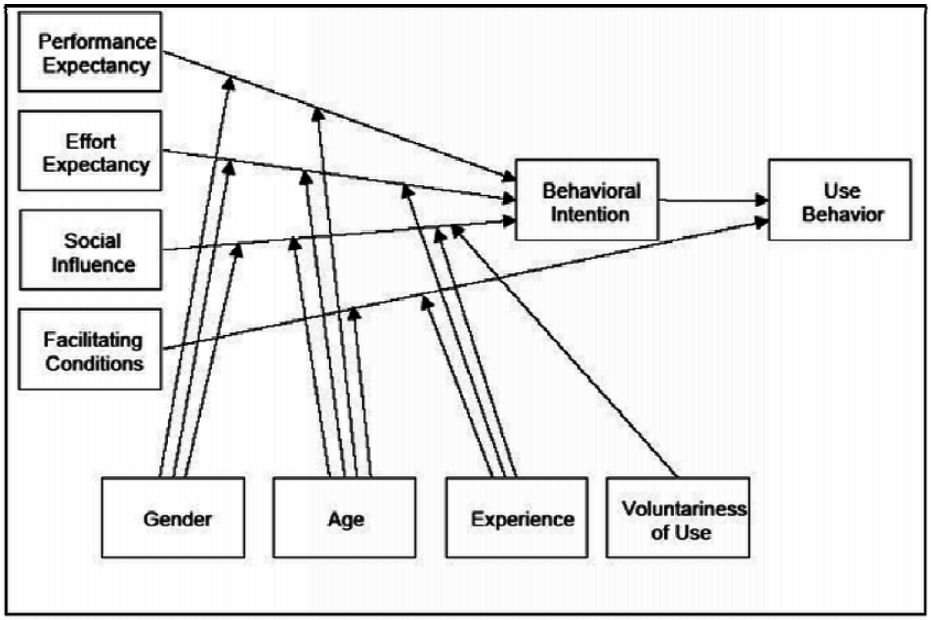


Figure 3.7. The Unified Theory of Acceptance and Use of Technology

(Venkatesh, Morris, Davis, and Davis, 2003).

The way in which the antecedents are measured also provides helpful guidance for this study and its direction. Although the present study is qualitative and UTAUT, like most of the models discussed, is predominantly supported by quantitative questionnaire research, the component constructs identified within the model highlight the importance of these issues when examining the factors that influence adoption or resistance to the OASIS system. For example, effort expectancy is measured in terms of stress-free interaction, ease of use, and importance of use (Varma, 2018), indicating that these manifestations will need to be examined. Similarly, the model indicates the importance of considering the role of performance

expectancy as measured through beliefs regarding productivity improvement, enhancement through the use of the system, usefulness for company and staff, and positive influence on performance (Varma, 2018). Likewise, it indicates the need to consider the perceived importance of, and intention to follow, others' beliefs about system use and the. Extent to which individuals perceived that they are adequately resourced and supported by their organization to use the system.

A common fact that unites all of the previously discussed technology adoption models (TAM, TRA, TPB, and UTAUT) is the fact that they focus on end user intention and adoption as the dependent variables. A number of other models also examine the factors that influence successful technology adoption but employ a more nuanced approach, using different dependent variables such as user satisfaction, the fit of the task to the technology under consideration or the influence of the organisational context. These are equally important considerations in relation to successful adoption of OASIS and for that reason the guidance that they can provide to the current study is now briefly discussed, even though, once again, the focus is on positive rather than negative outcomes, and so does not extend to explicitly accounting for coping outcomes.

3.6.5 The DeLone and McLean Information System Success Model

The first of these, the *DeLone and McLean IS Success Model* (1992) has sought to explain successful adoption of information systems by focusing on three perceived characteristics of the technology: system quality, information quality, and service quality. Attention is paid to how these three attributes influence user intention and satisfaction. The first of these, *information quality* (Figure 3.8), constitutes the output of the technology. Some exemplary measures of information quality include the usefulness, precision, accuracy, timeliness, understandability, format, and relevance of information, to the degree to which it satisfies the initial request made by the user (Laumer et al., 2017). The second factor, *system*

quality, focuses primarily on performance characteristics and usability aspects of the technology. Some exemplary measures of systems quality include flexibility, functionality, reliability, portability, integration, ease of use, and data quality of a system (Yakubu and Dasuki, 2018). The third factor, *service quality,* is the quality of support a user receives when working with the system. Some characteristics measured when assessing this dimension of IS success are the timely reaction of support staff and a low error rate. It is important to note that these factors typically measure user perceptions rather than objective measures, and therefore may vary. This theory is important to the current study as it indicates the need to include consideration of the quality of information provided by the system, the efficiency and reliability of the technology and the quality of the service that it provides, as potential influences on user adoption of the OASIS system. Importantly, this model proposes that an interplay exists between user satisfaction and intention to use/ use of the innovation, both of which influence the perceived net benefits of the technology. This is important to the current study is because it indicates that overall user satisfaction, and the factors that predict that satisfaction, are important considerations for understanding how end users perceive and respond to a system.

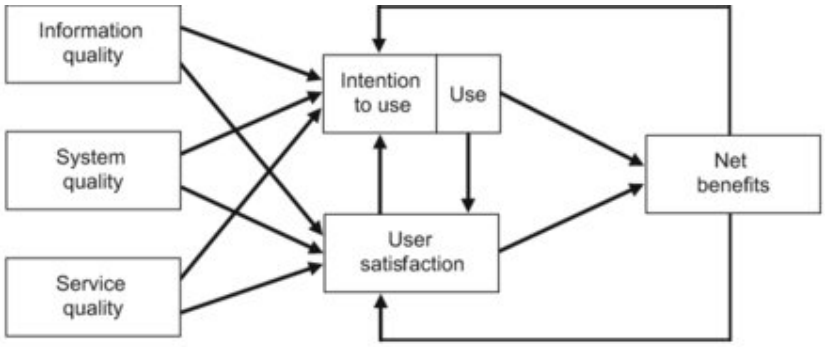


Figure 3.8. The D and M IS Success Model Was Developed by Delon and McLean (1992).

3.6.6. Task-Technology-Fit

Another model that takes a slightly different perspective on the factors influencing successful innovation adoption is the Task-Technology-Fit (TTF) model, proposed by Goodhue and Thompson (1995). TTF refers to the degree to which the alignment between the individual's abilities and the requirements of the task which they seek to complete are compatible with the technology's functionality and capability. Specifically, the theory proposes that individual competency, also known as *user characteristics*, must align with task requirements (known as *task characteristics*) in order for information system success to be achieved. This model raises two important issues of consideration for the current study. The first is recognition of *user characteristics* as important separate variables, specifically the fact that user competency is essential to a successful adoption outcome. Previous models did not explicitly consider this issue. These competencies (motivation, computer experience, and training on the specific new application) are important as they have potential to influence how easily the individual can access and utilise the technology and hence how likely they are to resort to adaptations. The second issue of importance is the theory's acknowledgement of the importance of *task characteristics*, something that has been absent as a consideration from previous theories. It recognises that the characteristics of the innovation must align with the *task characteristics*, in order to provide a successful adoption outcome. If the technology's characteristics do not match the task being performed, then the technology may not be used for the intended purpose, thereby failing to improve user performance. This is important in the context of the current study. For example, some hospital tasks (such as being able to check test results and identify medication response patterns) will require specific technological functionality. Where that functional alignment is present, that is, where there is high alignment between task requirements and what the technology can support, the more likely a positive

adoption outcome. The converse is equally true, which is what is significant for the present study, as it might lead to lack of full adoption, and use of adaptation. Clearly therefore, for the current study, this theory indicates the need to consider the characteristics of the user, specifically the degree of alignment between their competencies and the technology, and to equally consider the alignment of the technology with the task characteristics of the sample group. In the context of OASIS, this will require consideration of whether they have received adequate training to use the system and are competent to do so. It also indicates the need to consider the characteristics of the task and the ability of the technology to support these tasks.

In summary, all of the theoretical frameworks discussed in this chapter contribute to understanding of the factors which can potentially influence technology acceptance, adoption and use. They point to the important role of beliefs and attitudes on intention to adopt and highlight the need to consider normative influences on the individual, specifically their social environment and communication networks. They also indicate the need to consider the characteristics of the individual, their competency to use the technology (self -efficacy) and the level of alignments between the characteristics of the technology and the task requirements. In addition, they point to the increased need to consider voluntariness of the usage context. Lastly, they indicate the need to consider the organisational context within which the technology is situated including training, technical support and communication. Each of these are important considerations which will provide structure to the examination of factors which influence user response to the OASIS system. These theories and the insight that they provide to guide the current study are outlined in Table 3.4.

Table 3.4. Summary of Relevant Guiding Theories.

Theory/ Model	Primary Constructs Influencing Technology Adoption	Insight / Contribution (Value to the current study)
Technology Acceptance Model 1 (Davis, Bogazzi and Warshaw, 1989)	Perceived ease of use, perceived usefulness, intention to use	Highlights the importance of 2 core constructs – perceived usefulness (PU) and perceived ease of use (PEU) – showing that these influence intentions to adopt technology.
Technology Acceptance Model 2 (Davis and Venkatesh, 2000)	Sub-factors (job relevance, experience, image, subjective norms, result, and output quality).	Identified information about key determinants of PU and included the subjective norm which is a key factor affecting usage intention.
Theory of Reasoned Action (Ajzen and Fishbein, 1980)	Attitude, subjective norms, behaviour, and Intention.	This model assumes that human behaviour is *volitional.*
Theory of Planned Behaviour (Ajzen, 1991)	Attitudes, subjective norm, and perceived behavioural control.	This model considers the individual's *belief* in their agency (PBC), it does not consider *actual* agency.
Unified Theory of Acceptance and Use of Technology. (Venkatesh, Morris, Davis and Davis, 2003)	Performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC).	It highlights the role that EE, PE, SI, FC, and social norms will play in determining adoption of OASIS.
Information System Success Model (Delone and McClean, 1992)	System quality, information quality, service quality, intention to use, user satisfaction, and net benefit.	It indicates that user satisfaction is an important consideration that may influence not only use of the OASIS system, equally influences the perception of net benefits.
The Theory of Task-Technology-Fit (Goodhue and Thompson, 1995)	Utilisation, performance impacts, task characteristics, technology characteristics, and Task-Technology-Fit.	Recognises the importance of the fit between the task characteristics and the functionality of the technology to complete this task as an influence on technology use.

3.7 Conclusion

Technology adoption or rejection is a complex process. Successful adoption is dependent on and requires consideration of multiple factors. This chapter has explored those factors and discussed them in terms of their implications for this study, especially understanding users' responses to the OASIS system. In doing so, it provides an important overview of issues that may influence adoption or rejection of the OASIS system. It also shows that technology adoption literature tends to focus on the individual's response through a binary lens, one where the end point is that the technology is either adopted or rejected by the individual. It does not typically deal with partial adoption e.g., willingness to use a technology for some required purposes but not others, or only in specific contexts. It also tends to assume agency and voluntariness of use. In the case of mandatory technology usage, which has become increasingly common in employment contexts, overt total rejection of a newly introduced technology is simply not possible. In such contexts, it is far more likely that the adoption response may be more nuanced and variable on the part of the individual as they seek to cope or respond to mandatory technology usage in a variety of ways. This coping responses are discussed in more detail in the next chapter.

Chapter Four Resistance to Information Technology - Induced Change

4.0 Introduction

The previous chapter has shown that there is considerable literature on the acceptance and adoption of new technology, including the process of its dissemination, and the factors that may influence a positive adoption outcome. In doing so, it presented concepts and factors that are likely to be relevant to the present study and therefore merit attention. However, not all new technologies are positively received. Despite this, less attention has been paid by scholars to negative outcomes such as resistance, not only to the technology but to the change which can accompany new technology implementation. Similarly, little attention has been paid to specific adaptation strategies adopted by resistant users, to situations where the innovation is mandatorily imposed and where the ambient culture is collectivist. This is the context of the current study, which seeks to open and understand the "black box" of employees' adaptation responses to the mandatory adoption of the hospital information management technology (OASIS) in Jeddah, Saudi Arabia. It focuses on the factors that influence the varying nature of users' adaptation responses, as well as the factors influencing the positive or negative change of those responses over time. Such insight will provide information that may assist employers seeking to increase employees' willingness and positive use of such technologies.

This chapter therefore focuses on resistance to innovation in order to determine what issues are pertinent and may influence user response to the mandatory introduction of the OASIS system in Saudi hospitals. Resistance to technology, as an attitudinal or behavioral response adopted by employees, is often less about the functional characteristics of the technology and more about resistance to change in itself, especially change that technology causes, due to its implications, such as increased transparency regarding job performance, or loss of power (Al-Ameri, 2013). For that reason, this chapter starts by drawing on management

and psychology literatures to describe IT related change and resistance to change. This provides an understanding of the types, causes and effects of such change. Following this, the issue of resistance to change is explored, including the types and forms of this resistance. The varying predictors of resistance highlighted in the literature are outlined and the relevant theoretical frameworks which can provide useful guidance for examining this issue are discussed. This leads to a discussion of the two theoretical frameworks, Coping Theory and Equitable needs fulfilment theory, that are judged most useful for the present study due to their relevance for providing insight into how adaptation responses are formed in a mandatory use situation. Figure 4.0 provides a graphic depiction of the structure of the chapter.

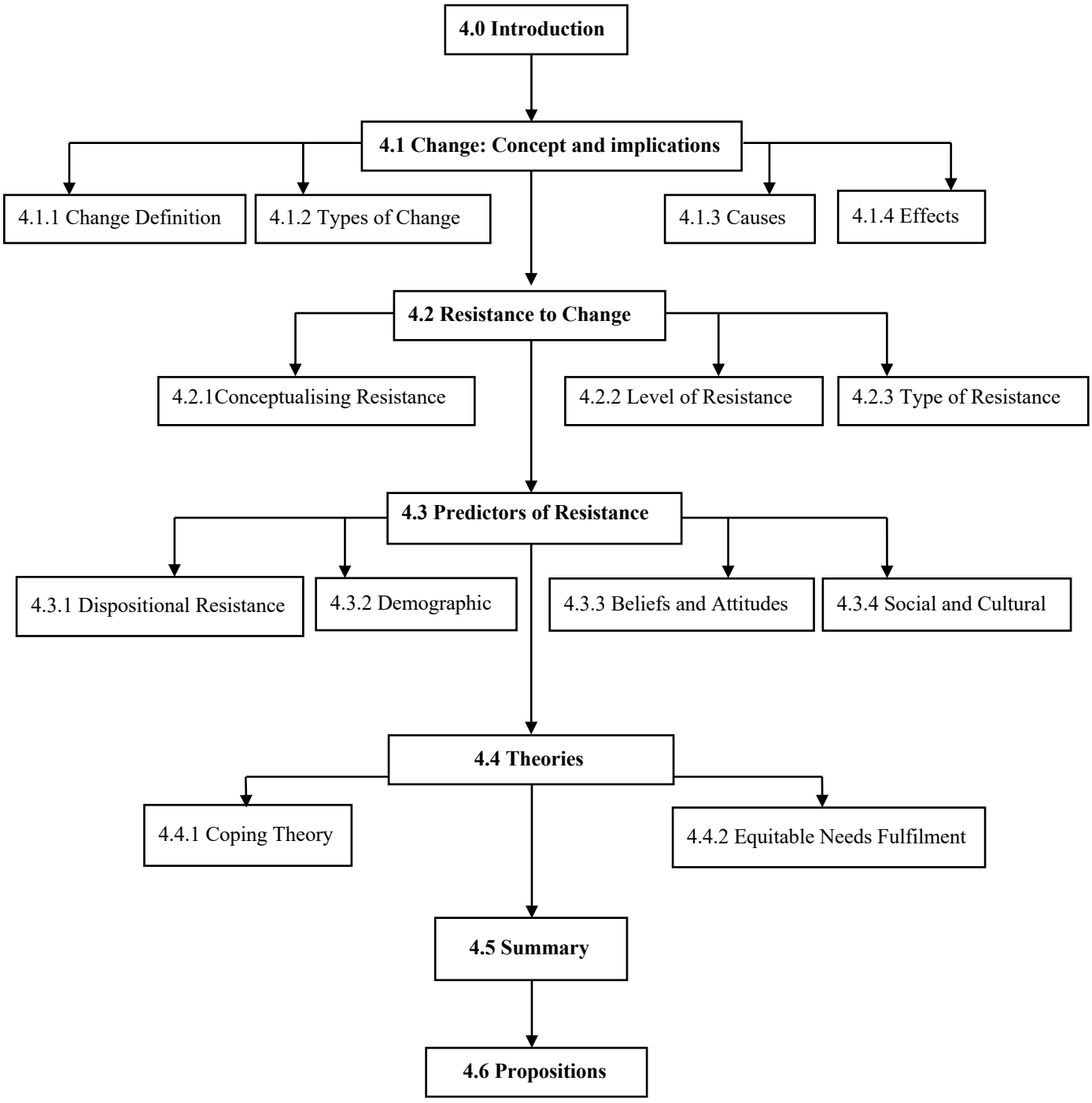


Figure 4.0. Chapter Four Structure.

4.1 Change: Concept, Causes and Implications

The process of technology adoption in any organization necessitates making a change to the organization itself, which sometimes leads to negative responses. To ensure consistency in understanding, this section starts by detailing change as described in the literature, the types of change, the causes and effects of such change, including potential outcomes such as resistance.

4.1.1. Defining Organisational Change

Various researchers have defined organisational change in terms of adaptation and movement (Halkos, 2012; Laumer and Eckhardt, 2012; Hashim, 2013; Yoon et al., 2020; Baldwin, 2020). For example, Halkos (2012) described organizational change as "the adaptation of new ideas or behaviour by an organisation" (p. 3), whilst Laumer and Eckhardt (2012) defined it as the modification of the organisation's processes and structures and Hashim (2013) defined change as altering the current business operation model into a new model or style. This emphasis on alteration of the status quo is also emphasised by Baldwin (2020) who defined change as transforming or transitioning different organisational processes, objectives, technologies, and core values.

A simple definition relevant to healthcare contexts is provided by Yusif et al. (2020), who define change as transitioning from an old way of doing things to a new way. In a healthcare context, transition to this 'new way' is particularly urgent as it is driven by numerous forces including changing disease patterns, new discoveries of disease treatment, aging populations, political reforms, technological advancements and policy initiatives that place demands on health care organizations (Nilsen et al. 2019).

While change can evolve naturally on many occasions, it may be imposed at other times. Indeed, within one organization, it may be voluntary at one level, such as top management, but imposed at other levels, such as frontline workers (Yoon et al. 2020). Such

imposed change has been defined by Oreg and Sverdlik (2011) as a change introduced in an organization without the knowledge of all employees and by Nugroho et al. (2018) as a change that has been forced/mandated in an organization. This latter definition fits the context of the present study. Imposed change is especially important because it is more likely to lead to resistance, in the sense that those who do not like the change (for whatever reason) experience a conflict between their attitudes and emotions (non-accepting/resisting) and their required behavior (adopting). In light of these definitions, imposed change is defined in the present study as a change introduced in an organization without employee agreement or choice, i.e., a forced or mandated initiative in the organization (Nugroho et al., 2018). This is pertinent to OASIS as it is an imposed change planned by the hospital management and implemented without consultation with medical staff.

4.1.2 Types of Change

The literature indicates that organizational change can take a variety of forms. For example, Ganta and Manukonda (2014) have identified a number of types of organizational change. These include: (1) macro versus micro, (2) transformational versus incremental, (3) remedial versus developmental, and (4) unplanned versus planned. Macro-level change involves major collaboration or rightsizing and restructuring to address issues in the business life cycle, such as the transition from a highly reactive, entrepreneurial organisation, into one characterised by stable and planned development. In this case, the emphasis is on change of business culture as one of the main drivers of organisation-wide change (McNamara, 2006). On the other hand, micro-level change covers a smaller scope, such as adding or removing a particular service, creating a new department, or changing elements of the delivery chain (Jalagat, 2016; Ganta and Manukonda, 2014; LLC, 2012).

A second type of change is transformational change, which consists of radical and fundamental change involving a large number of self-directing teams such as business process re-engineering, which intends to maximise the use and capabilities of computers and machines (Beer, 2000). Transformational change (quantum change) contrasts with incremental change, or change on a smaller scale, such as continual improvement of departmental activities, enhancing management quality, or increasing efficiencies (Jalagat, 2016; Ganta and Manukonda, 2014; LLC, 2012).

A third common type of change involves what is called remedial change, which is urgent to solve current problems, such as enhancing the poor performance of an organisation or its products, tackling burnout in the workplace or a large budget deficit. In contrast, developmental change focuses on improving what was already working well for the organization and amplifying that effect. An example is the expansion of the number of consumers served, or the duplication of successful products or services (Jalagat, 2016; Ganta and Manukonda, 2014; LLC, 2012).

The fourth type of change concerns unplanned change, which often happens when there is a sudden and surprising event, in a disorganised fashion, such as the sudden departure of the general manager, which can result in disorganisation of functions, poor performance, and malfunctioning of operations. Conversely, planned change exists when the institution recognises the need for major change and devises a proactive, strategic plan. This latter type of change is pre-planned, and all the affected stakeholders are well-informed regarding it (Jalagat, 2016; Ganta and Manukonda, 2014; LLC, 2012).

Although this discussion indicates that four types of change exist, multiple elements of these change types could apply in the context of digital disruption. For example, the introduction of a new technology such as OASIS results in macro-level and transformative changes as it streamlines pre-existing manual processes, resulting in greater efficiencies across

the organisation. However, it also allows doctors to access records instantaneously instead of waiting for manual records to be sourced, enables them to order medical tests for patients in real-time, and facilitates real-time transparency of who is treating a patient at any time point and shows the effectiveness of that treatment – all of which represent transformative outcomes for doctors, their patients and the functioning of the entire organization. Moreover, the implementation of OASIS is a planned and structured introduction, with training provided to employees on its usage and benefits.

4.1.3 Causes of IT-Related Change

In general, the causes or drivers of technological changes in organisations relate to three broad interconnected forces: corporate change, globalisation, and continuing technological development within IT itself (Rafferty and Jimmieson, 2017). Government policies, local and world health developments and emergencies are also factors for consideration. The first of these causes, that of corporate change or evolution, indicates progression in an organization, and can often manifest as slow, gradual process of change (Stouten et al., 2018). Such changes have often resulted from the evolving needs and preferences of customers. In this current study case, the customers are the patients, and the increasing and aging nature of the Saudi patient population has been one driver of the need for technological change to more effectively support the management of hospitals. However, a corporation or government department may not only be pushed to change from below, but also from internal forces or indeed from above. For example, the Ministry of Health in Saudi Arabia is responding to the need for wider government policies that will enable the country to modernise technologically and increase economic resilience, as well as dealing with the health demands of an increased population, as described in chapter 2.

The second cause of technological change is that of globalisation, which refers to the process of interdependence or integration of peoples, countries, and regions globally, resulting from the constant exchange of products, services, ideas, and other worldviews among the world's economies, populations, and cultures (Mohammad, 2013). This process of interdependence typically induces changes in the normal operation of businesses and organisations, with advancements in transport, communication, and infrastructure (Rizescu and Tileagă, 2017). Technology is required to support those changes. This cause, globalisation, has affected hospitals in Saudi Arabia. As previously discussed, hospital services come under pressure at particular times of the year and need to be available to large groups of foreign visitors as well as Saudi citizens. Moreover, the national strategic plan, Vision 2030, expresses a desire for Saudi Arabia to take for Saudi Arabia to take its place on the global stage alongside western nations as a modern country with a diverse mature economy. A state-of-the-art healthcare system including OASIS would be one part of that.

The final cause of technological change in large organisations is the evolution that occurs in technological development itself, which we witness occurring at a dizzying pace on a day-to-day basis. In recent decades the internet has mushroomed, computer and phone functionality has increased beyond all expectation, and we are on the verge of a huge impact of artificial intelligence on many areas of work, and indeed life in general. As an example, expert systems for disease diagnosis already exist and in some areas are as good as a live doctor (Matinfar and Golpaygani, 2022). Much of these impacts on the working of big corporations whether they want it to or not, since without harnessing the value offered by such developments, institutions would quickly become inefficient and uncompetitive. This can put management itself in the position of not immediately welcoming innovation but having to cope with it if not resist it. In a study conducted by Dhurkari (2017) to explore information technology and organizational change, the author found that the communication and

information technologies developed in the last decades have indeed resulted in organizations needing to devise new strategies to manage the inevitable changes caused by the latest technologies.

Since technological change is generally associated with progression and growth (Rizescu and Tileagă, 2017; Warnken and Ronning, 2019), it is considered by some to be an evolutionary rather than a revolutionary advancement (Sundarasaradula et al., 2005). The changes fostered by technology are evolutionary (i.e., incremental change in the sense described in Section 4.1.2 above) where they tend to occur gradually and with everyone's knowledge, unlike revolutionary (transformational) changes, which are usually drastic and sometimes forced. As we have noted, however, the innovation of OASIS has more of the hallmarks of a quantum leap, and for many workers is forced upon them, even though it was planned. In any event, technological change typically is adopted by organisations because it offers them a competitive advantage and increases overall performance (Jahanmir and Cavadas, 2018). While the first does not really apply to the Saudi situation, since both state and private healthcare use OASIS, the second does. For example, a system like OASIS reduces the manual record-keeping of patients' data, making work faster for healthcare professionals. Simultaneously, it reduces the time staff and patients wait for records to be retrieved, benefiting both the healthcare professionals and the patients. Generally, the OASIS system leads to fewer mistakes, less redundancy, and greater time savings than the manual system, which is time- and labour-intensive and especially challenging when trying to retrieve lost data.

Organizational change is usually inevitable because organizations operate in changing environments and because often the benefits of change seem obvious. However, implementing change in an organization is not necessarily a smooth process as it often involves a lot of stress, reorganisation, expenditure, temporary loss of productivity and requires a trustworthy workforce (Lewis, 2011). It is to these negative effects that we now turn.

4.1.4 Effects of IT Related Change

Despite the obvious benefits of IT-induced change across a wide range of industries, it can also result in negatively perceived impacts for employees, their duties, morale, and skill development. For example, a qualitative study (Bessen, 2019) showed that technology-based changes, such as automation, alter many employees' tasks, increasing their learning burden and changing familiar ways of operating. This was the case of the Indonesian midwives as previously described (Nugroho et al., 2018) who perceived using IT not as a benefit, but rather as an additional task. As a consequence, the changes resulting from new technology introduction can even be perceived by employees as threatening their jobs and their financial rewards (Mares, 2018), which may result in severe resistance.

It is worth noting that it is the *consequences* of IT-induced changes, as distinct from the IT itself, that may be felt to pose a threat to employees (Laumer and Eckhardt, 2010). That is, employees may resist change not because the change is inappropriate, but because of the perceived risk which the resulting change represents to their job security or role authority. A study conducted by Stouten et al. (2018) found managers in an organization tend to embrace the status quo and resist any change that comes their way. These researchers argued that people resist changes because they are used to their traditional ways of doing things and accepting change would mean they leave their comfort zone. Of greater interest is the fact that these researchers found that a key reason why employees find leaving their traditional ways of operating is due to the fear of losing their position of power.

Changes create resistance on their own, and IT-related changes are more prone to this than other types of change. They involve more technicality, more complexity of processes and practices and more stress and pressure. Most employees fear being unable to adapt appropriately and of extended use of their resources and energy in their struggle to cope with the change (Laumer and Eckhardt, 2012). Certainly, in the initial stages, using OASIS would

require more conscious attention than the system it replaced, which doctors would use without having to think. However, we must consider that at the time of this study the participants will have been using OASIS mandatorily for up to two years, so we would expect that stage to be passed. Issues like these have great importance in understanding resistance in the face of a change. However, the full range of factors affecting resistance remains under-explored, especially in the context of a mandatory rather than optional change to an innovation like OASIS. Furthermore, what constitutes resistance, i.e., the various coping strategies that workers may use, and how they may change over time, are poorly understood and therefore the focus of the present study.

4.1.5 Conclusion

In summary, while the literature of organizational change documents many different types and causes of change, especially IT-related change, the most important conclusions for the present study are that (1) change is inevitable if an organisation is to evolve, avoid failure, and thrive rather than become obsolete; (2) IT-induced change may have benefits, but equally may result in user resistance. This is a natural consequence of change, even where the change is mandatory; and (3) the forms that resistance can take, and how they may change over time, remain poorly understood. The focus of the present study on resistance is therefore justified, not only to help fill a gap in the research literature but also to provide information that will inform organizations as to how to manage such resistance effectively. In the next section, the literature on resistance is discussed in more detail in order to identify the issues of relevance to the current study.

4.2 Resistance to Change

4.2.1 Conceptualising Resistance

In the literature, the term resistance is conceptualised in four main ways, some of which are inter-related (Claudy and Garcia, 2015). The earliest definitions treat it as essentially a physical *behaviour* in response to a particular change or continuing situation. For example, Folger and Skarlicki's (1999) definition describes resistance as: "employee behaviour that seeks to challenge, disrupt, or invert prevailing assumptions, discourses, and power relations" (p. 36). However, many researchers have recognised that important cognitive and affective activity underpin such actions, which need to be included when defining the construct. Thus, Piderit (2000: 784) points to "three different emphases in conceptualizations of resistance: as a cognitive state, as an emotional state, and as a behaviour". The cognitive state, which emphasises beliefs, has been described in terms of 'un-readiness', which can predict an emotional/affective state or 'attitude' of resistance (Piderit, 2000). In the literature, these three conceptualisations of resistance (cognitive beliefs, emotion/ affect, or behavioural response) are often treated separately with researchers focusing on "what one thinks about the change (e.g. Is it necessary? Will it be beneficial?)", "how one feels about the change (e.g. angry, anxious)" or "actions or intention to act in response to the change". As Forsell and Åström (2012) note, some researchers emphasize attitudes and feelings toward changes as the primary focus of resistance research (e.g., Rehman et al., 2021), while others claim that resistance to change is predominantly behavioural (e.g. Ansoff et al., 2019). However, as Oreg (2006) have noted, beliefs and emotions are dual predictors of behavioural response and as such should not be separated from outcomes. The present study aims to avoid these types of limitations, instead adopting the more holistic perspective developed by Bhattacherjee et al. (2002, 2007, 2018) which acknowledges the importance of all three aspects (beliefs, attitudes and behaviour) and emphasises the importance of the individual's beliefs in influencing their emotional response

to imposed change within the organization, recognising that both of these can predict a variety of resistance behaviours.

A fourth conceptualisation of resistance focuses on the personality traits or dispositions of individuals, who simply resist change, regardless of what change it is (Laumer and Eckhardt, 2012). This perspective views resistance as a more or less permanent feature of the individual's personality (Oreg, 2003) and as such is frequently termed trait or dispositional resistance (He and Veronesi, 2017), and of course may often be a contributory cause of new technology or innovation resistance. A point worth mentioning is that most definitions of resistance, including that of Fugate at al., (2008), refer to resistance behaviour as a singular outcome, that is to say they do not consider detailed potential variation in resistance behaviours (as do, for example, Bhattacherjee et al., 2018; Huang, 2017). This is a critically important issue as treating resistance as a singular outcome ignores the fact that individuals may differ considerably in terms of their cognitive beliefs and affective response, both of which can result in variation in their behavioural expression of resistance including changing forms of response as evidenced in adaptive behaviours (Ecker, Lewandowsky, Cook and Fazio, 2022; Bhattacherjee at al., 2018). For example, in a voluntary new technology usage context, research has shown that belief-based or attitudinal state resistance is likely to result in behavioural resistance outcomes (non-use) (e.g. Samhan, 2018; Ferneley and Sobreperez, 2006). However, in mandatory usage situations (such as work contexts), those same beliefs and attitudes may apply, but employees are unable to express their resistance explicitly through non-acceptance of new technology (Bhattacherjee et al., 2018). Thus, research by Folger and Skarlicki (1999) found workers expressing resentment (emotional resistance) in the face of imposed practices (some of which led to covert industrial sabotage). More often, these beliefs and attitudes may result in a range of behavioral strategies, often labelled as adaptation or coping responses, which are designed to assist the user in managing their response to the

technology (Bhattacherjee et al., 2018). Those forms of response are the focus of the present study.

Moving on from the discussion of different conceptions of resistance, there is a debate as to whether resistance (in any sense) should be conceptualised as the opposite of acceptance, 'the other side of information systems acceptance' (Laumer and Eckhardt, 2010), or as an independent scale (van Offenbeek et al. 2013). Those who adopt the latter (e.g. Bhattacherjee, 2018) take the view that resistance is complex, with unique predictors and can encompass varying distinct degrees of response, many of which are expressed in indirect or nuanced ways. Acceptance by contrast they perceive as more directly expressed with far less complexity and with differing predictor variables. A helpful clarification is provided by van Offenbeek et al. (2013) who point out that individuals can be non-accepting and resisting, or accepting and resisting, a distinction which causes them to suggest that "non-acceptance and resistance are conceptually non-equivalent" (p.434). At the heart of this lies the fact that they limit acceptance as applying only to a binary behaviour (either use or non-use) and confine resistance to the more complex on-going cognitive or affective state, which can result in a variety of behavioural responses ranging from minimal to maximal usage. Support for this approach is provided by Bhattacherjee et al (2018) and Nilsen et al. (2019) whose work shows that that resistance to change can be expressed in a number of different ways, ranging from limited acceptance to enthusiastic usage. Their work highlights that resistance is a complex construct whose measurement is distinctly different from that of simple non-acceptance as resistance outcomes may include a variety of stages, some of which may transition the individual towards potential adoption.

4.2.2 Social Level of Resistance

Although the present study is interested primarily in individual resistance, three social levels at which it can occur are briefly described here as follows.

Individual Resistance is the response to an innovation from an individual person and is the type of resistance (or lack of acceptance) that is the main focus of this study. As previously described, the predictors and causes of individual resistance include psychological, social, cultural, demographic and contextual factors. ***Organizational resistance*** occurs at the level of a whole institution and is mainly found in organizations which are conservative (Rick, 2011). The majority of businesses are conservative, so they are resistant to new ideas and technology. One of the reasons for organizational resistance to change of any kind can be the culture of an institution, which may have developed over a long time, perhaps originating with its founder and perpetuated by a strict management hierarchy. It can be difficult to implement a change in an organization where the structural hierarchy has made everyone think in a certain way about the institution and their role in it. The more the structure and hierarchy are large and strict, the more the status quo will be maintained. Resistance may also arise when there is a change in power (new leader or managing board, with new ideas), or a change imposed from outside, such as the Saudi government imposing policy on the Ministry and the Ministry imposing it on the hospital.

Group Resistance occurs when people gather together in other social groupings with a common response to a certain change. Such common action is usually a threat to change if the action does not favour the change (Laidoune and Sahraoui, 2021). A classic example of group resistance to change is resistance by employee unions and associations. The reasons for this type of resistance include lack of trust in the effect of the change on job role or security, poor communication about the change, and fear of uncertainties. In the context of the current study, group resistance may have some relevance, as the persons using OASIS are doctors and

therefore members of a particular social sub-grouping, in the sense of a community of practice. As an individual, a person may be open to usage of the system, but the group dynamic may be negatively disposed to adoption of the technology due to fears regarding power removal or increased transparency. Such perceived threats have the potential to create a group resistance response to adoption or usage of the new technology. As a consequence, both individual and group responses are important considerations for this study.

4.2.3 Types of Resistance Responses

As previously discussed, resistance to change can be expressed explicitly (behavioral) or covertly (cognitive or affective). It has also been classified (Sittig et al. 2020) into three categories based on increasing strength of response, that of passive resistance, active resistance and aggressive resistance. The first, passive resistance, is attitudinal (cognitive/affective) and involves objecting to a change without voicing any opinion or doing anything that shows resistance, whilst active resistance is behavioral and involves overtly rejecting the innovation or change in some way. Aggressive resistance by contrast involves users not only resisting the innovation themselves, but also, for example, trying to persuade or threaten others who seek to implement the change. In the current study, the technology under consideration has been implemented with a mandatory usage requirement and as a consequence, resistance is more likely to be passive in form.

A different three-way classification of resistance expressions is provided by Mohammadi and Asadbeigi (2015). Their suggestion is that 'complacent resistance' is characterized by withdrawal and avoidance (behavioral) and emotional weakness, whilst 'resigned resistance' is expressed via covert withdrawing, expression of despair, ignoring proposed actions, being unwilling to participate, and giving up on trying. Finally, they suggest that 'overt resistance' is marked by demonstrations of contempt, aggressive and hostile attacks

on others, and active politicking. Both complacent and resigned resistance are of particular importance to the current study with its focus on mandatory introduction of a new technology. Another more detailed categorisation of resistance response is also provided by Huang (2017) who found that expressions of resistance can include aggression, sabotage, disloyalty, refusal to work, industrial action, and exit intentions.

The varied categorisations of resistance response outlined above essentially share the view that those who are forced to use a new technology may, broadly, express their resistance in one or more of three ways: cognitively, affectively, and through a multiplicity of behaviours other than acceptance of change. However, as we have repeatedly indicated earlier, many researchers talking about resistance responses further employs the terms *coping* and/or *adaptation*. The term coping particularly reflects the fact that, for most employees, job security is a paramount consideration and as a consequence their expression of resistance must be considered within that context. Their response is likely to represent an acceptable way of managing (i.e. coping with) the dissonance evoked by having to use a new technology to which they are resistant. That is, they choose an appropriate way of adapting their behaviour, which is a coping response which allows them to use the technology to the degree required in order maintain their job security (Lazarus and Folkman, 1984).

It is worth noting that the terms coping, and adaptation response are used variously by different authors to include cognitive and/or affective and/or behavioural responses. Indeed, Lazarus and Folkman (1984) make an explicit distinction between emotion focused and problem-focused (cognitive) adaptive strategies and their behavioural outcomes. The two terms are also typically used interchangeably in the literature, with definitions of both illustrating their similarity. For example, Beaudry and Pinsonneault (2005) describe adaptation by reference to coping as "the cognitive and behavioural efforts performed by users to cope with significant information technology events that occur in their work environment" (p 493).

Bhattacherjee et al (2018) use the term coping response, defining coping by example in a similar way to adaptation as: "coping may include modifying our expectations of the event, maintaining hope and optimism that the change or event will be reversed, selectively processing information about the event to make ourselves feel better, avoiding or withdrawing from the event, living in denial, or simply being frustrated or disappointed" (p 400). In fact, we have not found any author explicitly defining a distinction between *coping* and *adaptation* or between either of those or *response*. Indeed, in an effort to reduce the complexity and impose some semantic clarity, some researchers (e.g. Holahan et al, 2017) combine both words, using the term 'adaptive coping' which they describe as 'cognitive and behavioral efforts to manage stressful conditions or associated emotional distress' (p 485).

On reading the literature, it appears that there are at least three further distinctions that could usefully be made, but which are not apparently made by systematically using these terms to distinguish them. One is the evaluative distinction between coping/adaptation that would be regarded by managers or psychologists as good versus bad. As seen in the lists of examples above, the academic literature that we refer to lists both positive (e.g. modifying expectations) and negative (e.g. aggression) examples without attempting further distinction between 'good' and 'bad' coping/adaptation. A rare exception is Chenoweth and Corral (2019) which uses the evaluative terms *adaptive* and *maladaptive* to encapsulate the distinction between these two types of coping. The importance of making such a distinction and not remaining totally non-judgmental is that an account such as the present one may have as a secondary aim to inform managers as to how best to proceed in future. To guide such action, they need an evaluation of how the workforce is handling an innovation, not just a description.

A second distinction is between adaptation/coping that is deliberately done versus an involuntary response. Again, lists of examples often include likely examples of both (e.g. active politicking must be deliberate while being frustrated is surely involuntary). Although in

everyday English usage *coping* sounds more deliberate and *response* rather involuntary, with *adaptation* in between, no such distinction seems to be made by these terms clearly in the literature. However, it is noticeable that the term *strategy*, which again is usually used undefined in our sources, tends to occur more with coping and adaptation than with response. In business and social science, a strategy is typically defined as "setting goals and priorities, determining actions to achieve the goals, and mobilizing resources to execute the actions" (Simeone, 2020, p 515), which clearly implies deliberate, conscious activity. Thus, there is perhaps some faint secondary reflection of a distinction between what people do deliberately to deal with an unwanted change and what they do spontaneously as a response to it. The importance of this distinction perhaps lies in the fact that, if there is an ultimate aim to reduce people's resistance to an innovation, different interventions may be needed where involuntary rather than deliberate responses are involved.

Finally, there is the distinction between process and product: coping or adaptation viewed as an activity with time duration (e.g., avoiding using IT, politicking), versus as a summary result at a point in time viewed as a (perhaps provisional) endpoint (e.g. compliance, resigned, at the time when data was gathered). Here many sources make no clear distinction (e.g. Bhattacherjee et al., 2018) and indeed many words used in this area can be used both in a process and a product sense. However, more specific descriptions like 'covertly withdrawing' tend to relate to process and general single words like 'non-acceptance' tend to be understood as overall product labels. Nevertheless, this distinction was clearly marked in the founding paper of Lazarus and Folkman (1984), who separated what they called *coping* (strategic processes) from *outcomes* (summary product statements of overall response). The value of this distinction lies in the fact that a variety of processes, which need to be considered separately, and may not all be forms of resistance, may collectively lead to a single outcome. Hence for fuller understanding, a recognition of the difference is valuable. In the present study,

all these distinctions will be born in mind during the data analysis, regardless of how well current theoretical frameworks distinguish them in their terminology.

4.3. The Role of Individual and Social Factors

In an organisational context, resistance to change frequently relates to the introduction of a new technology and it is important to understand its causes. Dispositional factors (resistance as a trait), demographic features, beliefs and attitudes, social and cultural factors, and other psychological as well as emotional factors can influence whether the individual resists change. These are now discussed in more detail.

4.3.1 Dispositional Resistance to Change

Dispositional resistance, as previously described, is a personality trait of a person that operates regardless of type of change encountered and partly determines why some people are by nature more opposed than others to change. Researchers such as Laumer and Eckhardt, (2012) contend that dispositional traits are endogenous, stable and structured dispositions controlled by biological factors. He developed a resistance-to-change scale which includes measures for the personality trait of resistance. The basic assumption of this scale is that individuals who have strong resistance-to-change character traits are least disposed to initiate a change. Such people have more negative attitudes towards differences, and they are inclined to oppose any change. More recent research by Nuhu (2020) provides evidence of the longitudinal consistency and heritability of such personality traits and confirms the efficacy of trait scores in predicting individual perceptions and behaviours in various situations. In his research on personality traits and their relation to change, he identified four observable dimensions that reflect people's dispositional resistance to change: emotional reaction, routine seeking, cognitive rigidity, and short-term focus (Nuhu, 2020). The first of these, *emotional*

response, is concerned with how individuals affectively react to changes imposed on their lives. The second, r*outine seeking,* concerns how far people seek lasting stable routines in their lives. It can be expressed through *cognitive rigidity* which reflects the individual's tendency to hold on to their views (Laumer and Eckhardt, 2012). Finally, *short-term focus* concerns whether a person generally focuses on the short-term disturbances that are part of the main change or on latent long-term benefits of a change. High values on any of these four dimensions predispose individuals to resist (in the state sense) a specific change more strongly, while low values would lead to acceptance (Nuhu, 2020). Other personality traits that may influence an individual to resist change including new technologies have been shown (Nunes et al., 2018) to include level of openness, emotional stability, consciousness, agreeableness, and extraversion. An individual with an openness trait is more likely to accept new technology as research has shown that individuals with a higher score on the extraversion trait have stronger interactions with computers (Nunes et al., 2018; He and Veronesi, 2017). Although the purpose of the present study is not to focus on embedded psychological characteristics such as dispositional resistance, it nonetheless recognises that this trait may influence adoption outcomes or transition responses and will incorporate that understanding into interpretation of the study results.

4.3.2. Demographic Variables

A second predictor of resistance to change is based on the demographic characteristics of the individual. Some of the individual characteristics that have been found to substantially impact an individual towards a change include age, gender, self-efficacy, experience and personality (Nunes et al., 2018). However, little research has examined how these factors directly impact variation in response to change, including behavioural adaptation responses. Most researchers in the acceptance literature have instead focused on how they may moderate

the effects of other predictors on behavioural intentions and technology acceptance (Nunes et al., 2018; He and Veronesi, 2017). For instance, concerning age, behavioural intention to accept is strongly determined by facilitating conditions and effort expectancy in older people and strongly determined by performance expectancy in youths and young adults.

Concerning gender, women's intention to change is more driven by previous experience, social influence, facilitating conditions, and effort expectancy, while men's intention to change is more influenced by performance expectancy (Nunes et al., 2018; He and Veronesi, 2017). Concerning self-efficacy, technology adoption determinants such as ease of use and the perceived usefulness are highly moderated by self-efficacy. If a person sees themselves as having high IT competency, typically ease of use of new IT software will be less likely to affect their adoption. In the present study there will be an attempt to examine whether these variables similarly influence resistance to new technology and choice of adaptation response, which to this researcher's knowledge has not been considered before.

4.3.3. Beliefs and Attitudes

Many reasons that predict resistance to IT change take the form of beliefs that an individual holds about what is accurate or real (Laumer and Eckhardt, 2012; Fransen et al., 2015). As previously described (chapter 3) attitudes can be regarded as a particular type of belief. Many beliefs and attitudes influence individual behaviour, thus affecting personal response to a change. User beliefs (aka perceptions, based on questionnaire or interview responses) about some aspect of the IT innovation: e.g., relative advantage, complexity, performance expectancy, usability, effort expectancy, facilitating conditions, price to value ratio, hedonistic motivation, system quality, service quality, risk affects resistance, and indeed they are candidates to affect behavioural response as well. In addition, all the concomitants of IT innovation that, as was seen in 4.1.4, can generate resistance as a state attitude or behaviour

are also essentially matters of user belief, which may or may not be supported by reality. That includes anxiety about: position retention, new work practices and tasks, stricter oversight, pay, autonomy, and responsibility. Beliefs are at the heart of a three-step approach that posits that perceived threats, inhibitors, and loss of power (all of which are forms of belief and attitude) mediate the effect of the many factors (including inhibitors) already mentioned and, in turn, affect individual rejection behaviour. First, a perceived threat is an individual's cognitive evaluation of the likelihood that a change would negatively affect them and how badly (Laumer and Eckhardt, 2012). Typically, a greater perceived threat associated with a change lead to resistance to the change. Second, inhibitors are perceptions an individual holds regarding factors that discourage the use of a system. These may include the difficulty of using it and perceived lack of usefulness (Cenfetelli, 2004). Lastly, how a change would affect an individual's power determines how an individual responds to a change. Resistance to a change may be determined by the interaction between the implemented changes and the roles that are inclined to be affected by the change (Fransen et al., 2015). If the changes cause a perceived loss of power to people with certain roles, individuals in those positions will develop resistance behaviours. Such beliefs may relate to employees comparing their input to the workplace and the output they receive from the workplace.

4.3.4 Social and Cultural Factors

The fourth predictive category suggested is social and cultural factors. One such factor affecting people's resistance to change is the social influence of family, friends, and in the present case especially fellow workers. If the people around an individual employee are against the change, probably they too will resist the change (Maier et al., 2013). Within social factors, a distinct place is found for 'social system' factors. These have been mainly discussed in relation to the concept of diffusion, which is how innovation is transmitted within a period

of time across social system members (Rogers, 1983). In this regard, from a social perspective, the World Health Organisation defines innovation adoption as how social systems accept and do something different from what they had previously (Dearing and Cox, 2018). 'Social system' therefore refers to interconnected units involved in joint problem solving to achieve a common goal (Rogers, 1971). For instance, individuals, groups, subsystems, and organizations, and while they might be distinct, they work toward achieving a mutual goal. The diffusion of innovation occurs in a social system because the structure of a social system influences the diffusion of innovation (Millar et al., 2018). 'Social structures' refer to patterns within a social system that influence how individuals interact: the communication structure or communication flow. Importantly, these structures within a social system can either enhance or hinder the diffusion of an innovation within a system (Millar et al., 2018): in the latter case they create resistance.

Aspects of social structure that affect diffusion include norms, opinion leadership, and change agents. These three key ideas are now considered in turn. First, the established behavioural patterns for members of a social system are known as norms (Scott and McGuire, 2017). For example, the norms of a certain community may prevent individuals from that community adopting contraceptives because their norms have taught them to believe that contraceptive use is morally wrong. In the present study the most obvious source of norms is the hospital rules that a doctor is required to observe by virtue of his/her contract of employment (e.g., that they use OASIS). However, norms also include 'unwritten rules' that hospital doctors may observe which are simply traditions associated with hospital doctors considered as a community of practice (e.g., that the consultant is always right).

Second, the degree to which a person can informally influence the views or overt behaviour of others in a desired way on a regular basis is referred to as opinion leadership (Scott and McGuire, 2017). In the present study, this may also be the case with particular

individuals, within departments or hospitals or more widely, whose views on OASIS have for some reason become especially valued and sought after by doctors in general.

Third, change agents are people in an organisation who have the skill and power to stimulate, facilitate, and coordinate a change. In this current study this may include relevant members of the IT support department, hospital administrators in charge of OASIS innovation, and potentially staff from the MoH who visit to promote OASIS. These are expected to have a huge impact on individuals' opinions and, therefore, will influence whether an innovation may be absorbed in the social system. Thus, innovators need to identify change agents that their target audience respects and trusts, to promote their innovation, i.e., who are also like opinion leaders (Millar et al., 2018): that duality is what we see today in 'influencers' on the internet who are both chosen by ordinary people as their opinion leaders and are selected and paid by companies as change agents to promote their goods or views. For an innovator to reduce resistance to innovation within a social system, he or she has to communicate to the target audience how the innovation is compatible with their social and cultural norms and in other ways beneficial (Scott and McGuire, 2017).

Social factors in a wider sense have been found to be among the leading reasons why healthcare professionals resist innovations. Jacob et al. (2020) systematically explored relevant published literature to synthesize the current understanding of the factors impacting clinicians' adoption of mHealth tools. Using a very broad definition of 'social', the author listed social factors as comprising training, lack of time to learn how to use new technologies, quality and efficiency of care, safety concerns, perceived risks, patient education and awareness, policy and regulation, clinician perceptions and attitudes toward the new technology, and organizational culture and context as important social factors to consider when introducing a new system into a hospital.

Although the work of Linus (2020) focuses on acceptance, he found a strong and statistically meaningful association between so-called social factors such as technical skills and attitude and EHR adoption. Similarly, Aljarullah (2018), using a more careful and limited definition of 'social', explored and classified factors likely to affect primary care physician acceptance of EHR systems. He also found that social factors such as social influence and subjective norms do influence healthcare physicians' acceptance or rejection of EHRs in Saudi Arabia. As one of the few closely relevant studies that exist in the context of the present study, this creates a strong expectation for what the present study may find.

Cultural factors can also influence technology resistance. For example, Hofstede (2009) contends that collectivism and individualism are cultural dimensions in society that concern the extent to which individuals in societies integrate into different groups, and their perceived dependence on, and obligation to, the group or organisation. For instance, individualism places greater importance on personal goals. Countries that conform to this end of the scale tend to define their self-image as “I” as opposed to “We”, while societies or countries that conform to the collectivism end of the scale place greater importance on the well-being of a group as opposed to an individual, defining self-image from the perspective of “we” as opposed to “I” (Hofstede, 2009). According to Craig (2019), again, collectivism is mainly focused on what is best for a group. As such, people in such societies are mainly motivated by group rewards and not personal rewards. In practice, these theories of individualism and collectivism have been used to demonstrate how different countries approach governance. Governance in countries with cultures of individualism or collectivism is distinctly different, because of the difference in both the governments and the populations’ perceived obligations (Hofstede, 2009; Stein et al., 2015). For example, Saudi Arabia (moderately collectivist) understands each individual has a responsibility to engage in activities that bring growth and success to the group. In contrast,

people in the United States (extremely individualist) believe that they have a responsibility to satisfy their needs and those of close family members, but not necessarily society at large.

Research such as that of Abunadi (2013) confirms the role of culture, showing that cultural factors (as defined by them), including trust, perceptions, cultural value, and social values, all influence technology adoption positively or negatively in the context of Saudi Arabia, as do cultural norms such as collectivism. Correspondingly, a study conducted by Hoque and Bao (2015) on the adoption of e-health systems in Bangladesh found that cultural dimensions such as power distance, masculinity, and restraint had substantial impacts on intention to use e-health. These studies indicate the importance of culture as a consideration in understanding why an innovation may be accepted or resisted. It is worth noting however that limited research exists on variation in how resistance is expressed and that which does exist has been conducted in individualist countries, such as the United States (e.g., Beaudry and Pinsonneault, 2005; Lapointe and Beaudry, 2014; Bhattacherjee et al., 2018). The fact that the current study will be conducted in a country characterised as culturally collectivist is therefore particularly pertinent to addressing this gap in the body of knowledge.

4.4 Theories Relevant to Mandatory Technology Imposition

As previously discussed, the situations in which technology is implemented are not necessarily voluntary adoption contexts for the end user. This may require that the end user adopt the technology in practice or at least adapt their behaviour so as to appear to do so (Nickerson, 2020). However, they may act in ways which either limit or lead to more full rejection of the technology. This indicates that the user response can be nuanced and range from full or partial reject to full or partial adoption. Therefore, a more complete understanding of this issue is required. A number of theoretical frameworks can assist in this regard, providing an important lens for understanding resistance and its expression. These theories

include the Coping theory and the Equitable Needs Fulfilment theory. Their value to the current study is now discussed in more detail.

4.4.1. Coping Theory

A theoretical perspective of particular interest is that of the Transactional Model of Stress and Coping (TMSC), developed by Lazarus and Folkman (1984) which contends that a person's capacity to cope and adjust to challenges and problems is a consequence of transactions (or interactions) that occur between a person and their environment. It is their evaluation of harm, threat and challenges which determines the process of how they respond or coping with those stressful events or taxing events (Lazarus and Folkman, 1984). This theoretical framework is of particular value to the current student in that it recognises the cognitive evaluation associated with the introduction of a stressor, in this case, that of a new health information system, usage of which is a mandatory requirement. The model contends that this evaluation predicts the type of coping response which the individual will assume. As noted earlier in this chapter, adaptation is the behavioural manifestation of the coping response. This is indicated in Beaudry and Pinsonnault's (2005) description of user adaptation as "the cognitive and behavioral efforts performed by users to cope with significant information technology events that occur in their work environment" (p493).

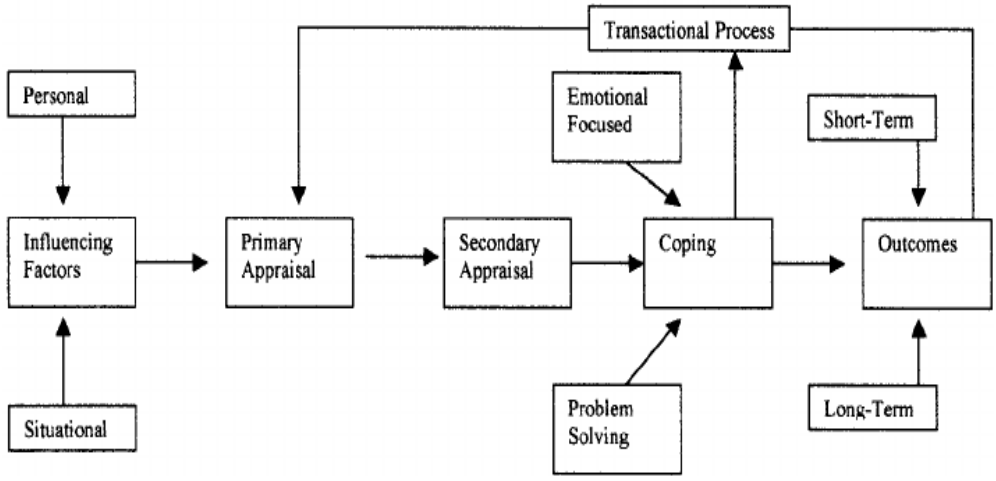


Figure 4.1. Coping Theory Model (Lazarus and Folkman, 1984: 98)

The premise of TMSC is that individuals choose the behavioural response that is likely to be most effective in re-establishing their sense of personal well-being within their particular environment. In the first instance, evaluation of the stressor can differ from person to person. For example, Lazarus and Folkman (1984), propose a set of **influencing factors** which affect how the individual perceives the change in their environment and how they relate to it, as would be the case with the introduction of a new technology. These influencing factors are both personal and situational in nature and many resemble those described above, e.g., in relation to the UTAUT. However, only subjective factors, as perceived by participants, are included here, not objective factors such as the researcher may identify. **Personal factors** refer to an individual's personal agenda, including their commitments and beliefs, therefore it embraces issues such as how they perceive the value of an innovation in relation to what they see as the goals of their work and their role in achieving that. It includes the extra effort that they think is involved and what enjoyment or lack of it they perceive as associated with it. It also must include how they think others will perceive their response. **Situational factors** again include many demand and resource aspects of innovation already familiar from earlier discussion, such as whether there is a perception of sufficient infrastructure support, and whether the authorities have put sufficient training facilities in place. Situational factors also include novelty, predictability, duration, and imminence.

The outcome of these influencing factors then stimulates a two-stage cognitive appraisal process, which is a complex evaluative process that then predicts the coping response of the individual, that is their behavioural adoption or rejection response (Lazarus and Folkman, 1984). The inclusion of these appraisals is a key element that distinguishes this theoretical approach from others discussed earlier where the influencing factors directly affect intention to accept or resist, without any such cognitive activity mediating the process. Due to the variation that exists in individual agendas and the complexity and ambiguous nature of

situational contexts, there can be "great variation in the appraisals that people make even in the same environmental context" (Monat and Lazarus, 1991, p. 6).

Furthermore, the influence of normative expectations cannot be understated when it comes to assessing the success of new technology implementations. Workplace cultures are shaped by norms that dictate how innovative disruptions are viewed and accepted, reflecting the values and expectations of employees as a collective. The evaluation of disruptive innovations in the workplace is closely linked to normative standards, as individuals weigh new technologies against established professional identities and social norms.

During **primary appraisal**, in the original formulation (Lazarus and Folkman 1984), a disruptive event (or, in our case, ongoing non-optimal situation following such an event) is assessed in terms of its personal significance and expected consequences. "During this stage, we ask the question 'how does this event impact me?'" This is crystallized as either seeing the event as an *opportunity* for personal or career growth or following others who view the same event as a *threat* of potential loss of control, position, or power. During **secondary appraisal**, participants assess the degree of control (high or low) that they feel they have over the disruptive event, considering the resources available to them. During this stage, "we ask the question 'what can I do about this event?'" (Lazarus and Folkman 1984). A person then either feels that they have some *control* over the event/situation, or that they do not. In TMSC model (Figure 4.1), the second appraisal leads directly to the kind of **coping** strategy that occurs. This is the core of TMSC with coping defined in process terms as "constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person." (Lazarus and Folkman, 1984: p. 141). If a person feels that they have some control over the event/situation, they tend to engage in *problem-focused coping*, which is essentially cognitive and behavioural. These coping

strategies are directed at identifying the precise problem that causes stress, generating potential solutions, assessing alternatives, selecting from them, and acting. Problem-focused strategies aim to reduce stress either by a person changing themself or by influencing their environmental conditions and thereby reducing the associated stressors. Changes in the person themself include altering their level of aspiration, lessening ego involvement, discovering different channels of gratification, or adopting changed standards of behaviour (Lazarus and Folkman, 1984). The coping actions could include voicing support for or opposition to the event, learning new skills to handle it, transferring to a different work role, retiring, or even just resigning. However, if a person feels that they lack sufficient control over the challenging event/situation, so cannot modify it', they may rather engage in *emotion-focused coping*, where what is adjusted is their own perceptions and emotions about the event without any behaviour actually affecting the situation, because they feel that trying to change the environment would be futile and just lead to frustration. Such coping might include modifying expectations of the event, "maintaining hope that the change will be reversed, selectively processing information about the event to make themselves feel better, avoiding or withdrawing from the event, living in denial, or simply being frustrated or disappointed" or even finding positive value in negative events (Lazarus and Folkman, 1984: 100). The last stage in TMSC is **outcomes** which correspond loosely to the dependent variables such as acceptance and resistance in the models reviewed earlier. They were categorized by Lazarus and Folkman as either short-term outcomes (including positive and negative feelings), or, more relevant to the present study, long-term outcomes (which include changes to social functioning and morale).

Although its scope is not limited to technology adoption, the value of this theory lies in the fact that it recognises that the change which is caused by a new event, such as would be the case with the introduction of a new technology, stimulates a process of staged evaluations and responses which are heavily emotional and dependent on the individual's evaluation of

their personal and situational environment. Furthermore, it recognises that outcomes can vary in type beyond simple adoption or rejection. In this way, by focusing on process and allowing variation in response, this theory moves beyond the limited focus of earlier models such as the Theory of Planned Behaviour (which is restricted to three main predictors, has no place for emotion such as stress in the process, and treats the adoption outcome as being the same for all individuals). In doing so, it provides a more granular analysis of the process which underpins variation in acceptance or rejection of technology, which is central to the current research.

One limitation of this theory relates to the fact that it does not specify the nature or form of the emotional or problem-solving coping strategies. Another is that it does not detail the behavioural outcomes, simply describing them as short or long term. Therefore, a number of elaborations and improvements have been suggested since the original Lazarus and Folkman (1984) formulation, of which the most important are now outlined.

Dewe and Cooper (2007) enriched the characterisation of the second appraisal, pointing out that the 'level of control evaluation' can involve a person identifying and evaluating their own coping resources (such as self-efficacy), situational variables (such as degree of job control), and their own coping style (i.e., how they coped with similar events in the past). It is this appraisal which determines the assessment of either high or low levels of control. They also note that 'secondary' does imply that the secondary appraisal is of less importance, or that primary and secondary appraisals are completely separate and strictly occur in that order. Thus, the appraisals are regarded as involving a complex, dynamic process with simultaneous switching back and forth between primary and secondary appraisal (Dewe and Cooper, 2007). It is these appraisals which determine the nature of the individual's coping response which they use to "shape, manage, or resolve the event" (Dewe and Cooper, 2007, p. 144).

Subsequent research by Lapointe and Beaudry (2014) provided more detail regarding the nature of the outcome response, proposing five IT user behaviours as potential adoption responses that result from the appraisal sequence. These five behavioural outcomes are described as *deviant, resigned, ambivalent, dissident* and *engaged* (Lapointe and Beaudry, 2014). Deviant behaviour is expressed by users who are non-compliant with new IT innovations. Resigned behaviour is displayed by users who feel the need to employ an innovation despite their dislike for it. Ambivalent users have conflicting emotions towards new IT policies and innovations, as they are both excited and afraid of the consequences that await failed compliance with the policies. Dissident behaviour is expressed by users who do not have a problem with IT changes and generally accept them but are nonetheless non-compliant. Engaged behaviour is displayed by positive-minded users who are willing to adopt new IT policies and innovations with an open mind to reap the utmost benefits from the new changes (Lapointe and Beaudry, 2014).

Research by Bhattacherjee et al. (2018) employs these distinctions of types of outcomes, within a context of information technology. Bhattacherjee et al. (2018) examined user response to mandatory IT use, albeit without separating process coping strategies from product outcome. The study was conducted in one large community hospital over an 8-year period in the United States. The study was qualitative, and data was collected through interviews with a total of 47 interviews comprising doctors, nurses, and administrative staff. Thus, it closely resembles the present study, except for the location and time span.

They describe **primary appraisal** as the cognitive process of determining whether the environmental event is relevant to the individual and whether it is positive or negative and similar to Lazarus and Folkman (1984) they conceptualize this as opportunity versus threat. As per TMSC they recognise the **secondary appraisal** process which they describe as the cognitive process of determining what can be done to manage the event (Bhattacherjee et al,

2018). Moreover, they recognise the four outcome possibilities arising from crossing the two appraisals, such as high threat with high control versus high threat with low control etc. Consistent with Lapointe and Beaudry (2014) they acknowledge that the individual's outcome response may vary. However, they point out that LaPointe and Beaudry's categorization of an 'ambivalent' response, is not adequately distinct from other response categories and could effectively be absorbed by them (Doty and Glick, 1994). Therefore, for the purpose of clarity, they further refine the response typology to a more parsimonious taxonomy consisting of four distinctive potential outcomes (rather than five). The first of these, an *engaged response,* indicates an enthusiastic and passionate reaction to the changes. This behavioural outcome manifests through the desire to explore a change to understand its usage and the capabilities it requires. It is therefore the optimal response from an employer perspective. The second potential response, that is a *compliant response,* indicates a generally positive inclination towards the change but with less enthusiasm from the end user. While accepting, the end user treats the required change only as a necessity. *Reluctant response* indicates user reservations or fear of the introduced change viewing it as an unwelcome disrupter of work. The final potential outcome, that of *deviant response,* indicates low expectations about the change, such as new IT, and the belief that development is a challenge to autonomy and work. From a behavioural perspective, this can be expressed as a desire to disown such IT solutions (Bhattacherjee et al., 2018). A visual depiction of their model, showing primary and secondary appraisal stages, as well as the four potential outcomes is shown in Figure 4.2. It can be seen that there is no overt recognition of what Lazarus and Falkman (1984) called *coping* (i.e. process strategies), between *secondary appraisal* and *response* (which is worded in outcome product terms). It seems that that category is meant to be subsumed under *response*.

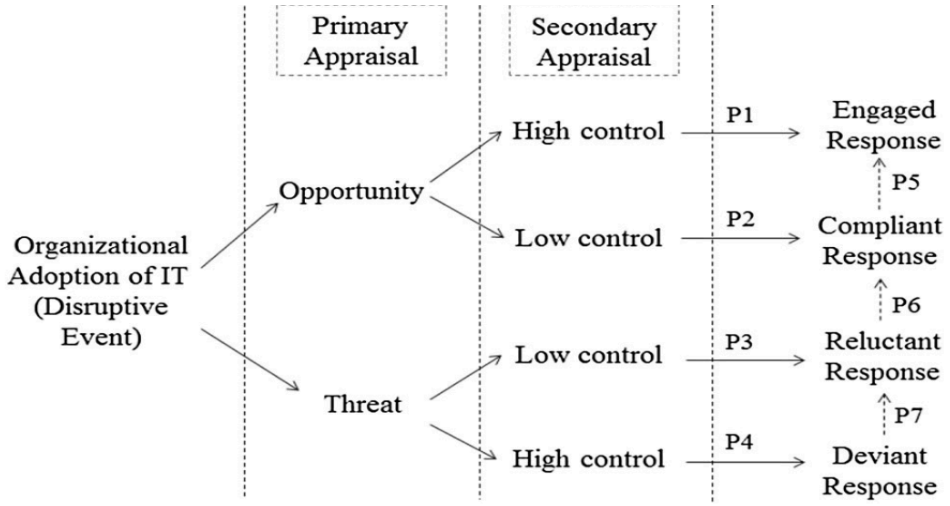


Figure 4.2. The Coping Theory model (Bhattacherjee et al., 2018: 401)

The value of these Coping models to the current research lies in the fact that they harness the key guiding framework of Coping Theory, which conceptualises that an individual's acceptance/resistance response to a change event, such introduction of a new technology, is not directly due to influencing factors, but is mediated through both a primary and secondary appraisal and potentially a process of adaptation; furthermore, that response is multivalued and strategically complex. Moreover, they recognise that adoption responses vary in type, they are not static, and it is possible for an individual to transition between them. In doing so they overcome the limitations of previous models (TRA, TRB and UTAUT: Venkatesh et al., 2016) which focused on beliefs but did not examine the process by which those beliefs are formed, nor the variation in response. This is particularly important in that it facilitates a more thorough examination of the process through which beliefs are formed, their impact on behavioural response, and in doing so contains the possibility for developing better interventions which can lead to positive responses. The model also represents opportunities for the current research since its authors call for future research which can provide insight into why and how end users can transition in their adaption response (P: 412-413). Specifically, Bhattacherjee et al. (2018) advocate for research examining whether positive and negative responses towards IT can exist simultaneously and identification of the influence mechanisms

that can change users' behaviours from reluctant use to engaged use. The following discussion details a theoretical perspective which may contribute to understanding of that latter point.

4.4.2 Equitable Needs Fulfilment

A second theoretical perspective of interest is that of Equitable needs fulfilment theory, which is a derivative of Equity Theory which originated with Adams (1963). The original theory states that employees will be satisfied when they perceive a balance between their input to an organization (which includes time, skill, trust in superiors, personal sacrifices, flexibility, enthusiasm, tolerance, efforts, and loyalty) and the output that they receive from the organization (e.g., salary, employee benefits, job security, reputation, praise, and a sense of achievement) (Lim, 2020). The theory is based on the (arguable) principle that employee motivations and actions are guided by a sense of fairness and that incongruities in workplace fairness lead to demotivation and low productivity. Furthermore, according to this approach, employees also compare themselves with their peers and if they have no one with whom to compare their treatment within their institution, they look to other employees in the same industry and at the same employment level in other businesses (Biswas and Kapil, 2017). This view of worker cognition is compatible with appraisal in the Coping approach, and indeed offers a detailed mechanism by which appraisal could proceed.

This is a theory explaining worker satisfaction rather than specifically their response to a change in the workplace. However, it is contended that every time the organization effects a change, the equity balance has the potential to be adversely affected, and some workers could become dissatisfied and reject the proposed change (e.g. appraisal of an innovation as a threat = dissatisfaction).

Work by Au, Ngai and Cheng (2008) on why an individual may be satisfied or dissatisfied with an information system has provided a more nuanced perspective on the

dependent variable, conceptualising that satisfaction or dissatisfaction in terms of needs fulfilment. The three types of needs fulfilment (shown in figure 4.3) that are claimed to be relevant are: equitable self-development, equitable work performance fulfilment, and equitable relatedness fulfilment. Equitable fulfilment in terms of self-development relates to career advancement and job security, whilst work performance fulfilment relates to whether the new technology helps the user work more efficiently and improves their ability to deliver good service without a disproportionate amount of extra effort being required. Finally, relatedness fulfilment is determined by whether the change enables the individual to build better communications with colleagues. In the words of Au et al. (2008. p47), relatedness fulfilment includes "all the socially oriented needs of the user that require interactions with other human beings", so fulfilment of such needs includes much of what elsewhere is termed 'social influence'. As previously discussed, both of these latter needs have potential to augment the end-user's professional identity as a member of a community of practice. Overall, the degree to which the needs of the individual are perceived as being fulfilled on each of these three levels determines whether the balance of inputs to outputs is perceived as being equitable and their behavioural response in relation to that technology.

This perspective as to why an employee might be satisfied or dissatisfied with a new technology is particularly salient to the current study, with its contention that end user satisfaction with a new technology is not simply a matter of expectations regarding the performance or functionality of the technology but must also comprise a more nuanced understanding of how the end user perceives the technology as supporting their relatedness, work performance and self-development.

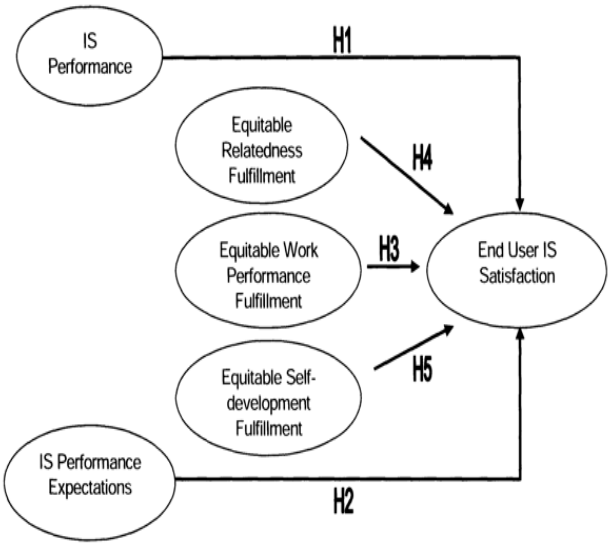


Figure 4.3. Equitable Needs Fulfilment Model (Au, Ngai and Cheng, 2008: 47).

More recent research has also pointed to the need to incorporate recognition of the fact that some people may be more sensitive to equity need fulfilment than others. For example, Huseman et al., (1987) proposed that those individuals who are 'equity sensitive' adjust their work inputs to the level of others, to ensure equity of effort and reward across the workforce. However, there may also be those who appear not to mind giving more input than they receive output, termed 'benevolent', whilst those who are 'entitled' are determined to do less than others. For them needs are fulfilled only if others do the lion's share.

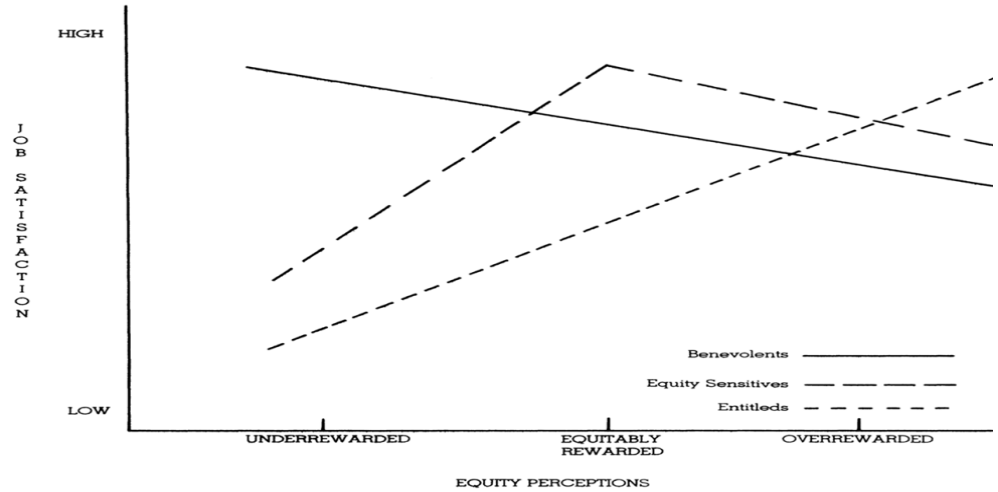


Figure 4.4. Equity Sensitivities Model (Huseman et al., 1987: 229).

4.5 Summary: Guiding Theories and Conceptual Model

The purpose of this study is to understand the coping responses which employees exhibit in response to the mandatory implementation of a healthcare information system in Saudi Arabia. In doing so, it seeks to identify the nature of the factors and processes that shape end-user coping responses and outcomes. A secondary objective is to identify whether an employee's response to the technology can transition (either positively or negatively) over a period of time, and if so, to identify the factors or interventions that influence these transitions.

To that end, a review of the literature was undertaken – focusing on the studies, theoretical frameworks and models which can provide insight into technology adoption and resistance to IT induced change. Technology acceptance theories such as DOI, TAM1, TAM2, TRA, TPB, UTAUT, D&M ISS, and TTF provide helpful insight into the factors that can influence users' intentions and adoption of a technology. They highlight the importance of beliefs and attitudes, the influence of social norms and the importance of perceived control and self-efficacy. However, the dependent variable is adoption and variation in the adoption response is not considered. Moreover, they are relevant to voluntary adoption contexts where the participant has agency regarding their response. That is increasingly not the case in many employment contexts where new technology is mandatorily imposed. This required a refocusing towards two theories which emerged as being of particular importance: Coping Theory and Equitable Needs Fulfilment Theory (ENF).

The former recognises the importance of personal and situational factors in terms of how these influence beliefs. It also recognises that beliefs are formed as part of a process, conceptualised as primary appraisal and secondary appraisal and that these influence coping response outcomes. The more recent evolution of this model, that developed by Bhattacherjee et al (2018), decomposes behavioural responses, presenting them on a staged progression from deviant to engaged, recognising that behavioural responses can vary substantially (as shown

by Beaudry and Pinsonneault, 2005), ranging from limited adoption to outright resistance. Such variation clearly has the potential to influence organisational success, particularly as mandatory usage of technology is likely to increase in the future. Cultural context may also influence outcomes and their predictive factors. Thus, Bhattacherjee et al. (2018) call for research employing their model in contexts where new technology usage is mandatorily imposed. Furthermore, they recognise that transitions between adoption responses may be possible and call for research to examine this issue. Coping theory is therefore both important and relevant to both the primary and secondary aims of the current study.

The second theory of interest, that of Equitable Needs Fulfilment, is particularly salient in relation to this last point, that of understanding transitions in adoption response. Au, Ngai and Cheng (2008) indicate behavioural outcome as being determined by satisfaction or dissatisfaction with an information system, which is predicated on the degree of end-user needs fulfilment. The three types of needs fulfilment that are claimed to be relevant are: equitable self-development (career advancement and job security), equitable work performance fulfilment (supporting work without undue effort) and equitable relatedness fulfilment (improved communications with colleagues).

ENF was chosen above other accounts of factors affecting favorability or not of response to innovation (variously termed response, acceptance, satisfaction, resistance, etc.) for two reasons. First, Au et al. (2008) argues in their theory that it does not just list 'factors affecting satisfaction or 'response. etc.', as UTAUT does, and even the 'influencing factors' box in the early form of the TMSC model in Lazarus and Folkman (1984) (our fig. 4.1). It rather provides a whole "theoretical underpinning" of the way people think about innovation, in terms of input versus output contributions, equity with others, and so forth. Furthermore, Au et al.'s ENF theory combines the benefits of three separate antecedent theories (expectancy,

equity, and need separately). Therefore, it provides a more satisfying and illuminating account than a bare list of factors with no unifying account of WHY they might affect satisfaction.

Second, it was decided by Au et al.'s (2008) successful use of ENF in an innovation setting loosely analogous to ours, with a dependent variable similar to ours (user satisfaction, although not concerned with transition). As Au et al. show, this theory helps understand what motivates user behaviour in an obligatory IS innovation context like ours. It conceptualizes the inputs regarding the effort of learning to use new technology and the outputs in terms of whether three types of employee needs are fulfilled. Furthermore, the Fulfilment of user needs is subject to change. It may, therefore, provide a fruitful mechanism for understanding transition in coping response – particularly regarding its potential to counter the 'threat' aspect of primary appraisal and the 'loss of control' aspect associated with secondary appraisal. No study has been found where ENF has been used to explain *changes* or transitions in satisfaction after the initial introduction stage of a new technology. Therefore, it seemed interesting to see whether ENF proved illuminating in that case as much as in its existing accounts of satisfaction simply at one moment, usually that of the initial introduction of new technology (as researched, e.g. by Au et al., 2008).

These two theories together therefore represent an important combined mechanism for understanding variation in user response to a new and mandatorily imposed technology such as the OASIS system which has recently been implemented in Saudi Arabian hospitals. There are several benefits associated with combining both theoretical perspectives. First, it ensures that both variation in adoption and resistance response as well as potential transition are equally represented. Many of the participants in the present study will have been using OASIS for many months or even a few years since it was first imposed. That gives the present study currency and interest, but also means that by that time some initial resistance may have changed into acceptance. Hence a model that can cope with varying time periods of adoption

and experience with the technology, as well as potential changes in adoption response is especially relevant. Second, as new technologies are increasingly being mandatorily implemented without consultation with employees, the imperative to understand how employee satisfaction can be more effectively managed to ensure optimal engagement increases in importance. Understanding the needs that underpin such satisfaction can provide valuable insight into securing that optimal outcome. This combined theoretical perspective and conceptual model is illustrated in figure 4.5. It synthesises coping theory with equitable needs fulfilment theory, illustrating that the variation in coping response is predicted by both primary and secondary appraisal of the technology, the former in terms of opportunity or threat and the latter in terms of loss or gain of control. Furthermore, it conceptualises the transition between coping response types as being motivated by the degree to which three needs of the end user are deemed to be fulfilled. It also recognises that some end-users may be more sensitive to fulfilment of such needs than are others.

It should be noted that a deviant coping response is not included in the model (it is represented as faded), as an appraisal of threat over which the individual has high control seems not relevant in organizational contexts where IT use is mandatory. In such a context an individual cannot easily have high control and even if they view the imposed IT as a threat, they are still forced to use it, or they will lose their job. Bhattacherjee et al. (2018) found only one case of this category. It was a doctor who saw high threat of the technology due to the belief that certain things were easy to order on the system and that that might lead to over-ordering or to the system getting slow due to too many orders being processed. However, he also felt he had control since he was able to delegate use of the system to proxies rather than use it himself. Therefore, we remain open to correction by the current study data, in case it should reveal some response that could be classified as deviant. In conclusion, the conceptual model above provides an important framework for the data gathering and informing analysis

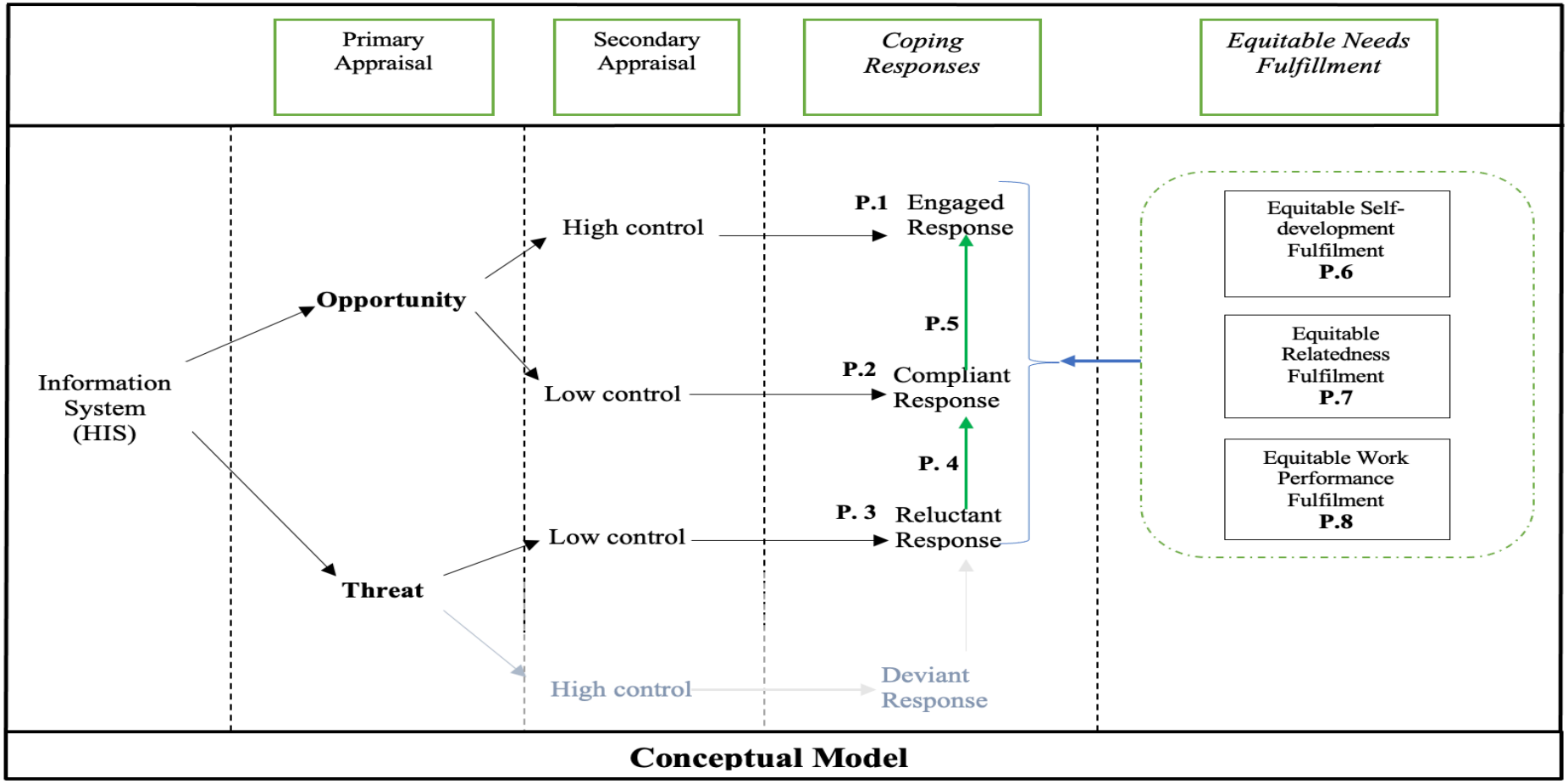
of the study. That is not to say that it is regarded simply as a theory to be tested. As described in chapter 5, the methodology of the study is not purely positivist but accepts the relevance of insights that come 'bottom up' from the data to be gathered, as well as those that come from prior models in the literature.

It should be noted that there are some consequences of choosing the two theories that we have chosen. One is that some terms common in general discussions of acceptance and rejection of new technology are not present in the propositions or model (Figure 4.5) of the present study because they are not key terms in either of the theories adopted. One such is 'social influence' which was shown above to be prominent in other studies and is commonly used in studies that adopt UTAUT. However, this does not mean that the substance of social influence is not considered or found in the present study, just that it falls under other labels in our chosen theories. In fact it will be reported in various forms in chapters 6 and 7, for instance in the coverage of factors affecting participants' primary appraisal judgments (TMSC), and when considering the effect of equitable relatedness need fulfilment (ENF).

Finally, it must be pointed out from the start that the model in Figure 4.5 is partial and not a full model. It represents what the researcher was reasonably able to expect to gather data for, and deal with, in the present study. However, it differs from what is probably a truer picture in several respects. The diagram (Figure 4.5) that we adopt shows ENF impacting directly on response transition and that is primarily how we will discuss the findings (similar to Battacherjee et al., 2018). In reality, however, as suggested by the above account of TMSC theory, we would see ENF factors as impacting on the change/transition of a participant's whole thinking process. In TMSC terms, that means that relevant factors (e.g. ENF ones, in the present case) do not just change their coping response, they first cause them also to reappraise their perceptions of threat and control that lead to their coping response. This in turn would mean that we should model ENF perhaps to the left of the primary appraisal, with arrows

pointing to the right (cf. 'influencing factors' in Figure 4.1), or below the two appraisals and the response, with arrows pointing upwards. Then, since we are interested in two time points (when people first met the HIS, and the present), really the whole diagram should contain feedback loops (cf. Figure 4.1) or some way of capturing the fact that there can be multiple occasions (initial, later….currently) when people weigh up ENF considerations, make appraisals, and have a response to some innovation. Bhattacherjee et al. (2018, p.402) reflect all that when they say "As users observe the outcomes of coping responses, they may revaluate and adjust their prior primary and/or secondary appraisals, thereby triggering a new set of coping responses".

However, given the kind of interviews that we were going to need to rely on, we could not reasonably expect participants to report both on detailed primary and secondary initial appraisals they made months or likely years ago and their ENF state of mind at that time, and then all that again separately in relation to the present time when they were speaking, reflecting ENF updates, reappraisals and changes of response. As will be shown in chapter 5, we were not able to gather data from people on two separate occasions with months in between but on one occasion when they were required to report on what they thought both months/years earlier and currently. Thus our working model (Figure 4.5) reflects what we did focus on, as a manageable target both in terms of what participants could be expected to recall and what the researcher could handle. That is, in brief, we aimed to get doctors' response to the HIS both when they first met it and in changed form later. However, the appraisals were only directly targeted for their first meeting with the HIS and ENF was studied only in relation to the recent, mostly changed, responses.



P = Propositions.

Figure 4.5. Core Conceptual Model for The Study.

4.6. Conclusion and Study Propositions

The literature reviewed has provided a multitude of important and interesting insights that can inform the present study as it seeks to answer the research questions:

- *What coping responses do employees exhibit in response to mandatory healthcare information system implementation in a Saudi Arabian context; and what factors influence the formation of those responses?*
- *Can users' coping responses transition (either positively or negatively) over a period of time, and if so, what factors motivate those transitions?*

Although research on coping response in relation to technology adoption is notably limited, the psychology and neuroscience literatures do provide important insights and guidance that can be harnessed to guide more detailed and nuanced technology adoption investigations, as detailed in this chapter. As a means of summarising the main points relevant to this study, some relevant propositions are now highlighted. Following the direction of Bhattacherjee et al. (2018) these propositions all make an empirical claim and so to that degree they resemble hypotheses in positivistic research. They are however merely expectations predicated on the findings and insights provided by relevant prior studies and theories, which are extended to the current context, in order to inform the present study's more constructivist qualitative data gathering and analysis.

Study Propositions Re User Adoption Response: *(Drawn from Bhattacherjee et al. 2018: 401-403)*

P1. If users appraise an IT as an opportunity and appraise themselves as having high control over their IT use, then they are likely to demonstrate an engaged response.

P2. If users appraise an IT as an opportunity and appraise themselves as having low control over their IT use, then they are likely to demonstrate a compliant response.

P3. If users appraise an IT as a threat and appraise themselves as having low control over their IT use or nonuse, then they are likely to demonstrate a reluctant response.

P4. For users who appraise IT as an opportunity, if their secondary appraisal of control over IT use changes over time from low to high, then their response may correspondingly change from compliant to engaged.

P5. For users who appraise themselves as having low control over IT use, if their primary appraisal of IT changes over time from a threat to an opportunity, then their response may correspondingly change from reluctant to compliant.

Propositions Re Equitable Needs Fulfilment *(Drawn from Au, Ngai and Cheng, 2008: 46-48)*

P6. Perceived equitable self-development fulfilment influences end user satisfaction with the IT, which can change the nature (+/-) of their response.

P7. Perceived equitable relatedness fulfilment influences end user satisfaction with the IT, which can change the nature (+/-) of their response.

P8. Perceived equitable work performance fulfilment influences end user satisfaction with the IT, which can change the nature (+/-) of their response.

In the next chapter, the study methodology will be described in detail.

Chapter 5: Methodology

5.0 Introduction

The chosen methodology for this study is qualitative, utilizing individual interviews to explore coping responses to mandatory healthcare information system implementation in Saudi Arabian hospitals using OASIS. Qualitative methods are deemed suitable for capturing participants' nuanced experiences and perceptions in this context, allowing for an in-depth exploration of the factors influencing coping responses and potential transitions over time. The qualitative approach aligns with the research questions and aims to provide rich insights into the subject matter.

The research questions which form the basis for this study are:

- *What coping responses do employees exhibit in response to mandatory healthcare information system implementation in a Saudi Arabian context, and what factors influence the formation of each response?*
- *Do users' coping responses transition (either positively or negatively) over a period of time, and if so, what factors influence those transitions?*

This chapter will fully describe the methodology used in the current study. First, the research paradigm and its justification will be discussed. This is followed by a description the research design, data collection, sampling and analysis methods.

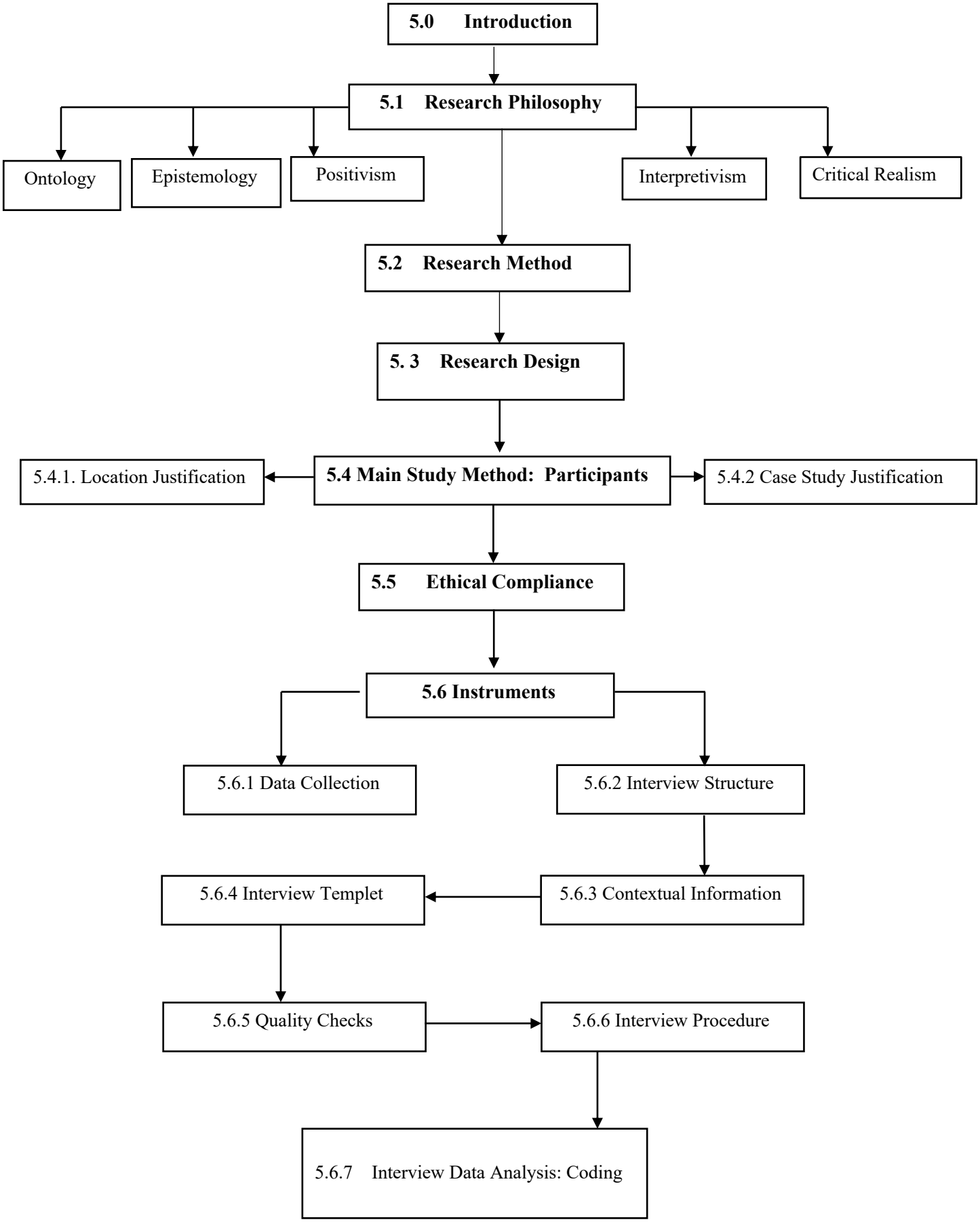


Figure 5.0. Chapter Five Structure

5.1 Research Philosophy

Two fundamental branches of philosophy are relevant to the choice of research paradigm for a scientific study - ontology and epistemology. Ontology is concerned with understanding the nature of the 'reality' of things or ideas that researchers aim to describe. Epistemology is concerned with understanding what constitutes 'knowledge' of that reality, in contrast, for example, with belief (Zukauskas et al., 2018). Different ontological and epistemological views underlie three general methodological paradigms used in IT innovation research, which have progressed from positivist to interpretivist and critical realist.

5.1.1 Ontology

Ontology is a branch of philosophy that seeks to understand the fundamental nature of reality. This discipline delves into the different types and arrangements of objects, properties, events, processes, and relationships that exist in the world around us (Viinikkala, 2004, p. 4).

Ontology tries to offer a complete and comprehensive taxonomy of entities or phenomena in all spheres of being, including physical things, processes, events and concepts. The present study is predominantly concerned with entities of the last type, such as the resistance to innovation, coping responses and motivating factors. Notably, different schools of philosophy offer diverse approaches to forming classifications of reality. Of most relevance to scientific research, as Al-Saadi (2014) asserts, are two positions of ontology, namely, objectivism and subjectivism (although many other labels are also used in a similar meaning, such as realism and anti-foundationalism) (Bryman, 2016). Objectivism/realism views the reality of entities in the world as independent of people, making it consistent and universally applicable across researchers, while subjectivism acknowledges the role of individuals' perspectives and interpretations, leading to potentially diverse understandings of reality.

In contrast, reality is wholly dependent on individuals' perceptions of or agreed upon among groups of individuals (e.g., social science researchers). In the present study, the realist view of ontology (but not epistemology, below) is adopted following the critical realist approach (explained in 5.1.5. For example, it is accepted that the coping behaviours that people use to deal with new IT introductions objectively exist but that our knowledge of them is inevitably subjective and imperfect).

5.1.2. Epistemology

According to Richards (2003), epistemology is a person's belief regarding the nature of knowledge. Similarly, Bryman (2008, p. 13) defines epistemology as "an issue that concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline". Moreover, Al-Saadi (2014) stresses that the nature of the epistemological assumptions that researchers hold about knowledge greatly affects research decisions on the kind of methods to be used in research.

A key epistemological issue relevant to scientific research is whether knowledge is seen to be 'hard', objective, and tangible, or personal, subjective, 'soft' and unique. For many, this distinction matches the objective/realist versus subjective distinction in ontology, and some of the same terms (e.g. 'objective') can be used to label positions in both. Hence, it is easy to confuse talking about knowledge of the world with talking about the nature of the world. However, technically, the two are different topics. In the present study, the researcher adopts the personal, soft knowledge view of the nature of much relevant knowledge but also employs a realist view of the nature of reality (ontology): essentially the critical realist position (5.1.5).

Ritchie *et al*., (2013) assert that when knowledge is assumed to be objective, researchers are more or less required to adopt an observer role and use quantitative methods such as measuring (e.g. based on closed response questionnaire items) and testing. If, however,

knowledge is assumed to be subjective, then a greater involvement of researchers with their subjects is demanded, and rejection of quantitative methods. The latter characterises the present study since the previous chapters have shown considerable disagreement about the nature of many relevant key concepts, e.g., resistance, acceptance, and adaptation. Hence, knowledge of these constructs must be taken as dependent on particular researchers and research contexts. Although many IT innovation studies (e.g., UTAUT) assume that a range of such constructs are well-known and set out to measure them quantitatively through closed-response questionnaires, this is not assumed with the current qualitative approach.

Epistemological positions can also be labelled as either positivist or interpretive/constructivist. However, these terms are often used for broader research philosophies or paradigms that accord with one or other of the described ontological or epistemological positions. Positivism focuses on the importance of objectivity while seeking proper knowledge (Al-Saadi, 2014). Also, in positivism, the world is not regarded as influenced by the researcher. On the other hand, interpretivism and constructivism reject positivist positions and assume the world is only known through the perceptions and interpretations of people (including scientific researchers). Constructivism and interpretivism claim that knowledge is not discovered but shaped by exploring and understanding the social world (Tennis, 2008). The latter is a common view of social science researchers and predominantly that of the present study.

5.1.3. Positivism

Positivism, as a research philosophy/paradigm, is grounded in realist ontology, objective epistemology (Research Methodology, 2020), and the view that science is the only approach to acquiring the truth. It claims that only knowledge gained via systematic observation and measurements is valid. The role of researchers in positivism is restricted to the objective collection of data and, in a limited sense, its interpretation (Gorski, 2018) on the model of hard sciences like physics. In positivist research, researchers are independent (Ray, 2017), meaning that they should maintain little interaction with their participants during the research and judge everything objectively. Positivism accords with the empiricist view in that it believes that knowledge comes from human experience. However, that does not mean that ordinary human common sense is considered relevant. Instead, it emphasises careful observation and logical reasoning.

Positivism embraces a deductive or 'top-down' approach to involving human thought in research. Researchers are understood as formulating general theories which make predictions (hypotheses) that are scientifically testable. The role of research then is seen by positivists as to gather data to support or disconfirm those predictions. (Gorski, 2018). The present study is like this in setting out to test the predictions of an existing theory, 'coping theory' (Ch4). It will also take into account many constructs identified in wider past research on IT innovation (Ch3). However, that theory and those constructs cannot be regarded as mature enough to make exact, quantitatively testable claims, and for that reason, as well as choices of belief concerning ontology and epistemology, the present study does not proceed entirely on positivist lines.

5.1.4. Interpretivism

Interpretivism is a broad label for an approach that aligns with the subjective, non-realist views of ontology and epistemology. It embraces a variety of more specific paradigms, such as hermeneutics, phenomenology, and constructivism (Ryan, 2018). Primarily, the paradigm emphasizes qualitative analysis over a quantitative approach and is popular in the human and social sciences, making it suitable for the present study.

Interpretivism employs naturalistic and open data collection methods, like observation and interviews, rather than closed instruments like questionnaires and tests. These methods involve first-hand experience with the phenomena under study precisely as they usually occur in their real-life context (O'Donoghue, 2018). The model also allows secondary data collection to facilitate the research (e.g., relevant documents).

Furthermore, it usually calls for, rather than minimising, the extensive application of the researcher's personal experience in research (Ryan, 2018). In addition, it is an inductive or 'bottom-up' approach. The meaning of a study conducted using interpretivism is usually obtained at the end after all the data has been interpreted. It does not state the meaning as a hypothesis to be tested. Thus, the interpretive approach recognizes an attachment between knowledge and the individual and their inseparable nature (O'Donoghue, 2018). The main advantage of interpretivism is that the data obtained through this method can be very honest and valid (Glesne, 2016). On the other hand, there may also be a significant disadvantage. The method is exceptionally subjective, and the interpretations obtained are usually dependent on the specific context of the research (not generalisable in the way that positivism aims for).

Although this philosophy aligns with the current study in that it emphasises qualitative analysis and subjective epistemology, it is limited in application as the study assumes the realism philosophical position for ontology. It is contended that the nature of reality is objective (just our knowledge of it is subjective) whereas interpretivism assumes that the nature of reality

itself is solely subjective. Furthermore, although a bottom-up approach will be prominent in interpreting the data, this study recognises categories identified in previous research, so some top-down thinking will also be present.

5.1.5. Critical Realism

As can be seen, the research approach employed in this study contains features of the interpretivist approach and also some from positivism. Critical realism is a paradigm that captures this approach effectively, as it combines elements of those two judiciously. According to Archer et al. (2016), critical realism (CR) is a research philosophy that differentiates the "real" world and the "observable" world. Critical realists assume that the "real" cannot be observed and exists independently from human constructions, theories, and perceptions. Contrastingly, the "observable" world is constructed from human experiences and perspectives. Furthermore, critical realists assert that unobservable structures cause observable events. Unlike other philosophies, critical realism assumes multiple philosophical positions on an array of matters, such as forms of explanation, ontology, persons, causation, and structure. However, some universal CR features unite researchers embracing this philosophy (Archer et al., 2016). They include its commitment to formulating a 'post-positivist' paradigm and the assumption of epistemic relativism, ontological realism, cautious ethical naturalism, and judgmental rationality.

Critical realism was established in the 1970s and 80s from the work of Bhaskar. Since its establishment, several critical realists, such as Tony Lawson (1997), Andrew Collier (1994), Margaret Archer (e.g., 1995), and Andrew Sayer (1992), have elaborated it in detail. Since then, CR has attained popularity as a research philosophy over the past few decades (Denzin and Lincoln, 2011). It emerged to resolve the existing disagreement between positivists and interpretivists / constructivists. CR uses both positivist and interpretivist/constructivist elements to provide an exhaustive account of ontology and epistemology, thus making it an

all-inclusive philosophical paradigm of science (Fletcher, 2017). It, therefore, assists researchers in elucidating social phenomena such as those of the present study. As a philosophy of science, CR is not linked with any specific set of research methods but works as a general methodological framework.

One of the most fundamental tenets of critical realism is that it does not reduce ontology (the nature of reality, what is real) to epistemology (human knowledge of reality). In CR, human knowledge represents only a tiny fraction of virtual reality. In this way, critical realism differs from both constructivism/interpretivism and positivism. Bhaskar (1998, p.27) opposes the positivism paradigm because it encourages the "epistemic fallacy". Simply put, positivism reduces ontology to epistemology or limits reality to what can be known empirically. The same opposition is witnessed in the constructivist or interpretivist paradigm, where reality is viewed as exclusively constructed via and within human discourse and knowledge. Although there is clear opposition between the constructivist and positivist paradigms, they both reduce ontology (reality) to epistemology (human knowledge).

Unlike positivism, which views the world as theory-determined, CR views the world as theory-laden. CR accepts the reality that there is a social world accessible or understandable via social science and philosophy but asserts that some knowledge is closer to reality than other knowledge is. Danermark et al. (2002, p. 10) argue that critical realists can attain knowledge 'in terms of theory, which can be truthlike'. In their work, Archer et al. (1998, p. xi) mention that the theories that assist researchers in getting closer to reality (theories that assist researchers in recognizing the causal mechanism behind activities, social events, or phenomena) are designed using coherent interpretations of social events. The ability of critical realism to engage with both description and inquiry into causal mechanisms, rather than just lengthy explanations of a particular context, makes CR suitable for investigating social

problems and making recommendations for social change (which are the aims of the present study).

Critical realists, therefore, in the end, stratify reality into three levels, namely, empirical, actual, and real. The empirical level is the realm of events as they are experienced by people (Danermark et al., 2002). At this level, objects or events can be empirically measured and are often described via the use of 'common sense'. However, these 'events' or 'objects' are always filtered through human experience. The empirical level is the 'transitive' level of reality in that social actions, decisions, ideas, and meanings occur at this level. Note that writers about CR use the word *transitive* in an unusual way, meaning that what is being talked about may change over time. The actual level is the middle level of reality, and at this, there's no filter of human interpretation or experience. Danermark et al. (2002, p. 20) assert that events or phenomena occur at this level whether humans experience them or not, and these occurrences are always different from what is observed or witnessed at the empirical level. The real level is the third level; causal mechanisms or structures exist at this level. Causal mechanisms are the intrinsic features of a structure or an object that act as causal forces to yield events. Therefore, the primary goal of CR is to explain social events via the use of causal mechanisms and the effect they have at the three levels of reality. The three levels of reality do not mean that one level is less or more real. All the levels interact together; they are part of the same reality or entity. These levels are meant to illustrate how the critical realism view of ontology and epistemology of reality relates to human knowledge and illustrate the limitation of the epistemic fallacy witnessed in positivism and constructivism or interpretivism.

Social structure is dependent on activity, unlike the natural world. Bhaskar (1979) pointed out that causal mechanisms exist only in the objects, events, or activities they govern and cannot be recognized empirically independently of them. Psillos (2007) states that all social structures have inherent features that constrain or enable them to act in particular ways. These

features are known as causal powers and liabilities. However, whether a structure or entity's causal power is actualized depends on the open social world condition.

In conclusion, critical realism has several key features. First, CR asserts that reality exists independently of human thoughts. While observation may enhance a person's confidence in what exists, critical realism is not dependent on their observations. Additionally, CR argues that although humans can construct or acquire knowledge about reality, such knowledge is imperfect and prone to mistakes (Archer et al., 2016). Secondly, reality is stratified into three domains: accurate, actual, and empirical. The real domain comprises structures and entities with features that give them the power to initiate a mechanism that affects other structures (Haigh et al., 2019). The actual domain comprises events and their effects caused by the activation of a causal mechanism. On the other hand, the empirical domain represents actual events that have or can be observed or experienced. Thirdly, CR argues that the world consists of entities that have properties that provide them with obligations and powers. The activation of the powers of one or more entities results in events happening. As reality is stratified, entities can be visible or invisible. Entities can be nonphysical things such as concepts, theories, ideas, institutions or physical entities such as guns or cigarettes. In the social world, entities are usually invisible and unobservable at the empirical level. However, the effects of their activated powers may be observable (Haigh et al., 2019). The fourth point to consider is that knowledge is transitive. This means that the understanding of a phenomenon can change over time. Although entities exist independently of human perception, humans use their minds to build knowledge about them. Therefore, their knowledge about the world is open to challenges and changes. The fifth point is that the social world is a complex, layered, and open system. Within this system, there are multiple entities of diverse types. Each system may include or be included in other entities, and these entities may be activated or deactivated from time to time. Based on the above discussion, the CR philosophical paradigm is the most appropriate guiding

philosophy for the current research as it emphasises qualitative research while retaining a form of realism and objective reality. Lastly, it acknowledges that reality is sometimes socially constructed.

5.2 Research Method

At its simplest, quantitative research gathers data in the form of numbers to interpret, while qualitative research deals with data in some other, non-numerical form, such as what people say, do, etc. In terms of the qualitative versus quantitative distinction, most research studies employ one of the following: mixed-methods methodology, quantitative methodology, or qualitative methodology.

First*, mixed-method* methodology uses quantitative and qualitative data to complete a research study. This usually gives this method a competitive advantage over the use of just one of the individual techniques. Quantitative data typically provides closed-ended information in objective factual categories decided in advance by the researcher who made the questionnaire or test that was used (i.e., goes with positivism), while qualitative data usually reflects a broader scope of responses in terms decided by participants rather than the researcher, and which allow more for explaining concepts (i.e., goes with interpretivism or constructivism) (Durdella, 2017). As such, the researcher is provided with a variety of information and different explanations that enhance understanding. The breadth and depth of knowledge achieved from using the mixed methods design counteract the weakness inherent in using the individual techniques separately (Durdella, 2017). This method also allows for triangulation, that is, the use of multiple techniques to obtain data on the same issue. However, the intensity of research involved in this method is complex and highly time-consuming and, for that reason, is not used in the present study.

Second, *quantitative methodology* involves gathering all data in numerical form or converting it into quantifiable statistics that can be used in analysis and give conclusive descriptive or explanatory results. It reduces everything to variables on which participants are measured and samples of participants from larger populations (Mertler, 2019). The variables typically include the target population's behaviours, opinions, and attitudes. The data collection methods used to this effect are usually more structured than those in the qualitative methodology (Mertler, 2019). They include fully structured observations, surveys, and questionnaires. Other methods include gathering various types of interviews, diaries, documents, records of software use etc., which are systematically analyzed to count up instances of phenomena of interest.

Third, *qualitative methodology* deals with data in the form of words, actions, etc., without counting them up and converting to numbers. This is usually done in an exploratory (DeFranzo, 2011), bottom-up way consistent with interpretivism and critical realism rather than positivism and targets the explanations behind concepts. It helps in identifying opinions and motivation in the occurrence of an event. This is used in developing hypotheses and theories concerning a subject matter (Seale. C, 2011), rather than testing existing theories (as positivism aims to). It can also be used to look for gaps in knowledge of various issues and provide suggestions for research into these areas.

Qualitative methodology usually adopts semi-structured and non-structured instruments in data collection. Most of them also usually involve first-hand experience with the subject phenomenon under study (Seale. C, 2011). These methods include observation, interviews, and focus groups, where the data is not simply reduced to several occurrences of selected features (Durdella, 2017). The participants utilized in these methods are usually smaller in number than in quantitative data gathering due to the more significant amount of time needed to gather and analyze the data from each person. In this study, a qualitative method

will be used to examine the coping responses of medical professionals in the context of the mandatory IT system recently introduced in Saudi public hospitals. This thesis will undertake qualitative research within a critical realist framework because that fits the requirements of the current study in numerous ways.

Qualitative research is usually exploratory and suits the embryonic nature of the research area, i.e. solutions to perceived problems encountered by OASIS system users (Mason, 2002). Robust theories and hypotheses are not yet available to test in a top-down quantitative-positivist way. Instead, it should begin with a qualitative study of the beliefs and behaviors reported by the targeted users of OASIS. Although complex problems can be quantified (Seale, 2011), qualitative research will better help describe the complexity of the use of the OASIS system and refine the complexity into more manageable forms. Structured quantitative measures do not fit the problem well (Seale, 2011): not all relevant features of OASIS usability can be quantified. Qualitative research provides a better understanding than quantitative of the role of the environment in which the data will be collected (Mason, 2002). Furthermore, this type of research will enable explanatory mechanisms to be discovered by which different user responses are caused (Mason, 2002). In short, the account will be protected by being reduced to a limited number of quantifiable variables. As this research will examine how and why people change over time in their responses to the adoption of technology, this can be best understood is by starting from qualitative insights from the people whose attitudes and behaviour change over time when they are allowed to explain transitions of responses in their own words.

5. 3 Research Design

According to Creswell (2013), research design refers to the general strategy chosen by the researcher to integrate various components of his or her study logically and coherently and in doing so, ensure they address the research problem adequately. Research design decisions fall between broader choices like those above (paradigm type, qualitative versus quantitative) and more detailed ones concerning specific data gathering methods (e.g., questionnaire, interview, diary, observation, document analysis, testing).

Research design can be qualitative or quantitative. A quantitative research design is a systematic, objective statement that specifies what groups of people will be involved, what characteristics and relationships are to be described, what measures to be used, and how combined together. On the other hand, a qualitative research design is less about the structure and mechanics of the study and more about the way that meaning is to be obtained to answer the research questions. Furthermore, the word *design* is not used in such a systematic way as it is in quantitative work. Creswell (2013), for example, equates it with data-gathering methods, such as in-depth interviews, participant observations, and focus groups: this is a practice the researcher will follow. Qualitative designs (aka approaches and methods) are usually addressed in terms of a list of types, including case study, grounded theory, narrative, ethnography, and phenomenology (Tomaszewski et al., 2020).

Nonetheless, qualitative design methodologies have uniting commonalities, such as those reviewed already, in that they all aim to attain a rich non-numerical understanding of a particular issue based on first-hand experience. In addition, all qualitative designs use a small selection of participants, which may not necessarily be strictly representative of any relevant entire population (Creswell, 2013). The reason for that is that qualitative data collection and analysis is time-consuming. This study will use the case study design. A case study approach targets 'in-depth, multi-faceted explorations of complex issues in their real-life settings'

(Crowe et al., 2022). It is a widely used design in qualitative research and is mainly used to explain entities, processes or organizations. Therefore, it is suitable to help answer "why" and "how" questions relating to the different responses that users manifest to the mandatory introduction of the OASIS system in Saudi public hospitals and how people change over time in their response to the adaption of that technology. Case studies can also be performed using quantitative measures or with the positivist aim to test whether a particular model or theory can be applied to a specific issue in the real world (Johannesson and Perjons, 2014). However, its use in this study is qualitative, within critical realism, in a situation where much of a phenomenon or issue is not known.

5.3.1 Justifying the Use of the Case Study

According to Stake (1995), a qualitative case study is a research design that enables researchers to explore an issue or a phenomenon in its context through the use of multiple sources of data. A case study ensures that a phenomenon is not explored via one lens but through a variety of lenses, thus allowing researchers to understand multiple facets of an issue. Yin (2003) and Stake (1995) assert that a case study approach should be in a constructivist paradigm, similar to the interpretive approach discussed above and consistent with critical realism. The use of case studies in research is advantageous in that it allows close collaboration between the participants and the researcher and thus enables participants to tell their stories. That enables the researcher to describe their views and perception of reality and develop a better insight into their actions. Yin (2003), asserts that case studies should be considered when four conditions are present: The first is:

(a) The researcher focuses on answering research questions which (regardless of their actual wording) are effectively "how" and "why" questions.

Table 5.1. Question description

Question	Description
How	'How' questions ask for more than a description: they call for an explanatory account which shows how phenomena are related together in processes. For example, RQ1 is equivalent to asking how users respond to the mandatory introduction of OASIS with a range of coping responses. RQ 2 prompts us to examine how user responses towards the OASIS system have changed over time.
Why	These questions are also explanatory, and they deal with operational links. Especially they ask about reasons or cause and effect relationships. RQ 2 are of this type, asking about reasons for, or causes of, different coping responses, and changes in those over time.

(b) The second condition is that the researcher cannot influence the participants' behaviour. In this case study, the researcher plans to gather data in a naturalistic way without any intervention that may impact the context.

(c) The third condition is that the researcher needs to cover the contextual setting because they believe it is pertinent to the issue being studied. For instance, in Baxter's (2003) study on nursing students' decision-making, the case could not be considered without the school of nursing context, particularly the classrooms and clinical settings. The author could not have obtained an accurate picture without including the context of the issues under study. That is also very true of the present study, where responses to OASIS are expected to vary very much related to the context (e.g., what hospital and what department a user is in, what role they perform and what exact task they have to use OASIS for).

(d) The final condition is that there are no clear boundaries between the phenomenon and the context. Clearly, OASIS use is not just meant to occur 'in' hospitals. Its use is intended to be an integral part of many kinds of hospital procedures (e.g., decision-making about admission or treatment). This means its boundary is not clear. This may make data analysis

challenging if participants are found not simply to respond separately to the use of OASIS but also to other aspects of the procedures of which use of OASIS is supposed to be a part.

Various classifications of types of case studies have been made related to the general purpose of a research investigation. Yin (2003) categorizes case studies as descriptive, exploratory, or explanatory. Further, he distinguishes between multiple, holistic, and single case studies. On the other hand, Stake (1995) classified case studies as collective, instrumental or intrinsic. These are described in the following table 5.2.

Table 5.2. Case Study Types

Case Study Types	**Definition**	**Published Study Example**
Descriptive	Used by researchers when they want to describe a phenomenon or intervention occurrence in the real-life context (Yin, 2003). The present study aims to do more than just describe the effect on hospital staff of the intervention by management to impose OASIS.	Tolson, Fleming, and Schartau (2002). Coping with menstruation: Understanding the needs of women with Parkinson's disease. Journal of Advanced Nursing, 40, 513-521.
Exploratory	Used when a researcher is seeking to explore situations in which the evaluated interventions have no precise, single set of outcomes. (Yin, 2003). The present study is partly exploratory, aiming to provide a rich account of the varied outcomes of an intervention (imposition of OASIS).	Lotzkar and Bottorff (2001). An observational study of the development of a nurse-patient relationship. Clinical Nursing Research, 10, 275-294.
Explanatory	When researchers need to address questions that cannot be answered through experiments or surveys, they turn to real-life interventions, which are assumed to address causal links (Yin, 2003). The present study aims to account for causes and effects seen in OASIS adoption.	Joia (2002). Analyzing a web-based e-commerce learning community: A case study in Brazil. Internet Research, 12, 305-317.
Single Holistic	A single holistic case study is where a single unit is treated as if it were composed of a collection of parts. The present study is not limited to a single case.	Curtis, M., and Morris, K. (2015). Cross-dressing as a meaningful occupation: A single case study. *British Journal of Occupational Therapy*, *78*(11), 706-712.

Single Embedded	A single embedded study is a case study containing more than one sub-unit of analysis. The present study is not limited to a single case.	Vallat-Azouvi, C., Pradat-Diehl, P., and Azouvi, P. (2014). Modularity in rehabilitation of working memory: A single-case study. *Neuropsychological rehabilitation*, *24*(2), 220-237.
Multiple	They were used to explore differences between and within cases. The main goal of multiple case studies is to work with parallel interventions, phenomena, and findings across cases. (Yin, 2003). The present study will indeed compare cases, both at the level of hospitals and departments, in a parallel way (e.g. the same intervention imposing OASIS has occurred in all).	Campbell and Ahrens (1998). Innovative community services for rape victims: An application of multiple case study methodology. American Journal of Community Psychology, 26, 537-571.
Collective	Like multiple case studies (Yin, 2003), this type is used to explore differences between and within cases. The main goal of this type of case study is to consider parallel interventions, phenomena, and findings across cases. (Stake, 1995).	Scheib (2003). Role stress in the professional life of the school music teacher: A collective case study. Journal of Research in Music Education, 51,124-136.
Instrumental	They are used when a researcher wants to accomplish something other than understanding the case. It offers insights into an issue or phenomenon and helps a researcher to refine theory. The case studied is of secondary interest because it plays a supportive function, by allowing the researcher to understand something else (Stake, 1995). Part of the aim of this study is to help evaluate/refine 'coping theory' within the range of theories available in the field of technology innovation research.	Luck, Jackson, and Usher (2007). STAMP: Components of observable behavior that indicate potential patient violence in emergency departments. Journal of Advanced Nursing, 59, 11-19.
Intrinsic	Used when the genuine interest of the researcher is to understand the case(s) better. It is used not primarily because the case explains a particular problem or trait or represents other cases, but because the case itself is of interest. (Stake, 1995). In this current study however participants and hospitals are not individually of interest in themselves, but more for what they suggest about technology innovation in a context such as Saudi Arabian hospitals.	Hellström, Nolan, and Lundh (2005). "We do things together" A case study of "couplehood" in dementia. Dementia, 4(1), 7-22.

The difference between multiple and single case studies is that in the former, a researcher uses more cases so that he can understand the similarities and differences between the cases. Also, a researcher can analyse the data both across multiple situations and within each situation (Gustafsson, 2017). The evidence obtained from numerous case studies is more

robust and more reliable. Another advantage of a multiple case study is that suggestions can be made, supported by a broader base of empirical evidence. So, a more convincing theory can be created from it. Therefore, the multiple case study is important for the broad exploration of research questions and the creation of more convincing theories (Gustafsson, 2017). Therefore, this study will study two cases: the study will be conducted in two hospitals in Jeddah, all using the OASIS health information system.

5.4 Sampling

The overall approach to sampling in this study is hierarchical (cf. cluster sampling), with purposive, non-random choices being made at each level (hospitals, departments, individual doctors).

5.4.1 Rationale: Hospital Selection

The first determinant was the number of hospitals that would be included in this examination. The decision was made to choose one general hospital, one chronic health centre, and two urgent care centres in Saudi Arabia and more than one department to ensure a comprehensive examination and detailed insight into coping responses. This was guided by the observation of Bhattacherjee et al. (2018) who determined that their examination of user response to mandatory IT use had been limited due to the fact that they examined user responses and factors in only one hospital and one medical department.

Public hospitals and clinics in Jeddah were chosen as this is a particularly busy city that serves as the entry point for many of those visiting Saudi Arabia. As a consequence, at various points in the year, the population of Jeddah (n=3.9 million) can be increased by a further 2.5 million per year. As a consequence, the pressure on hospitals and their need to be resilient is particularly important in this city. As further evidence of its special status, Jeddah is one of the Saudi cities approved by international healthcare accreditation bodies, such as the Joint Commission *International and Australian Council on Healthcare Standards*, with a high

demand for healthcare quality (Global Health Saudi, 2019). Jeddah's governmental hospitals have been especially well-resourced and have a massive pool of international expert medical professionals in addition to Saudi doctors. These characteristics have enabled Saudi Arabia to develop its medical tourism sector there (Jeddah Annual Report 2016–2017). In Jeddah, healthcare density statistics show that there are 7.4 hospital beds per 10,000 persons, 78.8 doctors per 100 beds, 223.7 nurses per 100 doctors, 14 governmental hospitals under the MOH system, and 33 private hospitals (Jeddah Annual Report 2016–2017).

The hospital and the three clinics were chosen on the basis of five criteria: (1) types (general, chronic, urgent care), (2) Size (large and small), (3) they are all public under the Ministry of Health, (4) with multiple departments and specializations, and (5) they were early introducers of the HIS. However, they differ in that one is a very large and general hospital, while the other is moderately small in size and focuses on dialysis and urgent care centers: thus, together, they represent a wider range of medical services and specialization types than would be the case with only one hospital. An added advantage of choosing these busy and multi-specialization hospitals is they employ large numbers of doctors, increasing access potential and ensuring that a wide range of views and behaviours would be represented. Furthermore, choosing hospitals where HIS had been introduced early increased the potential of gaining clearer and more retrospective insight into how doctors' beliefs and behaviours have transitioned over as long a period as possible. Those criteria, therefore, guided the choice of the hospital and clinics in Jeddah where, as previously described, the city's status as the second city of the Kingdom and its key location as the gateway for millions of visitors to the holy cities of Mecca and Medina (World Population Review, 2019) had led to it being the first area for the roll-out of HIS by the MoH.

Table 5.3. Summary of the Chosen Hospital and Clinics.

Chosen Hospital Features	**KFGH**	**PAMC**	**MUCC**	**RUCC**
Size	Large	Medium	Small	Small
Type	Acute-care government hospital	long-term care government center	Urgent care center	Urgent care center
Speciality	General	Specialist	General	General
Bed capacity	628 beds	140 beds	13 beds	13 beds
Use of the health information system is mandatory	Yes	Yes	Yes	Yes
Departments	Anaesthesiology, Internal medicine, autism centre, dermatology, endocrinology and diabetes, family medicine, gastrointestinal diseases, kidney diseases, neurological diseases, gynaecology, respiratory therapy, ICU, surgeon, A&E, general surgery, cardiology, obesity, outpatient, dentist, and more.	Nephrology	Family Medicine, immunization, A&E, and preventive medicine.	Family Medicine, immunization, A&E, and preventive medicine.

5.4.2 Rationale: Department Selection

Departments were chosen in each of these hospitals as follows:

General Hospital: A&E, general surgery, and outpatient departments

Chronic Centre: Nephrologists' consultants, residents, and specialists

Urgent Care Centre 1: General Practitioners

Urgent Care Centre 2: General Practitioners

The rationale for these choices are as follows:

1. These were the first departments to have employed the HIS in these hospitals.
2. There are a large number of doctors with varying levels of age, experience, seniority and experience of using the HIS in each of these departments.
3. These departments receive the highest number of patients daily and have high information requirements as a result.

4. Due to the variety in age, seniority and experience, a selection of doctors in these departments have experienced both the paper and electronic management system.
5. The inclusion of A&E means that doctors treating patients with acute conditions are included, while the choice of outpatients means that doctors treating patients with chronic conditions are included. The acute versus chronic distinction entails differing urgency of communication demands for doctors, which in turn could affect what constitutes appropriate use of the HIS by them (acute cases need urgent communication, chronic cases need slower but more varied communication).

These criteria increase the opportunity to gain access to an adequately sized sample of doctors comprising a wide range of attitudes and behaviours towards workplace technologies, many of whom have adequate exposure to using the HIS and, therefore, are more likely to provide informed insights into their coping responses and potentially the factors influencing transitions between these responses over time.

Table 5.4. Rationale: Departments.

Chosen Dept Features	**KFGH**			**PAMC**	**MUCC**	**RUCC**
Dept specialisms	A&E	General Surgery	Internist Outpatients	Nephrologists	General Practitioners	General Practitioners
Predominant type of case	Acute	Mixed	Chronic	Chronic	Mix	Mix
Communication urgency	High	Varied	Low	Varied	High	High
Total Number of patients daily	70-100	30- 35	20- 15	25-35	250-300	250-300
Total Number of doctors	Internal Medicine: 55 General Surgeons: 47 A&E: 60			19	7	7

5.4.3 Rationale: Interviewee Selection

At the level of individual participants within departments, the primary population to be sampled is deliberately bound to Saudi doctors working in these hospitals. This excludes other kinds of employees who use the HIS in more or less limited ways, such as nurses, receptionists, radiographers, pharmacists, administrators and so forth. Also, it excludes non-Saudi doctors working in these hospitals. The reason for limiting the study to Saudi doctors is primarily in order to ensure some homogeneity of the sample in terms of role, training and most importantly, in terms of cultural background. For example, previous research (Bhattacherjee et al., 2018) has examined the coping responses of employees of a large community hospital in an individualistic culture, that of the United States. Therefore, bounding the current study to Saudi Arabian doctors and their coping responses provides the opportunity to compare with the findings of that previous work in relation to culture.

The choice of number of participants is guided by the principal of 'theoretical saturation'. That is, data collection will continue until the point where interviews are deemed to be no longer providing any additional insights relevant to the research questions and their related propositions, that is what is being obtained does not substantially differ from that which has already emerged (the law of diminishing returns). Interviews will continue until such saturation has been achieved.

The number of interviewees is guided by the literature. For example, a study of the saturation principle in qualitative sampling (Hennink and Kaiser, 2022) which surveyed many studies using that approach, found that between 9 and 17 interviews was needed where a group of participants was homogeneous, and the study had narrowly defined objectives. In this current study, however, the researcher does not know in advance just how homogeneous the participants really will prove to be across different departments and hospitals, even though they are all Saudis with similar cultural backgrounds. Furthermore, the present study has a

considerable number of detailed propositions to verify. Therefore, consistent with the work of Bhattacherjee et al. (2018), who conducted a total of 47 interviews, the current study sets out to interview 38 doctors across one hospital and three clinics, with equal representation of women and men. At the hospital level (9 males: 9 females per hospital) and the department level (3 males: 3 females per department). At the chronic centre level (4 males: 4 females), and the urgent care centre level (2 males: 2 females per centre).

The choice of individuals is based on participant willingness to volunteer and as noted, interviewees will be chosen systematically to ensure representation of different age/gender groups, levels of seniority and different medical specialities. In other words, a form of stratified sampling will be used to obtain from each hospital a balanced set of participants in terms of ages, genders, specialisms, and seniority. The minimum age requirement will be 30 years and with at least 2 years' experience of working in the hospital and using the system mandatorily.

Table 5.5. Interviewee Selection.

Chosen Doctor Features	**KFGH**		**PAMC**		**MUCC**		**RUCC**		Rational Specification
Gender	Male	Female	Male	Female	Male	Female	Male	Female	To ensure equality
	12	9	6	2	1	4	1	3	Different responses
Nationality	All Saudi		All Saudi		All Saudi		All Saudi		To ensure the same cultural background (Collectivism).
Exposure to the HIS	Voluntary and Mandatory		Voluntary and Mandatory		Voluntary and Mandatory		Voluntary and Mandatory		To examine transition overtime.
Range of seniority	Junior to Consultant		Junior to Consultant		Specialist		Specialist		Technical literacy

5.5 Ethical Compliance

Two ethical reviews were approved by both Dublin City University in Dublin and the Ministry of Health in Saudi Arabia. The following are the main ethical precautions taken (see also copies of relevant documents in appendix A and D).

Informed Consent. Potential participants will be invited to volunteer and will be informed about the nature of the study with an information sheet before they formally agree. To avoid participant bias, specifically to avoid priming participants, the study will be introduced as research seeking to discuss their use and views of the OASIS system. The nature of the interviewing and its recording will be explained. They will be provided with a link to the researcher in case they have any queries later. No payment or other incentive to participate will be offered. The researcher will clarify that the study is research for researcher's PhD study, independent of their status as hospital workers. Therefore, participation is not obligatory, as it would be if it were a medical survey conducted by the Ministry of Health or the hospital management, which their contract of employment required them to participate in.

Care of Participants. It will be communicated to all participants that they have the option to withdraw from the study at any time without any consequences. Moreover, they can express their thoughts freely since the hospital or the Ministry is not conducting the research. The study is not intended to evaluate the performance of individual participants. Suppose there is any form of evaluation included in the study's findings. In that case, it will pertain to the OASIS software or the implementation of its rollout by the Ministry or hospital, but not to individual users.

Confidentiality. The researcher will store all the data on a password-protected computer that can only be accessed by them. The identity of each participant will be kept hidden in the write-up by the use of ID codes and descriptions that are as non-specific as possible. The interviewees will not be named in the study but will be ascribed numbers. Hospitals will be

identified by abbreviations (e.g., hospital KFGH or MUCC) and not names to avoid identification based on hospital or department. Departments will be described by nature (e.g., critical care department, acute care department) and not by name.

Similarly, roles/responsibilities will not be described explicitly - instead, information will be minimally descriptive, e.g., 'an interviewee working in an acute care context'. On the one hand, it helps interpret results if the ID code/description retains relevant background information. However, on the other hand, if it is too detailed, anyone in the hospital may guess which individual it is as much as if their name had been given (e.g., female charge doctor 3 in obstetrics in hospital 1). This is an important issue since the researcher wants honest answers to questions and needs to cite extracts of what people actually said. However, it is anticipated that honest answers might reveal participants engaging in 'adaptation' practices that the hospital management and Ministry would disapprove of. Hence participants mustn't feel that the precise identity of who said what will be easily discoverable. Otherwise, they might tend to give answers they think the authorities would expect/want them to give rather than the truth.

Conflict of Interest. It will be made clear that the researcher is not sponsored by the Ministry of Health or any hospital and is not a hospital employee. Therefore, there is no reason for the researcher's study to show any undue bias anywhere in favour of any hospital or the Ministry.

5.6 Instruments

The specific qualitative instruments used to gather data to support the case study are interviews.

5.6.1 Interview Data Collection

The benefit of interviews lies in their ability to provide a more profound understanding of a social phenomenon than an interviewer would obtain from relying on a qualitative approach, e.g. a closed-response questionnaire. The interview will gather data about the

participant demographic and background, concerning adaptation-related beliefs and behaviours. The researcher will collect the data via a 1:1 interview.

5.6.2 Type of Interview Structure Used

The choice of interview structure depends on the situation being examined (DiCicco-Bloom and Crabtree, 2006). In principle, there are three types of interview structure: structured, semi-structured, and unstructured. In each category, the researcher takes responsibility for what is said. For instance, in structured interviews, the researcher possesses much power and fully controls everything asked. In this interview category, interviewees are given less room for flexibility, and every interviewee answers the same questions. In unstructured interviews, the interviewer's questions are very general, and it is up to the interviewee to guide the conversation. Therefore, every interview may sufficiently cover a different range of topics and may include areas outside the researcher's field of interest (Adhabi and Anozie, 2017). The more an interview is structured, the stronger the link between interview questions and the phenomenon under study (Adhabi and Anozie, 2017). When the structure of interviews is not fixed, the link between the content of the interview and the case being examined is weak.

In this study, the structure of the interview will be semi-structured. Most analysts point out that semi-structured interviews are the most used in qualitative research (Alshenqeeti, 2014). In this type, the researcher prepares an outline of topics and a series of questions to be asked regarding the issue under study. The researcher, however, does not exercise full control over the interview, and the interviewees are given scope for flexibility. Implementing a semi-structured interview depends on how the interviewee answers or responds to the question asked by the researcher, who may then pose unscripted follow-up questions. Stuckey (2013) asserts that in this type of interview, researchers provide topics reflecting the phenomenon under study. However, the researcher should explore the topics the interviewee is comfortable with. Although a semi-structured interview has a guiding question, the response from the interviewee

gives the researcher flexibility to pose a more enhanced but relevant question than the drafted initially ones. DiCicco-Bloom and Crabtree (2006) uphold Stuckey's (2013) view by asserting that the primary source of information in qualitative research is semi-structured, in-depth interviews.

Semi-structured interviewing can be either done either with groups or individuals. When done with groups, similar to what are called 'focus groups', semi-structured interviewing accords the researcher enough control to examine the issue under study. Furthermore, information may emerge due to interaction among the members of the group that would not emerge if each person was individually interviewed. However, participants may also be inhibited from saying certain things due to the presence of an audience of peers. When conducted with an individual, the semi-structured interview allows the researcher to go deeper into a personal issue, with no fear of others overhearing, and thus better meets the goal of conducting "in-depth interviews" consistent with a case study. In this study, therefore, individual interviewing will be used to examine an interviewee's beliefs about the factors that drive their responses to OASIS.

5.6.3 Contextual Information Items

These will cover background features that may be relevant to helping the researcher understand the information that participants give about their coping strategies. They include questions about participant age group, gender, hospital department they work in, status (consultant, intern etc), length of service in hospital, self-rated IT expertise, etc. There also need to be some factual background items related to OASIS, such as how long it has been since they were first expected to use it, what training or support they have received for using it, and what functions they are expected to use it for, given their role in the hospital. The last will lead naturally to questions more closely related to the RQs.

5.6.4 Interview Items Targeting the Topics of the Questions

These will be slightly different on each occasion, eliciting responses to RQ1 and two on both occasions. The interview template will comprise open-ended questions commonly used in semi-structured interviewing. Open-ended questions are questions in which the respondent can freely respond to the interview question however they choose. In contrast, closed questions are questions in which the respondent can answer the interview question only with a single word or with limited choices provided by the researcher. According to Newcomer, Harty and Wholey (2015), open questions are often introduced by *why, what*, or *how*. As noted in 5.3, *why* questions are primarily used to reveal participants' views on **cause-and-effect** relationships, while *what* and *how* questions are primarily used in qualitative research to describe and explain in **depth an** issue or a phenomenon (Mason, 2002; DeCarlo, 2018). To avoid data bias, I will be using simply constructed neutral open-ended questions that are not leading and are judgement-free, and I will try to involve interviewees to participate in a way that reduces the bias of the data (Creswell, 2013; DeFranzo, 2011; Mason, 2002). Yes/no questions will be avoided to prevent the participant from agreeing or disagreeing. General questions are introduced first before naturally moving to more specific issues. The interviewer will use neutral responses such as 'thank you - can you tell me more about that?'. The interview template is available in Appendix C.

5.6.5 Checks on Interview Question Quality

Questions will be closely modelled on those in other studies in the literature. They will also be given to an independent scholar in the field (supervisor) for expert comment and to the hospital management for approval. The questions will be developed in English, later translated into Arabic, and back translated into English by an independent translator to check accuracy.

The interview template will be piloted with a few participants from the same population as that to be sampled for the main study to ensure participants will have an appropriate understanding of the items for discussion and enable the researcher to practice researcher interviewing skills. Feedback from the pilot participants and the researcher reflection will then be used to amend or modify questions were deemed appropriate.

5.6.6 Interview Procedure

Potential interviewees in each targeted department in each hospital will be contacted and invited to participate. The main researcher is a native of SA and has a background in public health. The researcher has previously worked in the health domain in Saudi Arabia and has had informal discussion with Senior Management and doctors working in these hospitals. They have indicated their interest in and willingness to participate in this study.

The interviews are expected to be conducted face to face in each participant's office or via Zoom due to the Covid-19 pandemic. However, I may face an issue related to interviewing opposite gender participants because some departments in these hospitals are divided into separate male and female parts.

Interviews will be conducted in Arabic because that is the language that will be easiest for most participants to understand and express themselves in, and many respondents will not necessarily be English speakers.

All interviews in this study will be digitally recorded, but only after approval from the respondents. This will allow the researcher to capture information from the interviewees with high accuracy (Neuman, 2007). Notes will also be taken during the interviews. After the interviews are conducted, they will be transcribed into Arabic orthography. The transcriptions are necessary for the researcher to establish an overall idea of each interview and reduce any errors which could have occurred while recording (Neuman, 2007). This method will be used to ensure data integrity and eliminate any confusion arising during the interviews. The

interview responses will be handled in Arabic for the analysis stage so as not to lose any of the meaning. Translation into English will only be performed for extracts that need to be cited in the thesis.

For two reasons, it is necessary to summarize and retain each participant's contact details with each transcript. First, it is essential to identify and connect the interviews to compare them. Second, it is essential to keep track of which hospital and department each interviewee is from, to guarantee that data collected through interviews is construed within the correct context. This will be essential to ensure there is no data mix-up during the analysis process.

5.6.7 Interview Data Analysis: Coding

NVIVO software will be used to handle the data in this study. This program is a qualitative data analysis suite that lets users import, sort, and analyze documents, PDFs, audio files, spreadsheets, databases, digital pictures, bibliographical data, web pages, and social media data. The following are some of the benefits of utilizing NVivo:

1- Data can be handled and organized more efficiently than in a large Word file, and queries can be executed better than by searching in Word files (e.g. all chunks of data with the same code can be automatically assembled in one place for examination)

2- Although the program cannot code the data for the researcher, it assists the researcher in keeping track of what codes she is using and makes it easy to assign codes to chunks of data as well as records of her reflective thoughts

3- A code hierarchy can be constructed and displayed easily as a diagram

4- NVivo also assists the researcher in creating an auditable record of the coding process. It can be utilized to improve transparency of the qualitative data analysis process.

The use of NVivo can open up new possibilities in the data analysis process, which aids in the production of explanations. The researcher can utilize any of NVivo's tools to help extract themes from the data in this study. It also helps the researcher to be aware that ongoing reflection on the participants' transcripts is required to re-examine and confirm specific features.

Analysis of the data in NVIVO follows transcription and any required correction or translation of the transcripts of the interviews. As stated by Bogdan and Biklen (1997) analysis broadly begins with "working with data, organizing it, breaking it into manageable units, synthesizing it, examining for designs, discovering what is important and what is to be studied, ..." (Bogdan and Biklen, 1997 p.26). In this way, our interpretive data analysis aims to understand the perspectives and views of the research participants. In the process of data

analysis, therefore, the researcher is required to use some creativity to place the raw data into meaningful and logical units of information (Bogdan and Biklen, 1997).

The process of analysing qualitative data can take many different forms. In a straightforward view, it comprises three steps, which will follow: identification, re-examining, and translation. *Identification* is also known as open coding and, in this stage, involves identifying chunks of transcript (phrases, sentences, etc) that seem to express a distinct theme, and naming each by its conceptual theme, using as a code whatever name comes to mind, or even a keyword in the chunk itself as the code (in vivo coding). The observed data (chunks of transcript) is then grouped into these themes (Botes *et al*., 2014). Those themes come predominantly 'bottom-up' (inductively) from the data, not any concepts the researcher has in mind from the literature or existing theory, so are consistent with the interpretive paradigm and critical realism rather than positivism.

The second stage is re-examining the initial codes, sometimes called axial coding. In this stage, the identified themes are compared and combined to form a coherent system of codes. By repeatedly revisiting all chunks that have been given the same code, some themes/codes may need to be split into two or there are codes that overlap in meaning and need to be better defined: either they should be merged or differentiated more explicitly, or maybe one is a subdivision of the other. A hierarchy of broader and narrower codes may be established, and the name of each code may be revised. At this point, some codes may be connected to constructs known from the literature, a top-down coding aspect that fits the critical realism paradigm better than the interpretive.

The final step is what Botes calls *'translation'*. This does not refer to translation between languages but to translation of a system of coded themes into a 'storyline', which is really means a theory emerging from the data. This should closely reveal the reality the collected data represents (Botes *et al*., 2014). This study will be an account (occasions) of how

participants feel when new IT is imposed on them in the workplace, why they feel as they do, the strategies they adopt to deal with that, and the effects of those strategies: it may or may not match the account given by coping theory (ch4). The following chapter details the study findings.

Chapter 6 Results: Research Findings

6.0 Introduction

This research aims to examine user coping responses to the mandatory introduction of the OASIS HIS in Saudi Arabia. Specifically, it seeks to:

1. Identify the nature of user coping responses and factors influencing their formation, and;
2. Determine whether and how those coping responses can transition over a period of time, and if so, to identify the factors that motivate such transitions.

In order to answer these questions, a theoretical framework drawn from the literature on coping responses and on equitable needs fulfilment was developed. Following this, detailed interviews were conducted with doctors in three distinctively different medical care centres and one general hospital in Saudi Arabia: KFGH, PAMC, MUCC, and RUCC. A total of 38 interviews were conducted across these four sites, and a qualitative analysis of the responses was guided by the categories of this conceptual model (Figure 6.1). This chapter details the findings of those interviews and how they relate to the theoretical model.

This chapter starts by providing background information on the interviewees, the characteristics of the hospitals within which they work and their use of the OASIS health information system which was mandatorily introduced in November 2020. That is followed by an extended account of the results of the study. First, user comments in relation to their primary appraisal of the system are presented, with particular attention to how they describe the HIS in terms of opportunity or threat. Next, the interviewees' secondary appraisal of the system are detailed, with specific attention to perceived controllability. Their coping responses are then detailed in relation to both appraisal stages. All interviewees have had the opportunity

to experience and evaluate the system over a period of time, so their transitions in response are next identified. Finally, their comments on transition are interpreted in terms of the degree to which they perceived the system as satisfying three different work-related needs. Figure 6.0 provides a graphic depiction of the structure of the chapter.

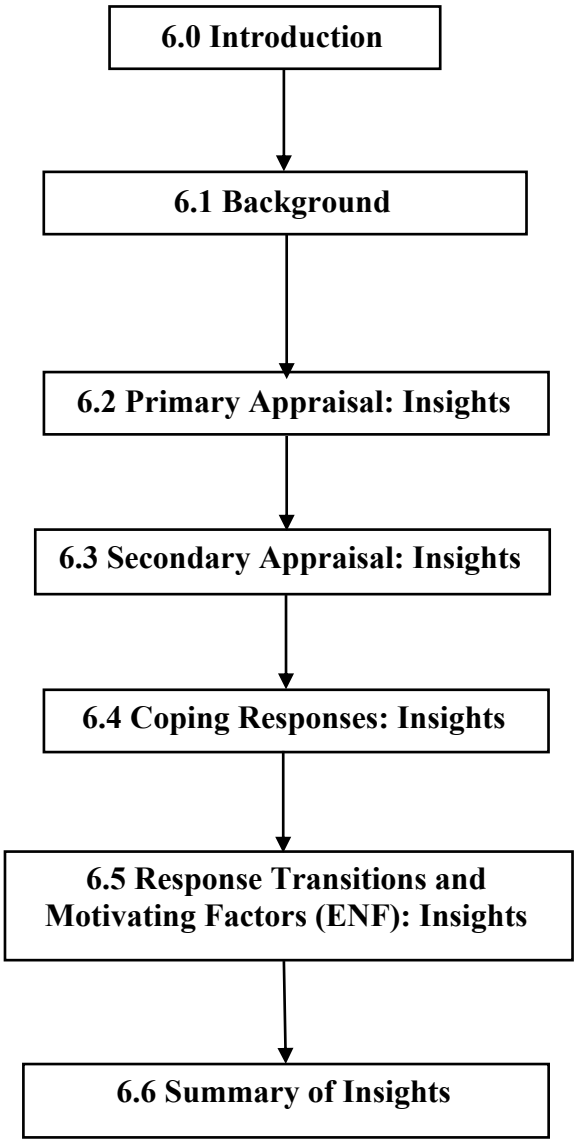


Figure 6.0. Chapter Six Structure.

6.1 Participant Background

As previously detailed in Chapter 5, the choice of cities, hospitals, departments and doctors in this study was purposively selected as they were determined to be most capable of providing the necessary insights to answer the research questions. Four medical care providers participated in this study: one large public general hospital, a specialised chronic care (dialysis) management hospital, and two smaller urgent medical care clinics in the Jeddah region, each of which provides state-subsidized medical services for both Saudi and non-Saudi patients, and each of which was a leader in the introduction of the mandatory health information system. Between them, they represent a wide range of medical service providers, large and small, as well as general and specialised, each containing a broad spectrum of medical departments and doctors.

The hospitals/clinics which formed the context for this research were as follows.

- ***KFGH:*** This is the largest general hospital in Jeddah, offering the broadest range of specialities. It treats the highest number of patients per annum, approximately 1500-1600 patients weekly, and was the first hospital where usage of the HIS became obligatory in Nov 2020. The total number of male doctors is higher in this hospital: 69% Male: and 31% Female.
- ***PAMC:*** Dialysis Centre is the largest public chronic care centre in Jeddah and in the Middle East region (Saudi Ministry of Health, 2020). It introduced the HIS in Dec 2020 and exemplifies a hospital with a lower patient load than the other chosen hospitals, nearly 250 - 300 patients weekly, with a more specialised focus on dialysis treatments. The total number of male doctors is higher in this clinic: 88% Male: and 12% Female.
- ***MUCC*** and ***RUCC:*** These represent two medical centres, both of which accept walk-in patients, typically with acute rather than chronic issues, and they consist of General Practitioner doctors and small emergency rooms. Their primary demographic is residents living in the nearby area. Each of these clinics treats more than 300 patients a day. Use of the HIS is obligatory in both clinics and has been since Dec 2020. The total number of female doctors is higher in these clinics: MUCC is 70% female, 30% male; RUCC is 90% female and 10% male.

The inclusion of KFGH and PAMC, in addition to RUCC/MUCC, allows the representation of doctors using the mandatory HIS in high-volume acute outpatient conditions and low-volume chronic inpatient conditions. The number of study participants recruited from each hospital/clinic reflects their relative size (Tables 1 and 2). Previous studies utilising the TMSC in healthcare settings have employed a maximum sample of 34 participants, deeming this as providing a point of theoretical saturation. The current study sought to interview a minimum of 30 participants, and in the total sample, 38 interviews were conducted, at which point theoretical saturation was deemed to have been achieved.

The choice of departments and doctors' specialisms to be represented was relevant only in the case of KFGH. This is because PAMC was a single specialism hospital (nephrology), while doctors in RUCC and MUCC, by nature of being general practice clinics, were generalists. In the case of KFGH, the decision was made to represent three broad specialist areas (Table 2): internal medicine, surgery and A&E. This choice of department/ specialism was intentional as these departments were the first to use the HIS and would, therefore, be capable of providing detailed insight into doctors' experience and appraisals of the system, as well as having enough usage time to develop reflection on the system and the possibility of changed coping responses. They also contained large numbers of doctors, including ones who had experienced both the paper and electronic management system, doctors of a wide range of age and seniority, and doctors who used the system to treat both acute and chronic conditions in both outpatients and inpatients.

At the level of individual doctors, as Tables 2 and 3 show, care was taken to ensure balanced gender and age representation, as detailed in Chapter 5. Both genders were represented within every hospital and within every department in the case of KFGH. Only doctors aged 30 years or older with a minimum of 3 years of medical practice experience (to ensure exposure to the HIS from before it became mandatory) were invited to participate in the study. That also ensured that medical practitioners with a range of seniorities, ranging from interns to consultants, were also represented. All doctors who participated in the study were Saudi citizens, enabling the examination of IT coping responses within a collectivist culture. In summary, as shown in table 1, a similar representation of Saudi doctors in terms of ages, genders, and seniority was obtained from each hospital and medical clinic.

Table 6.1 Participant Information: Case Study Hospital.

KFGH		PAMC		MUCC		RUCC	
Internal Medicine General Surgeons A&E	N= 55 N= 47 N= 60	Consultants Residents Specialists	N= 4 N= 10 N= 6	General Practitioners	N= 7	General Practitioners	N= 7

Table 6.2 Number of Doctors Who Participated in the Study by Gender and Specialism.

KFGH	Number of doctors	Female	Male	PAMC	Number of doctors	Female	Male	MUCC	Number of doctors	Female	Male	RUCC	Number of doctors	Female	Male
Internal Medicine	N= 6	N= 3	N= 3	Consultants	N= 3	N= 0	N= 3	General Practitioners	N= 5	N= 4	N= 1	General Practitioners	N= 4	N= 3	N= 1
General Surgeons	N= 8	N= 3	N= 5	Residents	N= 2	N= 1	N= 1	Total	N= 5	N= 4	N= 1	Total	N= 4	N= 3	N= 1
A&E	N= 7	N= 4	N= 3	Specialists	N= 3	N= 1	N= 2								
Total	N= 21	N= 10	N=11	Total	N= 8	N= 2	N= 6								

Table 6.3 Number of Doctors Who Participated in the Study by Age Group.

KFGH		PAMC		MUCC		RUCC	
Age group	Participant	Age group	Participant	Age group	Participant	Age group	Participant
30 + 35 + 40 + 45+ 50 +	N= 7 N= 4 N= 2 N= 2 N= 6	30 + 35+ 40 + 45+ 50+	N= 1 N= 2 N= 3 N= 1 N= 2	30+ 35 + 40 + 45+ 50 +	N= 1 N= 1 N= 1 N= 1 N= 1	30 + 35+ 40 +	N= 1 N= 2 N=1

Table 6.4. IT Experience

IT Experience				
Rate	**KFGH**	**PAMC**	**MUCC**	**RUCC**
Excellent	N= 2	N= 2		
Very good	N= 3	N= 2	N= 1	N=1
Good	N= 6	N= 4		N=2
Basic	N= 3		N=3	
Average	N= 8		N=1	N=1

Table 6.5. Starting Time

Starting Time				
	KFGH	**PAMC**	**MUCC**	**RUCC**
Prior to IT becoming obligatory	N= 16	N= 7	N= 2	N= 2
At time IT system was mandated	N= 5	N= 1	N= 2	N= 1
After IT system was mandated	N= 1		N= 1	N= 1

Table 6.6. Training

Training				
	KFGH	**PAMC**	**MUCC**	**RUCC**
Yes	N= 15	N= 4	N= 3	N=3
No	N= 6	N= 4	N= 2	N=1

Three further key background features of participants were ascertained, that were deemed relevant to the topic of the study. At the start of the interviews, participants answered three multiple-choice response questions about (i) their self-reported level of technical experience at the point of their first usage of the HIS and (ii) whether they had received any training on the HIS. On self-reported general IT experience, most participants in all hospitals rated themselves as good or below, with very few self-describing as better than good. Treating the rating responses on a 1-5 scale, with sound as the midpoint (3), the mean ratings were: PAMC 3.5; RUCC 2.75; KFGH 2.5; MUCC 2.2. Findings are summarised in Table 4. Concerning when they had first used the HIS in Table 5, the majority (68%) said they used it shortly before it became mandatory to use it, typically in the previous 12-18 months prior to it becoming mandatory. That pattern was consistent across the four hospitals.

On the matter of training in the use of the HIS in Table 6, in the case of PAMC, only half of the participants (exactly 50%) received training in the usage of the HIS prior to its usage (including during mandatory imposition of the HIS). In all other sample contexts, the majority of participants (67%) claimed to have received some training during their initial stages of mandatory imposition of the technology – but no training prior to that point.

The study findings are now presented sequentially in line with the initial research conceptual model, shown in figure 6.1. The findings relating to primary appraisal of the HIS are detailed, followed by secondary appraisal insights, concluding with initial coping responses as a consequence of those appraisals. Those findings covered in sections 6.2-6.5 provide a detailed account of how propositions 1-3 (Figure 6.1) are supported. Sections 6.6 and 6.7 then focus on response transitions and motivating factors, with particular attention to the role of Equitable Needs Fulfilment.

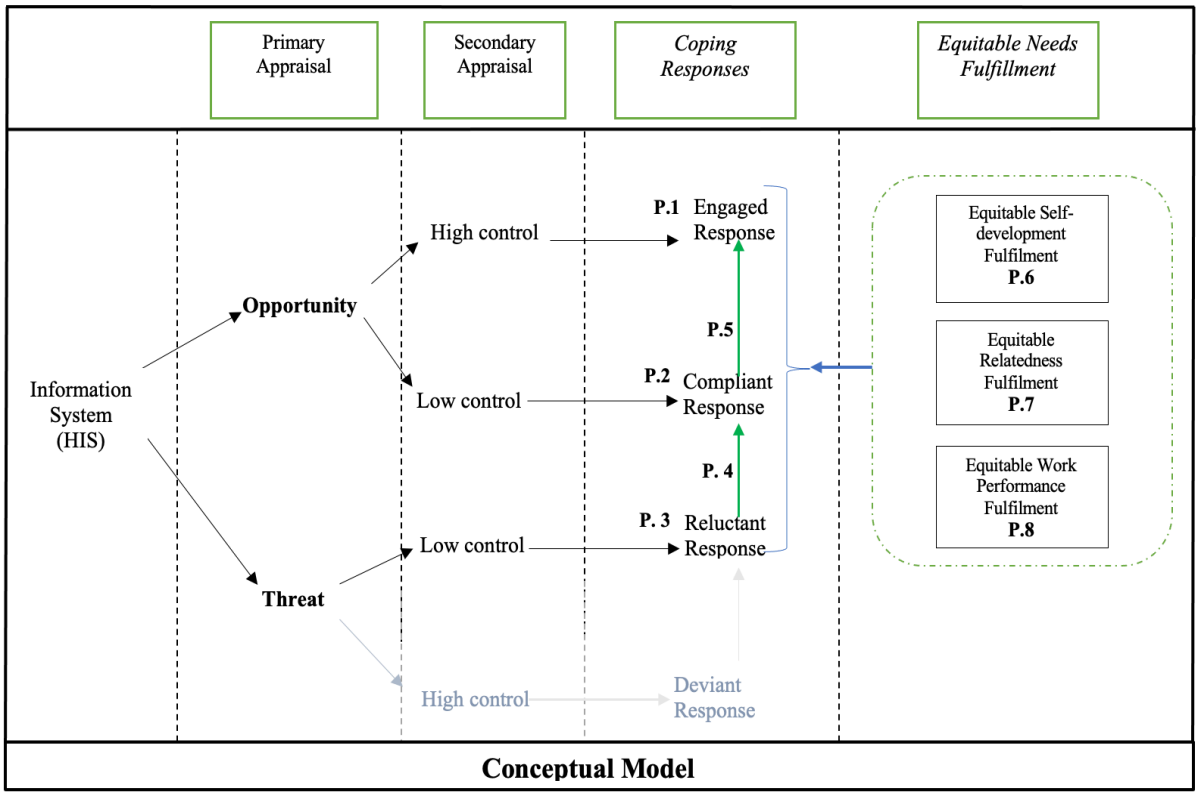


Figure 6.1. Conceptual Model.

6.2 Primary Appraisal

The primary appraisal findings show that when the HIS was first introduced in this mandatory usage context, the primary appraisal manifested in positive or negative wordings, and these were thematically coded and grouped as perceptions of opportunity or threat, in accordance with the conceptual model adopted. However, what is interesting is that those perceptions are not uniform in their expression, and their associated variation relates to a number of personal factors, some of which are more or less fixed characteristics and therefore static (e.g., gender), and others which are more malleable and have potential to change with the correct intervention (e.g., IT training). For the purpose of exploring possible effects of background differences, the primary appraisals of respondents in each hospital are detailed separately and in each, a primary appraisal is described in terms of doctors' age, gender, hospital department, seniority (years of experience), IT training, and perception of the characteristics of the technology that was introduced.

Since the primary appraisal is analysed in considerable qualitative detail in the following subsections, an initial overview is provided by Table 6.7. This demonstrates that the differences between the medical facilities where data was gathered are only quite subtle. Possibly that is due to the HIS software being the same in all places, and introduced in the same way, although it appears that the training was not the same across hospitals (or even between departments within the same hospital).

Table 6.7. A summary of the initial primary appraisal findings

	Primary appraisal					
	As Opportunity			As Threat		
Factor	**KFGH**	**PAMC**	**MUCC and RUCC**	**KFGH**	**PAMC**	**MUCC and RUCC**
Age	30-40 years	30-40 years and 40-50 years	30-40 years and 40-50 years	30-40 years and 40-50 years	40-50 years	40-50 years
Gender	Male	Male and female	Female	Female	Male	Female
Training	Received training			Did not receive training	Did not receive training	Did not receive training
Seniority	Higher	Higher	Lower	Higher	Higher	Higher
Technical literacy		High	Low		Non	Lower

6.2.1. Case Study 1: KFGH

Interviewees were asked about the first time they learned that they would be required to use this HIS and their thoughts about the system. When their responses were analysed in themes , it was clear that most informants had viewed the system negatively (64%), coded as a threat, with about one-third of them (36%) describing a positive response, interpreted as opportunity. Doctors mainly used the words positive or negative to describe their response. However, some used other words with positive or negative overtones (e.g., happy, easy, hard, shocked), which were coded according to their valence. An analysis was then conducted of the evaluative words used. It was found that many of them used descriptive words that indicated an attitude or emotion (e.g., essential, hate, ashamed).

6.2.1.1 Primary Appraisal as <u>Opportunity</u>

Over one-third of interviewees in this general hospital perceived the introduction and ability to use the new health information systems in terms of opportunity. This was described in a variety of ways, some being opposite versions of themes seen as negative above,

e.g., time given as allowing for faster access to data, availability in the form of better access to keep track of patient data. Other themes were uniquely positive, e.g., the HIS seen as giving more legal security. How those opportunities were perceived varied in terms of a number of factors, which are now discussed.

Age/Opportunity:

Findings from the KFGH interviewees suggest that the attitudes towards the opportunities presented by the introduction of OASIS vary widely across different age groups. Older individuals tended to have more experience with the system, and thus their responses were more nuanced. They noted both the positive aspects of the system, such as the convenience and the ability to record information more accurately (themes of convenience and accuracy) and the difficulties described earlier. On the other hand, younger individuals tended to be more uniformly positive about the system and its potential to improve healthcare.

It is notable however that some positive responses were associated with very first impressions of the HIS rather than following actual use for a few weeks. Thus, they might evidence novelty effect.

> *"I was selected to attend the system orientation meeting as the director of the department was on holiday, and I was thrilled.*"- (Interviewee n.3, 4 years of experience, 30+, male).
>
> *"I felt comfortable using the system from day one and had a positive first impression.".* (Interviewee n. 9, 10 years of experience, 50+, male).

Gender/Opportunity:

All of the interviewees who perceived the introduction of the new health information system to be an opportunity were men. This could be consistent with the stereotype that males

see themselves as more technologically confident than females or that females are more cautious and critical. Our data does not allow us to discern that clearly, though quotes like the following show a male providing ample justification for his positive view (referring to the legal rights and organisation themes).

> *"I am very fond of technology; it is my number one passion. Secondly, I am confident that technology can improve the medical industry for both doctors and patients. It allows me to save my legal right to protect my patients while ensuring that their rights are preserved as well. Additionally, everything is recorded for future reference, making it easier to stay organized."* (Interviewee n.1, 4 years of experience, 30+, male).

Department/ Opportunity:

In the Accident and Emergency (A&E) Department, there was a general positivity from many of the male interviewees, who noted the benefit of having a more automated system. For example, Interviewees 1 and 3 were both excited by the idea of quickly and accurately ordering tests and treatments and documenting a patient's care in a fraction of the time it usually would take (positive time theme). Notably in the following example the positive references to the convenience and legal rights themes were linked to the patient care theme.

"I love technology; it's my number one passion. Secondly, I am confident that technology can make my job as a doctor easier while also benefiting my patients by ensuring their rights are protected and everything is accurately recorded." (Interviewee n.1, A&E, 4 years of experience, 30+, male).

The A&E Department doctors also showed great concern for the technology as a tool to keep patients' data safe because they handled many patients and their information simultaneously.

For instance*, "As both a doctor and a patient, I was confident that having the legal and medical rights to save the patient's well-being would make my job easier. Additionally, properly documenting all records ensures that patient rights are preserved."* (Interviewee n.18, 4 years of experience, 30+, male).

Furthermore, the theme of using the system without relying on others was mentioned with enthusiasm and positivity in the surgeon's department. This may be interpreted as due to there being greater speed and accuracy when others are not involved. Certainly, the Accident and Emergency and Surgeon departments typically have the most experience dealing with time-sensitive and very technical information.

*"By doing it this way, I don't have to rely on others and can access everything from my computer." (*Interviewee n.14, Surgical, 20 years of experience, 50+, male).

The medical department staff (male) also noted that the system helped them do their job more efficiently (patient care theme). They said they liked the idea of automation as it allowed them to save time in entering patient information and maintain patients' rights when administering treatments (time and legal themes again). Those with experience in the most time-sensitive and technical departments are more likely to see the introduction as an opportunity, as they are comfortable with the idea of technology and are experienced enough to keep the complexities of the system from dissuading them from using it as a tool. However, those with less experience or working in less technical departments can experience difficulty with the transition and subsequent use of the system, potentially threatening their work.

IT Training/ Opportunity:

Interviewees who described OASIS as an opportunity tended to be from the Surgery and A&E departments with varied hospital experience levels. Notably, those with IT training, plus knowledge of the old system, were better able to see the new system's benefits (especially via the accuracy and time (speed) themes). The training enabled respondents to become more familiar with the system and gave them the confidence to try it out and the knowledge to work through any issues they encountered. For example,

"*The training was very helpful. The IT department sent links with videos, and I attended workshops at the hospital*." (Interviewee n.1, KFGH A&E, 4 years of experience, 30+, male).

Seniority/ Opportunity:

Over a third of the respondents at KFGH viewed the introduction of the HIS as an opportunity differently depending on their seniority and purpose in the hospital. For example, some surgeons (senior) were interested in the introduction of technology to keep records of patient conditions. It helped them to provide clear patient information on their health status and hospital admission (the recording theme). For example, (interviewee n.14, 50+, male) said,

"I have to set the data to go through several windows and record so many things then I do a small thing this is one example."

This showed his approval of the reliability of OASIS in keeping records. Generally, the seniority of the interviewees affected the opportunity responses dependent on their difference in hospital tasks.

Perceived Characteristics of the Technology/ Opportunity:

The interviewees who gave positive primary appraisals often characterized the technology in terms of the same themes seen in negative form earlier, such as time, convenience and accuracy. E.g. they highlighted that, in their perception, the HIS allowed for faster data entry and improved accuracy. They also often made the link with improved patient care. They noted that the implementation of the system was beneficial for the doctors and the patients. By contrast others worded their appraisal in terms of themes not found in negative form above, here comfort e.g.

> *"I was immediately comfortable using the system, and my excitement persisted."* (Interviewee n.9, 10 years of experience, 50+, male).

The characteristics of the system particularly favourably mentioned included keeping and storing accurate records and allowing doctors to review and assess their patients' medical histories more efficiently, write out their therapeutic plans more quickly, and hold all their references on their iPads, making the information more accessible.

> *"Now all my books and data are conveniently stored on my iPad in my pocket. I believe this electronic system will greatly help me...*" (Interviewee n.3, 4 years of experience, 30+, male).

6.2.1.2 Primary Appraisal as <u>Threat</u>

The evaluation of the HIS system in relation to the threat varied based on factors such as age, gender, hospital department, and experience level. These variables influenced the

reasons for the perceived threat of using the system, which constitute the themes identified within each subsection of the account below.

Age/ Threat:

Interviewees aged between 30 and 50 years were predominantly negative in their views regarding mandatory usage of the HIS. None were positive. However, the reasons for their negativity, precisely the nature of the threat they perceived, varied across this age category. For example, older interviewees, not being digital natives, experienced more of a learning curve to understand the new system than younger interviewees, citing the theme of lack of familiarity in using devices.

> *"Initially, I found it difficult to use the computer because I had no prior experience with any computer functions, including Excel and Word."* (Interviewee n.11, 34 years of experience, 40 years, Female).

Consequently, some were concerned about lack of training opportunities regarding the functionality of the system (a frequent theme in the data).

A related social theme was specifically how any perceived lack of competence in using the new system might be viewed by senior staff and thus affect their careers. Several older respondents who expressed their struggle in comprehending and utilizing newer technologies however did not seem too worried about how it would affect their career paths. Their main concern was how long it would take to learn or use the system (time theme) and related to that, whether they could use it efficiently to aid in their patients' treatment (patient care). They found it frustrating to invest their time in learning to use a system that may or may not work for them.

"I find it challenging and time-consuming to use the technology every time I attempt to do so. Being a surgeon, I have not had the opportunity to explore how the technology functions. There is an urgent patient, and the workloads are high, which is why I cannot concentrate on the system currently." (Interviewee n.8, 20 years of experience, 50+, Male).

"I was worried about being able to learn the system and consult patients simultaneously." (Interviewee n.11, 34 years of experience, 40+, Female).

By contrast, the negative reaction of some younger interviewees related to dispositional characteristics such as simply not liking change.

"I did not accept the idea at first. There are people who like new technology and change, but for me I did not agree with it from the start because I do not like change." (Interviewee n.21, 12 years of experience, 45+ years, Male).

Gender/ Threat:

The interviewees also provided insight into differences between men and women in relation to how they think about technology and the value associated with its implementation, with women (43 %) being predominantly far more negative in their views of the system.

Without exception, all women interviewees described the transition from paper to electronic systems as a challenge and a source of anxiety, referencing their lack of technical knowledge (unfamiliarity theme), and again the time it had taken to learn the system. Moreover, this gender-based attitude was found regardless of the age category.

"When we started using the HIS system, it was challenging for us since we were used to working with paper-based records. Suddenly, everything was digital, and getting used to the new system took some time. Now, using the system is

mandatory, and we no longer rely on paper records. Adapting to new technology was not easy, and I still prefer using a pen over technology." (Interviewee n. 5, 3 years of experience, 30+, Female).

Others again highlighted the time-patient care thematic connection: fear that using a system would affect patient care by forcing them to spend more time on inputting data rather than 1:1 interaction with the patient. They also mentioned the theme of HIS difficulty for elderly patients who are unlikely to be able to access the internet easily.

"Until now, most of my elderly patients have struggled to access the system or use the internet. This makes it difficult for them to benefit from it." (Interviewee n. 18, 35 years of experience, 40+, Female).

Notably, however, among themes related to handling negative factors, females highlighted their exploitation of peer support in teams, not just formal training.

"Initially, I found it difficult to use the computer because I had no prior experience with any computer functions, including Excel and Word. However, I started learning by asking my colleagues for help and signing up with a teacher who could teach me how to use the system. It took some time, but I eventually learned all the necessary steps with teamwork and consistent effort." (Interviewee n.11, 34 years of experience, 40 years, Female).

Male interviewees, on the other hand, were more likely to see the transition as a necessary change, referencing the potential advantages of the system. Hence they were dissatisfied when the system performance or computer availability failed to live up to this.

"Initially, I was resistant to the system due to suboptimal performance and long loading times. Additionally, we needed more computers as nurses had to enter

information, but only one computer was available for us." (Interviewee n.7, 5 years of experience, 35+, Male).

Department/ Threat:

The interviewees' appraisal of the technology also varied in type according to the needs of their medical department, specifically whether it was a department that provided urgent acute medical treatment under time pressure (such as A&E), or whether it was less time pressured (such as is often, but not exclusively, the case for internal medicine and surgery patients, who usually have chronic conditions).

Related reasons the A&E participants reported included the theme of time taken using the HIS in relation to patient care and the lack of access to the system.

For example, *"I felt threatened because my workload was too much. I don't have enough time to write, especially since I have to see so many patients."* (Interviewee n.4, A&E, 3 years of experience, 30+, Female).

The perception that the system was not optimal (system performance theme) surfaced in the feeling of being "lab rats" within the healthcare system.

"Our department was the first to start using the new system, and we felt like lab rats. Other doctors would come to us asking for guidance on how to use it since we were the first to try it out. However, the system was far from optimal, and we still had the old system available upstairs." (Interviewee n.7, A&E, 5 years of experience, 35+, Male*).*

In the surgical department, the participants initially felt frustrated due to their inexperience with technology and lack of training in the system. Additionally, they evidenced the system performance theme and consequent difficulty transitioning from paper systems.

> *"It's difficult to concentrate using this electronic system. The paper file was much easier to work with. The system changes frequently, is slow and unclear, and has too many icons, making it unfriendly to the eyes*." (Interviewee n.8, Surgery, 20 years of experience, 50+, male).

The participants in the Internal Medicine department also felt particularly challenged when using the system due to inadequate training. The participants needed the proper education and training to effectively use the system to ensure the best possible outcomes for their patients.

> *"In the beginning, I was hesitant to use the system due to issues with losing patient details and lack of education about it."* (Interviewee n.19, Internal medicine, 9 years of experience, 35+, male).

IT Training/ Threat:

One common theme from the interviews was the perceived lack of training (and support) when implementing the new HIS. This implies a perceived shortcoming in the hospital management or MoH that should have provided more training (referred to as *they* in the following quote).

> *"I was frustrated because they forced the system on us without adequate training."* (Interviewee n.15, Surgery, 15 years of experience, 30+, female).

Several interviewees pointed out the need for more technical support to deal with slow response times and other difficulties. Some reported having difficulty because they did not know how to use computers at all. Others reported that they had to collect patient information

separately since not all of it was fully integrated into the system at the start, implying a lack of adequate IT support.

> *"I don't know how to deal with technology, or my patient. I feel challenged and there is not enough technical support."* (Interviewee n.15, Surgery, 15 years of experience, 40+, female).

When neither training nor technical support are adequately available, peer support and self-learning are available resources. The former theme was mentioned just by females

> *I started learning by asking my colleagues for help and signing up with a teacher who could teach me how to use the system. It took some time, but I eventually learned all the necessary steps with teamwork and consistent effort." (*Interviewee n.11, 34 years of experience, 40 years, Female).

There were also a few hints at the latter theme. This interviewee implies that in the end she tackled her lack of prior knowledge herself but met problems of the amount of time needed to learn the new system and the limited access to computers. Therefore, her appraisal remains negative.

> *"My negative point is the lack of training. I don't know how to use the system, and there aren't enough computers, which makes the process time-consuming."* (Interviewee n.11, Surgery, 34 years of experience, 40+, female).

Seniority/ Threat:

The interviews show that the introduction of HIS posed a significant challenge to KFGH professionals depending on their seniority levels. These included again the themes of lack of training, support, and computer resources (e.g. insufficient connectivity and bandwidth), as well as poor system performance, and unfamiliarity. All could impact patient

care as noted by this experienced doctor. “Dealing with technology and patients can be challenging, and unfortunately, I do not feel equipped to handle either. The lack of technical support has only added to the difficulty. To make matters worse, we have not fully transitioned to new systems and processes, which has been a waste of time and a disservice to our patients.” (Interviewee n.15, 15 years of experience, 40+, female).

The consensus among the surgeons was that the system was a sudden change from paper forms and required more training.

> *" Negative because of lack of education about the system. Without my colleague's help, I don't know what to do.”* (*Interviewee n.13, 14 years of experience, 45+, female, KFGH).*

On the other hand, many senior employees (heads of medical department consultants with more than 20 years of experience) evidenced the theme of habit. They viewed the introduction of HIS as a threat because it performed poorly and was not fixed.

> *“The system undergoes changes every day, but it is slow and unclear. There are too many icons, and the interface is not user-friendly.”* (Interviewee n.8, 20 years of experience,50+, male).

Perceived Characteristics of the Technology/ Threat:

In the account above, many of the themes concern perceptions about the technology that may originate in the HIS itself and its implementation or in the user. The most common themes were system performance (including design), access/availability (of hardware and internet speed) etc., and time to learn and use. These were regarded by some as due to a lack

of adequate training and of a person's technical skills, by more as a failing of the technology itself, which for example, could have been more user-friendly, as there were too many icons, etc. and the loading times were slow. Typical of the latter stance are the following comments from two male interviewees:

> "*The process of ordering lab or X-ray for a patient requires me to fill out nearly 7 pages of detailed information in the system, which can be time-consuming and require a lot of effort."* (Interviewee n.6, 3 years of experience, 35+, male).

> "*The paper file was perfect; this electronic system made my work harder, not easier. The system changes every day. Very slow, not clear, too many icons, not eye-friendly…every time I try to use it, I find it hard, difficult and take so much time."* (Interviewee n. 8, 20 years of experience, 50+, male).

6.2.2. Case Study 2: PAMC

A total of 8 interviews were conducted in the dialysis departments of this chronic hospital. The interviewees comprised 6 males and 2 females recommended by the hospital research office as those who use the mandatory HIS.

6.2.2.1 Primary Appraisal as Opportunity

Age/ Opportunity:

Generally, the responses to the introduction of OASIS in this hospital were positive. As was the case in KFGH, the interviewees perceived that the new technology could help save time and improve accuracy. When viewed in more detail, it was clear that the responses again appeared to differ based on age. While a positive attitude regarding the implementation of the system was evident, there were specific nuances in the responses that varied depending on the age of the respondents, with those younger more enthusiastic about the opportunities which the new system presented. For example, interviewees aged 50 years and over, the introduction of the system was mainly reported as advantageous because doctors no longer had to rely on paper records or go through departments to access patient results (the non-reliance on others theme). However, they stated that the first few days with the system had been confusing, an issue that was later rectified with the help of IT support, which therefore seems to have been more efficient here than in KFGH.

Among those in the 45-50 age group, the implementation made accessing patient results much more convenient and less time-consuming since records could be accessed through mobile technology (the time and convenience themes again). The 40-50-year-old respondents also reiterated the recording and availability themes for patient data.

By contrast, those aged 35 and below reported being more familiar with and comfortable using electronic systems and had positively greeted the introduction of the Health Information System. Overall, those who were older may have had difficulty adjusting to the technological aspects at first but were eventually able to come to terms with it after some help and guidance.

> "I was content working in various hospitals, but I knew the electronic system would improve efficiency.″ – (Interviewee n.28, 20 years of experience, 35+, male, PAMC).
>
> *"Since I started using the information system, it has become easier for me to access patient information. The digital format is more convenient than paper files. I am pleased with this change."* (Interviewee n.22, 4 years of experience, 50+, male, PAMC).

Gender/ Opportunity:

Female interviewees focused on the potential ulterior value of the HIS and how it could improve medical processes and the patient experience (patient care theme). Interviewee n.25, for example, expressed that the system could help professionals "do their work in a proper way." At the same time, Interviewee n.24 thought it would be beneficial to patients as it would deliver "more information in a short time."

Male respondents shared the same general sentiment that the HIS provided numerous benefits, saving them time, accessing data, and making the work easier, but usually without explicitly mentioning patient care. The male respondents were especially appreciative of the system's efficacy in enabling them to have all necessary data at the tip of their fingers – eliminating the need for manual searches. Thus, they focused on the disembodied qualities of the system rather than its human connection.

The male respondents were also generally more confident about the use of the system in comparison to the female respondents, who noted the need for extra technical help during the transition. Therefore, while male respondents shared their positive experience with the system almost from the beginning, female respondents had some reservations concerning the ability to access data on the go with the HIS. This could be attributable to the fact that the male respondents were more technologically savvy than the female respondents and felt more secure using the system.

Nevertheless, regarding the utility of the HIS, both genders were confident that it improved data accuracy, speed, and access.

> *"From the beginning, everything was easy. However, my relationship with technology has never been good*."(Interviewee n.23, 45+, male).
>
> *"I thought it was good news, making the task easier to complete and helping professionals work more efficiently by providing readily available information."* (Interviewee n.25, 3 years of experience, 40+, female).

While there were some gender differences in terms of the level of confidence with the introduction of the system (cf. the KFGH result), both genders shared the same sentiment that HIS provided numerous benefits, including the familiar themes saving time, making it easier to access data, and generally making the work easier.

Seniority/ Opportunity:

The more experienced interviewees, which were mostly in the 50+ male and 45+ male categories, had a positive attitude towards the introduction of the HIS and expressed the common themes that it would save time and make their jobs more efficient. For example,

Interviewee n.2 said "The ability to view patient information electronically is better than using paper files." (Interviewee n.2, 4 years of experience, 50+, male).

The less experienced interviewees had a mixed reaction to the introduction of the HIS. Interviewee n.7, 40+, male, was initially apprehensive but was also confident that he could become comfortable with the system given enough time. Another said

> "I was happy because I had worked in different hospitals before and knew that an electronic system would make everything smoother and faster. However, the system was very basic." (Interviewee n.8, 20 years of experience, 35+, male).

Overall, it is clear that the more experienced interviewees had a more positive attitude toward introducing HIS than the less experienced interviewees. This could be because they had a more excellent knowledge of technology, were familiar with electronic systems, and were more confident in their ability to adjust to the new system. However, the less experienced interviewees were open to learning how to use the new system. They could make the transition easier with the proper support from an IT professional.

IT Experience / Opportunity:

All positive interviewees agreed that the new IT system would save time and improve accuracy and patient care. However, those with more experience with technology reported feeling more positive about it initially. For example, Interviewees 5 and 7 (40+) had more years of nephrologist experience but said they needed more IT experience. They both reported feeling optimistic about the new system and taking the time to learn how to use it.

"I was optimistic, but when using something for the first time, it takes time to learn." (Interviewee n.7, 5 years of experience, 40+, male).

Perceived Characteristics of the Technology/ Opportunity:

The interviewees positively characterized technology by expressing its potential to save time, provide accuracy, improve accessibility and efficiency of their work processes, and help protect the rights of doctors and patients (all themes seen already in the KFGH data as well). They were optimistic about its capabilities to enable smooth transitions between hospitals and reduce the manual labour needed for the paperwork. Most interviewees highlighted the efficiency and convenience of having a digital record system that eliminates the need to file and search paper documents. Interviewee 2 noted that they could now view a patient's health record with one click rather than going to paper files manually. The common factor mentioned here amongst all the interviewees was that the paper-based system took longer, increasing the chances of errors (time and accuracy themes).

Additionally, the interviewees felt the system would benefit them personally and their patients (the patient care theme).

> *"Obtaining more information quickly benefits both me and the patient...."* (Interviewee n.2, 4 years of experience, 50+, male).

This can be seen also in Interviewee n.5, who noted that the system would help the professionals do their work " properly, " saving time for their patients. Similarly, Interviewee n.8 shared that they had experienced the digital system in other hospitals, and from that experience, they knew that it would make everything "smooth and fast" for the patient.

> *"Since I started using the information system, it has become easier for me. I can view patient records from my workstation, which is more convenient than dealing with paper files. The information is easily accessible and user-friendly. I was pleased to hear the news."* (Interviewee n.2, 4 years of experience, 50+, male).

Primary Appraisal as Threat

Out of the eight interviewees from PAMC hospital, only two viewed the introduction of the HIS as a threat. They both expressed shock and confusion regarding a new system they had to learn.

Age /Threat:

Implementing the Health Information System (HIS) at the PAMC hospital was met with reluctance from two doctors, but this could be due to unfamiliarity rather than age. Interviewee n.1, who was 40 years old, male found the introduction of the HIS to be hard due to being something new, and he needed to possess more knowledge of how to use computers or access the system. This may have caused the interviewee to feel ashamed since his friends of the same age were having no difficulties learning the system while he found it hard and was still taking over eight months to get accustomed to it ('regard by others' theme). Clearly the learning required was extensive.

> *"I spent over 8 months learning about the system. I had to put in a lot of effort and dedication to acquire the necessary knowledge."* (Interviewee n.1, 4 years of experience, 40+, male).

Interviewee n.6's reaction to the introduction of the HIS was again unfamiliarity reported as a shock due to its complexity. She further mentioned that no one informed her of the use of electronics or the system to be adopted. This could have caused her to fear being left behind due to her peers transitioning easily and her being unaware of the shift.

It is clear that as age increases, there is a decrease in enthusiasm toward introducing a new technological system. The two interviews show how two individuals of older age found the new system threatening. This is opposed to the younger individuals who may associate the new technology with something more advantageous to their work and lives.

The transition to the HIS could have been made smoother, and the anxiety and shock felt by the older individuals could have been avoided if the hospital had had proper training sessions for introducing the technology.

Gender / Threat:

From the findings, of the few PAMC doctors who gave negative appraisals, both male and female participants experienced similar confusion and frustration when implementing the new system. However, the findings also suggest that the male interviewee struggled more with the system, and was more socially sensitive to peer regard (a form of social influence), taking eight months to try and learn about it. This could point to some gender-based differences in approaches to technology, particularly in the medical environment, but the numbers here are too small to be definite.

> *"In the beginning, it was difficult because it was a new experience. I felt embarrassed that my peers were not struggling like me."*- (Interviewee n.1, 4 years of experience, 40+, male).

Seniority / Threat:

The older nephrologist consultant (Interviewee n.1) was more negatively affected by the transition due to his seniority and experience. He had no prior knowledge of computers or the system, so it took much longer for him to get up to speed than his younger colleagues.

> *"I spent over 8 months learning about the system. I had to put in a lot of effort to properly understand it."*- (Interviewee n.1, 4 years of experience, 40+, male).

The younger nephrologist resident (Interviewee n.6) was still surprised that they needed to use the new electronic systems. However, she was not as intimidated by the learning curve as her more experienced counterpart.

"No one informed me about the new electronics. When I asked why, he said that it's the new system we have to use." (Interviewee n.6, 3 years of experience, 35+, Female).

The effect therefore is perhaps of age and (lack of) familiarity, rather than of seniority itself.

IT Training / Threat:

The lack of IT training negatively impacted both respondents. Interviewee 1 felt embarrassed and unsatisfied because he experienced difficulty learning by himself how to use the system, and it took him eight months to do so.

"The transition period was the major concern" (Interviewee n.1, 4 years of experience, 40+, male).

Interviewee n.6 was shocked as she had no prior knowledge about the new electronic system, leaving her feeling overwhelmed by having to learn something new without anyone's guidance or instruction. Notably neither doctor reported any reliance on peers or teamwork to overcome learning problems.

Those who gave positive appraisals, described above, seem to have been helped more by their own technological ability rather than any training supplied, suggesting that training was generally lacking in PAMC.

Perceived Characteristics of the Technology/ Threat:

The two interviewees who viewed HIS introduction as a threat also characterized the technology itself negatively: they did not solely blame their personal lack of skill or training. The nephrologist consultant (Interviewee n.1) did this more lightly, referring to *difficulties* (of the system).

"I am facing difficulties and finding it challenging to deal with the system." (Interviewee n.1, 4 years of experience, 40+, male).

The nephrologist resident (Interviewee n.6) did this more explicitly:

"I was shocked. It was complicated."- (Interviewee n.6, 3 years of experience, 35+, Female).

6.2.3 Case Study 3 and 4: MUCC and RUCC

A total of 9 interviews were conducted with general practitioner doctors in two acute care medical centres. The interviewees comprised 7 Females and 2 males recommended by the centre research office as those who use the mandatory HIS.

Primary Appraisal as <u>Opportunity</u>

Only two doctors, females, from the two health facilities, one from MUCC and the other from RUCC, viewed the system as an opportunity. They saw it as a way to make their workflows more accessible and more convenient.

Age/ Opportunity:

Both female respondents (n.30 and 37) viewed the introduction of technology positively, regardless of age. They saw it as an opportunity to lessen their workload, increase accuracy and so improve patient care. The younger respondent emphasized how easy it was to use the system, while the older respondent noted that using electronic systems was part of her life due to its rise in recent years.

> *"This is incredible news! We have been eagerly anticipating this."* (Interviewee n.30, 10 years of experience, 40+, female, MUCC).

Quotes below confirm that she felt her expectation was indeed met.

Gender / Opportunity:

Both the respondents from MUCC and RUCC who viewed HIS as an opportunity were female. This indicated that only females felt the HIS would improve their quality of care and be easy to use with their knowledge of computers due to being up to date with new technology.

> *"It is a positive outcome if executed and implemented correctly."* (Interviewee n.30, 10 years of experience, 40+, female, MUCC).

IT Training / Opportunity:

The two doctors did not mention training. Possibly this is because they appear not to have needed any, due to their prior expertise.

Seniority/ Opportunity:

The response from the MUCC general practitioner (Interviewee 30) demonstrated a slightly more hedged appreciation for the introduction of electronic systems than did the RUCC's. The primary difference relates to seniority or age, as the MUCC GP has more years of technology experience due to her age. The younger RUCC GP however is even more positive and does not modify what she says with if clauses.

> *"Imagine having to write 100 patient records manually every day. Of course, this task can be performed more efficiently with technology."*(Interviewee n.37, 6 years of experience, 30+, female, RUCC).
>
> *"It was very positive."* (Interviewee n.37, 6 years of experience, 30+, female, RUCC).

Perceived Characteristics of Technology/ Opportunity:

Both respondents positively characterized technology in general, and specifically the HIS, as an improvement on the manual way of doing things, with one respondent noting that it would improve the quality of care and claiming it was easy to use even for those unfamiliar with computer apps (which we have seen was not the case). Hence there were no criticisms of the technology such as we have seen elsewhere, e.g. claiming it was not user friendly, had too many icons, was not sophisticated enough, not carrying complete records, changeable, not enough access points etc.

"... of course, technology is better." (Interviewee n.37, 6 years of experience, 30+, female, RUCC).

Specific themes mentioned positively were mostly those benefits already mentioned in positive appraisals in KFGH or PAMC, as follows.

Time saving, convenience when dealing with many patients daily.

For example, interviewee n.37, RUCC noted, "*Imagine I write 100 patients every day manually. Of course, technology is better."* (Interviewee n.37, 6 years of experience, 30+, female, RUCC).

Accuracy and completeness

"It's important to document everything in an electronic system. Fortunately, that was the case for me, and it was wonderful." (Interviewee n.30, 10 years of experience, 40+, female, MUCC).

Ease of Use They stated that, with a general understanding of how to use computer apps and systems, it was a straightforward process to use the HIS.

Finally, what was apparent was the enthusiasm generated by the HIS in these two doctors uniquely among all those we interviewed.

"It was just wonderful. It's amazing. We were waiting for this." – (Interviewee n.30, 10 years of experience, 40+, female, MUCC).

Primary Appraisal as <u>Threat</u>

Seven of the nine interviewees from the two health facilities (MUCC and RUCC) viewed the HIS introduction as a threat. In particular, these interviewees expressed frustration and felt overwhelmed with time considerations.

Age/ Threat:

The responses of individuals aged 50+ were found to be more focused on the negative aspects and challenges associated with navigating the system. These individuals experienced a sense of frustration, confusion, and lack of education about how to use the system effectively. One expressed this clearly in terms of the unfamiliarity theme:

"Initially, it was challenging for me as I had no knowledge about the system." (Interviewee n.32, 13 years of experience, 50, female, MUCC).

In comparison, those who were 35+ tended to find a solution and were less overwhelmed by the potential limitations imposed upon them by the unfamiliar technology.

Gender / Threat:

The female responders were more likely to express depression, shock, embarrassment, and sadness than the male respondents. They tended to report feeling overwhelmed by not having sufficient education about the system initially or access to enough computers. Unfamiliarity seems to be the underlying basic theme here again.

"I was very depressed because we did not know anything about the system." (Interviewee n.32, 13 years of experience, 50, female, MUCC).

Only two males viewed the system as a threat, and they mainly expressed worries that working with HIS would increase waiting times for patients, making focusing on patient care slower than desired (the time affecting patient care theme).

> *"I was worried and afraid because it will take longer and make my work harder*." (Interviewee n.36, 8 years of experience, 35+, male, RUCC).

However, the gender difference could be due to females being more willing to express their emotions than men, rather than females actually experiencing more emotional effect of the introduction of the HIS.

IT Training / Threat:

One of the primary issues that the doctors implied led to negative responses was the need for more education and training on the system, due to unfamiliarity.

> *Initially, it was difficult for me because I lacked knowledge about the system."* (Interviewee n.32, 13 years of experience, 50, female, MUCC).

They felt unable to successfully self-learn and did not speak of peer or teamwork solutions. Several noted that they had to seek external help, such as attending classes or seminars, to become proficient with the system.

Lack of initial training is indicated, for instance, by these interviewees,

> *"They did not prepare properly before developing a system in the clinic, and they rushed us to use it. I felt frustrated and unsure about how to access the computer."* (Interviewee n.34, 13 years of experience, 45+, female, MUCC).

> *"They need to implement a better system with proper orientation to avoid negative feelings and save time."* (Interviewee n.33, 14 years of experience, 30+, female, MUCC).

Seniority/ Threat:

Those with more experience and years of practice found it easier to adapt to something new and unfamiliar, such as the introduction of an HIS system. They needed help navigating around and understanding how to use the system due to a lack of education and technical support.

> *"I have to ask about how to use the system. It took me a long time. The first three months were hard*." (Interviewee n.32, 13 years of experience, 50+, female, MUCC).

This doctor does not make clear who they asked for help, technical support staff or peers, but we may speculate it was the latter.

Perceived Characteristics of the Technology/ Threat:

Aside from their perceived lack of knowledge about the system and associated emotions, the doctors identified weaknesses that they attributed to the system itself. For example:

> *"It is a kid's system...The computers are also very old, and the system is not highly professional…"*- (Interviewee n.35, 10 years of experience, 40+, female, RUCC)

Consequently, they expressed concern for their patients' wait times if the system continued running inefficiently.

Associated with that, they felt disempowered in that their opinions were not considered and that they were forced to use the system. For example, Interviewee n.31, MUCC, was very hostile:

> *"I feel like I don't have a choice but to use the system. My ministry has made it mandatory, and I don't want to risk losing my job. Therefore, I choose not to*

speak up and comply with their requirements as part of my work responsibilities." (Interviewee n.31, 9 years of experience, 35+, male, MUCC).

The implication is that the Ministry did not treat the introduction of the HIS as a 'beta testing' of the system, where the emphasis would be on getting feedback from users to improve the system. Rather it was imposed top-down as a supposedly perfect final product for which no further improvement suggested by users could be required.

The following interviewee rolls together the weakness of the system and the lack of training (orientation) in one complaint.

"Shocked, heart attack! They need to get a better system than this because they started without any orientation. That is why I was negative. Time-consuming." (Interviewee n.33, 14 years of experience, 40+, female, MUCC).

6.3 Primary Appraisal Summary Conclusion

In summary, the primary appraisal of the new mandatory HIS conformed to positive and negative thematic codes which were termed opportunity and threat, consistent with the transactional coping theory literature. Interviewees across all four health facilities, PAMC, KFGH, MUCC, and RUCC, tended to acknowledge the potential automation benefits or opportunities which this new HIS could bring to their daily work experience. Despite this, many appraised their *actual experience* of using the technology negatively. Age, gender, department, seniority, IT training and perception of the characteristics of the new HIS technology emerged as relevant to understanding both positive/opportunity judgments and their negative/threat appraisals.

- **Positive appraisals** (perceiving the new technology in terms of opportunity) were more often associated with younger, and to a lesser extent, middle-aged (45 years and older) male doctors who worked in specialist hospitals. This may be because younger doctors have greater technical literacy, and the larger hospitals employ more male than female doctors. Prominent themes in the positive appraisals were: (1) time saving and convenience, (2) accuracy and completeness of records, (3) organisation of and access to records, (4) legal security, (5) not having to rely on others, (6) ease of use.
- **Negative appraisals** were more frequently evident in older female doctors, who also tended to have greater seniority. This remained consistent regardless of hospital type or department. Urgent care clinics tended to be dominated by women doctors, and these interviewees were, in the main, negatively disposed towards the technology. The reasons for negative appraisal consistently emerged as the following themes: (1) unfamiliarity and lack of tech experience, (2) lack of training in advance of technology usage and of support staff later, (3) time required to learn and use, (4) perceived weaknesses of the system such as poor functionality (processing slowness or crashing), (5) an interface that frequently changed, (6) poor user friendliness and usage complexity, (7) insufficient access (e.g. too few computer terminals) and (8) incomplete patient information.
- **Appraisal complexity:** Regardless of age, gender or seniority, most of the interviewees across all hospitals had a nuanced view of the system in that they were able to acknowledge some positive aspects of the HIS (such as the elimination of paper records), indicating their openness to new technology, whilst also holding opposing viewpoints relating to the experience of using the system (e.g., incomplete patient information). Coding information regarding positive and negative words used to describe the system is available in Appendix D.

- **Training:** The existence of training/orientation specifically concerning some features of the HIS that were perceived to be helpful was strongly related to positive appraisals. A point worth noting is that while the majority of doctors in KFGH, MUCC and RUCC claimed to have received training in using the system, for many, this training *did not take place prior to using the system,* and some interviewees referenced the difficulties associated with working out how to use the system. This is an important issue as those who received training in advance were predominantly positively disposed towards the technology. Although coping strategies used by doctors to overcome lack of training were not specifically targeted in the interviews, it emerged that there was some reliance on three solutions: self-training (usually time consuming), peer assistance (especially females), and resort to outside trainers. A further point is that only 50% of doctors in PAMC received training in how to use the system but were nonetheless notably positive towards the system. Possible reasons for this outlier result are discussed below.
- **Medical Generalist vs Specialist:** Interviewees in PAMC evidenced a strikingly high positivity towards the system. This may be because this hospital focuses exclusively on one medical speciality – that of nephrology. As technology is predominantly used in treatment of kidney-related disease, it is unsurprising that this should be the case as interviewees working in this hospital - all of whom were very highly qualified nephrology specialists – all self-described as highly IT literate. It is possible therefore that their prior familiarity with technology generally made them more open to viewing the HIS positively, seeing how it could be used within a limited patient treatment context. In contrast, in KFGH, which has multiple departments, the predominantly negative interviewee appraisal remained consistent regardless of department or whether the doctors were treating acute or chronic cases. These doctors tended to be generalist doctors with less experience (14 years or less) who were working in a context of high

patient throughput and under considerable time pressure to treat as many patients as possible during their shift (a minimum of 70 patients in a 4-hours' time frame). GP clinics by nature employ generalist practitioners who also treat multiple medical conditions under time pressured conditions. It is therefore possible that this combination of needing to use the system to source and record information on patients with multiple and varying medical conditions, combined with this time pressure and lack of advance training, may negatively influence their view of the system and its potential.

6.3 Secondary Appraisal

Following on from primary appraisal, the second stage of the transaction model of stress and coping is that is secondary appraisal (figure 6.2). These interview questions focused on how much control (high or low) doctors perceived themselves as having over their usage of the HIS, related to whether they viewed the introduction of the system positively (as an opportunity) or negatively (as a threat). A guiding template (adapted from Bhattacherjee et al, 2018) was employed, which asked interviewees to describe their perception of their level of control over the use of the system, at the time when they first met it, what factors influenced that perception and how these control perceptions influenced their attitudinal response and usage of the system. Guiding questions included: *Can you describe the level of control you felt (capability/ skill) in relation to this system and whether/ how this has influenced your overall attitude towards the technology? (In the case of low control perception, interviewees were asked how they managed in light of the mandatory usage requirement of their hospital.)*

The interview findings show that controllability in a mandatory usage situation can be conceptualized under three themes: doctors may view the technology as an opportunity and regard themselves as having either high or low control, or they may view it as a threat and consistently describe themselves as having low control. These high and low control descriptions and how these relate to the hospital context are now described in more detail.

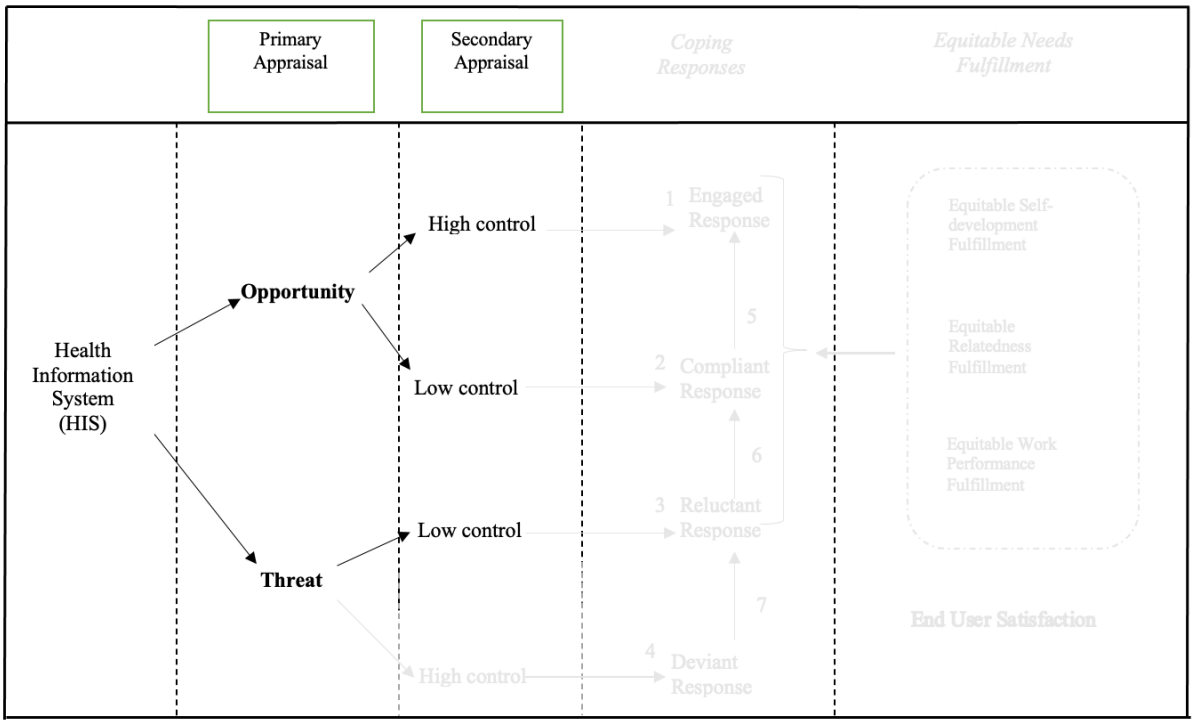


Figure 6.2. Secondary Appraisal Finding

6.3.1. Opportunity – <u>Perceived High Control</u>

Most interviewees who described themselves as having high control over the system were from the PAMC, followed by the general hospital, where several reported being able to manage the requirements, while those from the urgent clinics were the fewest, perhaps because many of those interviewees had only average IT experience and therefore a steeper learning curve to use the HIS. The PAMC has the highest number who claimed high ability to control this technology because this hospital had the most experienced staff, with the highest average years of experience, and well educated about technology. This experience allowed the doctors to rapidly become familiar and comfortable with the HIS and its requirements, largely regardless of any inherent difficulties in the HIS or the quality of institutionally provided training.

Training did however affect the responses of the opportunity-high-control doctors in two ways. First, those with training were better able to use the system and could give more detailed descriptions of its features and their ability to handle the requirements. Second, those

who had been trained could see the system's possible benefits, like better patient safety and care, which they thought they could exploit. For example, a PAMC doctor evidenced his feeling of control due to training:

> "Knowing the keys for each function is crucial to easily operating the system. Our hospital offers comprehensive training, including virtual classes for doctors who cannot attend in person, links to instructional videos, and IT support available at any time. It is important to note that any mistakes made by the user or their unwillingness to learn or adopt the technology cannot be attributed to the IT department or the system providers*."* (Interviewee n.26, 17 years of experience, 40, female, PAMC).

> A KFGH doctor also said the following about training: *"For me, yes. Even the things I discovered in the system were very easy things that make a positive impact on the service. It was very useful."* (Interviewee n.3, 30+ 4 years' experience, male, KFGH).

> Others, however, drew attention to the importance for control of possessing good general IT knowledge: *"If you have a general command of using computer apps and if you're like up to date like the new generations, we know everything about computers in general and how to use apps and systems."* (Interviewee n.30, 40+, 10 years' experience, female, MUCC).

Furthermore, a majority of these interviewees who felt a sense of control also voiced satisfaction with the system due to the consequent work-related benefits that it brought, in control of access to documentation and time.

> For example, *"Nowadays, technology has made managing and retrieving data easier and faster. This saves a lot of time and allows you to access patient information easily. You don't have to struggle to find papers or patient details*

anymore. Everything is organized and readily available, including the patient's medical history and other important information." (Interviewee n.24, 26 years of experience, 45, male, PAMC).

Additionally, some interviewees even responded that they were sufficiently in control to use the HIS in innovative ways to track who a patient is, whether their health has improved and whether the patient responded to drugs or technology over time.

"Since using the system, I am now able to access the patient's medication details and review their previous visits. I can see all the relevant information in one place. The system's benefits are apparent, and it has made my job easier." (Interviewee n.23, 26 years of experience, 50, male, PAMC).

In terms of gender, particularly male high-control participants were more inclined to attribute enhanced patient care and safety to their control of the system, noting how the system enabled them to locate patient information more quickly and precisely, hence creating a safer atmosphere for both them and their patients. The female participants were more likely to express appreciation for the system's user-friendly interface and its ability, under their control, to save time through its efficient navigation system, allowing them to be more productive in their work.

"The system display is user-friendly, making it easy to locate patients and view their assigned caretakers." (Interviewee n.9, 50+, 10 years' experience, female, KFGH).

"The system's infrastructure is designed to be user-friendly for doctors." (Interviewee n.30, 10 years of experience, 50+, male, MUCC).

6.3.2. Opportunity- <u>Perceived Low Control</u>

One interesting finding relates to the fact that the two respondents who viewed the technology in terms of opportunity, but nevertheless described themselves as having low levels of control over it, described that lack of control in distinctively different ways. This difference relates to the level of technical literacy. For example, the interviewee with less technical literacy and less experience using hospital technologies as part of their work described the system as challenging to use and navigate, rather than himself as lacking in any way.

> *"I want to emphasize that the system we are currently using is not very user-friendly. We need to perform several tasks, which we have already mentioned. However, we are unable to do them because the system does not allow us to. For instance, when I write progress notes, I am unable to attach an image or a sketch. This makes it difficult to convey all the necessary information...."* (Interviewee n.14, 20 years' experience, 50, Male, KFGH).

On the other hand, the interviewee with greater experience focused less on the system limitations and instead emphasised his own lack of time to learn and use the system entirely, specifically in relation to inputting information into the system. As this quote shows, he had developed a coping strategy which enabled him to postpone patient data entry.

> "I am feeling optimistic about the news. I have a great interest in technology, and I am capable of using a computer, but I need to find the time to learn about the system functions. Currently, I am not inputting the patient details and history into the system from the start. Instead, I am just adding a dot or dash on each page to move on to the next page." (Interviewee n.6, 3 years' experience, 35, Male, RUCC).

In terms of background, the two respondents interviewed in the opportunity-low control category differed considerably in seniority/years of experience but less in that 6 had

very good IT experience and two days of training, while 14 had just good IT experience and some unspecified initial training. However, those backgrounds show that IT experience and training are insufficient to always remove a feeling of lack of control. In the second doctor's case (6), it may be institutional pressure in the form of a high workload that really caused it. In the first case (14), the software limitations clearly did not particularly trouble other doctors.

6.3.3. Threat – Perceived Low Control

Most interviewees viewed the electronic system negatively and as associated with Low control, so it was not a viable solution for their needs. In general, their responses suggest that the hospitals evidence many different issues related to doctors' lack of a sense of control. Some arise from the electronic system itself, ranging from technical problems to a lack of user-friendliness. Others arise from the doctors' own limitations (e.g., limited IT experience), others from the institutional environment (e.g., lack of training and support). Training significantly impacted their ability to manage the electronic system in their hospitals. Most of the interviewees who had no prior experience with electronic systems had negative experiences due to lack of, or insufficient, training. Thus, they have also had to increase their understanding and skills to gain some control of the system. They all also mentioned that the system itself was slow or difficult to use and that they had to overcome many difficulties before they could manage it.

First, the KFGH had the greatest percentage of interviewees who viewed the HIS as a *Threat* merged with low control. This is likely because the General Hospital is a larger hospital, with more staff and more patients. One doctor expressed his feeling of lack of control as follows, in this case arising from a feature of the software.

> *"We have been working under enormous stress, as you may already know. We would like to first focus on the investigations and the medication and then*

provide the full details later on. Although a new update supposedly allows editing, it seems to have some issues as it shows an error message, and the system does not fully support it yet." (Interviewee n.7, 5 years of experience, 35+, male, KFGH).

Other interviewees said they had to rely on self-learning and prior IT experience to manage the system, with no mention of any training:

"At first, I felt extremely overwhelmed and speechless while trying to learn about the system after working hours. It took me around 1 to 2 hours every day to understand all the icons and functions in the system. I searched online, watched the videos that the IT department sent, and asked colleagues who are experts in the system to help me out." (Interviewee n.13, 13 years of experience, 45+, female, KFGH).

Second, the MUCC clinic interviewees viewed the introduction of the mandatory HIS as generally a low control event. However, the reasons for their negativity often arose from themselves and the context rather than the HIS itself, specifically technical literacy, time, and loads of patients. Furthermore, it was found that many of them used descriptive words such as (complicated, slow, stressful, and not easy) to characterise their lack of a sense of control.

"It was tough, but now I am able to manage. For instance, previously when referring a patient to a specialist, I couldn't locate the appropriate diagnosis code. However, the system has improved now, and I can't complain since it is my responsibility. Unfortunately, I have no experience in using computers, and none of my colleagues have the time to assist me." (Interview n. 24, 13 years of experience, 40+, female, MUCC).

" *The system was difficult to navigate, but over time I learned to manage. Unfortunately, I don't have control over it. My only option is to seek advice from*

other doctors at a different public clinic." (Interviewee n.32, 13 years of experience, 50, female, MUCC).

Third, RUCC interviewees all mentioned that the system was slow and complex and how stressful it was. They said that they had to ask for help or be creative to find solutions.

" I have been using the system, but I cannot confidently say that I completely control it. Initially, a few icons and functions were missing in the system, but they have since been added. However, as a doctor, I still feel like the system does not fully cater to my needs. To be honest, I have not been using the system as required because of a lack of time." (Interviewee n. 36, 35+, 8 years' experience, female, RUCC).

"Although I did everything, the system is very slow and stressful." (Interviewee n.35, 10 years' experience, 40, female, RUCC).

Overall, the control-related responses from both genders were generally negative regarding the electronic system. While some respondents initially found the system difficult, they all voiced their ability to manage it with time and personal effort.

However, gender did appear to make a difference in the responses, with the male respondents being more direct in voicing their dilemmas and frustrations with the system, while the female respondents appeared to be more patient and willing to take time to learn the system and use it effectively, in several cases mentioning using colleagues to help.

At the General Hospital, both males and females showed similar levels of frustration with their control of the system, but females tended to focus more on the practical applications of the system, such as its effect on patient care, and how to make it work for the benefit of patients. On the other hand, the male respondents seemed to express their frustrations with the system and offered practical ways to go around it, such as returning to paper files.

"It is necessary to learn and accept the electronic system as it is an essential part of my job, whether now or later." (Interviewee n.2, 30+, 4 years' experience, female, KFGH).

At the MUCC clinic, the female respondents were more patient and understanding of the system and were less likely to express frustration at their low sense of control. Instead, they expressed their willingness to learn and use the system, as well as their willingness to ask for help from colleagues.

"I am satisfied with the improvements made. I have no reason to complain as it is my responsibility." (Interviewee n.34, 45+, 13 years' experience, female, MUCC).

6.3.4 Secondary Appraisal Summary Conclusion

In summary, the findings relating to this section of the research indicated that.

- Regardless of whether they viewed the introduction of the new system positively or negatively, all interviewees were able to appraise the degree to which they perceived themselves as being able to use the system in terms of a level of control.
- Those interviewees who viewed the system as an ***opportunity*** appraised their ability to use the system either in terms of ***high or low control***. In contrast, those who viewed the system ***negatively*** tended to appraise their ability to use the system only in terms of ***low control.*** This is consistent with the extant literature.
- Of those that viewed the technology introduction as an ***opportunity*** and described themselves as ***having high control***, that control was described as the HIS being **easy to use, user-friendly, basic, useful and providing accessibility and tracking.** The roles of a person's **own high tech ability** and of good institutional

training were also cited. This was typically the experience of those who worked in the PAMC and a few from KFGH.

- Those who viewed the technology introduction as an ***opportunity*** but described themselves as having ***low control*** over how they use it, tended to describe this either in terms of their own limitations, e.g. **technical literacy,** or limitations of the HIS, such as **functionality,** and **difficulty of retrieving or inputting information**
- Those who viewed the technology introduction ***negatively*** in the primary appraisal also appraised themselves as having ***low control*** over technology usage in the secondary appraisal. This was consistently described in terms of institutionally controlled lack **of training, number of patients,** and **limited time,** or a person's own limited **technical literacy,** and **experience with technology,** or limitation of the HIS system, such as **lack of computers,** and **poor system function.**
- The respondent responses varied little between genders. However, there was some evidence of females in the threat with low control category working with peers to boost their control, as a coping strategy.
- The health facilities KFGH, MUCC, and RUCC, with the highest number of patients visiting their doctors, tended to be more negative in their responses about control due to the high pressure in their work and lesser prior technology expertise of the doctors, compared with the PAMC.

Table 6.8. A summary of the initial secondary appraisal findings.

	Secondary appraisal		
	As opportunity		**As threat**
Factor	**High control**	**Low control**	**Low control**
Hospital	PAMC, KFGH	KFGH, RUCC	KFGH, MUCC, RUCC
Gender	Male and female	Male	Male and female
Training	Received training	Half received training and half not.	Did not receive traning
Technical literacy	High	High in KFGH and Low in RUCC	Low

6.4 Coping Response

The transaction model of stress and coping contends that, subsequent to the two stages of appraisals, individuals will then adopt one of three coping responses: engaged, compliant, or reluctant (Bhattacherjee et al., 2018). In the first category, high control with opportunity, individuals perceive that they have a high control over the event and the resources available to them. As a result, they are likely to respond with an engaged coping response, which involves actively seeking to take advantage of the opportunity.

In the second category, low control with opportunity, individuals perceive that they have a low level of control over the event but recognize the potential for gain. Consequently, they will likely respond with a compliant coping response, accepting the situation and making the best of it.

In the third category, low control with a threat, individuals perceive low control over the event and few resources available. As a result, they are likely to respond with a reluctant coping response, in which they feel overwhelmed and avoidant of the situation. Overall, the coping response chosen will depend on the individual's perceived level of control over the situation and the resources available to them.

In this section researcher will identify the user coping responses to the mandatory introduction of the health information system in Saudi Arabia. Specifically, we aim to identify the nature of those coping responses and the factors that influence their formation.

The interview findings showed that *Coping Responses* in a mandatory usage situation can be conceptualized under the three categories found in the literature: Engaged, Compliant, and Reluctant, as just described above.

6.4.1. Engaged Response

A high number of interviewees were engaged in this study. Interviewees who appraised the mandatory HIS as an opportunity and appraised themselves as having high control over their IT use were, as expected, likely to demonstrate an engaged response. From the data, interviewees we regarded as expressing an engaged response used words like (positive, excited, happy, useful, accepted, and supported) to describe their reactions to the new system. These interviewees were mostly male, with more seniority, and tended to be more optimistic about the change. This doctor for example, shows clear enthusiasm in his explanation, signalling engagement.

> *"Easy accessibility to patient information is of utmost importance. Patients' files must be easily accessible to healthcare providers for efficient service delivery. For instance, if you provide your ID number, I can retrieve all the details of your hospital visits."* (Interviewee n.3, 20 years seniority, 30+, male, KFGH).

Engaged participants showed a more positive attitude toward the new system, believing it could improve their work efficiency. They also reported quickly adapting to the system thanks to its user-friendly functions and accessibility. They saw the new system's benefits and felt that it could help them be more efficient in their work, using very positive wording.

> *" I was excited to start using the system, and my experience has been positive so far. The system has introduced new features that have made my work easier. I can now search for anything in the electronic file, so I don't need to return to the paper file. The system is good and has made me enjoy my work even more. Using this system is essential to improve our work processes, especially in the dialysis centre."* (Interviewee n.29, 35+, 14 years seniority, male, PAMC).

Other interviewees that were classified as engaged described how valuable and helpful the system was. They appreciated the increased access to information and the shortening of

time needed to complete tasks. They also spoke glowingly about how the system enhanced their creativity and allowed them to enjoy their work more.

> *"I was a supporter. I was telling the nurse because they were my close friend. This system, even if it is based on an error, is enough that it is the idea to come up with the result.*" (Interviewee n.3, 30+, 4 years seniority male, KFGH).

Overall, these interviewees expressed an engaged response to the new system, demonstrating their adaptation to the change.

6.4.2. Compliant Response

A small number of interviewees were regarded as compliant in this study. Interviewees who appraised the mandatory HIS as an opportunity and appraised themselves as having low control over their IT use were, as expected, likely to demonstrate a compliant response. Interviewees who were regarded as compliant tended to use words such as (It is a sound system, but not user-friendly). These compliant interviewees differed considerably in seniority/years of experience. However, n.6 had very good IT experience and two days of training, while n.14 had just good IT experience and some unspecified initial training. We see here the positive but hedged (*but*) wording of a typical compliant doctor.

> *"The system is useful for protecting both patient and doctor but requires further improvements to meet industry standards."* (Interviewee n.6, 35+, 3 years seniority, male).

They also tended to have a more favourable initial response to mandatory IT use in hospitals. This suggests that these interviewees had a more favourable initial appraisal of the mandatory IT and could better use their experience with the system to understand it over time despite the struggles. The following again hedges the favourable judgment by locating it in an *although* clause.

"Although having a system is beneficial, we need to improve the user-friendliness of the current system." (Interviewee n.14, 50, 20 years seniority, male).

Being able to see how the HIS could be beneficial to their work, these interviewees were later able to transition to compliant responses, often noting how the system had improved despite some disadvantages and how they were able to get results quickly and easily.

6.4.3. Reluctant response

A few numbers of interviewees were classified as reluctant in this study. Interviewees who appraised the mandatory HIS as a threat and appraised themselves as having low control over their IT use or non-use tended to demonstrate a reluctant response. The interviewees who described a reluctant response to mandatory IT use in the hospital usually exclusively used negative terms such as (forced, not happy, very bad, disappointed, and frustrated, not satisfied) suggesting that these interviewees generally felt like they had no choice but to accept the new system and that it was inadequate for various reasons, such as the high load of patients in the hospital.

Interviewee n.8 expressed a strong negative view:

"I was forced to use the system to obtain patient results." (Interview n.8, 50+, 20 years seniority, male, KFGH).

Reluctant doctors often noted that the system was not user-friendly and needed improvement in speed and accuracy. Furthermore, they suggested that the system developers should have considered the doctors' views before implementing it in the hospital.

Interviewee n.19 stated:

"I was hesitant because although I prefer electronic education, I lack computer knowledge."(Interview n. 19, 35+, 9 years seniority, male, KFGH).

6.5 Coping Responses Summary

In the main, most responses were engaged, with a lesser amount reluctant, and few coping responses were compliant. See also Table 6.9.

- The research findings show that ***reluctant*** respondents perceived the technology as a threat because they judged that there was **no training**, a **shortage of computers, very low bandwidth capacity of the hardware,** and **it is unsuitable for the high load of patients**.
- They also viewed the level of controllability as having been **forced to use the system, not having a choice, and not being able to treat the patient without** it. Specific concerns raised included demanding processes that made using the system time-consuming and issues with patient load.
- Respondents with a ***compliant*** response tended to perceive the technology as less of a threat. **While not viewing it enthusiastically as an opportunity, they could nonetheless recognize its benefits**. Interestingly, they also exhibited greater confidence in their ability to use the technology, and all had received training in the early stages of usage.
- ***Engaged*** respondents were most optimistic about the technology, describing it as "**wonderful" and a "shortcut to time," noting that with artificial intelligence, it would be "awesome**."
- Overall, the research findings suggest that implementing mandatory IT use in hospitals can be met with mixed responses, with varying response levels

depending on the individual. It is essential to understand these different attitudes and how to accommodate them to maximise the effectiveness of IT use in hospital settings.

Table 6.9. A summary of the initial coping response findings.

	Initial Response		
Factor	**Engaged response**	**Compliant response**	**Reluctant response**
Appraised Oasis as 'Opportunity'	Opportunity – High control	Opportunity – Low control	Threat – Low control
Also claimed Control	Most optimistic about the technology.	Tended to perceive the technology as less of a threat.	Perceived the technology as a threat.

With respect to RQ1 and propositions 1, 2, and 3 (Table 6.10), as the account above shows, and as the arrows in figure 6.1 summarise, we can confidently say that all three propositions are supported. That is to say; there were no divergent cases where, for example, a doctor reported high opportunity but gave a reluctant response, nor where they reported low control but gave a compliant or engaged response, and so forth.

Table 6.10 RQ1 and its Associated Propositions

RQ1. To identify the nature of those coping responses and the factors that influence their formation	
Main Propositions	
P1. If users appraise an IT as an opportunity and appraise themselves as having high control over their IT use, then they are likely to demonstrate an engaged response.	← P1. Supported
P2. If users appraise an IT as an opportunity and appraise themselves as having low control over their IT use, then they are likely to demonstrate a compliant response.	← P2. Supported.
P3. If users appraise an IT as a threat and appraise themselves as having low control over their IT use or nonuse, then they are likely to demonstrate a reluctant response.	← P3. Supported

6.6. Transition in Coping Responses and Equitable Needs Fulfilment

6.6.1. Response transition

RQ2 focuses on whether the end users' initial appraisals and coping responses can transition (either positively or negatively) over a period of time. Table 6.11 shows the findings with respect to occurrence of transition/change in each hospital and gender. It shows that such transitions are not only possible, but multi-valenced and very much in evidence. A high number of doctors reported evidence of change of response (and associated appraisals). In fact, 79% of interviewees reported changing their appraisal of and response to the technology.

Five response transitions were described by interviewees. These were reluctant to compliant, compliant to engaged, engaged to compliant, compliant to reluctant, and reluctant to engaged. This evidence of transition in coping response is a far more comprehensive finding that that obtained by Bhatterjee et al (2018) who only found evidence of 2 positive staged move transitions (reluctant to compliant; and compliant to engaged.). Insights obtained from the current research shows that three further transitions were possible – one of which was a substantial direct transition that by-passed an intervening stage – that is the transition from reluctant to engaged, i.e. a transition from the bottom to the top of the response scale. In addition, there was evidence of regression in coping response, specifically two transitions to a lower satisfaction rate were found, a regression from engaged to compliant and a regression from compliant to reluctant. Although coping response transitions were predominantly positive in nature, the fact that a small number of negative transitions/ regressions are possible is a finding of particular interest and once which equally merits attention in terms of predictive factors.

Table 6.11. Coping Responses Transition.

Coping Responses	Positive or Negative	Hospital and clinic	Total Number	Gender	
R→C	P	KFGH	7	2 F	5 M
R→C	P	RUCC	2	1 F	1 M
C→E	P	PAMC	2		2 M
C→E	P	KFGH	1		1 M
C→E	P	MUCC	1	1 F	
R→E	P	KFGH	5	3 F	6 M
R→E	P	PAMC	3	1 F	5 M
R→E	P	MUCC	2	2 F	
R→E	P	RUCC	1	2 F	
E→C	N	KFGH	3		3 M
C→R	N	MUCC	2	1 F	1 M
C→R	N	KFGH	1		1 M

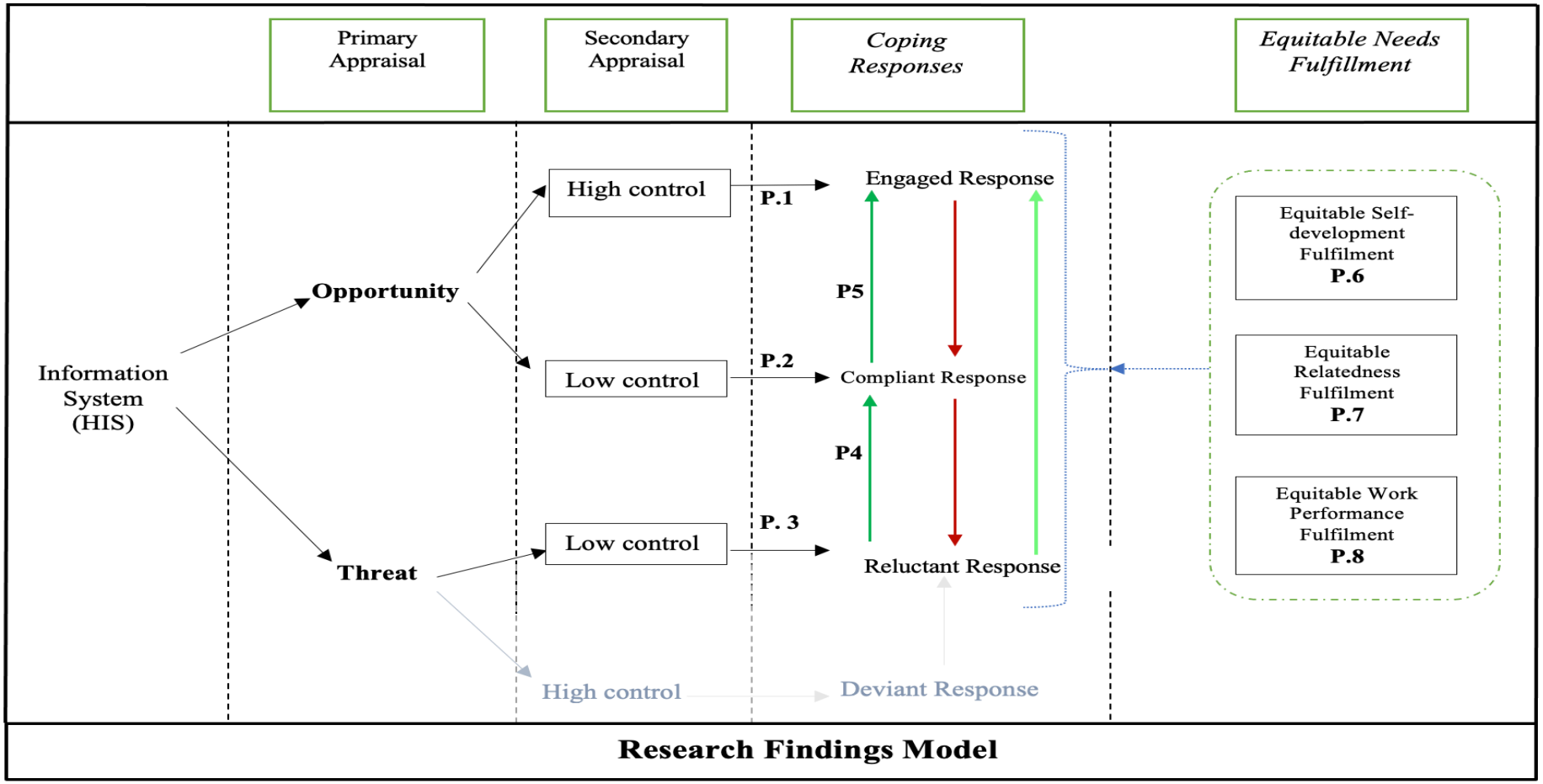


Figure 6.3. Coping Response Transition Final Model (* Red arrows indicate exceptional findings)

6.6.2. ENF influence on transition

As previously discussed, Equitable Needs Fulfilment (ENF) was deemed a particularly salient guiding framework for gaining insight into the factors that motivate coping response transitions (propositions 6, 7, and 8). Au, Ngai, and Cheng (2008) indicate behavioural outcomes as being determined by satisfaction or dissatisfaction with an information system, which is predicated on the degree of end-user needs fulfilment. Such satisfaction or dissatisfaction approximates the level of coping response in our conceptual model. The three types of needs fulfilment that ENF theorists claim as influencing such satisfaction and behavioural response are (1) equitable self-development (career advancement and job security), (2) equitable work performance fulfilment (supporting work without undue effort), and (3) equitable relatedness fulfilment (improved communications with colleagues).

The data analysis showed that equitable work performance fulfilment was a particularly important motivating factor for interviewees. It was expressed in terms of system characteristics, training, timesaving, the accuracy of information).

6.6.2.1 Equitable Work Performance Fulfilment (EWPF)

Perceived equitable work performance fulfilment influenced end-user satisfaction with IT, and as a consequence exerted a strong influence on response transition for the interviewees. A large number (total 21) of interviewees responded positively about equitable work performance fulfilment. Those all described increased satisfaction with technology usage based on their increased perception of what benefits it brought to them. In general, interviewee responses focused considerably on the adaptation by the system or by the user that had occurred in the transition or failed to occur. Very often, some particular work performance aspect of the system that had been prominent in the change was also mentioned (e.g. time-saving). The following main patterns of change were identified.

• **Adaptation by the system** Interviewees expressed satisfaction with the improvements where the system had adapted to their work practices and needs, e.g. enabling faster access to patient information, better collaboration with other doctors (cf. ERF below), and faster referrals (cf. the themes of system design and performance and time in initial appraisal 1 above). They also often highlighted the need for further improvements, as certain aspects of the system still did not meet their expectations.

For instance, in the last sentence, the researcher learn that improvements which had already occurred clearly induced the change of response of this ***reluctant to engaged*** respondent (n.7), but he wants more:

> *"I find the system quite useful as it allows me to view all available information, including the medications my patient is taking or hasn't taken. However, I wish the system was more adaptable to our way of working, particularly regarding the referral system. It would be helpful if we could write data in one place and have it visible to other medical professionals so that if a referral was necessary, all the relevant information could be viewed on one screen. We have to switch between screens to view all the necessary information. I am happy with the improvement, but this change would improve the system."* (Interviewee n.7, 35+ years, 5 years' experience, male, KFGH).

A specific factor that characterised those transitioning from compliant to engaged was the experience of increased efficiency and accuracy in their work (cf. the convenience and accuracy and time themes in initial appraisal 1). A complaint ***to engaged*** respondent (n.14) said the following, which seems to combine reference to adaptation by the system with adaptation by the user, showing that both may be often needed to achieve better work performance and so a more positive response:

> "Initially, it took me a couple of months to learn all the details about how to use the system. However, it has improved significantly in the last six to twelve months and is working very well. It continues to get better every day, saving us a lot of time and improving accuracy. It's particularly useful because we no longer have to go through every department to pick up the results." (Interviewee n.25, 50+, 24 years of experience, male, PAMC).

By contrast, a **compliant *to reluctant*** respondent (n.33) evidenced what she perceived as a complete lack of system adaptation to work needs as a reason for her worsened response.

> *"(Initial response) I accepted only because it is my work; I have to use it. I cannot give service to the patient without using the system. (Current response) Most of the time, the system is not working. The computers were very old. As Idea is a good system. But I do not think it can work here. The developer of the system must take the doctor's view before they implement this system in the hospital*." (Interviewee n.33, 40+, 14 years' experience, female, MUCC).

This ***Reluctant to Compliant*** respondent (n.5) illustrates how her improvement in response was perhaps limited (not progressing to engaged) by the system being perceived as not having changed to deliver the necessary speed for good work performance.

> (Initial response) It took me a lot of time to complete my work as the system was not very fast. I was worried that I might not be able to finish it on time. It is always good to take some time to write down important information and save it in the system for future reference. In case anything goes wrong, the saved notes can help you out. (Current response) The system needs improvement as it is causing a lot of inconvenience and frustration." (Interviewee n.5, 30+, 3 years' experience, female, KFGH).

An ***engaged to-compliant*** respondent (n.9) said this, suggesting a conflict. He recognises that good work performance requires everything to be on the system but implies that the system still cannot accommodate all kinds of material:

"Certain tasks cannot be handled by the system alone and require manual documentation using paper. This can slow down your progress, but it is a necessary duty that must be carried out in order to maintain proper records. While it may have been acceptable to document certain things on paper and file them away in the past, it is now mandatory to document everything in the system. Therefore, it is your responsibility to ensure that all necessary information is recorded in the system, and failure to do so is not an option." (Interviewee n.9, 50+, 10 years' experience, male, KFGH).

- **Training/Education of the User**

Some reluctant interviewees initially struggled with the HIS due to a lack of experience with technology (as seen in appraisal 1). However, they became more positive over time as they learned how to use the system properly, via one or more of several means.

A ***reluctant to engaged*** respondent (n.34) makes it clear at the very end that in her case it was training that facilitated the transition that greatly improved work performance:

"(Initial response) A year ago, when the system started to be mandatory, I had no experience using computers and technology. I was very slow and did not know how to open or close the computer. I was shocked when they said the system is now mandatory. You must use it. It was a very sad moment because I saw most of my friends my age knew how to use at least a computer and I knew nothing. (Current response) Now I'm very positive about the system. I can see all the patient prescriptions, I can see the patient history, I can order lab or x-ray, and I can do everything the patient needs in the system. I can say I'm very happy about

the system. I can see the benefit after I learn how to use the system in the right way. Education is very important." (Interviewee n.34, 45 years, 13 years of experience, female, MUCC).

- **Assistance to the User Other Than Training**

A number of interviewees evidenced other kinds of help that promoted work performance transition (again, in aspects also mentioned in appraisal 1). This interviewee refers to IT support staff and peer assistance (Social influence) but further recognises that the system itself also needs to better adapt to hospital work conditions in areas such as time/speed, accessibility, and legal security.

A ***Reluctant to Compliant*** respondent (n.12) said:

> "At first, I was hesitant to use the system because I was unsure how to operate it. However, I sought help from my colleagues and the IT support centre. I understand that getting used to something new takes time. In my opinion, the technology has potential, but it needs improvement in terms of system performance and speed. It should be faster and have more computers. The system should also be more accessible, with clearer notes and handwriting. Additionally, it should be more secure to safeguard not only my rights but also those of my patients." (Interviewee n.12, 50+, 35 years of experience, male, KFGH).

A **reluctant to engaged** female participant also reports the importance of peer assistance in motivating their changed response to the technology:

> *However, now this system has opened up more possibilities for us. I cannot work without it. Great credit goes to my fellow doctors and their assistance to me in the department."* (Interviewee n.16, 41 years, 15 years' experience, female, KFGH).

Another ***reluctant to compliant*** respondent (n.17) here refers to transition as achieved by learning. Possibly, many of our participants, to some degree, achieved their EWPF transitions by that means, in effect, self-learning through using the system.

> *"I was worried because it is a new system, and it is normal to feel that way when you have to learn something new. However, I have started to like the platform now."* (Interviewee n.17, 50+, 15 years' experience, male, KFGH).

In short, EWPF was very prominent in the interviewees' minds and can influence the transition positively and negatively. The reluctant users of a system can progress to being compliant, compliant users can transition to engaged, and reluctant users can engage if EWPF is present. In the absence of EWPF, users will regress from engaged to compliant and from compliant to reluctant. Overall, it is quite surprising how extensively the doctors reported necessary improvements in the system itself still not having been made. In addition, When the end user perceives that the IT is satisfying their EWPF, this motivates a staged transition in their coping response. This is the strongest motivator of change in coping response.

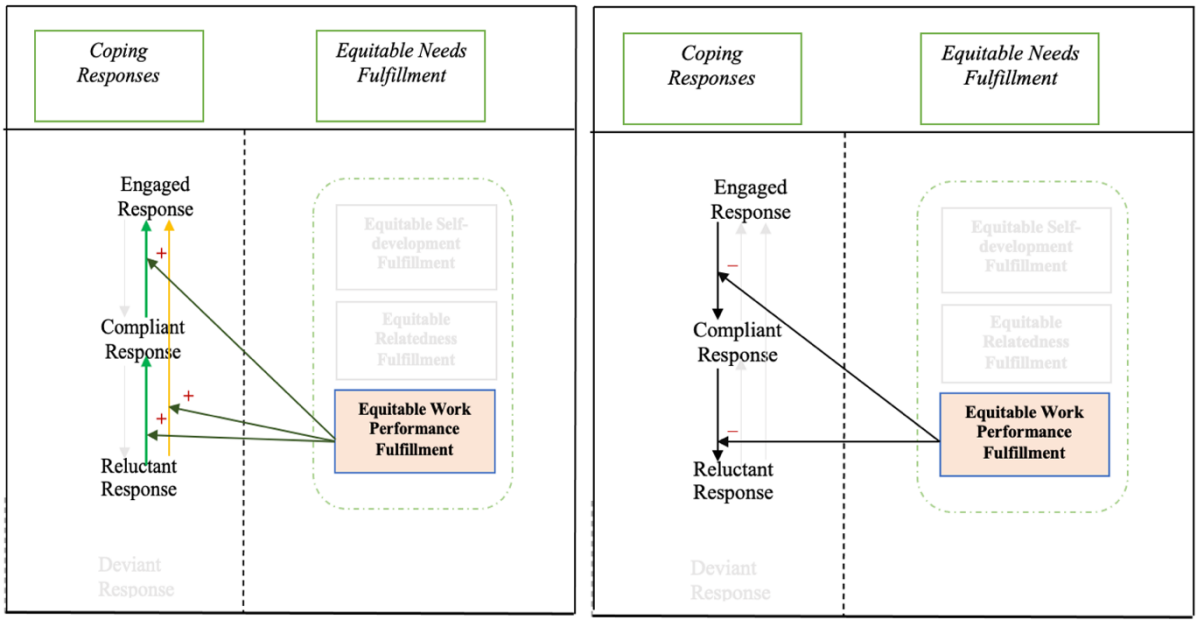


Figure 6.4. Response Transition: Equitable Work Performance Fulfilment

6.6.2.2 Equitable Relatedness Fulfilment (ERF)

Perceived equitable relatedness fulfilment was also found to influence end-user satisfaction with the HIS, which can change the nature (positive or negative) of their response. A moderate number (total n.13) of the interviewees' responses related to equitable relatedness fulfilment, either increasing or decreasing their satisfaction. Most of them were positive, although sometimes hedged. All the themes found here are really different forms of one major theme: HIS impact on communication, which in turn could often equally have been treated as an aspect of work performance.

- **Communication With the Care Team and Other Doctors in the Hospital**

The interviewees mostly expressed increased satisfaction due to the system's ability to facilitate communication with other doctors and nurses, making it easier for them to treat patients.

A ***compliant to engaged*** respondent (n.1) showed how the system's communication capability prompted that change of response. This view was modified only by regret that the move to the HIS was not yet fully complete:

> *"Improved communication is one of the benefits of the new note icon that enables all doctors to write detailed feedback about patient consultations. This feature helps other doctors better understand the patient's health condition and provide faster treatment. As communication is crucial to me, I believe that this feature will become even more useful once we fully transition to a digital system. Although the current transition period from paper to digital can be frustrating, overall, I am happy with the Health Information System (HIS) we are using."* (Interviewee n.1, 30+ years, 4 years' experience, male, KFGH).

A ***reluctant to compliant*** respondent (n.15) also showed how her change of response was associated with the value of communication via the HIS despite suggesting that there was a serious problem with some colleagues entering faulty information.:

> "Initially, I requested help in improving my ability to understand the notes of doctors and nurses, as it is crucial for effective communication. In our field, patient care is a team effort, not an individual responsibility. However, I now realize that there is a concerning issue regarding the accuracy of information on the system. It is dangerous when people input false information into the system to protect themselves or to show that something has been done when in reality it has not. The use of digital technology provides more opportunities for such abuse." (Interviewee n.15, 40+, 15 years of experience, female, KFGH).

Others like this complaint ***to reluctant*** respondent (n.10) evidenced a negative effect of HIS communication due to colleagues not entering what was needed:

> *"It is currently difficult to communicate within the system as some colleagues fail to provide all the necessary details about the patient. This leads to us having to resort to phone calls to obtain the required information. While this is not a major issue at the moment, it may become one in the future, especially if the communication icon in the system is activated correctly. I am not very satisfied with the current situation.*" (Interviewee n.10, 40+ years, 11 years' experience, male, KFGH).

• Communication to Outside the Hospital

A ***reluctant-to-engaged*** respondent (n.2) shows how her response changed as she discovered a particular external communication feature of the HIS:

"I can communicate with any doctor outside the hospital to get fast treatment for urgent patients. Very easy to get virtual consultation. Using the system correctly, whether from doctors or nurses, makes dealing with the patient easier. I am delighted." (Interviewee n.2, 30 years, 4 years' experience, female, KFGH).

- **Communication With Patient Records**

Interviewees also noted the system improvements. For example, a ***reluctant-to-engaged*** respondent (n.38) expressed an increase in satisfaction with the system after it changed to allow her to more fully access patient historical data.

> *"I can see everything. It is documented. I can do the follow-up. What medication the patient takes? Communication is very important…Satisfy... it is Improved because I can see the systems and development change."* (Interviewee n.38, 35 years, 8 years' experience, female, RUCC).

In short, ERF can influence transition positively and negatively. The reluctant users of a system can progress to being compliant, compliant users can transition to engaged, and reluctant users to engage if the ERF present. In the absence of the ERF, users will regress only from compliant to reluctant. Furthermore, the end user perceives that the IT is satisfying their **relatedness needs, which** motivates a transition in their coping response. Relatedness needs are essential for women because OASIS allows them to become valuable team members and showcases their contribution more effectively. They don't have to do it; the technology does it for them, and it's essential in overcoming normative restrictions. They don't have to speak out; their work speaks for itself; the system captures their efficiency.

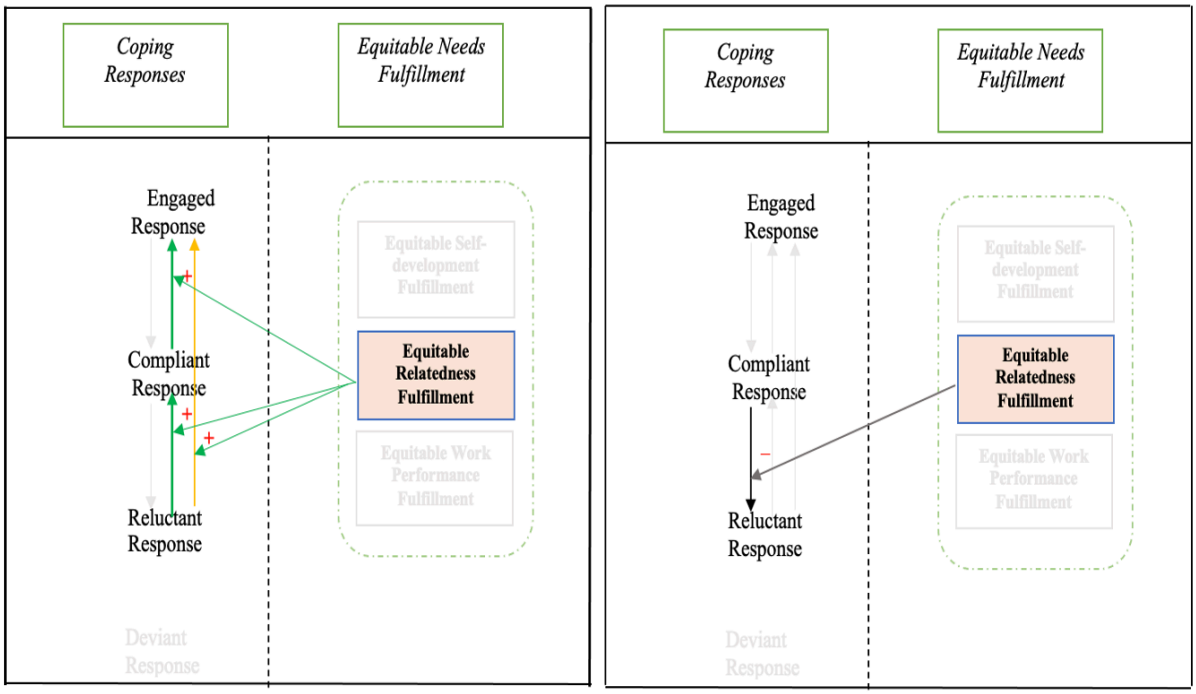


Figure 6.5. Response Transition: Equitable Relatedness Fulfilment.

6.6.2.3 Equitable Self-Development Fulfilment (ESDF)

Perceived equitable self-development fulfilment was also found to influence some doctors' end-user satisfaction with IT, which could change the nature of their response. A total of 11 interviewee responses related to equitable self-development either increased their satisfaction or decreased it.

- **Job Evaluation by Superiors**

One ***reluctant to engaged*** respondent expressed their satisfaction with the HIS because, since it began to be used, not only had care improved (EWPF), but an award had been gained by her team.

> "I believe that if I enter all the patient details correctly in the system and provide the best possible medical care to my patients, my supervisor will be pleased. I have been nominated for the Outstanding Board Candidate Award, which I am

very satisfied with. This system has helped improve the quality of care we provide.”.*”* (Interviewee n.34, 45 years, 13 years’ experience, female, MUCC).

- **Promotion**

Furthermore, several interviewees described decreased satisfaction with the HIS based on their experiences since its implementation, claiming its use was not related to any benefit such as promotion, and it was used as a tool for daily work.

An ***engaged to compliant*** respondent (n.9) said:

"It's not related to any specific promotion; rather, it's a tool that we use in our daily work routine.” (Interviewee n.9, 50 years, 10 years’ experience, female, KFGH).

- **Motivation**

Some interviewees also expressed self-development effects of poor EWPF features in the form of negative feelings. The following complaint ***to the reluctant*** respondent (n.33) shows how her personal self-development journey was at risk due to the imposed use of a system she found problematic.

I am struggling with the system, and it's slow. I have only been able to save some of my data. Despite this, I am required to use it, but I am feeling demotivated and uninspired.” (Interviewee n.33, 40 years, 14 years’ experience, female, MUCC).

In summary, ESDF can influence transition either positively or negatively. ESDF in our examples can only be positive if the authorities encourage the use if the HIS and reward it, rather than impose it. If positive ESDF is not generated, users may regress from engaged to

compliant and from compliant to reluctant. The need for end users to enhance their profile within their identity group and potentially gain promotion emerged as a significant theme, aligning with the concept of Self-Development (SD) and underscoring its crucial role in motivating positive adoption responses. Motivates the biggest transition from reluctant to engaged response.

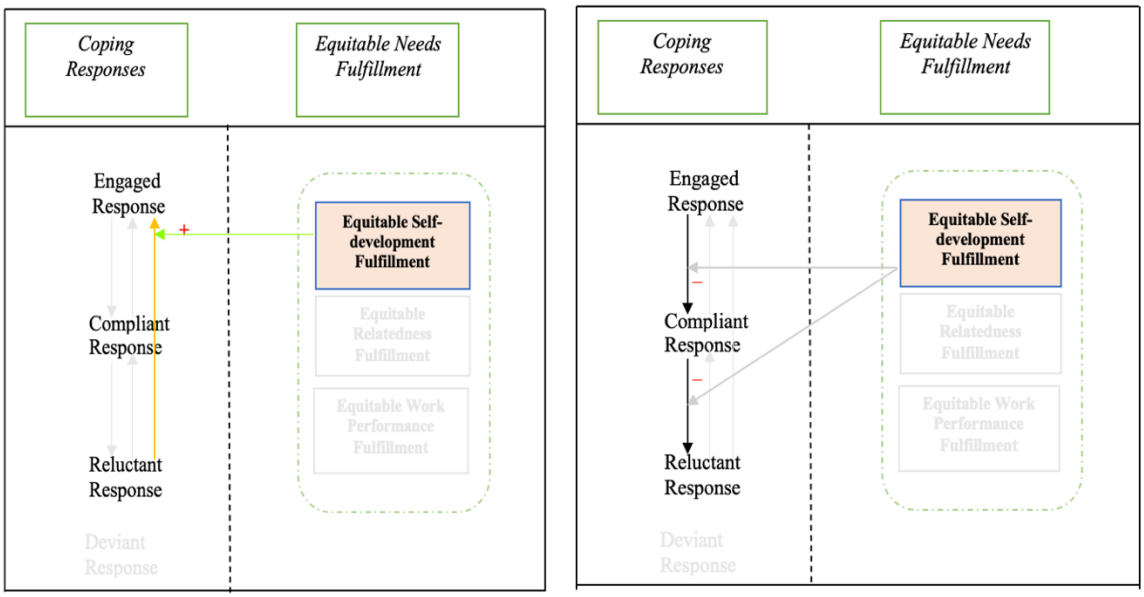


Figure 6.6. Response Transition: Equitable Self-Development Fulfilment

In short, the findings reveal the critical role of Equitable Work Performance Fulfilment (EWPF), Equitable Relatedness Fulfilment (ERF), and Equitable Self-Development Fulfilment (ESDF) in influencing the transition to system adoption among end users. EWPF was shown to positively impact users' progression from reluctant to compliant, compliant to engaged, and even reluctant to engaged, as discussed on page 225. Similarly, ERF positively influenced users' progression from reluctant to compliant and from compliant to engaged, with its absence resulting in regression, particularly from compliant to reluctant, as detailed on page 228. Furthermore, ESDF was found to be crucial, with positive ESDF contingent upon authorities encouraging and rewarding HIS use, rather than imposing it, leading to regression in user

engagement levels when not fulfilled, detailed on page 231. These findings collectively highlight the necessity of addressing these factors for successful system adoption**.**

6.7. Equitable Needs Fulfilment Summary Conclusion

In summary, the interviewees' responses to the *equitability of work performance fulfilmen*t section expressed some satisfaction with **the system improvements** over the period accessed by the study. The system has adapted to their **work practices and needs, enabling faster access to patient information, speeding up the treatment process, enabling better management, and faster referral**s. Nevertheless, several interviewees were also dissatisfied because the system had not changed or needed improvement in infrastructure, access, and some functions (e.g., handling certain **documents).**

The responses to ***equitable relatedness fulfilment*** showed some increased satisfaction with the system's **ability to facilitate communication with other doctors and nurses in the hospital (e.g. follow-up and feedback).** It also allowed **contact with doctors outside the hospital** and **virtual consultation,** making it easier for them **to treat patients.** However, they also expressed dissatisfaction **with the lack of clarity in the system due to colleagues not providing all or correct details about the patient** and **the communication icon not being activated correctly.** Finally, the responses on ***equitable self-development*** showed increased satisfaction with using technology where they **felt it helped with their Job evaluation**. Meanwhile, decreased satisfaction was caused by their **lack of promotion related to the use of the HIS** and some consequential **demotivation.**

To conclude, the three propositions associated with RQ2, concerning transitions and their motivating factors are all supported. Moreover, the insights obtained provided evidence of the importance of EWPF as a predominant motivator of positive transition response for the

majority of interviewees, regardless of age, seniority or gender. It also showed that ERNF was of particular importance in motivating the response of younger female doctors. ESDF was of less importance than either of these factors. A further insight is that the presence of ERNF and ESDF motivate positive transitions, including a direct multi-stage transition in the case of ESDF, but their absence can result in transition regression, indicating the importance of ensuring that both factors which the technology supports need to be strongly and consistently communicated to end-users of the technology.

Finally, it should be reiterated that the current study has richly illuminated ENF effects on satisfaction/response change. It is likely that those effects come into play via ongoing reappraisals (both primary and secondary). In addition, it is very likely that those same ENF factors may influence initial appraisals – even if the respondents in this study did not articulate their primary appraisal according to these three dimensions. (Such as how opportunity is appraised. There is clearly potential for future research in this regard. A summary of the ENF factors that can motivate transition in coping response is provided in Table 6.12.

Table 6.12. Summary of Motivational effect of ENF factors on coping response transition

	Response change				
	Positive Transition			**Negative Transition**	
ENF Motivating Factor	**R→C**	**C→E**	**R→E**	**E→C**	**C→R**
Work performance (Resulting from functional (task supporting) attributes of the HIS)	yes	yes	yes	yes	yes
Relatedness (Resulting from improved communication enabling features of HIS)	yes	yes	yes		yes
Self-development (Relating to perceived ability of HIS to showcase employee effectiveness)			yes	yes	yes

6.8. Research Findings Overall Conclusion

In summary, the research findings identified the factors that motivate coping responses and their transitions in a mandatory technology usage environment. Two theoretical frameworks applied in a Saudi Arabian context showed a range of themes which often appeared both in the appraisals of the coping theory model and as exponents of the three equitable needs fulfilment factors affecting transitions. They show that user responses do transition over time, both positively and negatively. To summarise the highlights of the findings, the following Table 6.13 is offered in conjunction with Figure 6.3. We then move in the next chapter to a wider discussion of these findings.

Table 6.13. Summary of Findings.

Initial appraisals and responses and their causes	**RQ1**	**Proposals 1-3 supported**
Primary appraisal: opportunity	Prominent factors: Good training; prior IT expertise; favourable expectations met (re. accuracy, speed, accessibility etc. of the HIS)	
Primary appraisal: threat	Prominent factors: Reported no/inadequate/late training; older age and greater seniority; female gender; inadequate implementation of HIS; favourable prior expectations not met.	
Secondary appraisal of degree of control	Influenced by primary appraisal as per Coping Theory (e.g. low control associated with perception as threat). Low control often due to reported: lack of time; number of patients; poor functionality or userfriendliness of HIS and infrastructure; own experience and ability.	
Coping response	Related to appraisal choices as expected from the Coping Theory model. No deviant responses found.	
Hospital and department differences	Related to how busy the department was (e.g. A & E) and also to prior IT expertise of the doctors (high in PAMC).	
Gender differences	Evidence of peer/team work chosen by females as a coping strategy	
Later transition of appraisal and response	**RQ2 (part 1)**	**Proposals 4-5 supported**
Types of transition	Three new types discovered: many complete shifts from reluctant to engaged; a few downward shifts found (not previously reported)	
Direction of transition	63% of doctors evidenced improvement of response over time. No falls in PAMC or RUCC	
Equitable Need Fulfilment causes of response transitions	**RQ2 (part 2)**	**Proposals 6-8 supported**

Work performance NF	The most influential consideration, focused on patient care. Especially helped by ongoing training and support and adaptive improvements made to the HIS system
Relatedness NF	Includes relationship with peers and patients outside the hospital as well as inside, and good communication with patient records (which peers need to maintain). Seen (especially by females) as relevant to work performance
Self-development NF	Helped if using HIS is associated with positive job evaluation and promotion

Chapter 7. Discussion

7.0 Introduction

This chapter discusses the findings of this research study in relation to the research questions and associated propositions. It details the contributions of the work and its implications in advancing the body of knowledge, both in terms of theoretical knowledge and also at a practical level for practitioners and stakeholders in the particular context in Saudi Arabia (e.g., doctors, hospital management, the MoH). This chapter starts by outlining the research objectives and propositions and then moves into a sequential discussion of each contribution. Figure 7.0 depicts the structure of this chapter graphically.

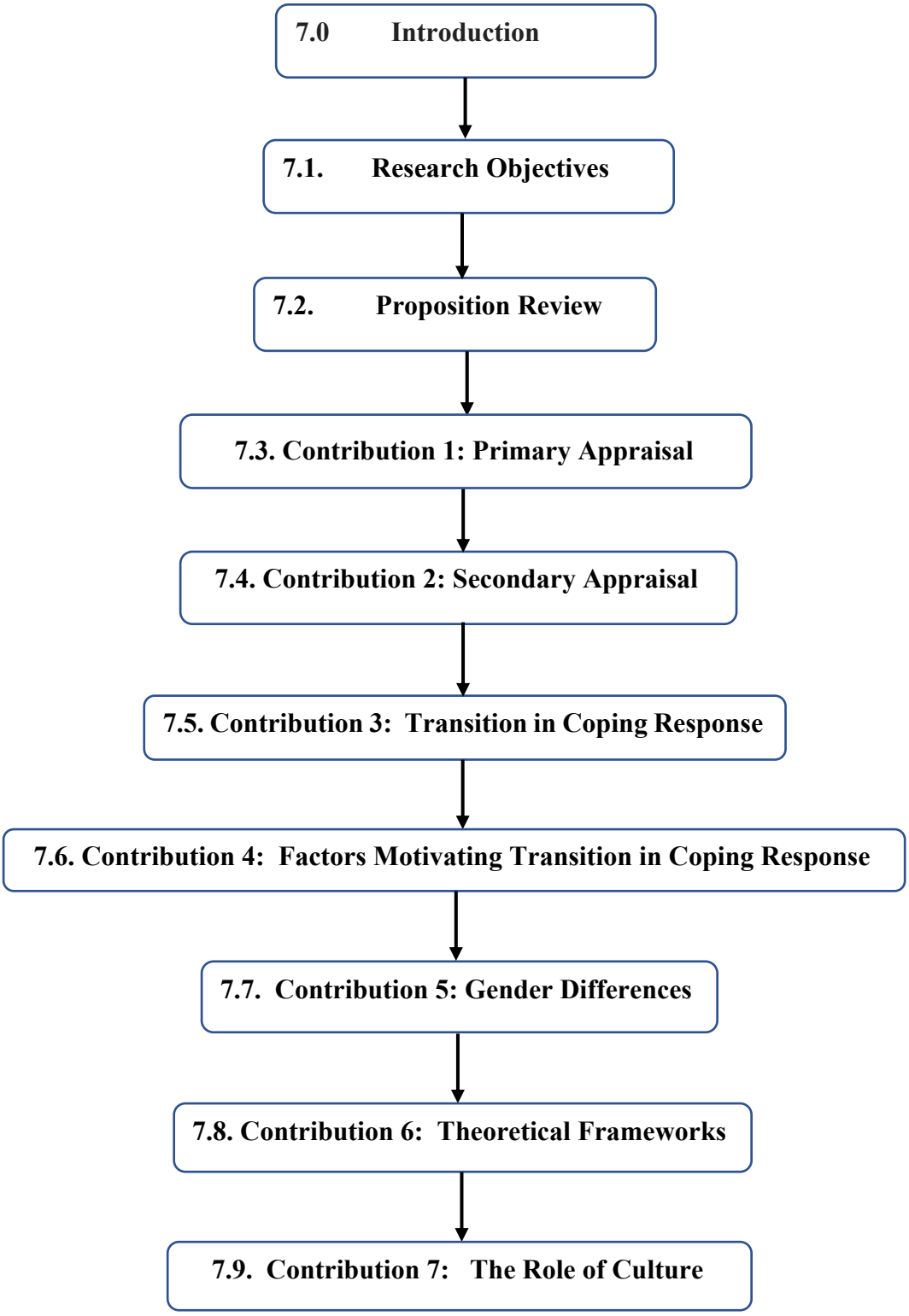


Figure 7.0. Chapter Structure

7.1 Research Objectives

This study focuses on user to a new, mandatory usage health information system that has recently been introduced into public hospitals in Jeddah, the second largest city in Saudi Arabia, particularly examining users' coping responses to the mandatory introduction of a HIS.

The literature presented in chapters three and four showed that research on technology adoption predominantly focuses on voluntary contexts. However, research on mandatory technology usage is limited (e.g., Beaudry and Pinsonneault, 2005; Beaudry and Pinsonneault, 2010; Lapointe and Beaudry, 2014; Bhattacherjee et al., 2018). Furthermore, the work that does exist has been conducted in a North American context, resulting in an absence of insight regarding the implications for collectivist cultures such as that of Saudi Arabia. Bhattacherjee et al., 2018 called for research to examine coping responses in other cultural contexts and to further examine whether coping response transitions are possible. This study responds to such calls, providing insight into coping responses, transition in those responses and motivating factors. It examines user coping responses to the mandatory introduction of a health information system in Saudi Arabia, focusing on two main guiding research questions and their associated proposition. These questions are:

- *What coping responses do employees exhibit in response to mandatory healthcare information system implementation in a Saudi Arabian context; and what factors influence the formation of each response?*
- *Do users' coping responses transition (either positively or negatively) over a period of time, and if so, what factors influence those transitions?*

Two main theoretical perspectives guided the study. The first is the Transaction Model of Stress and Coping, which provides insights into the staged formation of coping responses.

The Information Systems literature has emphasized the importance of user satisfaction as influencing perceptions and behavioural change in relation to technology usage. This research draws on that focus, through its employment of a second theoretical perspective, that of Equitable Needs Fulfilment, that provides a nuanced focus on employee satisfaction in relation to introduction of an intervention. This framework is a derivative of equity theory as developed by Adams (1963). It proposes that employee satisfaction is achieved when a balance exists between what employees perceive as their organizational input/ effort versus output/benefit received. More recent work by Au, Ngai and Cheng (2008) has employed their theoretical perspective to understand why an individual may be satisfied or dissatisfied with an information system, conceptualizing that satisfaction or dissatisfaction in terms of needs fulfilment. The three types of needs fulfilment deemed relevant are:

- **Self-development -** which relates to career advancement and job security.
- **Equitable work performance -** which relates to whether the new technology helps the user work more efficiently and improves their ability to deliver good service without a disproportionate amount of extra effort being required.
- **Equitable relatedness fulfilment**- which is determined by whether the change enables the individual to build better communications with colleagues.

The benefit of these combined theoretical perspectives is that this synthesis enables a holistic overview of the stages and factors that influence variation in coping response and potential transition. These models also focus more holistically on the individual and their perspective, not simply at the attributes of the technology. This is particularly important in relation to a mandatory organizational technology usage context. The research model which guides this research therefore synthesizes two theoretical perspectives, the Transactional

Model of Stress and Coping (TMSC) and the Equitable Needs Fulfilment Model (ENF). See Figure 7.1 below.

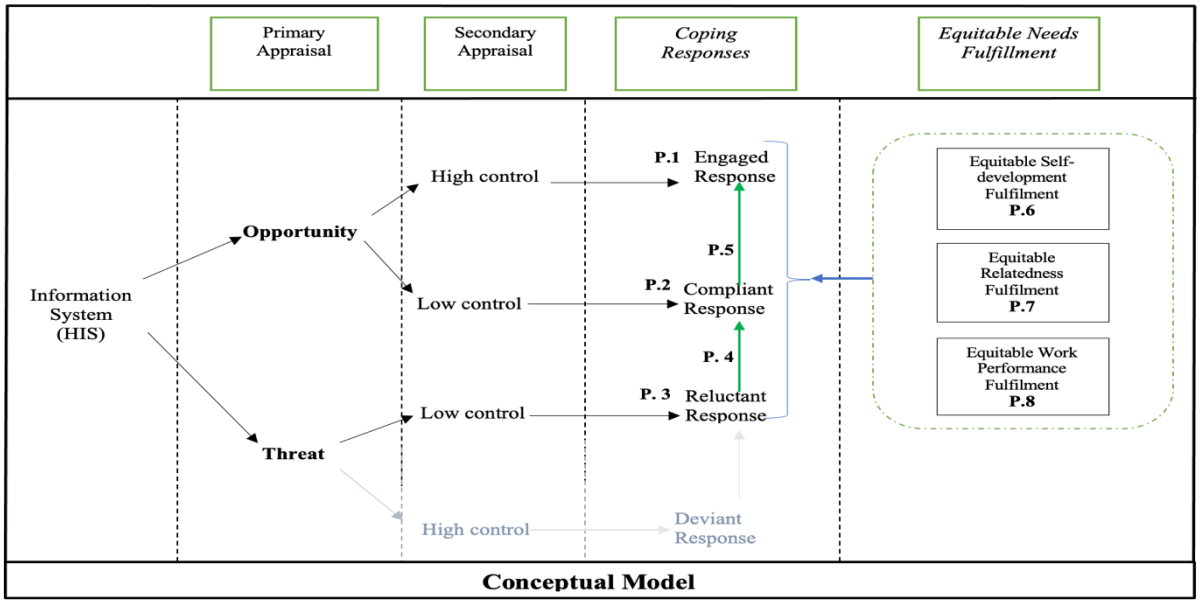


Figure 7.1. *Conceptual Model.*

As indicated, the option of a deviant coping response is not included in the model (it is represented as faded), as in an mandatory organizational IT usage context, the user does not have voluntariness of use or the ability to reject the system. In such a context, even if the user views the imposed IT as a threat, they are still required to use it, or will lose their job. Bhattacherjee et al. (2018) found only one case of this category. It was a doctor who saw a high threat of the technology due to the belief that certain things were easy to order on the system and that that might lead to over-ordering or to the system getting slow due to too many orders being processed. However, he also felt he had control since he was able to delegate the use of the system to proxies rather than use it himself. Therefore, we remained open to correction by the current study data in case it should reveal some response that could be classified as deviant. In fact, no such data was found, so our study confirms the irrelevance of that option.

In conclusion, the conceptual model above provides an essential framework for the data gathering and informed analysis of the study. That is not to say that it is regarded simply as a theory to be tested. As described in Chapter 5, the methodology of the study is not purely positivist but accepts the relevance of insights that come 'bottom-up' from the data to be gathered, as well as those that come from prior models in the literature. The main contribution of this study and how it advances knowledge are now discussed sequentially.

7.2. Contribution 1: Key Factors Affecting Primary Appraisal

Within TMSC, primary appraisal is the key first step in a two-stage cognitive appraisal process, which is a complex evaluative process that then predicts the coping response of the individual, leading to behavioural adoption or rejection response (Bhattacherjee et al., 2018; Lazarus & Folkman, 1984). The present study provides rich elaboration of the first step in that process, the primary appraisal of the HIS. Specifically, it identified many factors, which affected that primary appraisal, positively (opportunity) or negatively (threat).

7.2.1. Contribution to the Body of Knowledge

The research findings detail the key factors contributing to ***primary appraisal*** of a new HIS in a Saudi Arabian hospital context. Two *primary factors* that influence and shape the primary appraisal response as to whether an individual perceives the introduction of new technology in terms of threat or opportunity were (1) whether they were already familiar with an HIS (which was almost universally 'no') and (2) whether they have received ***training*** in advance of using that technology and/or ***support*** later (which varied from person to person and hospital to hospital).

- **Training**

The current research finding is consistent with the research conducted by Davis and Bostrom (1993), who investigated the roles of the computer interface and training methods in their study on training end users. They found that training is particularly important when using new technologies in an organisational setting. Their findings align with the importance of IT training and support highlighted in the current research, which emphasises the need for training to overcome difficulties and challenges associated with using the new HIS. Similarly, Weigel and Hazen (2014) found that the key organisational factors influencing technology acceptance

(or lack thereof) are training and support. They focused on technical proficiency businesses, not hospitals. However, when Bhattacharjee et al (2018) focused on hospitals and a mandatory setting, they also found that training and support are important and help the user see new IT as an opportunity. That research focused on a North American context, but findings obtained by the current research confirm that this equally applies in a Saudi Arabian context, thus confirming the role and culture independence of training as an important factor motivating a positive primary appraisal.

- **Alternatives to Training**

Insights obtained from this research showed (6.2) that there are at least two important provisos to add to the role of training driving positive primary appraisal. One was concerned about how doctors dealt with the lack of training. It was apparent that some dealt with it by simply ploughing on using the system and through self-directed learning, while others (especially females) appealed to peer support for help. These have been less explored in other work. Another point that the data highlighted was that there were perceived limitations of the system that no amount of training could resolve. These included icons that did not work, missing patient data, and a lack of sufficient terminals. Clearly, much could be represented in a richer version of the Coping Theory model through inclusion of the factors that generate opportunity or threat appraisal.

- **Demographics**

The study was especially rich in its discovery that demographic factors, such as age and gender, play a significant role. The research findings indicate that the level of comfort and adaptability with technology varied between younger and older interviewees. Younger participants showed a smaller learning curve and greater ease in using technology, while older participants expressed negativity and tended to perceive the new system as a threat. This observation aligns with existing literature that indicates how personal characteristics, such as demographic factors,

can impact people's attitudes towards innovation and their adoption decisions (Garavand et al., 2016; Goswami & Dutta, 2015; Weigel & Hazen, 2014; Scott et al., 2008).

Regarding gender differences, the current research found that female interviewees, particularly older female doctors with greater seniority, held predominantly negative views of the system. This sentiment remained consistent across different types of hospitals and departments. In contrast, male interviewees were more likely to view the system as a necessary change and emphasize its potential advantages, often displaying higher technical literacy. The reasons for negative appraisals among females included insufficient training before using the technology, perceived system weaknesses (such as slow processing or crashing), frequent interface changes, poor user intuition, system complexity, and incomplete patient information. While previous literature (in the UTAUT tradition) suggests that women's intention to adopt innovation is influenced by previous experience, social influence, facilitating conditions, and effort expectancy, and men's intention to change is influenced by performance expectancy (Nunes et al., 2018; He and Veronesi, 2017), the current study confirms that gender is a predictor of resistance to change (Nunes et al., 2018). Moreover, gender can influence individuals' attitudes towards innovation and adoption decisions (Garavand et al., 2016; Goswami & Dutta, 2015; Weigel & Hazen, 2014; Scott et al., 2008).

7.2.2 Implications for Practitioners

In the present context, training occurred in all four health facilities in 2020. However, the nature, extent or timing of that training was not aligned with the needs of end users, specifically providing such training in advance of being required to use the system. Some methods that organisations can use to train employees include training programs, meetings, workshops, and sending employees to outside programs (Erwin & Garman, 2010) or even via provision of online training such as YouTube videos. Another approach is to have a new user

shadow an experienced user. These methods could be more fully exploited with future innovations.

The participants' workarounds also contain lessons. In PAMC, doctors reported extensive self-learning support with videos, but it is uncertain if that was available in all the hospitals. This sort of support is necessary to counter the experience of many doctors of feeling that they have to spend too much time working out how to use the new software on their own. The other strategy, used especially by females, was using peers to help them learn and use the system. This could also be formally encouraged by the authorities, e.g. perhaps by managing a database where a doctor could check which other doctors have expertise in this or that feature of the HIS system and could be approached for advice. Finally, the reports that the system itself was inadequate in various ways show that management need to be careful not to expose users to a new HIS before it is fully ready. That creates problems that training usually cannot resolve and which greatly increase feelings of threat.

7.3. Contribution 2: Primary and Secondary Appraisal in Relation to Response

The first three propositions of the study related to this contribution are restated for convenience.

P1. *If users appraise an IT as an opportunity and appraise themselves as having high control over their IT use, then they are likely to demonstrate an engaged response.*

P2. *If users appraise an IT as an opportunity and appraise themselves as having low control over their IT use, then they are likely to demonstrate a compliant response.*

P3. *If users appraise an IT as a threat and appraise themselves as having low control over their IT use or nonuse, then they are likely to demonstrate a reluctant response.*

This research supported those propositions. Firstly, it found that interviewees who viewed the system as an ***opportunity*** appraised their ability to use the system either in terms of ***high or***

low control (e.g., acceptance). In contrast, those who viewed the system ***negatively*** tended to appraise their ability to use the system only in terms of ***low control (e.g., resistance).*** The findings also confirm that control evaluations influence the type of user coping response. .

7.3.1 Contributions to the Body of Knowledge

The study findings advance understanding in *3 ways,* in the context of KSA.

- The **first** contribution is that those interviewees who viewed the technology introduction as an ***opportunity*** described themselves as ***having high control***. That control was described as the HIS being **easy to use, user-friendly, enhancing accuracy, its timeliness, usefulness** and **accessibility.** These outcomes led to an engaged response, even in a mandatory usage context. This aligns with research conducted by (Garavand et al., 2016; Talukdar, 2012; Venkatesh and Davis, 2000; Igbaria et al., 1996) which found (utilizing a UTAUT framework) that these factors can exert a significant influence on information technology acceptance, albeit in a voluntary usage context. It also aligns with the *DeLone and McLean IS Success Model* (1992) which emphasises the perceived quality characteristics of the technology including, usefulness, accuracy, and timeliness, all of which are consistent with the current research finding. The present study further advances knowledge as previous research in a mandatory usage context such as that of Bhattacharjee (2018) did not provide granularity of insight regarding what constitutes perceived high control, which the current research provides. For example, the current research illuminates that high control is described by end users as the HIS being easy to use, user-friendly, and providing accuracy, timeliness, usefulness and accessibility. This was typically the experience of those who worked in PAMC and KFGH.

- The **second** contribution regarding secondary appraisal relates to those interviewees who viewed the technology introduction as an ***opportunity*** but described themselves as having ***low control*** over how they use it. These interviewees tended to describe that low control in terms of lack of **technical literacy, / IT education, the system not being user-friendly** and **time-consuming**. *They are likely to demonstrate a compliant response.* This was typically the experience of two interviewees who worked in KFGH. This aligns with the work of Mantzana et al. (2007), which examined doctors who supported a new technology deployed at their workplace to help their job, but found that they did not utilise it due to time restrictions, demonstrating a compliant response. It is also consistent with Bhattacherjee et al., (2018), who confirm that the reasons for compliant response in an obligatory sitting are the end users' perceived lack of adequate control over its use, little or no innovation, and no customization of IT.
- The **third** contribution related to secondary appraisal findings demonstrates that those who viewed the technology introduction ***negatively*** in the primary appraisal also appraised themselves as having ***low control*** over technology usage in the secondary appraisal. This was consistently described in terms of lack of training, technical literacy, lack of computers, limited time, number of patients, less experience with technology, and the limitation of system function. *They were likely to demonstrate a reluctant response.* The current research finding is consistent with (Venkatesh and Davis, 1985; Ajzen, 2006). The value of TAM and each of its subsequent refinements culminating in UTAUT for the current study lies in the fact that those models emphasize the central importance of beliefs regarding the consequences of using technology and their influence on the individual's adoption behaviour, including resistance to adoption and the associated adaptations that result from that resistance in a mandatory usage context. They indicate the need to consider the importance of beliefs relating to

perceived usefulness and perceived ease of use as a potential factor influencing the adoption of the mandatory HIS. Furthermore, the research finding is consistent with the work of Bhattacharjee et al., (2018) who found that a reluctant respondent indicates a fear of or resistance toward IT, and only utilizes it to "meet quotas" or adhere to hospital regulations. It therefore speaks to the culture independence of this issue.

7.3.2. Implications for Practitioners

The implication for managers and for those introducing new technology in a mandatory mode is clear. Users need to be involved in design of the system and the fine tuning of its features to ensure that it is easy to use, user-friendly, enhances accuracy, provides timely and useful information as well as being easily accessible. These features and benefits need to be communicated during training on use of the system, and where end users are not satisfied with features or find them difficult to use, these issues need to be addressed. If end users can feel at least that management wants to hear what they say, and indeed will act on it, they will not feel so powerless, and their ensuing adoption response may consequently be more positive. However, the impression obtained from interviewees who participated in this study is that their feedback was not elicited. Rather the authorities imposed a system that was not completely ready in a top-down way. Hence, some of the least prepared doctors felt that they had no control of the system and no control over the forces imposing it on them.

7.4. Contribution 3: Transition in Coping Response

A major contribution of the present study is that it illustrates that users can transition from one form of adoption or coping response to another, even in a mandatory usage context. Therefore, the following two propositions were supported:

P4. *For users who appraise IT as an opportunity, if their secondary appraisal of control over IT use changes over time from low to high, then their response may correspondingly change from compliant to engaged.*

P5. *For users who appraise themselves as having low control over IT use, if their primary appraisal of IT changes over time from a threat to an opportunity, then their response may correspondingly change from reluctant to compliant.*

7.4.1 Contribution to the Body of Knowledge

This research provides insights confirming that coping responses can transition, even in a mandatory usage context. In doing so, it answers the call by Bhattacherjee et al. (2018) for research examining coping responses in other cultural contexts, and which also provides insight into whether adoption response transitions are possible. Interestingly, the present study confirmed that adoption/ coping response transition can be both positive and negative. This research confirms that such transitions are possible and frequently take place in a developing country's mandatory technology usage context. Examples of coping response change were found in all four health facilities studied in KSA: KFGH, PAMC, MUCC, and RUCC. Both positive and negative transitions were evident in KFGH. A key factor here was whether training post introduction of the HIS had been provided and whether the doctor had attended that training. It was also notable that younger male doctors tended to transition upward/ positively towards increased enagement with the system.

This current research advances knowledge by showing that in a Saudi mandatory HIS usage context, there are two acceptance responses- (engaged and compliant) and only one resistance response- (reluctant). Moreover, the current study findings showed that coping responses can transition over time from reluctant to compliant, compliant to engaged, reluctant to engaged, engaged to compliant, and compliant to reluctant. In short, they are both negative and positive in orientation. This is a particularly important insight as previous research by Bhattacharjee et al.' (2018) had identified only positive transition outcomes, for example that user responses can move from deviant to reluctant, reluctant to compliant, and compliant to engaged. However, the current research shows, that in the case of end users working in hospitals in Saudi Arabia, the coping response transition may be negative or positive in orientation, thereby increasing the importance of carefully managing and motivating a positive coping transition. A comparison between Bhattacherjee et al. (2018) and the current study in coping response transition findings is shown in the table below.

Table 7.1. Comparison between Bhattacherjee et al. (2018) and the current study in coping response transition findings

Responses	**Bhattacharjee et al. (2018): Previous Transition Findings**	**This Study: Transition Findings**	**Insights obtained / Advances in Knowledge**
Engaged	Compliant to engaged (+)	Compliant to engaged (+) **Engaged to compliant (-)**	1. Confirms that end user coping response can progress from compliant to engaged in a collectivist context. 2. Also shows that it is possible for end user coping response to transition negatively/ regress e.g. from engaged to compliant.
Compliant	Reluctant to compliant (+)	Reluctant to compliant (+) **Compliant to reluctant (-)**	1. Confirms that end user coping response can progress from reluctant to compliant in a collectivist context. 2. Also shows that end user coping response can transition negatively from compliant to reluctant.
Reluctant	**Deviant to reluctant (+)**	**Reluctant to engaged (+)**	1. None of the interviewees changed their responses from deviant to reluctant. 2. Illustrates that a positively valenced, multi-state transition is possible - A high number of respondents transitioned directly from reluctant to engaged coping response.

7.4.2. Implications for Practitioners

The main implication for managers and those introducing new technology is that they should not suppose their role is limited to when the innovation first occurs. They must not adopt the view that whatever attitudes the workforce adopts initially are set in stone, nor indeed assume that changes may occur but that they will always be in the direction of greater acceptance. Rather they need to recognise an ongoing responsibility to continue working on the factors which affect the initial user appraisals of the system.

7.5. Contribution 4: ENF Factors Motivating Coping Response Transition

This research advances our understanding by confirming that transitions are possible in an individual's coping response, even in a mandatory usage situation, and applying a novel lens to understanding the factors affecting such transitions. Drawing on the work of Au et al. (2008), and employing ENF theory as a theoretical scaffolding, it advances our understanding by providing a new insight into the factors that motivate each type of coping transition through its influence on user satisfaction. Three propositions had been formulated relate to this, one for each of the three dimensions of ENF that were investigated. All three were supported, as the account below will demonstrate.

P6. Perceived equitable work performance (EWPF) fulfilment influences end user satisfaction with the IT, which can change the nature (+/-) of their response.

P7. Perceived equitable relatedness need (ERNF) fulfilment influences end user satisfaction with the IT, which can change the nature (+/-) of their response.

P8. Perceived equitable self-development (ESDF) fulfilment influences end user satisfaction with the IT, which can change the nature (+/-) of their response.

All three equitable need factors emerged as capable of motivating both positive and negative transitions in user coping response, with some exerting a stronger effect than others. Each of the factors and their effects are now discussed in detail. How the insights obtained advance the body of knowledge is discussed below sequentially, first in relation to the effect of these factors in motivating *positive advancement in* coping response, followed by a discussion of where absence of these factors can actually result in *regression* in coping response.

7.5.1 ENF Factors Motivating Positive Transitions in Coping Response

In the present study, the data supported the interpretation that all three of the subtypes of ENF factor recognised in our adopted model were evidenced as capable of motivating either positive or negative effects on response transition. These are now reviewed in turn, starting with the positive effects.

7.5.1.1 Equitable Self-Development Fulfilment (ESDF) and Positive Transition

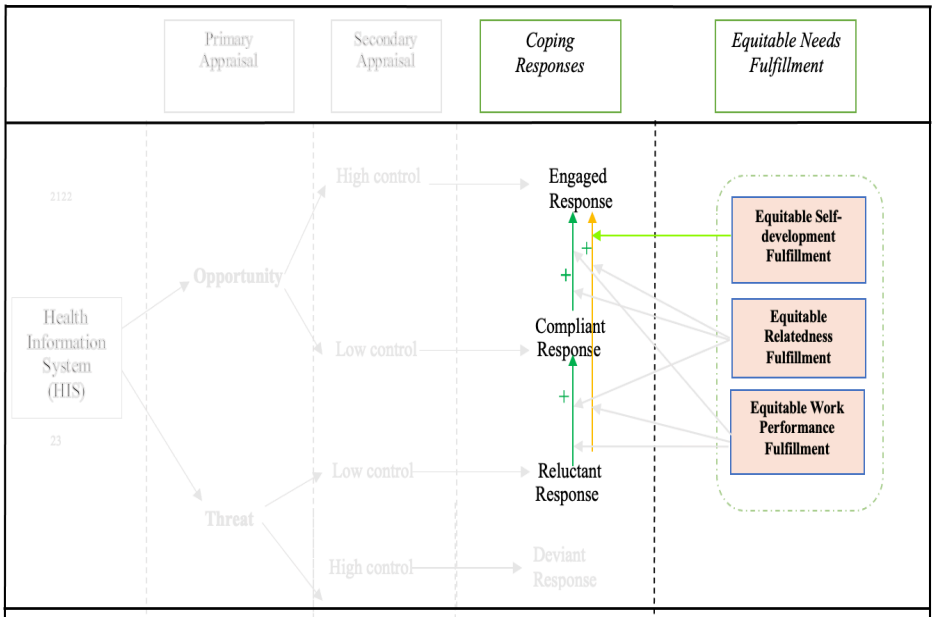


Figure 7.2. Positive ESDF

The insights obtained from this study advance knowledge by showing that **equitable self-development need fulfilment** may be interpreted as one of the factors which can motivate a positive transition from reluctant to engaged coping response. However, **ESDF** showed a less widespread effect on the positive transition of coping response than was the case for the other two ENF subtypes.

Notably, however, **ESDF** was found to be capable of bringing about the most extreme form of positive transition in the end user's response. It was capable of motivating transition directly from *reluctant* to *engaged* response, which is the ultimate aim of management. For example, some doctors reported originally having a *reluctant adoption attitude,* but

subsequently recognized the system's potential self-development benefits, and following this reported having a far more actively *engaged response* – referring to self-development benefits such as job security, promotion, preserving doctors' rights, and pensions. This raises the question as to why, on their first experience or introduction to the HIS, these ESDF factors did not predominate over other factors that led to the initial response being reluctant, but only came to prevail later. One explanation for this is that those providing the training on the OASIS system did not view discussion of the self-development benefits which the system could confer as being important and instead focuses on the technical characteristics of the system,

A point worth mentioning is that there seemed to be some difference in how the impact of ESDF was evidenced dependent on whether the interviewee was younger or older, female or male, from a large hospital or not, or a specific medical specialism. Specifically, younger doctors who were initially reluctant in their attitude towards the new technology, upon becoming aware of how it could increase their self development and benefit their careers, were more likely to demonstrate a speedy transition from reluctant to engaged coping responses, indicating the impact of ESDF and the need to generate awareness of this factor. Moreover, the absence of this factor seemed to be mentioned disproportionally more often as the reason for negative coping response transition by doctors who were female, doctors who were older/more experienced regardless of gender, and doctors who worked as General Practitioners.

Contribution to the Body of Knowledge

From a theoretical perspective, this advances our knowledge considerably as previous researchers (e.g., Bhattacharjee et al., 2018) have emphasized the need for more insight into whether transitions, especially such an extreme one as reluctant to engage, were possible, their direction, and motivating factors. The study conducted by Au et al. (2008) provides empirical evidence of ENF factors that can affect end-user satisfaction in a voluntary usage context but views this outcome as static and does not directly address transition/change in coping response.

This current research contributes to the body of knowledge by showing that the ESDF can motivate the end user's coping response transition from reluctant to engaged, even in a mandatory usage situation. However, it also shows that when this kind of ENF is not achieved (e.g. because there are no financial or promotional incentives that accompany the technological innovation, so the doctors' inputs are felt to outweigh the benefits received), it can stop positive transition or even result in a negative coping response transition and that this outcome is independent of gender or hospital context. Therefore, these variables should be considered in any examination of coping responses or transitions between coping responses. This insight addresses the gap highlighted by Bhattacharjee et al. (2018) and brings to light the intricate interplay between ESDF and various user-specific factors, adding depth to our understanding of these transitions.

However, it is important to note that its impact, while notable, was found to be relatively less pronounced compared to other ENF factors which are described below. This suggests that while ESDF plays a role in encouraging positive coping responses, it may not be the primary ENF driver of such transitions. Additionally, the study observed that younger doctors tend to undergo a quicker transition from reluctance to engagement, indicating potential differences in the way ESDF influences coping responses among various demographic groups. This finding implies that while ESDF is a noteworthy contributing factor, it operates within a broader context where other variables exert substantial influence on the dynamics of coping responses.

- **Implications for Practitioners**

This research also contains implications for practitioners introducing new mandatory usage technologies in a large-scale organisational context, who must communicate the system's benefits to end users to motivate a positive coping response. The factors promoting positive

ESDF include awareness of how the technology can support job security and promotion, and preserve doctor and patient rights. These ESDF factors, correctly communicated, can encourage and motivate doctors from a reluctant towards an engaged response.

7.5.1.2 Equitable Relatedness Fulfilment (ERNF) and Positive Transition

The insights obtained from this study further advance knowledge by showing that positive ERNF motivates all the three positive transitions: (1) from reluctant to compliant, (2) compliant to engaged, and (3) reluctant to engaged coping responses.

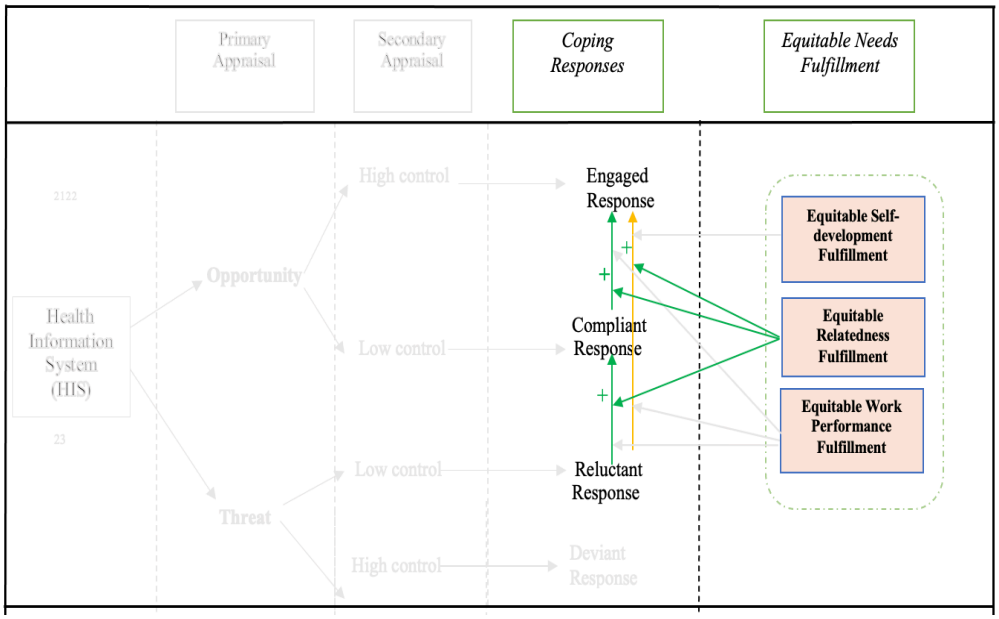


Figure 7.3. Positive ERNF.

Interviewees who initially exhibited negative orientations towards the newly introduced technology underwent a notable shift in perception of how the innovation improved relatedness. They came to recognize the technology's potential benefits in that area and shifted from reluctance to a more engaged attitude. This transition was particularly notable among those who received training and experienced improvements in communication and work organization. This finding signifies that positive ERNF plays a crucial role in motivating individuals to overcome their initial reluctance and embrace the technology.

It is particularly notable that female doctors consistently emphasized the paramount importance of ERNF in facilitating a positive transition towards technology acceptance, specifically and repeatedly referencing the degree to which it facilitated their participation as part of the medical team and enhanced their ability to contribute in a valued way, showcasing their commitment and expertise in a way that enabled them to contribute meaningfully and transcend the constraints of culture or gender. **This was the case for female doctors regardless of age across all case studies, but was particularly emphasized by younger female doctors in the larger hospital case studies.** Male doctors valued ERNF, but did not highlight it to the extent that women doctors did and tended to view it simply in terms of enhancing work-related outcomes.

- **Contribution to the Body of Knowledge**

These insights represent a significant contribution to the field by addressing critical gaps highlighted by previous researchers. Previous research had emphasized the lack of insight into whether transitions in coping responses (reluctance to compliance coping response, compliance to engagement coping response, and reluctance to engagement coping response) were possible, how these might express (e.g. staged expression or direct expression) and raised the question as to what factors could motivate such transitions. This study bridges that gap by confirming the feasibility of such transitions, illustrating the pivotal role of ERNF in motivating such expressions and showing that it motivates staged transitions. These research findings further suggest that ERNF involvement's strength in these transitions is influenced by age and gender. It is particularly valued by women doctors and reflects their perception of the innovation as an assistive mechanism for overcoming cultural constrains, particularly facilitating their recognition as a valued member of a medical team.

- **Implications for Practitioners**

This current research also holds practical implications of great import, especially for practitioners involved in introducing new mandatory technologies within large-scale organizational contexts, such as healthcare institutions. To motivate a positive coping response among the end-users, clear and effective communication about the technology is paramount. This we can understand to include communication between management and workforce and, as our findings showed, especially between the doctors and fellow staff and patients, because that kind of communication was essential not just for social benefits but as part of ensuring work performance quality. Healthcare professionals need to be made to understand how these technologies can improve their relatedness. By illuminating how the technology supports equitable relatedness fulfilment, organizations can empower their healthcare workforce to embrace these innovations more readily. However, in doing this, there is a need for tailored communication strategies that acknowledge and accommodate the age and gender diversity of the end-users. This underscores the need for a nuanced approach to understanding and promoting technology adoption within the medical community. It is evident that a "one-size-fits-all" strategy is not effective in such cases. Instead, recognizing the diversity of individual characteristics and contextual factors is essential when addressing the effect of something like ERNF on coping responses, highlighting the crucial need for tailor-made strategies to address these variations effectively.

This particular insight raises a crucial consideration for healthcare organisations and stakeholders. At least with respect to ERNF benefits, they must adopt a gender-sensitive approach when communicating the benefits of new technologies to medical professionals. Organisations can promote successful technology adoption by recognising and addressing female doctors' unique needs and preferences, fostering a smoother transition from reluctance

to engagement. Additionally, our study's comprehensive exploration of contextual variables and individual characteristics underscores the complexity of these transitions. It reinforces the necessity of personalized communication strategies that cater to diverse end-user profiles in the dynamic landscape of healthcare settings.

7.5.1.3 Equitable Work Performance Fulfilment (EWPF) and Positive Transition

EWPF again has the highest effect on the positive transition of coping response as it was found to impact on all three types of positive transition.

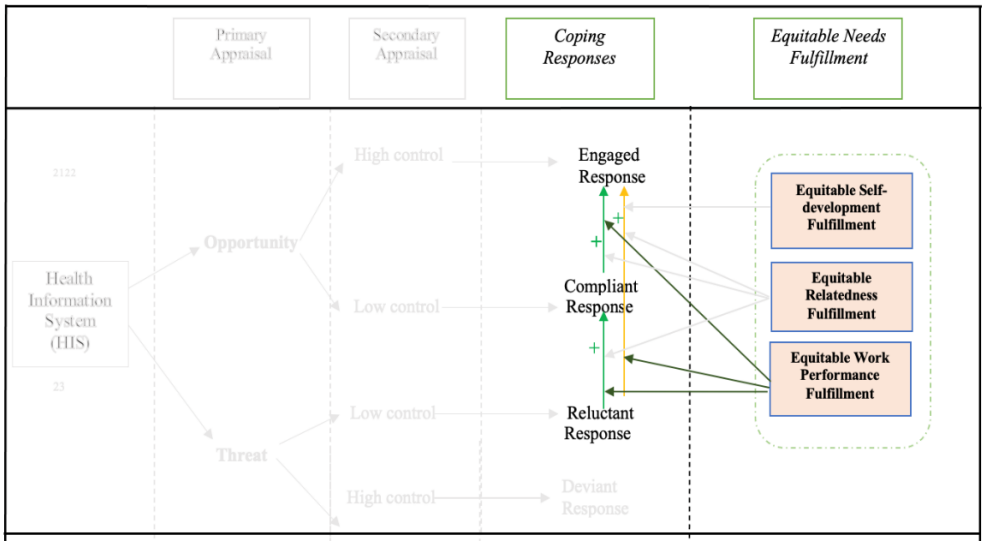


Figure 7.4. Positive EWPF

The insights obtained from this study advance knowledge by showing that equitable work performance fulfilment (EWPF) relates specifically to transitions from R to C, C to E, R to E coping responses. For example, interviewees referenced the fact that they were originally negative in their orientation towards this newly introduced technology, but when they perceived that their equitable needs related to work performance began to be addressed, they became more positive and open to the technology's benefits. This shift highlights the importance of fulfilling work performance-related needs in motivating a transition towards more positive coping responses.

A point worth mentioning is that there was some difference in how this was expressed dependent on whether the interviewee was a senior doctor in a large hospital or not. The dynamics of technology adoption among healthcare professionals are intriguing and multifaceted. Specifically, this current study revealed that doctors in senior positions, typically those aged 45 to 50, who initially exhibited reluctance towards embracing the new technology, often traversed a more extended transition period. This extended period was characterized by comprehensive training initiatives and an incremental increase in their understanding of how the technology could significantly enhance their work performance.

In contrast, doctors working in smaller healthcare facilities highlighted the paramount importance of improved communication strategies (related more to ERNF) alongside organizational enhancements (EWPF) as the primary motivators behind their positive shift in coping responses towards technology adoption. This divergence in experiences underscores the intricate and context-dependent nature of technology acceptance within the medical field. It serves as a vivid reminder that the motivating factors for such transitions can significantly vary, contingent upon an individual's role, professional experience, and the specific context of their workplace.

- **Contribution to the Body of Knowledge**

From a theoretical perspective, this again represents a significant advancement in our understanding of technology adoption within the healthcare sector. Previous research efforts have repeatedly underscored the dearth of insights concerning the feasibility of transitioning between coping responses, the direction of these transitions, and the motivating factors that drive them. This current research, however, substantially contributes to the existing body of knowledge by revealing that perceived achievement of equitable work performance fulfillment plays a pivotal role in motivating transitions among healthcare professionals.

These transitions span from initial reluctance (R) to cautious acceptance (C), from caution to enthusiastic embrace (E), and even from reluctance directly to enthusiastic embrace (R to E). Moreover, the research findings highlight that facilitating the transition from reluctance to enthusiastic embrace is not only plausible but can be significantly influenced by addressing the specific work performance-related needs of individual healthcare professionals. It is important to note that the intensity of this transition may vary based on various factors, such as the seniority of the user and the type of healthcare institution they are associated with. Therefore, when examining and managing coping responses in the context of technological change, it is imperative to consider these individual characteristics to tailor strategies effectively.

Notably, this study reveals a fascinating and intricate dynamic related to the seniority of medical professionals in the context of technology adoption. As stated above, senior doctors, typically those in the age range of 45 to 50, who initially displayed reluctance towards integrating new technologies into their practice, often find themselves traversing a more extended transition period. This elongated transition journey in our context was characterized by comprehensive training programs and an increasing understanding of how the technology can serve as a potent tool for enhancing their work performance and patient care.

Doctors working in smaller healthcare facilities place a stronger emphasis on the benefits of improved communication strategies (so ERNF) alongside organizational enhancements (EWPF) as the primary motivating factors driving their positive shift in coping responses towards technology adoption. These contrasting experiences underscore how any model of HIS innovation must encapsulate the complex nature of technology adoption in healthcare, shaped by a multitude of factors, including the individual's role, level of professional experience, and the unique context of their workplace.

- **Implications for Practitioners**

These research findings again hold profound implications for practitioners, especially those tasked with introducing new mandatory usage technologies within large-scale organizational contexts, such as healthcare institutions. Clear and effective communication about how a technology addresses work performance-related needs is crucial, as demonstrated by the HIS system in the present study, which initially failed to deliver it comprehensively. By articulating and emphasizing the tangible advantages that the technology offers, such as improvements in work efficiency, more effective time management, and overall performance enhancements, practitioners can significantly facilitate a smoother transition towards technology acceptance and adoption. This communication is pivotal in motivating a positive coping response among end users. However, we have noted that the system must also be able to deliver what is promised, and training must be available.

It is also essential for healthcare organizations to recognize and appreciate the nuanced variations among the end users (in this study the doctors) and implement tailored communication strategies that resonate effectively with healthcare professionals at different career stages and operating within a variety of healthcare settings. Doing so ensures that transitions are effectively managed and that healthcare professionals are more likely to respond positively to the integration of new technologies into their work routines.

7.5.1.4 Contribution Summary: ENF Positive Transition Motivating Factors and Their Practical Implications

The study above of how ENF (Equitable Needs Fulfillment) relates to positive transitions in coping response reveals that all three of the subcomponents of ENF included in our conceptual model can in fact relate to positive change. *Equitable self-development fulfillment* (ESDF) was identified as one of the motivating factors that can drive a positive transition from reluctant to engaged coping responses. The findings also highlight the need for tailored communication strategies when introducing new technologies in healthcare settings to address individual differences effectively.

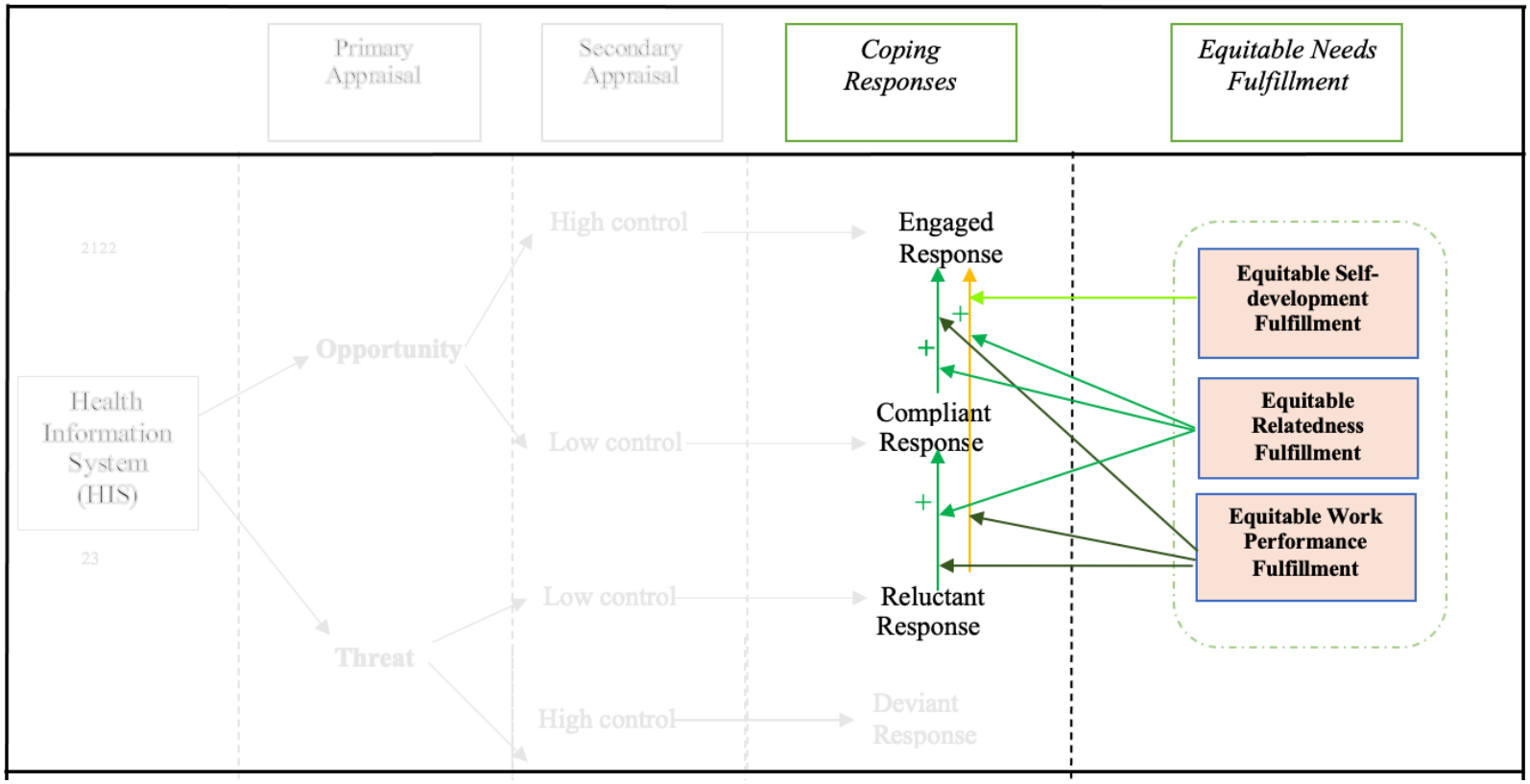
Equitable relatedness fulfillment (ERNF) also emerged as a crucial factor in motivating transitions from reluctance to compliance, compliance to engagement, and reluctance to engagement coping responses. The study observed that different demographic and professional backgrounds influenced how doctors expressed their attitudes towards technology adoption. Female doctors consistently highlighted the importance of ERNF in facilitating a positive transition towards technology acceptance, indicating the need for gender-sensitive communication strategies in healthcare technology adoption efforts.

Equitable work performance fulfillment (EWPF) was also identified as a significant factor in transitions from reluctance to compliance, compliance to engagement, and reluctance to engagement coping responses. The study found that addressing work performance-related needs played a crucial role in motivating a transition towards more positive coping responses. Additionally, the impact of EWPF varied based on factors such as seniority and the type of healthcare facility. Senior doctors often experienced an extended transition period, while doctors in smaller healthcare facilities emphasized improved communication strategies and organizational enhancements as motivators for positive coping shifts.

Virtually all the above constitutes an addition to existing knowledge about ENF in relation to change in response to technological innovation. The contribution of this study is

however not just a contribution to knowledge. It will provide helpful, practical insights for managers seeking to achieve optimal usage of health information technologies. It implies the relevance of techniques such as: **recognition** (acknowledging and appreciating employees' efforts and achievements), **empathy (**understanding and addressing employees' needs and concerns), **accessibility (e**nsuring that communication channels are available and accessible to all employees), and **training** (providing employees with necessary skills and knowledge to do their jobs effectively).

Figure 7.5. Final Model- Factors Influencing Positive Coping Response Transitions



7.5.2 Factors Motivating Negative Transitions in Coping Response (Regressions)

This study provides insight into the fact that negative transitions are also possible and these can be motivated by the absence of particular factors. Two negative transitions were reported – engaged to compliant response, and compliant to reluctant response. Clearly it is especially important to understand why responses should ever move in this direction over time, since for responses and satisfaction to become worse over time is even less satisfactory for an innovation than for responses and satisfaction to fail to improve to the highest level. The study findings illustrated how the absence of the three subtypes of ENF can motivate negative transition or regression (just as their presence can motivate positive transition).

7.5.2.1 Equitable Self-Development Fulfilment (ESDF) and Negative Transition

ESDF has the highest level of effect in the negative transition of coping response, impacting on negative transitions at a higher level than those affected by the other two types of ENF (E to C and C to R).

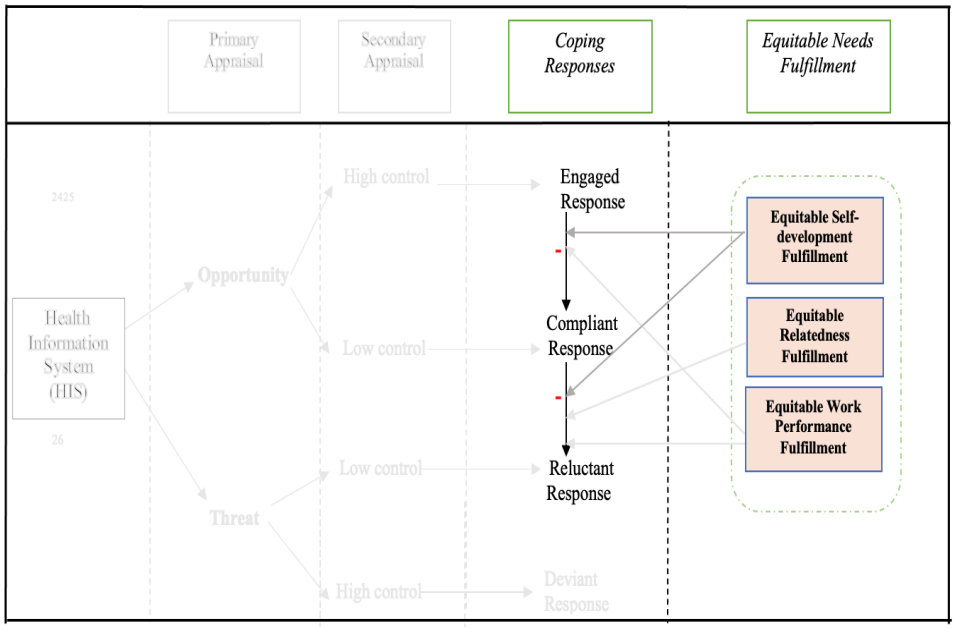


Figure 7.6. Negative ESDF.

Equitable Self-Development Fulfilment (ESDF) is a multifaceted and pivotal factor that requires a comprehensive examination when seeking to understand the motivation behind negative transitions in coping responses during periods of change or innovation implementation. ESDF encompasses a wide array of dimensions, including an individual's perceptions of personal growth, skill development, and the opportunity for self-improvement within their work environment.

It is worth noting that our research has unveiled intriguing variations in how negative ESDF operates across different demographic groups. For instance, younger individuals and those working in larger hospitals appear to be particularly susceptible to the negative consequences of ESDF deficiencies. In these contexts, the influence of factors such as low self-esteem and fear of making mistakes becomes significantly more pronounced, thus profoundly impacting changes in doctors' coping responses.

- **Contribution to the Body of Knowledge**

From a theoretical perspective, the current research observations go some way in enriching our understanding of negative transition in coping responses. Previous research efforts, including the work of Bhattacharjee et al. (2018), often focused on understanding the feasibility of transitions in coping responses and the factors driving them, but failed to adequately address negative transitions. This study takes a significant stride in bridging this gap by shedding light on how the absent or negative equitable self-development fulfillment can have a profound and detrimental impact on coping responses, thereby expanding our comprehension in this critical area.

Furthermore, these research findings reinforce the importance of addressing factors such as emotional support and self-esteem to improve coping responses. This underscores the critical role that psychological well-being plays in individuals' ability to cope with change and

adapt to new innovations, especially in professional settings characterized by high pressure on agents to perform at their best.

- **Implications for Practitioners**

These findings have profound practical implications for organizations and institutions introducing innovations. They unequivocally highlight the need for interventions that acknowledge and actively promote ESDF opportunities to foster more positive coping strategies and enhance the overall well-being of employees. Recognizing and addressing these psychological aspects can serve as a cornerstone in helping individuals maintain a more positive outlook during times of change and drive them toward personal and professional growth. These findings however not only emphasize the paramount importance of ESDF but also underscore the need for highly tailored interventions and strategies that can effectively address intricate contextual variations and individual differences.

7.5.2.2 Equitable Relatedness Fulfilment (ERNF) and Negative Transition

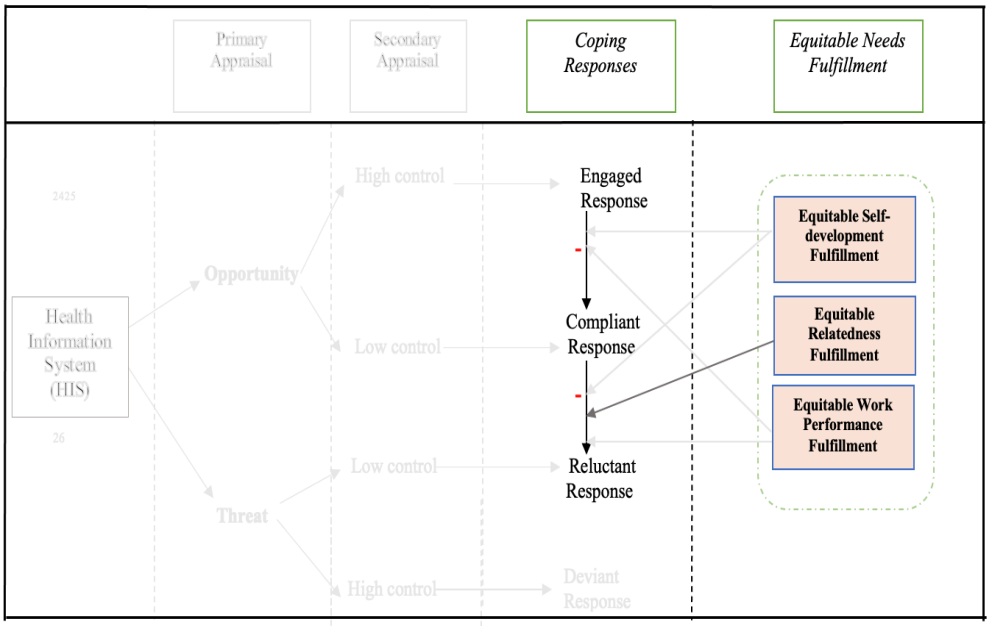


Figure 7.7. Negative ERNF

Equitable Relatedness Fulfilment (ERNF), although only evidenced in our data for the transition C to R, also constitutes a pivotal factor that warrants comprehensive exploration when considering the motivation behind negative transitions in coping responses. ERNF involves the intricate dynamics of an individual's sense of belonging, social connection, and the quality of interpersonal relationships within their work environment. That is of course only partly mediated through an HIS: much of it may arise in face-to-face encounters. However, an HIS typically does in effect reduce the amount of face-to-face encounter, so its ERNF dimension becomes an increasingly important consideration.

In this current research, it once again becomes evident that the effect of expression of the absence of positive ERNF is not a one-size-fits-all concept; instead, it varies based on demographic factors such as age, gender, and hospital size. These variations underline the nuanced nature of human interaction in the workplace, where interpersonal relationships are subject to a myriad of influences and complexities. Individuals of different ages, genders, and working in various hospital sizes perceive and respond to the absence of equitable relatedness fulfillment in distinct ways.

- **Contribution to the Body of Knowledge**

From a theoretical perspective, this research serves as a significant milestone in advancing our understanding of coping responses. Previous scholars, including Au et al. (2008), have often emphasized the positive aspects of ERNF in the workplace. However, this current study breaks new ground by highlighting the importance of considering the detrimental effects of poor communication and limited teamwork on coping responses, thus shedding light on previously unexplored dimensions of this facet.

These findings make a substantial contribution to the literature by underscoring the significance of addressing negative factors related to teamwork and communication to facilitate

positive coping responses. Organizations and institutions can derive immense benefits from these insights, recognizing the compelling need for customized strategies that address the perceived negative impact of an HIS on ERNF.

Moreover, this research bolsters the body of knowledge by demonstrating that the absence of equitable relatedness fulfillment, stemming from ineffective teamwork and communication, can lead to adverse coping responses among individuals grappling with multifaceted challenges during times of change. These findings underscore the paramount importance of fostering collaborative work environments and promoting open communication channels to enhance relatedness fulfillment.

- **Implications for Practitioners**

Turning to what institutions can do, by proactively addressing these negative influences, organizations can effectively empower individuals to develop more robust coping mechanisms, consequently enhancing their overall well-being in the face of daunting circumstances. Recognizing and addressing these communication and collaboration issues can undoubtedly contribute to more positive coping responses when individuals are confronted with changes brought about by innovations.

In essence, nurturing a sense of belonging, camaraderie, and effective communication within the workplace can significantly buffer the negative impact of change and enhance coping responses, benefiting both individuals and the organizations they are a part of. It is crucial however for institutions to consider the diverse demographics of their workforce and tailor interventions and strategies that address the specific needs and challenges faced by different groups, ultimately fostering ERNF and facilitating more effective coping during times of change and innovation.

7.5.2.3 Equitable Work Performance Fulfilment (EWPF) and Negative Transition.

EWPF like **ESDF** has the strongest level of effect on the negative transition of coping response, affecting both E to C and C to R deterioration.

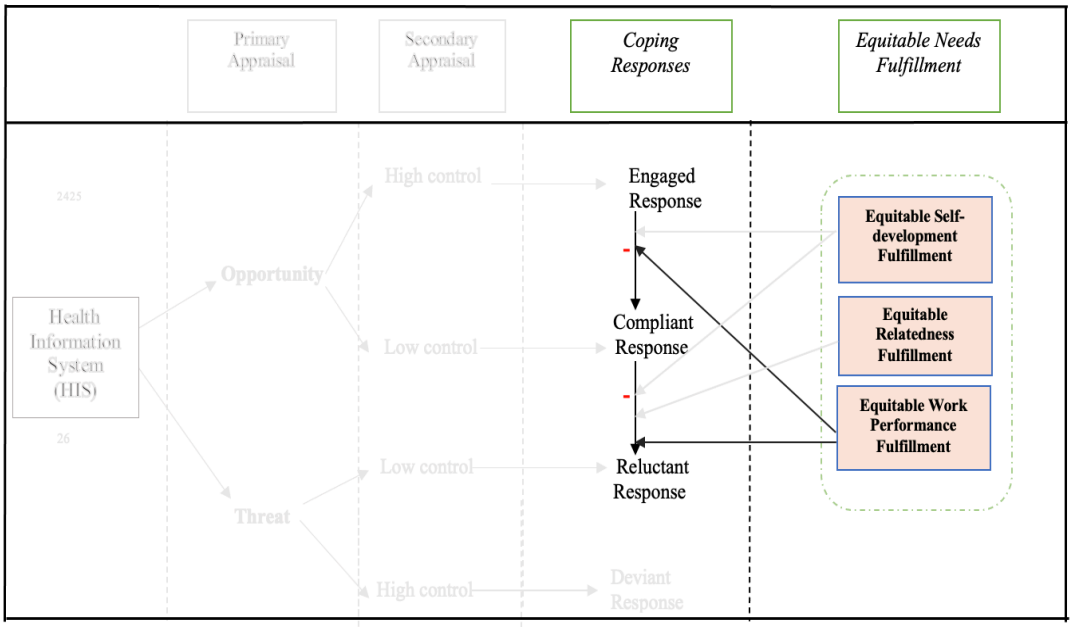


Figure 7.8. Negative EWPF

Equitable Work Performance Fulfilment (EWPF) stands out as the joint most influential factor when it comes to motivating negative transitions in coping responses during the implementation of new technology in the present study. However, it is crucial to delve deeper into the nuanced dynamics of this factor. The absence of positive EWPF manifests itself differently among various demographic groups, including by age, gender, and hospital size. Younger individuals and those operating within larger hospital settings appear to be more susceptible to the perceived detrimental impacts of slow work procedures, missing functions, and perceived inaccuracies (which, by and large, we assume to reflect actual deficiencies of the system, especially in the early stages).

In the context of this study, it becomes evident that the hindrance posed by these factors is multifaceted. Slow work procedures, for instance, not only impede the pace of tasks but also contribute to a sense of frustration and inefficiency among healthcare professionals. The

prolonged time required to complete tasks due to system sluggishness can result in cascading delays throughout the healthcare setting, potentially compromising patient care and overall hospital workflow. Moreover, such issues impose an added burden on the shoulders of healthcare providers who already work under substantial pressure.

Perceived inaccuracies within the system introduce an additional layer of complexity to the problem. Healthcare professionals depend on the accuracy of data and information provided by the system to make critical decisions. When they begin to doubt the reliability of the system due to perceived inaccuracies, it not only erodes their trust in the technology but also forces them to double-check and cross-verify information, leading to increased workloads and potential errors. This not only compromises EWPF but also patient safety.

- **Contribution to the Body of Knowledge**

From a theoretical perspective, our research significantly contributes to our understanding of negative transitions in coping responses by uncovering how negative perceptions associated with work performance can detrimentally influence them. Prior research, such as Au et al. (2018), often emphasised the positive aspects of work performance fulfilment. While the importance of a well-functioning system in enhancing work performance fulfilment cannot be denied, our study underscores the need to recognize and mitigate the impact of system-related hindrances on coping responses. This current study enriches the body of knowledge by highlighting the necessity of addressing these negative influences on work performance fulfilment to promote effective coping strategies.

- **Implications for Practitioners**

Turning to what the institution can do, it becomes evident that to foster more positive coping responses among healthcare professionals facing the challenges of new technology implementation, organizations must focus not only on the functionality of the system itself but also on streamlining processes, addressing functional gaps, and enhancing the accuracy of work systems.

The absence of EWPF within the healthcare setting can have far-reaching consequences. It extends beyond mere dissatisfaction with the technology and touches upon the core aspects of healthcare delivery, including patient care, provider well-being, and the overall effectiveness of the healthcare system. Therefore, recognizing and proactively addressing any negative factors associated with EWPF is the first priority for organisations aiming to successfully implement new technologies while maintaining high satisfaction among their healthcare workforces.

7.5.2.4 Contribution Summary: ENF Negative Transition Motivating Factors and Their Practical Implications.

The effect on negative response transition of the absence of Equitable Self-Development Fulfilment (ESDF) underscores the importance of awareness that the negative side of ENF is just as important as the positive one usually targeted in the literature. Furthermore, our findings show that interventions and strategies must be tailored to address the specific needs of different demographic groups. Younger individuals and those in larger hospitals are particularly vulnerable to the negative consequences of ESDF deficiencies. Organizations must recognize that individuals' coping responses are profoundly influenced by factors such as self-esteem and fear of making mistakes. Practical implications include the need for tailored training programs, mentorship opportunities, and support systems to nurture self-

confidence and personal growth. These measures can enhance employees' coping abilities, ultimately benefiting their well-being and productivity.

The effect of negative Equitable Relatedness Fulfilment (ERNF) highlights the nuanced nature of workplace relationships and communication. The variations in how individuals perceive and respond to the absence of relatedness fulfilment based on demographic factors emphasise the need for customised strategies. Organisations should invest in fostering collaborative work environments, promoting open communication channels, and providing conflict resolution mechanisms to enhance relatedness fulfilment. These practical measures can improve teamwork, employee satisfaction, and overall coping responses, facilitating smoother transitions during periods of change and innovation.

Consideration of negative Equitable Work Performance Fulfilment (EWPF) reveals the multifaceted impact of system-related hindrances, actual and perceived, on healthcare professionals' response changes. Organizations must not only ensure the functionality of technology but also streamline processes, address functional gaps, and enhance system accuracy. This approach can alleviate frustration, reduce workload, and prevent potential errors, ultimately safeguarding patient care and provider well-being. Recognizing and proactively addressing negative factors associated with work performance fulfilment is crucial for organizations aiming to successfully implement new technologies while maintaining high satisfaction among their healthcare workforces.

7.5.3 Summary of ENF-Related Factors that Motivate Coping Response Transitions

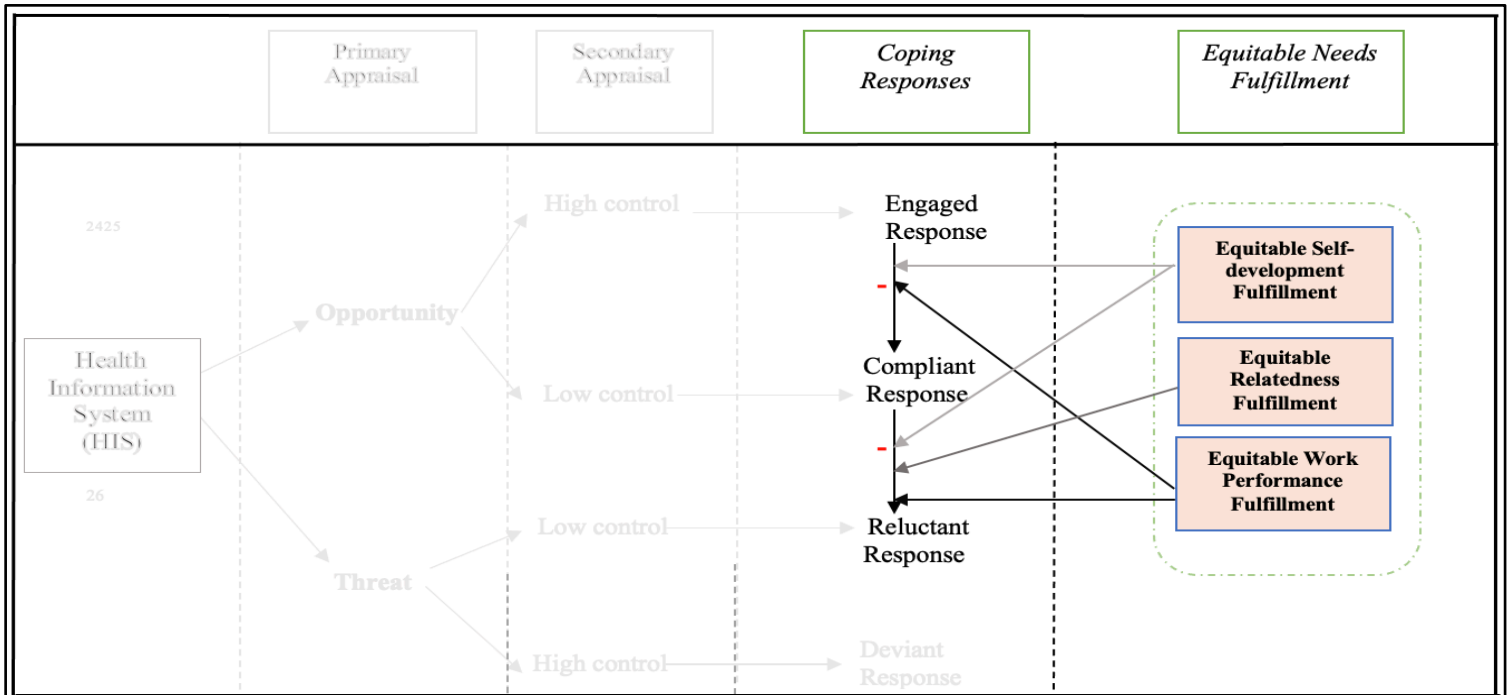
The contribution of this study is to have identified *three major* needs which influence transition (positively and negatively) from an equitable need's fulfilment theory prospective. Positive factors influencing satisfaction and coping response are as follows. **First,** positive factors influencing equitable ***self-development fulfilment*** include training support, recognition (acknowledging and appreciating employees' efforts and achievements), empathy (understanding and addressing employees' needs), and concern, and preserving doctor and patient rights. **Second,** positive factors influencing equitable ***work performance fulfilment*** include faster access to patient information, speeding up the work process, documentation, time management, and accuracy. **Third,** there were responses concerning ***equitable relatedness fulfilment***. Positive factors influencing equitable relatedness fulfilment include the ability to work with others, communication, doctor notes and virtual consultations making patient treatment more efficient.

Nevertheless, there are number of **negative factors** influencing the needs. First, self-***development fulfilment*** includes low self-esteem, consistent fear of making mistakes, and no emotional support. Second, ***equitable work performance fulfilment*** includes lack of training and technical literacy, system not user-friendly, slowness, not enough computers, and not all functions being activated in the system. Third, ***equitable relatedness fulfilment*** includes a lack of clarity in the system due to colleagues needing to provide comprehensive patient details and issues by activating communication icons correctly.

Overall, managers must address employees' needs for work performance fulfilment and relatedness fulfilment, considering their benefit-input ratios. The study emphasizes that more than an IS that benefits employees is needed for satisfaction; employees should perceive the IS as helping them at work with a worthwhile cost. By understanding the inputs required

for different needs fulfilment, managers can manipulate the benefit-input ratios to enhance EUS.

Figure 7.9. Final Model- Factors Influencing Negative Coping Response Transitions.



7.6. Contribution 5: Gender Differences in Relation to ENF Pathways.

This contribution concerns the gender preferences that were found to affect the impact of ENF on satisfaction. As we have seen, three dimensions provided by equitable needs fulfilment theory were critical in understanding our transition data (ESDF, ERNF and EWPF). However, the present research on the Saudi mandatory HIS has shown that these dimensions are not independent of each other. For instance, two of those dimensions (EWPF and ERNF) have a relationship with each other, and that relationship is gender dependent. According to section 6.2.1, male physicians prioritise teamwork and use of peer assistance (relevant to ERNF) less than female doctors.

This relationship is found in women and is what we call a symbiotic relationship (which means it benefits all those involved in both directions). In this case, the female doctors' need fulfilment in terms of ease of performance in doing the job (EWPF) is related to their perception of the collegiality aspect of their relationship with each other (ERNF) and together that helps in relation to the positioning of women and their reporting of an engaged response. As a woman doctor recognises herself as a team member (so her ERNF needs are satisfied), this recognition can influence her contribution to teamwork, ultimately leading to her self-development needs also being satisfied (ESDF) as shown in section 6.2.

By contrast, male doctors value the technology itself and the effectiveness of the system in relation to patient care, rather than any relatedness or teamwork aspect of the workplace. Men tend to prioritise workplace performance over collegiality while also emphasising self-development (interviews n.1 and 5, section 6.2).

One could say that both men and women were found to value patient care and what are sometimes called the 'hygiene factors' of the workplace (the elements that satisfy basic needs, which for an HIS would be its basic functionality such as system quality, information

quality, and service quality as in the Delone and McLean 2003 model). However, only the females, especially those under 45, further valued the social dimension, seen in teamwork.

This current research, therefore, shows a highly nuanced situation that a purely quantitative study would struggle to reveal. According to interviews n.21, 11, and 13 section 6.2, women interpret what is important through a different lens. They place emphasis on relatedness (ERNF) as being part of the team. Particularly, in a culturally evolving environment, being a member of that team not only influences their work performance fulfilment (EWPF), but it also influences their perspective self-development fulfilment (ESDF). That is what, for them generates the engaged response. It is not just a matter of simple relationships between the three ENFs (work performance, relatedness, and self-development) on the one hand and the coping response or satisfaction transition on the other. What has just been described with respect to gender applies across all of the health facilities which were accessed for the present study, regardless of whether it is a clinic or a hospital. However, the larger the hospital, the more important it was for the female doctors. It was especially obvious in the larger settings, where women needed to stand out because there are so many male doctors. That is what made collegiality so important to them.

- **Age and Influence on Outcomes**

The study's findings reveal an interesting aspect regarding the role of age in shaping different outcomes related to the mandatory implementation of healthcare information systems (OASIS). The study highlights the coping responses and transition dynamics associated with OASIS implementation, showing that age plays a significant role in shaping these responses. The participants under 45 years of age showed a more adaptable approach towards the implementation, possibly due to their familiarity and comfort with digital technologies. They perceived the technology as a tool for professional growth and social integration, leading to an engaged response. On the other hand, older participants seemed to face more significant

challenges in adapting to new technologies and viewed them as disruptive, leading to reluctant or compliant responses.

- **Contribution to the Body of Knowledge**

The present study adds to existing knowledge here since, in general, ENF studies of innovations do not pay attention to any influence of variables like gender. Rather they restrict themselves to the primary factors/predictors that make up the ENF model (often our three plus two others) (e.g. Au, Ngai and Cheng, 2008). Hence it is unusual to hear about gender differences in reports of such research. However, in general social psychological research on the workplace, gender is often included. Nevertheless, it is still rare to find gender attitudes to teamwork and the related themes above reported (rather, the benefits or otherwise of different proportions of the genders in teams are often focussed). One relevant study is Stark et al. (2007), but that in fact shows a significantly greater preference by males for working in teams. However, that study was conducted in a context very distant from ours (US students on a Business Administration course).

In the wider literature on response to workplace innovation, again our gender themes above are hard to find reported. In one respect, however, our findings for gender support the general role (if not the precise nature) of gender in influencing response to HIS as it is modelled by UTAUT researchers such as Venkatash et al. (2003). Although that theory works with different proposed factors and different dependent variables from ours and is acceptance rather than resistance-oriented, it does in one respect fit our data in the general role accorded to gender. As seen in Figure 3.7 in chapter 3 the UTAUT arrows portray gender not as directly influencing behavioral intention but, with 'arrows pointing at arrows', as influencing the effect of those factors that do directly affect behavioral intention. Those primary factors, on the left in this diagram, include ones like Performance expectancy, which would consist of elements akin to those in EWPF in the ENF theory, and social influence which might consist of elements

close to those in ERNF and termed collegiality above. Translating this into our model, then, this suggests that we think of gender as 'moderating' the effect of the three ENF components on satisfaction rather than causing an effect itself, and that is more or less how we have described it above. Moderator variables are widely recognised in quantitative research (which UTAUT primarily reflects) where they are seen as increasing or decreasing the effect of the primary factors/predictors. The present study, however, is more informative than that in that it provides qualitative information on exactly how the effects of main factors (EWPF, ERNF, ESDF in our case) are altered or enhanced depending on whether males or females are considered.

- **Implications for Practitioners.**

  The main implication here is for induction trainers when they are training women coming in as interns into the hospital. Usually, both men and women are trained with an emphasis on the importance of functionality the hygiene factors. But when it comes to women, trainers should explain to them how the technology facilitates teamwork and enhances their position on the team, and how that in itself will increase their work performance, assist their positioning within the team and how they are accepted within the team. That can be shown to ultimately influence their future promotion prospects, and so will increase their engaged response.

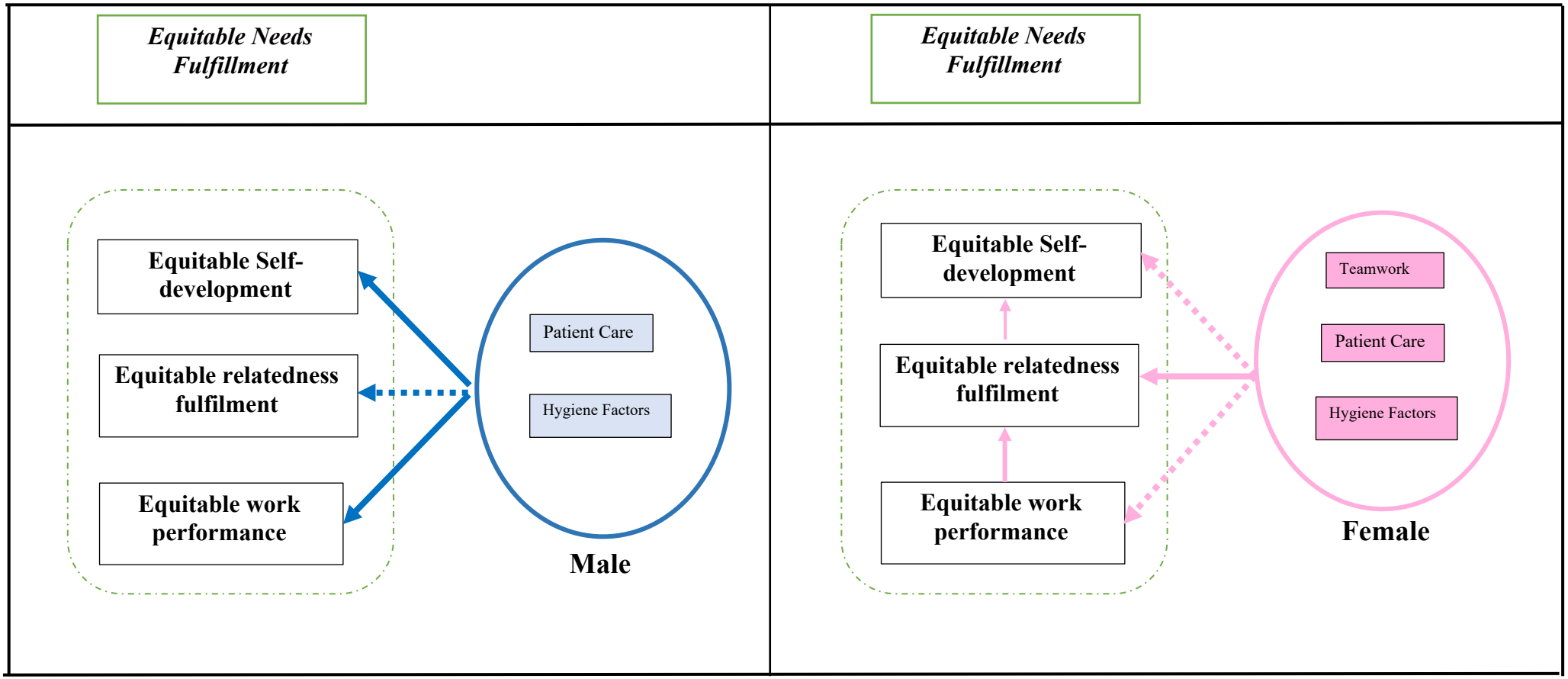


Figure 7.10. Gender-Based Differences in Relation to ENF Variables

7.7. Contribution 6: Synthesisation of Theoretical Frameworks

This research further provides a theoretical contribution by interpreting the data through a synthesis of two theoretical frameworks, one drawn from the organisational psychology domain and the other drawn from the management/ IS domain. In doing so, it moves beyond disciplinary boundaries and answers calls in the literature (e.g., from Bhattacharjee et al., 2018) to increase the level of insight by exploiting the value of cross-disciplinary theoretical engagement. The two theories involved are the Transactional Model of Stress and Coping (TMSC) from the social psychology literature (guiding research question 1) and the Equitable Needs Fulfilment Model (ENF) from the information system literature (guiding research question 2). The benefit from combining these is that we gain a more holistic understanding of the factors that influence variation in coping response at various stages and which may bring about transition. The two theoretical frameworks are compatible because both are based on the individual and their subjective perspective, not on the objective attributes of the technology. That seems particularly important when the situation considered is that of the introduction of a mandatorily used technology. The importance of ENF theory is that it illuminates the factors influencing satisfaction and dissatisfaction and so allows us to interpret what are termed coping responses, and changes of coping responses, in the TMSC in a deeper way than is achieved simply by treating them as the product of two appraisals as the TMSC does. By synthesising both frameworks, a more nuanced perspective on end user response to IT innovation was achieved in this study and richer insights obtained. It therefore answers calls (Bhattacherjee et al, 2018) from the IS literature for research that draws on the theoretical richness which other disciplinary areas can provide and confirms the value and relevance of doing so.

7.8. Contribution 7: The Role of Culture

The Kingdom of Saudi Arabia (KSA) has a rich cultural heritage that significantly influences the responses and transitions observed in the study. Despite the cultural complexities and collectivist tendencies within the KSA context, it is essential to recognize the multifaceted nature of the impact of culture. Middle Eastern cultures, which encompass diverse traditions and values, often place a strong emphasis on familial ties and communal cohesion (Jonathan Haidt, 2013). This emphasis may manifest in the dynamics of the workplace, including responses to technological changes. Moreover, the KSA's rapid development and digital transformation present unique challenges and opportunities, which shape individuals' coping strategies and organizational responses.

To date, limited research exists on variation in how resistance is expressed, and that which exists has been conducted in individualist countries such as the United States (Beaudry and Pinsonneault, 2005; Lapointe and Beaudry, 2014; Bhattacherjee et al., 2018). The current study was conducted in Saudi Arabia, a country characterised as culturally collectivist and which has specific characteristics – being a rapidly developing country, with a rapid infusion of change, particularly digital change. The insights provided by this study therefore provide a valuable point of comparison to earlier research and a counterpoint to the emphasis on research conducted in individualist cultural contexts. They illustrate that the stages outlined in the TMSC are relevant to understanding how individuals respond to mandatory introduction of a health information system in a cultural context that differs significantly from North America or Europe. Moreover, it highlights the relevance of ENF as a theoretical framework for providing insight into the factors that can motivate coping response transitions. As this is the first study to examine ENF as a motivator of coping response transition, it is not contended that the motivating factors identified are culture independent. Indeed to do so, would invalidate the importance of the KSA context and the relevance of the insights which are specific to that

context (e.g. the importance of ENF for women doctors). Instead, this study provides uniquely detailed and robust insight into the stages that predict technology adoption coping responses and the factors that can motivate transition of those responses in a collectivist context, thereby providing an important baseline that will enabled future examinations of the culture independence of those factors in other cultural contexts.

Chapter 8 Limitations and Conclusion

8.0 Introduction

This research has examined doctors' coping responses to the mandatory introduction of the HIS health information system in hospitals and clinics in Saudi Arabia. Specifically, it set out to:

- To identify the nature of those coping responses and the factors that influence their formation within the Transactional Model of Stress and Coping (TMSC) from the social psychology literature and;
- To identify whether those coping responses can transition (either positively or negatively) over a period of time, and if so, to identify what may influence such transitions in terms of Equitable Needs Fulfilment (ENF), from the information system literature.

In order to answer these questions, a unified theoretical model drawn from the literature on coping responses and equitable needs fulfilment was developed, and critical propositions based on that model were articulated. To test those propositions, and answer the questions, the research then took the form of a qualitative investigation in four case studies, which included three distinctively different medical care centres and one general hospital in Saudi Arabia.

8.1. Limitations of this study

Limitations associated with the qualitative research method chosen i.e. the interview approach to data collection, have been outlined in section 5.6. Further limitations of this study include the following:

- Access to doctors due to impact of Covid-19. The data gathering necessarily occurred in the period that was affected by the COVID pandemic. This had the effect of making it harder to get doctors to participate and to organize interviews. The samples that were obtained therefore were not ideal. I did not succeed in getting the same planned balanced number of doctors from each of the four locations, representing different levels of experience, gender, age etc. in a fully parallel way. This meant that it was hard to identify effects of location that were not conflated with other variables. For instance, the doctors in the sample from PAMC were predominantly better trained/experienced in IT than those from the other locations, where the doctors in our samples were more mixed in this respect.
- The limitation is associated with the sample size and gender. The researcher expected that 50% of the interview participants would be female; however, due to the shortage of female physicians working during the research period, this was not the case. Therefore, the ratio of male doctors working in KFGH and PAMC is higher than that of females.
- Nature of participants. Although theoretical accounts often refer to 'end-users' of IT, as if such people form some sort of homogeneous group, hospital management software has many types of end-users, each with their own differing backgrounds and requirements of the software. They are not limited to doctors but also include clerical

staff, nurses, radiographers, pharmacists, hospital management and, indeed, the patients. Furthermore, there are the people involved in the design of the innovation, e.g., the software production team and the Ministry of Health. In order to obtain the fullest picture of what kinds of responses people have to the software and the explanations for such responses, ideally, all these types of people would be interviewed. However, it was apparent from early on in the study that that would be far too ambitious a scope within the scope of one PhD, so the participants were limited to doctors.

- Timing of interviews. Due to the timing of the study in relation to the timing of the HIS innovation, it was possible to gather data about the changes/transitions in doctors' responses only retrospectively, not concurrently. The study was, in a sense, longitudinal since it covered the same doctors' responses to the HIS at different times. However, the information about those times all came from one interview, which was more than a year after the innovation had taken place, so doctors were being asked to report not just how they felt now about the innovation but also how they felt quite a long time before, and how their views changed (if they did). Clearly, in such cases, there is always the danger of reports of the earlier stages being affected by later feelings or post hoc rationalisation or by lack of full recall or an increase in good or bad associations of the events due to the passage of time (halo or horn effect). Ideally, the doctors would have been interviewed very shortly after the innovation and again, a year or more later, to obtain the best evidence of change/transition. This limitation, however, was inevitable due to the timing of the study.
- Limited confirmation of the models. The study clearly showed the benefits of interpreting the data through the lenses of two theoretical models rather than one. Greater insights were obtained. However, this must not be mistaken for confirmation of everything claimed by these models. In particular, each model provides an account

of the mental processes that a person goes through, which was not in detail evidenced by our data. The TMSC, for instance, claims that two appraisals occur on the way to arriving at a response to an innovation. In our study, however, the participants were asked questions which assumed this pattern, so were not free to evidence their natural line of reasoning; hence we cannot claim that what they said supports the details of the TMSC framework, only that assuming it proved an effective way of eliciting relevant information. Again, the ENF theory claims that people engage in a subtle process of weighing up their own inputs and outputs in relation to those of others in order to decide whether their needs are equitably fulfilled. Again, the questions we asked did not probe that process but focused on the three key areas of need that they also distinguish (need for self-development, relatedness and work performance fulfilment). Hence, we cannot claim that our study does more than support the usefulness of drawing attention to that part of the ENF model.

- Connection between the models. In connecting the two models, decisions were made that seemed reasonable at the time and yielded good results but clearly need more thought and investigation. They include the following. (1) It was assumed that the ENF was relevant to explaining changes/transitions in TMSC response to the OASIS rather than the responses themselves: one could argue that changes in ENF assessment would yield change in response to software. (2) The ENF itself speaks of satisfaction as the dependent variable, which we tacitly equated with the TMSC three-point response scale. (3) It is unclear how a person's calculation about their ENF connects with or coexists with their engagement in TMSC appraisals: perhaps we should imagine the ENF as coming in to affect the appraisals rather than the TMSC response scale directly, so it provides an alternative view of the factors affecting the appraisals.

8.2. Contributions to Theory

This study makes a contribution in a number of ways. This is achieved by its focus on dimensions of the technological innovation event, which are, if not absent from, at least under-represented in the existing literature. Chapter 7 has already detailed the study's particular contributions to our understanding of primary appraisal, secondary appraisal, coping responses, transitions of coping response and the role of three ENF categories.

The broader contributions may be considered under seven heads.

- Focus on mandatory rather than optional use of innovative technology. Much of the previous research on technological innovation has focused on users' choice to use or not use technological innovation in their workplace or elsewhere. However, such innovations are increasingly imposed by institutions, often with little consultation with the workforce. Hence the user has no natural choice so consequently, the nature of acceptance or nonacceptance takes on a different form. There is a pressing need for more research on that situation, to which the present study contributes.
- Focus on lack of acceptance as well as acceptance. Connected with the preceding, attention has more often been paid to how and why innovations are accepted rather than resisted. Most theories in this area include some sort of scale which has two ends, e.g. acceptance – resistance, adoption – rejection, satisfaction – dissatisfaction. However, often they talk predominantly in terms of the positive end of that scale and their implicit stance is that what needs explaining is that positive end and not the reverse. The present study however attempted to be even handed in its approach.
- Focus on theories other than UTAUT. Associated with those decisions, the approach selected was not to adopt the UTAUT or a similar framework.

Although increasingly popular and seen by some as the gold standard of technology acceptance research, such theories tend to perpetuate both the above-mentioned disadvantages, i.e. emphasis on acceptance in non-mandatory contexts. The theories chosen were, therefore, even-handed in their attention to both negative and positive ends of the scale.

- Focus on change/transition, not just a single time point. Again, although the dissemination of a change over time has long been modelled theoretically, there are few empirical studies of this process. The present study made a considerable contribution here by demonstrating an upward (to more positive) and a downward transition, thus contributing to filling that gap. Furthermore, it was found that, in ENF terms, the same variables were involved in both directions of movement.
- Involvement of multiple theories rather than one. A further feature of theoretical importance is that the present study employed two theories rather than one. Most studies are consistent in following one chosen approach. However, all frameworks have their limitations; arguably, it would be more informative to unite more than one. The present study attempted exactly that and demonstrated the increase in insight by employing two lenses rather than one through which to view the data.
- Qualitative research. This is not so often used in this field of research as quantitative research. However, aware of the many limitations of quantitative research, e.g. in restricting participants to a researcher led list of closed response questions, the present study adds to the body of qualitative information in this area.

- Focus on a less studied context. Finally, in an area where most work is done in western countries, the present study is the first we know of in the Saudi context, which differs in many socio-cultural respects from the West. However, it is notable that barely any feature of the study was able to be interpreted as distinctively Saudi in its cultural nature.

8.3 Directions for Future Research

The limitations already suggest some obvious follow up studies. Clearly there is a need for studies that track similar innovations with a series of data gathering points over time, possibly both quantitative and qualitative. In this way a richer and more precise picture could be built up of the process of response change and its causes.

- In the hospital context there is room for a cross-sectional study over different kinds of user, to ascertain how much they differ in response and reasons for response. Indeed, there is a need to answer the questions whether in such a context with such diverse users it is possible for one system to be implemented in a way that it can suit all.
- A dimension not pursued in the present study was analysing and evaluating the IT system alongside the doctors' perceptions. That was a consequence of the decision to choose only theories that dealt with user perceptions. However, it means we do not know where the doctors' perceptions match reality. That is important when planning follow-up interventions. If doctors report that a certain function does not work on the system, then the remedial action would be quite different if the function in fact does not work properly or in a suitably friendly way from if it in fact does work. In the former case, the software needs fixing; in the latter case the doctor needs 'fixing', i.e., through training. If such reality checks are not performed, there may be a tendency to overinterpret

reported problems as due to the user, so that more and more training is called for to enable a poorly designed system to be perpetuated.

- Finally, there is a need for increased efforts to identify a unified theory of factors affecting user perceptions of innovation (and by implication also change in such perceptions). At the moment we still have multiple theories with their own lists of factors, e.g., UTAUT, ENF, the factors affecting appraisal in TMSC, including the list uncovered in the present study.

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Appendix (A) Informed Consent Form

Study Title: A Qualitative Examination of Employee Coping Responses to Mandatory Health Information Technology in Saudi Arabia: A Coping Theory Perspective.

Researcher name: Hanof Abozenadah.

Supervisor name: Prof. Regina Connolly

School/ Department: *DCU Business School*

Purpose of this research: This research seeks to examine user's coping responses to the health information system in Jeddah hospitals, the second-largest city in Saudi Arabia. The literature on coping responses to new technology introduction in organisations is particularly scarce. For that reason, this research will provide valuable and necessary insights that will be helpful to researchers and to practitioners seeking to ensure maximal adoption of new health technology systems in a rapidly developing country (MOH, 2019; Bhattacherjee et al,2018; Beaudry, A. and Pinsonneault, A., 2005).

The specific objectives of this research are as follows:

- To identify the differing user coping responses to mandatory introduction of the health information system in Saudi Arabia.
- To identify the factors that influence the formation of those responses, whether user responses to the technology can transition (either positively or negatively) over time and, if so, what interventions may influence such transitions.
- To investigate coping responses in relation to a mandatory technology in a developing economy.

Participant - Please complete the following YES and NO questions:

1-	I have read the Plain Language Statement.	Yes/No
2-	I understand the information provided	Yes/No
3-	I have had the opportunity to ask question related to the study	Yes/No
4-	I am aware that my interview will be recorded	Yes/No
5-	I am aware that involvement in this study is voluntary	Yes/No
6-	I am aware that I can withdraw from the interview at any point	Yes/No

7- Confirmation of arrangements to be made to protect the confidentiality of data, including confidentiality of information provided is subject to legal limitations Yes/ No

Consent: I have read and understood the information in this form. My questions and concerns have been answered by the researcher, and I have a copy of this consent form. Therefore, I consent to take part in this research project

Name in Block Capitals: **Participants Signature:**

Witness: **Date**

Appendix (B) Plain Language Statement

This research entitled "A Qualitative Examination of Employee Coping Responses to Mandatory Health Information Technology in Saudi Arabia: A Coping Theory Perspective" is being conducted by Prof. Regina Connolly (email: Regina.connolly@dcu.ie) and PhD candidate Hanof Abozenadah (email: Hanof.Abozenadah2@mail.dcu.ie).

School/ Department: *Dublin City University/ Business School*

Details of Research

The literature on coping responses to new technology introduction in organisations is particularly scarce. For that reason, this research will provide valuable and necessary insights that will be helpful to researchers and to practitioners seeking to ensure maximal adoption of new health technology systems in organisations.

This study will try to identify the differing user coping responses to mandatory introduction of the OASIS health information system in Saudi Arabia, the factors that influence the formation of those responses, whether user responses to the technology can transition (either positively or negatively) over time and, if so, what interventions may influence such transitions.

The data collected will be used only for academic purposes.

Details of involvement

- By deciding to take part in this study, you will be expected to complete via interview questionnaire which take approximately 30 minutes to complete.
- Participants they do not have to answer any questions that may make they feel uncomfortable.
- Data management will be conducted in accordance with the *GDPR* principles**,** all data will be securely stored.
- Each completed questionnaire will have a unique identifier to link to the respondent and this detail will be stored in a file separate from the data. All data will be stored electronically on DCU google drive and in encrypted folders on a DCU desktop and on an encrypted DCU laptop. All paper relating to this study will be shredded or disposed via a secure bin, whilst electronic based information will be deleted two years after the project ends by the researcher.
- Participants can leave the interviews at any point, either pausing and returning later, or stopping entirely, and can withdraw their data from the study at any point of time contacting- Researcher Hanof Abozenadah - (email: hanof.Abozenadah2@mail.dcu.ie).

- The DCU Data Protection Officer – Mr. Martin Ward (data.protection@dcu.ie Ph: 7005118 / 7008257).
- While every effort will be made to ensure the protection of data collected, participants are advised that data will be protected under the legal limitations of the law. In accordance, data may be subject to subpoena, or a freedom of information claim.

In the event you have any complain or query on the way the research is conducted, Kindly contact:

The Secretary, Dublin City University Research Ethics Committee, c/o Research and Innovation Support, Dublin City University, Dublin 9. Tel 01-7008000, e-mail rec@dcu.ie

Appendix (C) Interview Template: Background and Guiding Questions

Thank you for agreeing to participate

Section 1: Background Information

- Age
- Work role/ status/seniority
- IT use/ skills
- Support/ training
- When did you first start to use OASIS? (Was it obligatory? At that time? After that time?

Now, let's talk a bit more about your OASIS experience.

Section 2: Guiding Questions related to Propositions 1-7 (Coping theory)

Primary Appraisal *(adapted from Bhattacherjee et al. 2018).* *(Opportunity/ threat)*

- Can you describe to me the first time you learned about OASIS and what your thoughts were at that time about being asked to use it, what you expected it to be able to do/ how you viewed it? *(Increased efficiency/ may not be able to use)*

- Why did you feel that way?

- Are your views regarding OASIS the same today? If not, what caused them to change?

Secondary Appraisal *(adapted from Bhattacherjee et al. 2018) (High/ Low Control)*

- When you used the OASIS system for the first time, how did you feel? (*In control/ overwhelmed/ capable of using it as required/ May reference training, Ease of use, helpful to their work*: Did it meet your expectations and how/ how not?)

- If you did not feel in control and able to use the system, how did you manage the expectation or requirement to use it as part of your work?

- Is the way you view OASIS the same today? What, if anything, has changed between then and now?

Coping response *(adapted from Bhattacherjee et al. 2018)*

- Can you describe your attitude towards using the OASIS system when you first used it? (Coping strategies: Engaged, compliant, reluctant)

- Is the way in which you use the technology the same or different from your colleagues, and if so, how?

Section 3: Coping Response Transitions

Guiding Questions related to propositions 8-12 (Equitable Needs Fulfilment)

ENF 1: Self Development (*adapted from Au, Ngai and Cheng, 2008).*

- Does OASIS help you to do your work in a way that looks good to your manager and could strengthen the possibility of you being promoted (or made permanent in your role)?
- In what way? How important is this to you, and why?

- Has this changed your view of the technology and the way in which you use it – and if so, how and in what ways? *(Transition: Increased, reduced, remained same over time)*

- Has it increased your satisfaction with the technology? *(Satisfaction)*

- How would you describe your use of the technology today? *(New coping response)*

ENF 2: Relatedness (adapted from *Au, Ngai and Cheng, 2008).*

- Does OASIS improve communication between you and your colleagues/ your clinical team and patients? How important is this to you, and why?

- Has this changed your view of the technology and the way in which you use it – and if so, how?
- *Transition: Increased, reduced, remained same over time)*

- Has it increased your satisfaction with the technology? *(Satisfaction)*

- How would you describe your use of the technology today? *(New coping response)*

ENF 3: Work performance fulfilment (adapted from *Au, Ngai and Cheng, 2008).*

- Does OASIS help provide fast and reliable information and improve your ability to do your job more effectively? How important is this to you, and why?
- Has this changed your view of the technology and the way in which you use it – and if so, how? *Transition: Increased, reduced, remained same over time)*
- Has it increased your satisfaction with the technology? *(Satisfaction)*
- How would you describe your use of the technology today? *(New coping response)*

Final
Is there anything else you would like to say about the OASIS technology?

Appendix (D)

Table. Positive and negative words applied in the initial primary appraisal

Category	Word	Positive / Negative	Occurrence
Overall evaluation	positive	p	a1 a3 a9 a14 a25 s26 a30 a38
	negative	n	a8 a10 a11 a13 a31
	not accept	n	a21 a35
	accept	p	a6
	ok	p	a37
Perceived importance	essential	p	a17
Perceived ease	hard	n	a16 a22 a32 a36 a38
	difficult	n	a5 a7 a28
	easy	p	a7 a23 a24
Emotion/Affect	happy	p	a4 a29
	not like	n	a7 a21
	hate	n	a5
	resistant	n	a19
	threat	n	a2 a4
	challenge	n	a2 a15 a17 a20
	shocked	n	a27 a33
	depressed	n	a32
	worried	n	a36 a37 a38
	frustrated	n	a15 a34
	ashamed	n	a22

Appendix (E) DCU Ethical Approval

Appendix (F) **MoH Ethical Approval**

وزارة الصحة
Ministry of Health

المملكة العربية السعودية
Kingdom of Saudi Arabia
مديرية الشؤون الصحية بمحافظة جدة
Directorate of Health Affairs - Jeddah
(٢٠٢/٢٧٥)

Research and studies Department- Jeddah Health Affairs — إدارة البحوث والدراسات بصحة جدة

IRB registration Number with KACST, KSA: H-02-J-002	
Date: 21/03/2021	Research Number: 1462
Type of review:	☐Full board ☐Expedited ☐Exempt

Initial Approval with Conditional - **الموافقة المبدئية المشروطة للجنة الأخلاقية**

The Principle Investigator (PI)	Hanof Abozenadah	اسم الباحث الرئيسي
Submission Date	20/02/2021	تاريخ التقديم
Research Title	Understanding User Adaptation Responses to Health Information Technolo Use in Saudi Arabia: A Coping Theory Perspective	عنوان البحث

The above titled research / study proposal has been examined with the following end closures: The study Protocol, ethics and Questionnaire.
The IRP recommended granting permission of approval to conduct the project along the following terms:

1. The PI and investigators are responsible to get permission from the head of department or unit in the institution to commence data collection.
2. The Investigator will conduct the study under the direct supervision by **Sawsan Al-Ghamdi**
3. Provide IRB "Continuing Review Progress Report" every **6 month**.
4. Any amendments to the Approved Protocol or any element of the submitted documents should NOT be under taken without prior re-submission to, and approval of the IRB for prior approval.
5. Monitoring: The Project may be subject to audit or any other form of monitoring by the IRB.
6. The PI is responsible for the storage and retention of original data of the study for a minimum period of five years.
7. The PI is expected to submit a final report at the end of the study.
8. The PI must provide to IRB a conclusion abstract and the manuscript before Published.
9. The PI and researchers are required to have current and valid certificate on protective human research subjects.
10. The final approval letter with the IRB number will be given to the IP after he complete all the above terms and conditions
11. To follow all regulation issued by the National Committee of bio med ethics – King Abdul Aziz city for science and technology.

The organization and operating procedures of the research and study Administration – Directorate of health Affairs – Jeddah – Institutional review board (IRB) are based on the good clinical Practice, (*GCP*) Guidelines.

PLEASE NOTE THAT THIS APPROVAL IS VALID FOR ONE YEAR COMMENCING FROM THE DATE OF THIS LETTER.

☑ **I Read and Agree to the Above and take full responsibility**
Signature :

Hanof H

تمت مراجعة المشروع المذكور للمحتويات الاتية: البروتوكول، الاستبيان واخلاقيات البحث العلمي.
توصي لجنة اخلاقيات البحث العلمي بالموافقة لإجراء المشروع على أساس الشروط التالية:

1. على الباحث الرئيسي والباحثين المشاركين الحصول على اذن من رئيس المنشأة للبدء بجمع البيانات المطلوبة للمشروع.
2. سيقوم الباحثين بإجراء الدراسة تحت اشراف مباشر من **سوسن غرم الله الغامدي -مستشفى الملك فهد العام**
3. يقوم الباحث بتقديم تقرير كل **6 أشهر** عن اخر ما تم تنفيذه في المشروع.
4. أي تعديل على بروتوكول المشروع او أي من الوثائق المقدمة مسبقا يجب الحصول على موافقة اللجنة قبل البدء في التنفيذ.
5. **المراقبة:** ممكن للمشروع ان يخضع للمراجعة او أي نوع من المراقبة من قبل اللجنة الأخلاقية اثناء تنفيذ المشروع.
6. الباحث الرئيسي هو المسؤول عن حفظ البيانات الاصلية لمدة لا تقل عن **خمس سنوات** من اجراء المشروع.
7. المتوقع من الباحث ان يقدم تقريرا نهائيا في نهاية المشروع.
8. يجب على الباحث تقديم ملخص الدراسة ونسخة من المخطوطة قبل القيام بالنشر في المجلات العلمية.
9. يجب على الباحث الرئيسي والباحثين المشاركين الحصول على شهادة اخلاقيات البحث العلمي حديثة وسارية.
10. **يحصل البحث على خطاب الموافقة النهائي ورقم الموافقة من اللجنة الأخلاقية بعد قيام الباحثين باستكمال الشروط السابق ذكرها.**
11. على الباحثين اتباع الأنظمة والقوانين الصادرة من اللجنة الوطنية لأخلاقيات الطب الحيوي بمدينة الملك عبد العزيز للعلوم والتقنية.

ان اللوائح التنظيمية والتشغيلية للجنة الأخلاقية التابعة لإدارة البحوث والدراسات في صحية جدة تستند على الممارسة السريرية الجيدة، (*GCP*) Guidelines.

ملاحظة: هذه الموافقة المبدئية صالحة لمدة عام من تاريخ الصدور.

☑ قرأت وأوافق على ما سبق واتحمل كامل المسئولية.
التوقيع :

Hanof H

Dr. / Hanouf Bin Hind
Chairman of Jeddah Institute Review Board

الرقم : / التاريخ :

هاتف : ٦٩٧٠٠٠٦-٠٢ / ٦٨٣١٣٧٧-٠٢ فاكس : ١٢٤٩٣ ص.ب : جدة ٢١١٧٦
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