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Investigating the Antecedents of Perceived Threats and User Resistance to Health Information Technology

Thesis presented by

Mansor Alohali

Thesis submitted for the degree of Doctor of Philosophy in Business Information Systems

University College Cork

Supervisors: Dr Fergal Carton and Dr Yvonne O'Connor

July 2021

Table of Contents

List of Figures *6*

List of Tables *7*

List of Publications *9*

Acknowledgements *11*

Abstract *12*

1. Chapter One: Introduction to the Study *13*

1.1 Research Problem **13**

1.2 Research Objective and Research Questions **17**

1.3 Health Information Technology **18**

1.4 Key Contributions **21**

1.4.1 Key Theoretical Contributions 21

1.4.2 Key Practical Contributions 26

1.5 Research Approach **27**

1.5.1 Research Philosophy 29

1.5.2 Research Strategies: Adopting a Qualitative Approach 32

1.5.3 Research Method: Adopting a Case Study Method 35

1.5.4 Data Collection 41

1.5.5 Data Analysis 44

1.6 Thesis Structure **49**

1.6.1 Chapter One 49

1.6.2 Chapter Two: Literature Review 50

1.6.3 Chapter Three: Theoretical Foundation and Model Development 51

1.6.4 Chapter Four: First Case Study 52

1.6.5 Chapter Five: Second Case Study 53

1.6.6 Chapter Six: Cross-case Analysis 54

1.6.7 Chapter Seven: Discussion and Conclusion 55

1.7 Conclusion **55**

2. Chapter Two: Literature Review *57*

2.1 Abstract **57**

2.2 Introduction **57**

2.3 Methodology **59**

2.4 Conceptualising Resistance **60**

2.4.1 Analysing Existing Definitions of User Resistance 61

2.4.2 Defining User Resistance 66

2.4.3 User Resistance Behaviour 67

2.5 Theories of Resistance 70
2.5.1 Theories: Perception and User Resistance 71
2.5.2 Theories: Change and User Resistance 74
2.5.3 Summary of User Resistance Theorising 75
2.6 Findings and Future Research Directions 76
2.6.1 Future Theorisations of User Resistance 77
2.6.2 Extending User Resistance Theories: Antecedents of Perceived Threats 77
2.6.3 Focus on Users 80
2.6.4 Operationalisation of User Resistance 83
2.6.1 Impact of Resistance 84
2.6.2 Management's Actions and Resistance Behaviour 86
2.7 Conclusion 87
3. Chapter Three: Theoretical Foundations and Model Development 89
3.1 Abstract 89
3.2 Introduction 90
3.3 Theoretical Background 93
3.3.1 Definition of User Resistance 93
3.3.2 Overview of User Resistance Theory 95
3.4 Model Development (Antecedents of Perceived Threat of HIT) 97
3.4.1 Personal Factors 98
3.4.2 Interaction Factors 98
3.4.3 Organisational Factors 99
3.4.4 HIT-related Factors 100
3.4.5 Perceived Threat 101
3.5 Proposed Methodology 102
3.6 Conclusion 103
4. Chapter Four: A Case Study of a Military Hospital 105
4.1 Abstract 105
4.2 Introduction 106
4.3 Literature Review 108
4.4 Methods 112
4.4.1 Data Collection 113
4.4.2 Data Analysis 114
4.4.3 Case Background 115
4.5 Results 116
4.5.1 Personal Factors: Related Knowledge of HIT 117
4.5.2 Organisational Factors: Management Support 118
4.5.3 HIT-Related Factors: System Incompatibility 119
4.5.4 Interaction Factors: Lack of Trust 121
4.5.5 Perceived Threats: Perceived Dissatisfaction 122

4.5.6 Perceived Threats: Perceived Risk 124
4.6 Discussion and Conclusions 125
4.6.1 Key Findings 125
4.6.2 Theoretical Implications 128
4.6.3 Managerial Implications 128
4.6.4 Limitations and Future Research 129
5. Chapter Five: A Case Study of a Public Hospital 130
5.1 Abstract 130
5.2 Introduction 130
5.3 Theoretical Background 133
5.3.1 Understanding User Resistance 133
5.3.2 Overview of User Resistance Theory 134
5.4 Model Development (the Antecedent of Perceived Threat to HIT) 136
5.4.1 Personal Factors 136
5.4.2 Organisational Factors 137
5.4.3 HIT-related Factors 138
5.4.4 Interaction Factors 138
5.4.5 Perceived Threats 139
5.5 Methodology 140
5.5.1 Case Description 142
5.5.2 Data Collection 144
5.5.3 Data Analysis 144
5.6 Findings 145
5.6.1 Personal Factors: Related Knowledge 147
5.6.2 Organisational Factors: Management Support 148
5.6.3 Organisational Factors: User Involvement 149
5.6.4 HIT-related Factors: System Performance 150
5.6.5 Interaction Factors: Social Influences 151
5.6.6 Perceived Threat: Perceived Dissatisfaction 153
5.6.7 Perceived Threat: Perceived Loss of Professional Autonomy 154
5.7 Discussion and Implications 155
5.7.1 Theoretical Implications 159
5.7.2 Practical Implications 160
5.7.3 Limitations and Further Research 161
6. Chapter Six: A Cross-Case Analysis 162
6.1 Abstract 162
6.2 Introduction 163
6.3 Literature Review 166
6.3.1 Definition 167
6.3.2 The Antecedent of Perceived Threats 167

6.4 Research Approach 169
6.4.1 Overview of Case Study Sites 171
6.4.2 Data Collection 172
6.4.3 Data Analysis 174

6.5 Cross-Case Analysis: The Antecedents of Perceived Threats 175
6.5.1 Introduction to Findings 175
6.5.2 Exploring the Antecedents to Perceived Threats 178
6.5.3 Exploring Perceived Threats to HIT 186

6.6 Cross-Case Analysis 190
6.6.1 Comparing the Two Cases 190
6.6.2 Differences Between Physicians and Nurses and Across the Level of Physicians. 194
6.6.3 Summary of Cross-Case Analysis 196

6.7 Discussion 197
6.7.1 Contributions for Research 197
6.7.2 Contributions for Practice 199
6.7.3 Limitations and Future Research Directions 201

7. Chapter Seven: Discussion and Conclusion 203

7.1 Research Question: Why do users perceive HIT as threats and how do perceived threats lead to user resistance? 203
7.1.1 Related Knowledge of HIT 205
7.1.2 Management Support 207
7.1.3 Lack of User Involvement 208
7.1.4 System Performance 210
7.1.5 System Incompatibility 211
7.1.6 Social Influence 213
7.1.7 Lack of Trust 214
7.1.8 Perceived threats 215

7.2 Research Contributions 221
7.2.1 Contributions to Theory 222
7.2.2 Contributions to Practice 232

7.3 Implications for Theory and Practice 236

7.4 Limitations and Future Research 243

7.5 Concluding Remarks 244

References 245

Appendices 263

List of Figures

Figure 1.1 Overall research design and strategy *28*
Figure 1.2 Analysis and findings *48*
Figure 1.3 The antecedents of perceived threats and user resistance *51*
Figure 1.4 The antecedents of perceived threats and user resistance *55*
Figure 2.1 How IS researchers view user resistance *66*
Figure 3.1 The antecedent of perceived threat *97*
Figure 4.1 The antecedents of perceived threats and user resistance *117*
Figure 5.1 The antecedents of perceived threats and user resistance (Alohali et al., 2018) *140*
Figure 6.1 Preliminary model of the antecedents of perceived threats and user resistance. Adapted from Aloahli et al. (2018, p. 5) *169*
Figure 6.2 The antecedents of perceived threats and user resistance *176*
Figure 6.3 Difference between physicians and nurses *195*
Figure 7.1 The antecedents of perceived threats *205*
Figure 7.2 Perceived threats of HIT *217*
Figure 7.3 The antecedents of perceived threats and user resistance *222*
Figure 7.4 Differences between physicians and nurses *231*
Figure 7.5propositions for the model of the antecedents of perceived threats and user resistance *237*

Figure E-1 Differences between interviewees in both cases *284*
Figure E-2 Comparing interviewees (by level of interviewee) *285*
Figure E-3 Comparing physicians and nurses *286*
Figure E-4 Mind map of analysis and findings *287*

List of Tables

Table 1-1 Strengths and weaknesses of quantitative methods *33*
Table 1-2 Strengths and weaknesses of qualitative research *34*
Table 1-3 Strengths and weaknesses of case studies *36*
Table 1-4 Cases considered for this study *38*
Table 1-5 Similarities and differences between the cases *41*
Table 1-6 Strengths and weaknesses of interviews *42*
Table 1-7 Physicians and nurses interviewed *43*
Table 1-8 Sample of the coding process *46*
Table 2-1 Breakdown of user resistance definitions *63*
Table 2-2 Description of user resistance behaviours *69*
Table 2-3 Common constructs used in user resistance theories *78*
Table 2-4 Overview of types of users in user resistance research *81*
Table 2-5 Focus of user resistance research in IS literature *85*
Table 4-1 A sample of the chain of evidence linking related knowledge with perceived dissatisfaction *118*
Table 4-2 A sample of the chain of evidence linking management support with perceived dissatisfaction *119*
Table 4-3 A sample of the chain of evidence linking system incompatibility with perceived dissatisfaction *121*
Table 4-4 A sample of the chain of evidence linking trust with perceived risk *122*
Table 4-5 A sample of the chain of evidence linking perceived dissatisfaction with User resistance *124*
Table 4-6 A sample of the chain of evidence linking perceived risk with user resistance *125*
Table 6-1 Similarities and differences between the cases *170*
Table 6-2 Summary of physicians and nurses interviewed *173*
Table 6-3 Definition of the antecedents of perceived threats *176*
Table 6-4 Definition of the perceived threats to user resistance *177*
Table 7-1 source of factors and relationship model figure 7.3 and contributions to the user resistance literature *225*
Table 7-2 Summary of the study's contributions to user resistance research *229*
Table 7-3 A summary of the study's contributions to IS research *232*
B-1 Chain of Evidence *267*

C-1 Sample of the analysis and calculation process (military hospital case study) 269

D-1 A sample of the chain of evidence linking related knowledge to HIT with perceived dissatisfaction 270

Table D-2 A sample of the chain of evidence linking management support with perceived dissatisfaction and perceived loss of professional autonomy 272

Table D-3 A sample of the chain of evidence linking lack of user involvement with perceived dissatisfaction and system incompatibility 274

Table D-4 Sample of the chain of evidence linking system incompatibility with linked with perceived dissatisfaction 276

Table D-5 A sample of the chain of evidence linking social influence with perceived dissatisfaction 277

Table D-6 A sample of the chain of evidence linking perceived dissatisfaction with user resistance 279

Table D-7 A sample of the chain of evidence linking perceived loss of professional autonomy with the perceived dissatisfaction and with user resistance 282

Table D-8 A sample of the chain of evidence linking perceived risk autonomy with user resistance 283

List of Publications

- Alohali, M., Carton, F., & O'Connor, Y. (**Under review, Submitted 5th of December 2020**). 'User resistance to information technology: An "organising" review of the literature.' *Behavior and Information Technology.*
- Alohali, M., O'Connor, Y., & Carton, F. (2018). 'Investigating the antecedents of perceived threats and user resistance to health information technology: Towards a comprehensive user resistance model.' In *ECIS 2018: Twenty-Sixth European Conference on Information Systems* (pp. 1–13). European Conference on Information Systems, ECIS.
- Alohali, M., Carton, F., & O'Connor, Y. (Accepted 15 Sept. 2020). 'Physicians' and nurses' perceived threats toward health information technology: A military hospital case study.' *IFIP Working Group 8.6. Tamil Nadu, India. December 17–19, 2020.*
- Alohali, M., Carton, F., & O'Connor, Y. (2020). 'Investigating the antecedents of perceived threats and user resistance to health information technology: A case study of a public hospital'. *Journal of Decision Systems, 29*(1), *27–52.*
- Alohali, M., Carton, F., & O'Connor, Y. (**Under review, Submitted 7th of December 2020**). 'Understanding resistance to health information technology: The antecedents of perceived threats.' *Information and Organization.*

The Author declares that, except where duly acknowledged, this thesis is entirely his own work and has not been submitted for any degree in the National University of Ireland, or any other University.

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Abstract

The problem of physicians and nurses' resistance to Health Information Technology (HIT) is an issue that could lead to time wastage, budget overruns and HIT implementation failure, leading to substantial financial losses for many organisations. Moreover, it prevents organisations from harnessing the desired benefits of HIT. Therefore, to better manage the implementation of new IT projects, it is imperative to recognise and understand behaviours of resistance. A deeper understanding of user resistance will allow organisations to control and manage such behaviour, helping to ensure the success and continued use of HIT.

Information systems (IS) literature indicates that user resistance can arise from a negative user perception of IS in healthcare. The antecedents of these negative perceptions have not been thoroughly examined nor have their relationship with the perceived threat. This study theorises why physicians and nurses perceive HIT as a threat and how those perceived threats lead to user resistance. The study adopts a qualitative method, using within- and cross-case analysis of two in-depth case studies, a military hospital and a public hospital.

This study contributes to user resistance research by identifying the antecedents of perceived threats and user resistance. It highlights the differences between the cases due to the differences in culture, management style, and organisational decisions regarding whether to develop HIT in-house or to buy it, and whether these factors influence the antecedents of perceived threats and user resistance. Finally, the study shows how the differences between physicians and nurses and the differences across various levels of physicians influence the antecedents of perceived threats.

1. Chapter One: Introduction to the Study

This chapter presents an introduction to the research investigated in this thesis. The thesis is structured as a collection of papers, with an introduction and a conclusion chapter. This chapter outlines the research problem (Section 1.1), identifies the research objective and research question (Section 1.2), and defines the concept of health information technology (HIT) (Section1.3), highlights the key contributions of the research (Section 1.4), outlines the plan of this research, the research philosophy and the research approach (Section 1.5), and presents the structure of the thesis and a summary of each chapter (Section 1.6). Finally, Section 1.7 is the conclusion of the chapter.

1.1 Research Problem

Technological advancement brought about by information technology (IT) has led to improvements in organisational efficiency and effectiveness (Meri et al., 2019; Sabi et al., 2018), including those achieved in the healthcare sector (Beglaryan et al., 2017; Li et al., 2019). It is very well documented that Health Information Technology (HIT) has the potential to improve the quality of healthcare delivery by reducing medical errors (Gates et al., 2019; Howlett et al., 2020), increasing patient safety (Boockvar et al., 2017; Howlett et al., 2020), improving service management (Unruh et al., 2017), and lowering healthcare delivery cost (Everson et al., 2017). Such documented benefits of HIT have led to an increase in the number of hospitals that are implementing HIT (Liang et al., 2020; Sood and McNeil, 2017). Investments in HIT represent a substantial percentage of hospitals' budgets (Chaudhry et al., 2006; Joia et al., 2014). However, the problem of physicians and nurses' resistance to HIT is an issue that could lead to time wastage and budget overruns, as well as HIT implementation failure (Alsharo et al., 2018; Mahmud et al.,

2017), leading to substantial financial losses for many organisations (Choudhary et al., 2018; Mahmud et al., 2017). Moreover, it prevents organisations from harnessing the desired benefits of HIT (Brenner et al., 2015; Hersh et al., 2016). Therefore, to better manage the implementation of new IT projects, it is imperative to recognise behaviours of resistance and understand the reasons for user resistance (Ngafeeson and Midha, 2014; Shang, 2012; Smith et al., 2014). A deep understanding of the reasons for user resistance behaviour will allow organisations to control and reduce user resistance behaviour (Lapointe and Rivard, 2005; Laumer et al., 2016b). Moreover, overcoming the problem of user resistance behaviour will ensure the success and continued use of HIT (Chong et al., 2015). This will allow hospitals, as well as physicians and nurses, to obtain the desired benefits of HIT.

There is a common belief among Information Systems (IS) scholars that user resistance must be mitigated to gain the desired benefit from new IT projects (Beaudry et al., 2020; Kheybari et al., 2020). Therefore, there is a large number IS researchers who have studied the problem of user resistance (e.g., Ferneley and Sobreperez, 2006; Hossain et al., 2019; Klaus and Blanton, 2010). Further, various perspectives and theories have been adopted by IS researchers to investigate user resistance and improve our understanding of the subject (e.g., Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Kim and Kankanhalli, 2009; Markus, 1983). Researchers have identified many sources of user resistance, such as a user's negative perception (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Lin et al., 2012), change of status quo (Kim and Kankanhalli, 2009; Lee and Joshi, 2017), uncertainty (Mahmud et al., 2017), lack of motivation to change (Fu et al., 2020), transition cost (Darby et al., 2019), and switching cost (Kim and Kankanhalli, 2009; Mahmud et al., 2017). A large number of researchers view resistance as the outcome of a conscious and reasoned decision based on users' perceived threats of IT (e.g.,

Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Lin et al., 2012). Perceived threat is explained as an overwhelming emotional pain, the perception of a dangerous situation, or any fear of negative consequences (Lapointe & Rivard, 2005). Some researchers found that perceived threat is one of the strongest indicators of user resistance (Hsieh and Lin, 2018). Furthermore, it can be argued that the term perceived threat encapsulates many of the sources of user resistance, such as fearing a change of the status quo, uncertainty, and the fear that the switching cost will be high. In addition, many of the sources of resistance fit into the 'perceived threats' category since they describe users' perception of a dangerous situation and fear of negative consequences (Lapointe and Rivard, 2005; Lin et al., 2012).

Therefore, this study will examine perceived threats to HIT to better understand how physicians and nurses could perceive HIT as a threat and resist using HIT. Previous researchers have examined perceived threats using quantitative methods and adopted a conceptualisation of perceived threats developed by Bhattacherjee and Hikmet (2007) (see also Hsieh 2015; Lin et al., 2012; Smith et al., 2014). Bhattacherjee and Hikmet (2007) conceptualised perceived threats as the extent to which users fear they will lose control over how they make decisions. However, this measure only examines one element of perceived threat: the loss of control over a situation. Still, researchers indicate that perceived threat can be caused by many other factors, such as the fear of losing power (Lapointe and Rivard, 2005), fear of losing revenue (Hsieh, 2015), and fear of losing current status in an organisation (Klaus and Blanton, 2010). Therefore, this study develops a more complete model and theorises how users may perceive a system as threats, which, as a result, develops a better measurement of perceived threats and enhances our current understanding of why and how users perceive HIT as a threat, and thus better explain user resistance.

While a relatively large body of literature examines how perceive threats influence user resistance (e.g., Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Lin et al., 2012), little research addresses why users may perceive a system as a threat (e.g., Esmaeilzadeh et al., 2015; Laumer et al., 2016b). Several researchers have called for further studies to identify the factors that contribute to user perception and resistance (Ali et al., 2016; Hsieh, 2015; Laumer et al., 2016b). This research contributes to IS research by investigating the conditions that lead physicians and nurses to perceive HIT as a threat, thereby leading to user resistance. Therefore, this research further examines users' perceived threats and the antecedents of perceived threats as it will help us understand the major source of user resistance behaviour. This will allow organisations to understand the root cause of the problem and how to control and reduce user resistance behaviour to ensure the success and continued use of HIT.

Further, the study addresses the problem of physicians and nurses' resistance to HIT by examining user resistance from a post-implementation perspective. Implementation is an ongoing process that leads to changes in the roles and behaviours of employees in the organisation (Hartveit et al., 2019). As both HIT technology and the requirements of hospitals are rapidly changing, hospitals seek to improve their HIT through regular updates and upgrades (Tsai et al., 2019; Vrhovec, 2016). Therefore, there may not be a clear consensus of what the term post-implementation means since many hospitals implement their systems through multiple stages and have multiple go-live dates (Awazu and Newell, 2010). So, in the context of this study, post-implementation can be understood as the period of time after the system has been successfully rolled out to the majority of its intended users and up until the time the system is replaced by another system. Given the heightened chances of meeting initial resistance to change during the pre-implementation and implementation phases, where disruption to existing processes is most prevalent, this research instead looks at user

resistance from a post-implementation perspective. Focusing on user resistance from a post-implementation perspective (typically 6 to 24 months after the system goes live) will allow for the examination of the longer-term factors that could lead to user resistance and potential system abandonment (Eden et al., 2014; Fryling, 2015). Further, at the post-implementation stage, users will re-evaluate their initial perception of the system based on their direct interaction and actual experience with it (Orlikowski and Gash, 1994; Saeed et al., 2010), thus providing the researcher with an opportunity to study the actual causes of user resistance and understand the factors that lead to the continuous use of HIT. Consequently, this research contributes to the IS community by investigating the conditions that lead physicians and nurses to perceive HIT as a threat, thereby leading to user resistance. It aims to investigate the antecedents of perceived threats to HIT, as many studies have indicated that perceived threats to HIT are a major predictor for user resistance (Bhattacherjee and Hikmet, 2007; Hsieh and Lin, 2018; Lapointe and Rivard, 2005; Ngafeeson, 2015; Wild et al., 2012). Additionally, through cross-case analysis, the study will examine how the culture of organisations, management styles, and organisational decisions on whether to develop HIT in-house or to purchase it from an outside vendor could influence physicians and nurses' perceived threats. Moreover, the cross-case analysis will investigate how the differences between physicians and nurses and the differences across the hierarchy level of interviewees could influence perceived threats.

1.2 Research Objective and Research Questions

To address the gap in the literature, the objective of this research is:

To theorise why physicians and nurses perceive HIT as a threat and how perceived threats lead to user resistance.

To address this research objective, the following research question was formulated:

Research Question: Why do users perceive HIT as a threat and how do perceived threats lead to user resistance?

The knowledge gaps identified later in Chapter Two (Section 2.6) led to the formation of the above objective. This research conducted an exploratory study to answer the research question. The rationale for using an exploratory study is that the literature on the factors that lead physicians and nurses to perceive HIT as a threat and resist HIT is scarce (Section 2.6.2). Additionally, the exploratory approach facilitates the exploration of new ideas, capturing new phenomena and rich contextualised details of complex concepts such as physicians and nurses' resistance (Bhattacherjee, 2012; Cassell and Symon, 2004).

1.3 Health Information Technology

This paper examines user resistance to HIT. Therefore, it is important to define HIT and give some examples to better clarify how the term HIT is used in the context of this study (user resistance is defined in Section 2.4). There is a growing interest from health organisations and policymakers to develop and implement HIT in hospitals (Brenner et al., 2015; Buntin et al., 2011). This growing interest is due to the potential of HIT to improve the quality of healthcare delivery by reducing medical errors (Gates et al., 2019), increasing patient safety (Boockvar et al., 2017), improving service management (Unruh et al., 2017), and lowering healthcare delivery cost (Everson et al., 2017). However, HIT does not have a clear and agreed-upon definition (Hersh, 2009). Adding to this complexity is the fact that HIT is used across a number of disciplines (Mettler and Pinto, 2018). The lack of an agreed-upon definition of HIT has led to uncertainty for both academics and

practitioners (Sun and Qu, 2015). Because of this uncertainty and because there are many existing definitions of HIT, it is vital to clearly define HIT in the context of this study.

A review of the existing definitions of HIT shows that researchers define it based on the context of its use or the intended use of the technology (Brailer, 2004; Gee and Newman, 2013; Hersh, 2009; Moore and Fisher, 2012). For example, Hersh (2009) views HIT based on the context in which it is used and explains that it is the application of computer hardware and software in healthcare settings (Hersh, 2009). Moore and Fisher (2012) offer a more detailed definition of HIT, defining it as an application of computer hardware and software that deals with data storage, sharing of data between patients and healthcare providers, and the retrieval of healthcare information. Some researchers also include in the definition of HIT the design, development, adoption, and implementation of innovative IT in health delivery, including business management and strategic planning (Menachemi et al., 2015). HIT extends to supporting healthcare providers in problem-solving and decision-making by analysing archived health information (Brailer, 2004; Gee and Newman, 2013).

Adding to the lack of consensus on a unified definition of HIT is the fact that the technology is rapidly changing, leading to changes in the capabilities of HIT; as a result, the definition changes (Tahara and Laufer, 2014). HIT is a broad term that has a variety of functions, such as supporting the management and business aspects of healthcare delivery (Mindel and Mathiassen, 2015)—as well as physicians, nurses, and other healthcare professionals—with the goal of improving the quality of healthcare delivery (Ang, 2019; Tubaishat, 2019) and supporting patients (Samhan, 2017).

Some researchers have, in their definitions, highlighted a large number of users and a variety of HIT's functionalities. For instance, Blumenthal and Glaser stated that 'HIT consists of an

enormously diverse set of technologies for transmitting and managing health information for use by consumers, providers, payers, insurers, and all other groups with an interest in health and health care' (2007, p. 2527). However, since this research will focus on physicians and nurses, this definition is too broad, as it includes a large number of different users of HIT. Such definitions are not suitable for this study as it is important to include only physicians and nurses in the definition to better clarify and narrow down the definition. A number of researchers have used definitions that are too broad and generic (e.g., Alrahbi et al., 2019; Mettler and Pinto, 2018; Nesheva, 2019). For example, Alrahbi et al. define HIT as 'the use of computers for digital assistance by physicians' (2019, p. 1). Another example of a definition that is too broad and does not clearly explain HIT is that used by Nesheva: 'Any clinical information technology system that captures patient data in an electronic record' (2019, p. 1).

For the context of this study, it is more suitable to use definitions of HIT that clearly state what HIT is, where it is being used, and its purpose. Such a definition will help the reader better understand HIT in the context of this study. Based on common definitions of HIT (e.g., Brailer, 2004; Putera, 2017) and the definition used by the Office of the National Coordinator for Health Information Technology, which is adopted by many researchers, in the context of this study, HIT is defined as:

The application of computer hardware and software that store, share, and retrieve healthcare information to support physicians and nurses in problem-solving and decision-making.

By borrowing from and adapting common definitions of HIT, this definition avoids the limitations of other definitions that are too broad and generic. This definition is concise and covers important components of HIT, as it explains what it is, where it is being used, who the main users are, and why it is needed. Therefore, it will support the topic of this research.

Providing some examples of HIT can help us better understand its definition and illustrate what is meant by HIT. An example of a HIT application is the Computerised Physician Order Entry System (CPOE), a computerised system in which physicians can enter clinician orders for medication, laboratory tests, and other patient services (Brenner et al., 2015; Ejaz, 2019). This system improves communication and enables the transfer of data in healthcare settings, thus reducing medical errors such as those that occur from difficult-to-read handwritten orders (AlAzmi et al., 2019; Menachemi et al., 2015). A similar example is the electronic health records (EHR), a system that allows physicians and other care providers to document patient histories, diagnoses, and treatments (Gee and Newman, 2013). EHR can save lives by providing vital information about patients' health records to care providers (Brenner et al., 2015; Lin 2019). Other examples of HIT are order entry alerts, health information exchange, automated error detection software to detect medication errors, and electronic medication administration records (eMAR) (Brenner et al., 2015).

1.4 Key Contributions

This thesis contributes to both the academic (Section 1.4.1) and practitioner communities (Section 1.4.2). The key contributions are presented in the following sections, with a more detailed overview presented in Chapter Seven.

1.4.1 Key Theoretical Contributions

The main theoretical contribution of this study is the model developed in this thesis. This builds on, and extends, existing theories of user resistance that indicate that perceived threats lead to user resistance (Bhattacherjee and Hikmet, 2007; Hsieh and Lin, 2018; Lapointe and Rivard, 2005;

Ngafeeson, 2015; Wild et al., 2012). The study extends user resistance theories by investigating the antecedents of perceived threats. The model highlights seven core antecedents of perceived threats (i.e., related knowledge of HIT, management support, lack of user involvement, system performance, system incompatibility, trust, and social influences). Further, the model explains how physicians and nurses perceive HIT as a threat and that perceived loss of professional autonomy, perceived dissatisfaction, and perceived risk lead to user resistance. This explanation allows us to better understand how physicians and nurses perceive HIT as a threat. To date, studies that have examined the antecedents of perceived threats are limited in the user resistance literature. This study identified a number of undocumented relationships between related knowledge of HIT, management support, lack of user involvement, system performance, system incompatibility, social influences, perceived loss of professional autonomy, and perceived dissatisfaction. It also identified that management support leads to a perceived loss of professional autonomy, which, in turn, leads to user resistance.

The study also examined the factors, the differences between cases, and the differences between physicians and nurses, which provided additional insights into the problem of user resistance and negative user perceptions. Further, as it examined user resistance at the post-implementation stage, it facilitated examination of longer-term factors that could lead to user resistance and the impact of continuous use of HIT. Understanding the antecedents of users' perceptions of technology is important for predicting and explaining user resistance to technology. This study provides a foundation by examining the antecedents of perceived threats from the perspective of physicians and nurses.

The study contributes to the IS field in general, and to user resistance research, by showing the organisational factors, the personal traits of the user, IT-related factors, and the factors related to

the interaction between users and the organisation; these influence how users perceive IT as a threat. Moreover, the study investigated previously unexamined relationships in the IS literature. It revealed that factors such as related knowledge of HIT, lack of management support, lack of user involvement, and perceived loss of professional autonomy lead to perceived dissatisfaction and contribute to user resistance. Further, the study shows that lack of management support influences perceived loss of professional autonomy, while lack of trust leads to perceived risk. Factors such as related knowledge of HIT, management support, lack of user involvement, and poor system performance were found by previous research to impact users' expectations, attitudes, and intention to use. This study extended this knowledge by showing that these factors influence users' resistance and influence the continuous use of HIT, too. As this study examined user resistance at the post-implementation stage, it was able to examine the longer-term factors that could lead to user resistance. Further, at the post-implementation stage, users re-evaluate their initial perception of the system based on their direct interaction and actual experience with it (Eden et al., 2014; Fryling, 2015), thus providing an opportunity to study the actual causes of user resistance and understand the antecedents of perceived threats, as well as the factors that lead to continuous use of HIT. Consequently, these findings add additional insights and enhance the current understanding of scholars in relation to the domain of users' perception and resistance. Such findings will help the managers responsible for HIT implementations to design resistance mitigation plans that will ensure the continued use of HIT, hence allowing organisations to achieve the desired benefits of HIT.

The study further revealed the difference between physicians and nurses. The findings indicate that nurses had less related knowledge of HIT than physicians and that nurses' perceptions are more likely to be influenced by social influences than physicians' perceptions. Consequently,

decision makers should provide more training and a step-by-step tutorial guide that nurses can refer to when they have difficulties with HIT. It is important that this is done after the implementation of HIT, such as when HIT is updated or upgraded. Decision makers should also work on promoting HIT and highlighting its benefits to nurses to encourage its use. Managers should also seek to recruit more active and influential nurses to champion HIT implementation and support their colleagues.

This study revealed that resident physicians are more impacted by a perceived loss of professional autonomy than other users. This shows that individual differences enhance or diminish users' perceptions of the threat caused by HIT. Hence, managers should regularly discuss the issue of perceived loss of professional autonomy with resident physicians and work to resolve their concerns to improve the chances of successful HIT implementation and continued use. Technology continuously evolves and new viruses emerge that require organisations to update and change their HIT. Therefore, managers should regularly discuss HIT with physicians and nurses and aim to resolve any issues or concerns they have to ensure the continued use of HIT.

This study also contributes to the academic community by identifying differences between the two cases (Case 1: public hospital; Case 2: military hospital). Through cross-case analysis, the study revealed differences between the cases due to the differences in the cultures of the organisations, the management styles, and the organisational decision of whether to develop HIT in-house or to buy it from an outside vendor, which affects the control of a hospital over HIT. First, the findings suggest that lack of user involvement is related to organisational control over the development of IT (Section 6.6.1.3). The study found that perceived loss of professional autonomy was higher in one of the cases (the public hospital). This could be due to the difference in organisational culture and structure, such as the centralisation of power and rigidity of hierarchies (Section 6.6.1.1). For

this reason, decision makers should consider how their control over the development and implementation of HIT may impact user resistance. Technology continuously evolves and new viruses emerge that require HIT to be adaptive. Thus, decisions makers should aim to have control over HIT and be able to change and customise it to their needs. They should also aim to improve their organisational culture and structure, making it more dynamic to prepare for HIT implementation and reduce the chances of user resistance. Focusing on the antecedents of perceived threats highlighted in this study will help an organisation be more flexible and responsive to change, and reduce the chances of user resistance.

Several valuable insights were identified in this study; for instance, the potential negative consequences on the relationship between physicians, nurses, and their patients. The study revealed that poor system performance and system incompatibility create friction in the relationship between physicians, nurses, and their patients because they increase the waiting times for patients and reduce eye-to-eye contact between physicians and nurses and their patients. Decision makers should work on making HIT reliable and compatible with the work styles of physicians and nurses. For instance, the location of a computer in a clinic may impact eye-to-eye contact between physicians, nurses, and their patients. Decision makers should aim to design the clinic in a way that allows physicians and nurses to look at their patients while using HIT to consult or record medical notes. Also, voice detection technologies could be utilised to reduce the amount of time physicians and nurses spend typing medical notes.

Finally, the cross-case analysis confirmed the user resistance literature that suggested that resistance behaviour could be covert or overt. This study extended this knowledge, as the cross-case analysis revealed that resistance behaviour is influenced by the cultural and structural

elements of an organisation (Section 6.6.1.1). These findings will help decision makers identify the different types of user resistance behaviours and develop appropriate strategies.

1.4.2 Key Practical Contributions

This study's key practical contribution is the development of the model that will help the future development and implementation of HIT. Health organisations can utilise the model developed in this study to better understand factors that could lead to user resistance. Moreover, as it examines the longer-term factors that lead to user resistance, it allowed for examining actual causes of user resistance and understanding the factors that lead to continuous use of HIT. Consequently, the factors identified in the model are important for ensuring the continued use of HIT. The findings emphasise the importance of developing HIT that is reliable, quick, and a good fit with existing work styles, needs, and environments of hospitals. When considering whether to develop HIT in-house or to purchase it from an outside vendor, decision makers should examine how such decisions will affect their ability to change and customise the system according to the recommendations of physicians and nurses. This study encourages managers to provide strong support and involve users throughout the development of HIT, as well as post-implementation. Additionally, the study explains how physicians and nurses perceive HIT as a threat. It recommends that decision makers should re-evaluate the system regularly by evaluating restrictions on users who are allowed to request medicines, lab exams, or provide patients' sick leave recommendations. The findings revealed that differences in organisational culture and structure—such as the centralisation of power and rigidity of hierarchies—impact perceived threats and user resistance. Thus, decision makers should aim to improve their organisational culture and structure by having a more dynamic organisational culture to prepare for HIT

implementation, which will reduce the chances of user resistance and ensure the continued use of HIT.

This study further contributes to the practitioner community by highlighting some differences between users and organisations that could contribute to user resistance. For example, the findings revealed that fewer nurses had related knowledge of HIT than physicians; thus, it is recommended that managers provide additional training to nurses. Such training should also be provided post-implementation, when HIT is updated and when new nurses join the hospital. Also, providing a step-by-step tutorial guide that users can refer to when they have difficulties with HIT is recommended.

1.5 Research Approach

The study is exploratory; thus, it employs a scientific inquiry of post-positivism. An exploratory qualitative method approach is favourable, considering the research objective, the research question, and the epistemological stance of the research. Since the objective of this research is to theorise why physicians and nurses perceive HIT as a threat and how perceived threats lead to user resistance, multiple case study methods were selected as suitable methods for achieving the research objective. Multiple case studies are preferred for better understanding phenomena and answering *what* and *how* questions (Miles and Huberman, 1994; Yin, 2009). This aligns with the objective of this study. Semi-structured interviews were used to collect data, and data were analysed using qualitative data analysis techniques based on the recommendations of Strauss and Corbin (1997). Figure 1.1 Overall research design and strategy represent this study's overall research strategy.

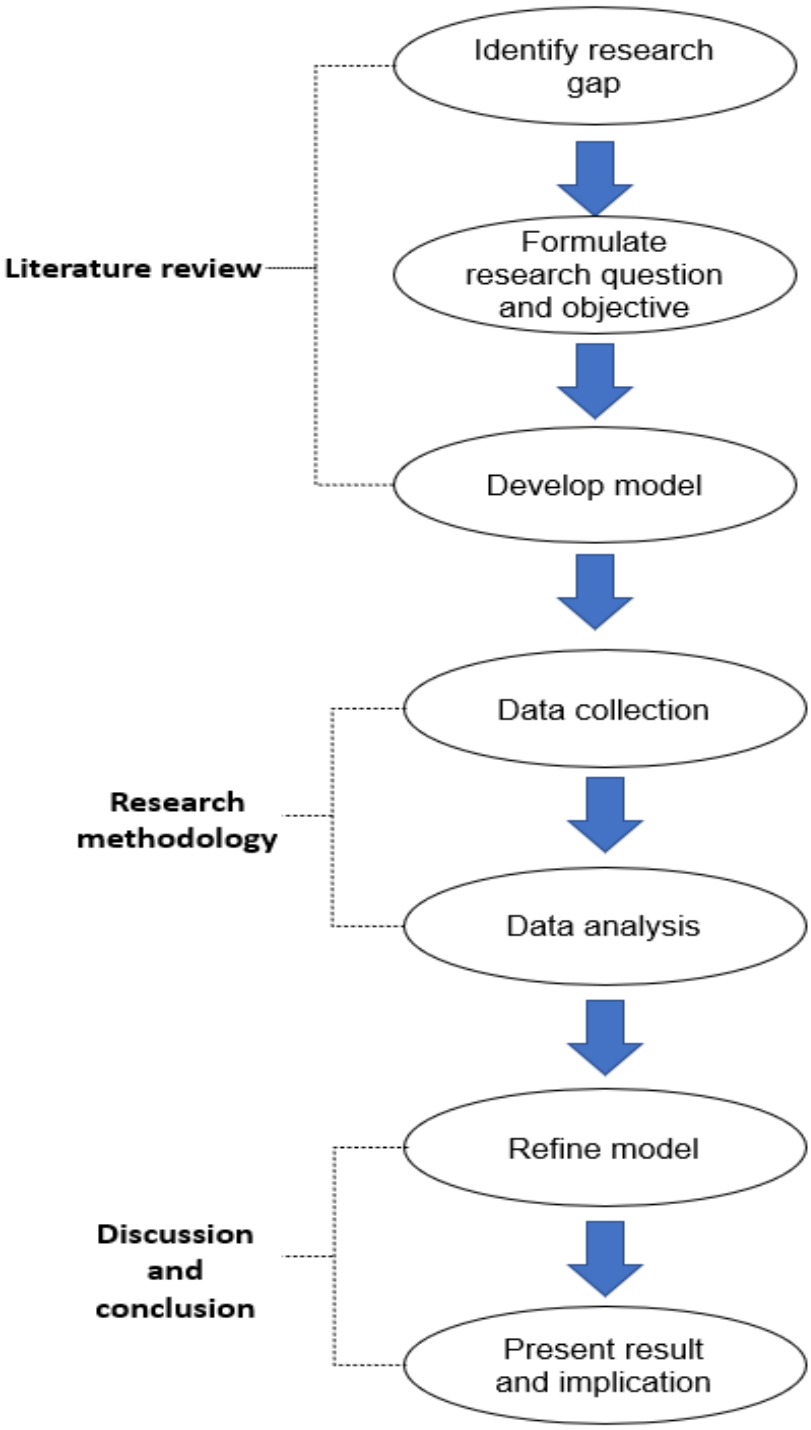


Figure 1.1 Overall research design and strategy

The next section depicts the principles of IS research, discussing the epistemological, ontological, and methodological stances guiding IS research. The subsections discuss and outline the case selection, data collection, and data analysis techniques adopted in this study.

1.5.1 Research Philosophy

Researchers need to identify their personal philosophical position, as this represents the starting point of the research process and guides the selection of the appropriate research methods (Mayer, 2015). This section will discuss the different research philosophies and justify the adoption of a post-positivist paradigm in this study.

A research paradigm connects the research to reality. They are a set of assumptions about ontology, epistemology, and methodology. As Guba and Lincoln (1994, p. 108) outline:

Ontology: What is the form and nature of reality?

Epistemology: What is the relationship between the knower and what is known? How do we know what we know? What counts as knowledge?

Methodology: How can the inquirer go about finding out whatever he or she believes can be known?

A paradigm can be defined as 'basic belief system or worldview that guides the investigator not only in choices of the method but also in ontologically and epistemologically fundamental ways' (Guba and Lincoln, 1994, p. 105). Paradigms influence the research design, including data collection and analysis. IS researchers generally adopt three main paradigms: positivism, interpretivism, or post-positivism (Walsham, 2006).

First, positivist research posits that there is one true reality and uses observation and measurement to describes what we experience (O'Leary, 2004). Positivist research usually follows deductive methods to test a theory or hypothesis that can be confirmed through observations (O'Leary, 2004). Positivism comes from the natural sciences, so it treats observations as entities similar to how natural scientists treat physical phenomena (Flick, 2009). The positivist paradigm is often criticised for its blind faith in observed data and rejection of attempts to explain phenomena beyond the observable data (Bhattacherjee, 2012).

Second, the interpretive paradigm posits that reality is subjective (Fitzgerald and Howcroft, 1998). Hence, it aims to understand phenomena from the perspective of the people experiencing them (Orlikowski and Baroudi, 1991). Interpretivism adopts relativist ontology, so it assumes that multiple realities exist (Fitzgerald and Howcroft, 1998). Interpretivism aims to gain a deeper understanding of a social phenomenon by showing more flexibility, which suits the study of constructs involving human activities (Kaplan and Duchon, 1988). Some researchers have criticised the interpretivist approach because it 'focuses on particularities and neglect the general' (Hackley, 2007, p. 104).

Finally, it was concluded that the post-positivist perspective was the most appropriate for this research. This paradigm combines the elements of the previous paradigms as it combines observations with logic and reasoning (Bhattacherjee, 2012). Post-positivism was developed to overcome the conflict between positivism and interpretivism (Hirschheim, 1985). It posits that there is no one correct method of science but a variety of methods (Wildemuth, 1993). Post-positivism employs a critical realism stance, referring to the belief that objective reality is understood imperfectly, with a certain degree of probability (Lincoln and Guba, 2000). It implies that the researchers' perceptions and feelings influence observations, and that reality is viewed

from the perspective of researchers, so it may not necessarily be an accurate view of reality (Teddlie and Tashakkori, 2009).

The post-positivist approach allows researchers to examine facts in the context of where this fact exists (Ryan, 2006). Post-positivist researchers adopt learning rather than a testing role, indicating that they learn *with* the people being researched rather than researching *about* them (Wolcott, 1990). The post-positivist approach 'is a suitable approach specially used to investigate the behaviour of individuals' (Creswell, 2009, p. 7). Guthrie (2010) noted several advantages of post-positivism:

[It] regards knowledge as subjective and value-laden; views data on the relationship between the knower and the known; favours naturalistic, non-experimental research where the researcher does not manipulate the research setting or subjects or put data in predefined categories; and view[s] knowledge as subjective, holistic and not based on cause and effect, and considers that scientific methods are social constructs. (p. 43).

Further, this paradigm allows for in-depth analysis of data (Creswell, 2009).

This research extends the current understanding of user resistance behaviour and identifies the circumstances that lead physicians and nurses to perceive HIT as a threat. Therefore, the post-positivist approach is appropriate for several reasons. First, it allowed the researcher to examine the context, along with the facts (Kankam, 2019). Second, it is suitable for investigating the behaviour of individuals (Creswell, 2009). Third, it allowed the researcher to investigate the behaviour of individuals and learn from people (Creswell, 2009; Kankam, 2019). Fourth, it 'favours naturalistic, non-experimental research where the researcher does not manipulate the research setting or subjects or put data in predefined categories' (Guthrie, 2010, p. 43). Finally, it

allowed for in-depth analysis and more comprehensive exploration of the topic studied (Guthrie, 2010).

1.5.2 Research Strategies: Adopting a Qualitative Approach

This section discusses the research modes employed in this study. Research strategies tend to be quantitative, qualitative, or mixed-method. This section discusses the quantitative (Section 1.5.2.1) and qualitative (1.5.2.2) research modes. A qualitative research mode was found to be most suitable for this study. In this section, a justification for the selection of the qualitative research mode over the quantitative research mode is presented.

1.5.2.1 Quantitative Research

Quantitative research analyses numbers to establish a statistical link between variables and generalise the findings (Bradley et al., 2009). It conceptualises reality by describing variables and the relationships between them (O'Hara et al., 2011). It is typically associated with the positivist research and is therefore widely used in the IS field (Orlikowski and Baroudi, 1991; Chen and Hirschheim, 2004). The major advantage of quantitative data analysis is that it is an excellent tool for analysing a large amount of data from a wide population, as well as measuring a wide variety of unobservable data, such as people's preferences (Bhattacherjee, 2012; McGrath, 1981; Scandura and Ethlyn, 2000). Table 1-1 summarises the strengths and weaknesses of quantitative research methods.

Strengths	Weaknesses
Describes the relationships between variables (O'Hara et al., 2011)	Not suited to theory building (Marshall, 1999; Rossman, 1989)
Associated with positivist research (Orlikowski and Baroudi, 1991)	Eliminates important factors that are difficult to value (Galliers and Land, 1987)
Analyses a large amount of data (Bhattacherjee, 2012; McGrath, 1981; Scandura and Ethlyn, 2000)	
Measures unobservable data, such as people's preferences or beliefs (Bhattacherjee, 2012; McGrath, 1981; Scandura and Ethlyn, 2000)	

Table 1-1 Strengths and weaknesses of quantitative methods

Despite the widespread use of quantitative research methods, it was not the most appropriate method for this study. The goal of this study was to build a comprehensive user resistance model by investigating the circumstances that lead physicians and nurses to perceive HIT as a threat, thus causing them to resist HIT. Quantitative methods are best used for theory testing, not theory building (Sutton and Staw, 1995). Quantitative methods can validate a theory or hypothesis because they use statistical techniques on a wide population to verify that theory or hypothesis (Bhattacherjee, 2012; McGrath, 1981). Several researchers suggest that when using quantitative methods for theory building, researchers might miss phenomena because the focus is on theory/hypothesis testing rather than theory/hypothesis generation (Cavaye, 1996; Gregor, 2006; Marshall and Rossman, 2010; Sutton and Staw, 1995). Moreover, it might be difficult to apply values to variables in quantitative research, often resulting in the elimination of important factors that are difficult to value (Galliers, 1992), such as users' perceptions and resistance behaviour. Therefore, some determinants that lead physicians and nurses to perceive HIT as a threat and subsequently resist it may be omitted if a quantitative method is used.

1.5.2.2 Qualitative Research

Qualitative research is used to answer why, what, or how questions (Lacey and Luff, 2009). It uses data obtained from qualitative data collection methods such as interviews, documents, observation, and focus groups. The last few decades have seen a growing interest in qualitative research (Mayer, 2015). There are several qualitative research strategies, including ethnographic, action research, and case study (Marshall and Rossman, 1989). The major advantages of qualitative methods are that they allow the researcher to explore new ideas, capture new phenomena, test theories, and develop interesting research questions for future studies (Bhattacherjee, 2012; Cassell and Symon, 2004). Further, it is used to add richness and thick description to studies (Farber, 2006). Another advantage of qualitative methods is that they help address complex phenomena and measure phenomena that are hard to measure in quantitative terms, such as human behaviour and intentions (Mayer, 2015; Kothari, 2004). Table 1-2 summarises the strengths and weaknesses of qualitative research methods.

Strengths	**Weaknesses**
Explores new ideas, captures new phenomena, tests theories, and develops interesting research questions for future studies (Bhattacherjee, 2012; Cassell and Symon, 2004; Sauders et al., 2003)	Ethical issues and access to participants (Daymon and Holloway, 2010)
Adds richness and thick description to the study (Farber, 2006)	Quality of research is largely interpretive, so the interpretation of data is heavily dependent on the researcher's skills and could be influenced by personal bias (Anderson, 2010)
Addresses complex phenomena (Mayer, 2015; Kothari, 2004)	It is difficult to demonstrate and assess the rigour of the research. (Anderson, 2010)

Table 1-2 Strengths and weaknesses of qualitative research

A qualitative approach was considered appropriate for answering the research question of this study as it facilitates a more comprehensive exploration and analysis of the circumstances that lead

physicians and nurses to perceive HIT as a threat (Carroll and Swatman, 2000; Eisenhardt and Graebner, 2007). Consequently, the researcher could examine and refine the relationships between the constructs of the study. This involved building a conceptual model from existing research and, subsequently, refining this model.

1.5.3 Research Method: Adopting a Case Study Method

This study is exploratory in nature as it aimed to build an empirically grounded research model to theorise why physicians and nurses perceive HIT as a threat, and how perceived threats lead to user resistance. The study extends and refines a preliminary theoretical model of user resistance that was derived from the literature. That is, it is fundamentally concerned with explaining the variables causing a phenomenon and identifying the relationship between these variables. This section justifies the selection of case studies in this study.

1.5.3.1 Case Study

A case study is a detailed investigation of a contemporary phenomenon within its context (Cassell and Symon, 2004; Yin, 1994). It is one of the most common methods used in qualitative research (Stake, 2005) to study social units such as a person, a family, an organisation, or an entire community (Kothari, 2004). Case studies provide a deep and rich understanding of a phenomenon within its real-life context (Cavage, 1996). They are used to 'build holistic understanding through the development of rapport and trust' (O'Leary, 2004, p. 116). Further, they allow researchers to study a predefined phenomenon without controlling or manipulating other variables (Yin, 1994). Therefore, a case study is well-suited for generating theory from collected data (Eisenhart, 1989). They are also used to 'locate the factors that account for the behaviour patterns of the given unit as an integrated totality' (Kothari, 2004, p. 113).

Case studies can be single or multiple studies. The advantage of a single case study is that it allows the researcher to focus on the phenomena while using less time and resources unlike in multiple case studies (Baxter and Jack, 2008; Yin, 1994). Also, it is a good method to use if the study's goal is to refine a theory or provide insight into an issue (Baxter and Jack, 2008). However, evidence from multiple case studies is more compelling and adds confidence to findings, as the researcher can compare cases and study the phenomenon in multiple contexts (Yin, 1994). Further, multiple case studies facilitate hypothesis generation and theory building (Eisenhardt, 1989; Kothari, 2004). Table 1-3 summarises the strengths and weaknesses of case studies.

Strengths	**Weaknesses**
Provides a deep and rich understanding of the phenomenon within its real-life context (Cavage, 1996; Sauders et al., 2003)	Perceived lack of rigour (Yin, 1994)
Generates theory from collected data (Eisenhart, 1989; Sauders et al., 2003)	Limited generalisability (Yin, 1994; Daymon and Holloway, 2010)
Explores relationships and connections (Daymon and Holloway, 2010)	Validity problem (Kothari, 2004; Daymon and Holloway, 2010)
Uncovers new concepts because they focus on those taken for granted (Daymon and Holloway, 2010)	Boundaries are difficult to define (Daymon and Holloway, 2010)

Table 1-3 Strengths and weaknesses of case studies

Despite the advantages of case study-based research, there are some weaknesses associated with it. For example, case studies have been criticised for their perceived lack of rigour and limited generalisability (Yin, 1994). The validity of case study-based research is often questioned because case situations are rarely comparable (Kothari, 2004). Additionally, case studies are often questioned when it comes to whether the propositions of the study are actually supported by the data or whether the researcher has overlooked alternative propositions, and whether the researcher was subjective and evaluated the data systematically (Lillis, 1999). Finally, there is fear that the

researcher could affect the behaviour of the research subjects, risking inaccurate data or cases that are difficult to reproduce (O'Leary, 2004). These limitations make case research a difficult method that requires the researcher to have advanced research skills (Bhattacherjee, 2012).

Notwithstanding the issues associated with case study-based research, this approach was preferred in this study as it provides an opportunity to address the research objective and research question. Case research aims to develop a deep understanding of a phenomenon by intensively investigating a small number of entities and using those insights for theory/hypothesis development and refinement (Yin, 1994). This is in line with the goal of this exploratory study, which aims to provide a deep understanding of the circumstances that lead physicians and nurses to perceive HIT as a threat, thus leading to user resistance. For this study, multiple cases are especially appropriate as the study investigates the factors that lead physicians and nurses to perceive HIT as a threat, thus leading to user resistance. It is argued that the multi-case study increases generalisability and provides an opportunity for a more powerful explanation and more sophisticated descriptions (Miles and Huberman, 1994). Therefore, it is important to study multiple organisations and investigate how different systems, organisations, and cultures of organisations could lead to perceived threats and user resistance.

1.5.3.2 Case Selection

The selection of cases is a critical decision within case study research. The researcher considered a number of cases for inclusion, which were hospitals that had implemented HIT in the previous ten years. A list of cases considered for inclusion is presented in Table 1-4. Names and locations of the hospitals are kept private to protect the privacy of the hospital and participants.

Hospital	Established	Main Speciality	Organisational Type	Target Patients	Bed Size	Name of HIT	Year of Implementation
1	2004	Tertiary	Public	Public	800+	Biretx	2012
2	1972	Primary to tertiary	Military	Eligible patients only	500+	In-house system	2010
3	2013	Secondary to tertiary	Public	Public	500	Cerner	2014
4	2005	Primary to tertiary	Public	Public	170	Woodo	2016
5	2002	Specialised	Public	Public	500	Eadf	2014
6	1985	Primary to tertiary	Public	Public	225	CSC	2012
7	1982	Tertiary and academic	University	Eligible patients only	950	Cerner	2015
8	1995	Primary to tertiary	Private	Paying/insured public	300	CDS	2017
9	1975	Tertiary and research centre	Public	Eligible patients only	1000	Cerener	2014
10	2004	Primary to tertiary	Private	Paying/insured public	300	HIS	2015

Table 1-4 Cases considered for this study

After considering all cases, the decision was made to select one public hospital and one different type of organisation, such as military, university, or private. This would allow the researchers to perform an in-depth examination of the antecedent of perceived threats, examine how different organisations affect users' perception and resistance, and develop a comprehensive user resistance model.

A public hospital was chosen because of several unique characteristics. For example, there is likely to be internal tension in a hospital where physicians and nurses have professional autonomy while administrative support is managed more bureaucratically (Southon and Dampney, 1999; Walter and Lopez, 2008). Additionally, in public hospitals, physicians and nurses receive their salary from the government and not the hospital; therefore, some physicians and nurses might feel less allegiance to the hospital and its HIT initiatives and thus be more likely to resist (Bhattacherjee and Hikmet, 2013). This may also be why people working in a public environment tend to resist change (Agasisti and Erbacci, 2018). Finally, when selecting HIT, public organisations prefer the most economical option, even if this is not always the best (Barkley, 2019). Hence, the form of HIT might not be a good fit for the hospital and therefore, it is likely to face resistance (Boonstra et al., 2014). For these reasons, a public hospital was selected as one case study for this research as HIT is more likely to face resistance there.

When comparing public hospitals, it was found, for several reasons, that the first case (Hospital 1) was the most suitable case for this study. This was mainly because it is one of the largest and oldest hospitals considered. So it was expected that the internal tension would be stronger and implementation of HIT would be challenged, as it is more difficult to change older, larger organisations (Dwivedi et al., 2009). Further, this is a tertiary hospital, so it is likely to receive a

larger and wider mix of complex cases than specialised and secondary hospitals (Najaftorkaman et al., 2013).

After considering all other types of organisations, such as military, university, or private hospitals, a military hospital was selected as the second case study. The military hospital was chosen due to many unique characteristics. For example, studies have shown that physicians and nurses working in military hospitals have high professional autonomy and control over their work practice (Alshahrani et al., 2018). Moreover, the unique relationship between management, which tends to be military personnel, and physicians and nurses, who are mostly civilians (Alshahrani et al., 2018), suggests that managing change brought by HIT can be more challenging due to the different backgrounds of management and most of the users (Feaver and Kohn, 2000; Hall, 2011). Additionally, the military hospital developed its HIT in-house, which allowed the researcher to further compare the two cases based on how the HIT was developed, as the HIT in the public hospital was commercially purchased. Table 1-5 summarises the differences between the two cases.

Characteristics	Case 1	Case 2
Size of hospital	500 + bed	800+ bed
Type of hospital	Military hospital	Public hospital
Type of HIT	EHR	EHR
HIT development	In-house	Commercially purchased
Organisational culture	Bureaucratic, hierarchical, meritocratic, predictable, rational, focused on education and training, greedy relationship with members of the organisation (Holmberg and Alvinius, 2019)	Rigid hierarchies, centralisation of power (common in public organisations), under-resourced and understaffed, tight control over finances by the health ministry, high job security, focus on procedures and internal rules (Bannister, 2001, Iliuta, 2013; Nwanzu, 2017)
Management	Mostly from a military background	Civilian
Service provided	Primary to tertiary care to military personnel and their families	Primary to tertiary care to all patients in the region

Table 1-5 Similarities and differences between the cases

1.5.4 Data Collection

Choosing the correct data collection method for the research is essential for the success of the research (Kothari, 2004). This research used semi-structured interviews to collect data. Interviews are a way of collecting data through back-and-forth, one-on-one verbal interaction between researchers and participants. Interaction is conducted rigorously to ensure reliability and validity, and focuses on the researcher's needs for data (Kothari, 2004). It is a personalised method and the most popular data collection method in qualitative research (Bhattacherjee, 2012; King, 2004). The researcher's role in this method is to create guidelines for the interviews, identify and recruit participants, and moderate and record the interviews (Bhattacherjee, 2012; Cassell and Symon, 2004; O'Leary, 2004). Moreover, the researcher must have good communication and interview skills to motivate respondents, overcome any resistance from respondents, and tap into

participants' knowledge (Bhattacherjee, 2012; Harrell and Bradley, 2009; Kothari, 2004; O'Leary, 2004).

Some of the advantages of using interviews as a data collection method for research include that it is a flexible method that allows researchers the opportunity to ask follow-up questions and clarify issues raised by respondents (Bhattacherjee, 2012; King, 2004). Further, it is relatively easy to find participants because most people like talking about their work, either to share their enthusiasm or to air complaints (King, 2004; Kothari, 2004). The interview is a perfect method for examining topics where different levels of meaning need to be explored (Bhattacherjee, 2012; King, 2004). These advantages make interviews a great method to use to gain insight into topics and an in-depth understanding of the subject matter (Brewerton and Millward, 2001; Harrell and Bradley, 2009). Table 1-6 summarises the strengths and weaknesses of interviews.

Strengths	**Weaknesses**
Rich data (Brewerton and Millward, 2001; Harrell and Bradley, 2009; Kothari, 2004)	A huge volume of data (Bhattacherjee, 2012; King, 2004)
Follow-up questions (Bhattacherjee, 2012; Harrell and Bradley, 2009)	Interviewer bias (Brewerton and Millward, 2001; Kothari, 2004)
Relatively easy to find participants (King, 2004; Kothari, 2004)	Interviewing skills and interviewer effect (Bhattacherjee, 2012; Daymon and Holloway, 2010; Kothari, 2004)

Table 1-6 Strengths and weaknesses of interviews

A disadvantage of using interviews as a data collection method is that it requires researchers to possess special interviewing skills to encourage participants to provide accurate and honest answers that can provide relevant data for the research (Bhattacherjee, 2012; Lee and Liebenau, 1997). Additionally, researchers must be able to deal with a huge volume of data that must be coded and analysed to produce valuable information, which means that interviews can be an

expensive and time-consuming method (Bhattacherjee, 2012; King, 2004). Finally, interviews can be subject to interviewer bias (Brewerton and Millward, 2001; Kothari, 2004).

Semi-structured interviews were selected for this research because they provide valuable insights into participants' perception of HIT and allowed the researchers to comprehend the perception of physicians and nurses and the conditions that lead them to view HIT negatively. As this research examines user resistance from a post-implementation perspective, data was collected six to 12 months after a major HIT update. This allowed users to re-evaluate their initial perceptions of the system based on their direct interaction and actual experience with it (Orlikowski and Gash, 1994; Saeed et al., 2010). They thus provided researchers with an opportunity to study the actual causes of user resistance. A snowball sampling strategy was used to identify subsequent respondents, where each initial respondent was asked to suggest other physicians and nurses working in the hospital. The respondents were physicians and nurses familiar with the hospital's HIT and represented a subset of the hospital population. In total, 28 physicians and 30 nurses across four departments were interviewed. Table 1-7 provides a summary of physicians and nurses interviewed.

	Case 1: Military hospital	**Case 2: Public hospital**	**Total**
Total number of interviews	13 Physicians 15 Nurses	15 Physicians 15 Nurses	28 Physicians 30 Nurses
Level of interviewee	Resident 6 Specialist 3 Consultant 4 Nurse 15	Resident 5 Specialist 3 Consultant 7 Nurse 15	Resident 11 Specialist 6 Consultant 11 Nurse 30
Departments of interviewees	Surgery 10 Emergency 8 Family medicine 5 Paediatric 5	Surgery 8 Emergency 8 Family medicine 9 Paediatric 5	Surgery 18 Emergency 16 Family medicine 14 Paediatric 10

Table 1-7 Physicians and nurses interviewed

Data were collected between May and June 2018. The researchers visited the hospital during this time to conduct face-to-face interviews. Interview questions for the semi-structured interviews were guided by the conceptual model presented in Figure 1.3 (an interview guide is attached in Appendix A). Data collection ended at the point of redundancy, as no new information was being added (Lincoln and Guba, 1985). Interviewees were given complete freedom over what they wanted to say and how they said it. All interviews were recorded and subsequently transcribed. Some of the interviews were conducted in Arabic depending on the English-language level of the interviewee. All interviews were transcribed word-by-word and those conducted in Arabic were translated into English by a third party in order to avoid bias. The transcripts were then reviewed with the recording in order to supply any missing words. Finally, the transcripts were reviewed to ensure that they were true to the meaning of the original interview. All recorded interviews were deleted after transcription to protect the privacy of the interviewees.

This study received ethical approval from the University College Cork Social Research Ethical Committee. The name and location of the hospitals are kept confidential to protect the privacy of the hospitals, physicians, and nurses.

1.5.5 Data Analysis

Data analysis is subjective and interpretive, whereby researchers follow a set of steps to reach a conclusion (Lacey and Luff, 2001). Data analysis is not a single linear process but includes going back and forth between the different stages to refine and improve the analysis (O'Hara et al., 2011). Some researchers argue that there is no unified approach to qualitative data analysis as each research question requires a specific approach (Bradley et al., 2007). Hence, the researcher must develop a range of special skills to make decisions and judgements on the best methods for analysing the data and understanding what it actually means (O'Hara et al., 2011).

In this study, data analysis started with the transcription, organisation, and management of the data. In this step, the researcher should systematically organise and sort the data into sections so that it can be retrieved easily (Lacey and Luff, 2009). This step can be done by using indexes or other methods that the researcher develops from their understanding of the questions used to collect the data (O'Connor and Gibson, 2003). This very important and valuable step will make it easier for the researcher to identify categories, concepts, and relationships (Daymon, 2010; Dey, 1993). This study utilised NVivo 9.0 to organise, manage, and code the data.

After organising the data, the researcher started coding it. This is considered a central and important process in qualitative data analysis (Daymon, 2010). In this study, the researchers used coding techniques following the recommendations of Strauss and Corbin (1997), which are open, axial, and selective coding. The information obtained using this method provided the flexibility and rigour required for the study and provides a structured approach for analysing the phenomenon of interest (Day et al., 2009).

The interview transcripts were examined line by line and composed into codes that reflected the researcher's understanding and interpretation of the data. Afterwards, codes were grouped based on abstract categories through an analysis of similarities and differences across all interviews. Axial coding was then applied simultaneously with open coding (Bhattacherjee, 2012; Strauss and Corbin, 1997). At this stage, categories were refined and linked with subcategories. During this phase, emerging themes were noted. Table 1-8 shows a sample of the coding process

Code	Quotation	Concept	Category
Involvement	**Physician 10:** 'I think it's good to ask for the employee's opinion; there is a probability that an employee suggests an idea that they don't have in the first place and it makes the system better.' **Physician 8:** 'If the update concerns paediatrics, it's good to have a meeting with us and take our views into consideration before implementing the update.' **Physician 1:** 'I know that it means more effort, more fatigue, spending more time taking people's requirements, a possible and expected slowness in their work, but in the end, we will have a system that contains everything we need.' **Nurse 8:** 'I think that the hospital needs to discuss the system with us beforehand because we are the end-users; what are our preferences, what is suitable so far and what is not. So they have to do a survey.' **Physician 11:** 'I think if they go to residents and people who use it a lot like us, that would be good. I think we can give them good recommendations that will improve the system.' **Nurse 4:** 'Honestly, I've been here for two years and no one has asked me yet about the system [laughs]. They should ask because we are the ones who use it the most and know what we do and don't need in it.'	Involving the main users	**Lack of user involvement**
Survey	**Nurse 10:** '[Management] should use a survey to evaluate the system, check if there is anything lacking or maybe, something that can be better.' **Nurse 1:** 'They should give us an opportunity to give our suggestions; surveys for example. One part should be for all the staff through the email.'	Listening to the main users	
Feedback	**Nurse 12:** 'I have some great suggestions that would make the system better. But no one asked me what I think. Honestly, I was a little disappointed that I was not asked [laughs].' **Nurse 11:** 'All areas should be asked first. They need to do a survey to find out what they need to improve.' **Physicians 3:** 'They should ask each department. Then, [the department] should study it. The department gives feedback.' **Physicians 6:** 'I emailed the IT department a while ago about some suggestions I have, but I did not hear back; they should at least acknowledge my feedback.'		

Table 1-8 Sample of the coding process

In the last stage of the analysis, selective coding was used. At this stage, the potential core categories were identified. Then, the core categories were related to the categories that accrued in the axial coding. A coherent picture of the phenomena emerged after cross-validating the core category against the raw data. The data analysis focused on identifying physicians and nurses' negative perceptions of HIT, as well as the organisational, personal, HIT, and interactions' factors that lead physicians and nurses to perceive HIT as a threat and resist the system. Figure 1.2 Analysis and findings.

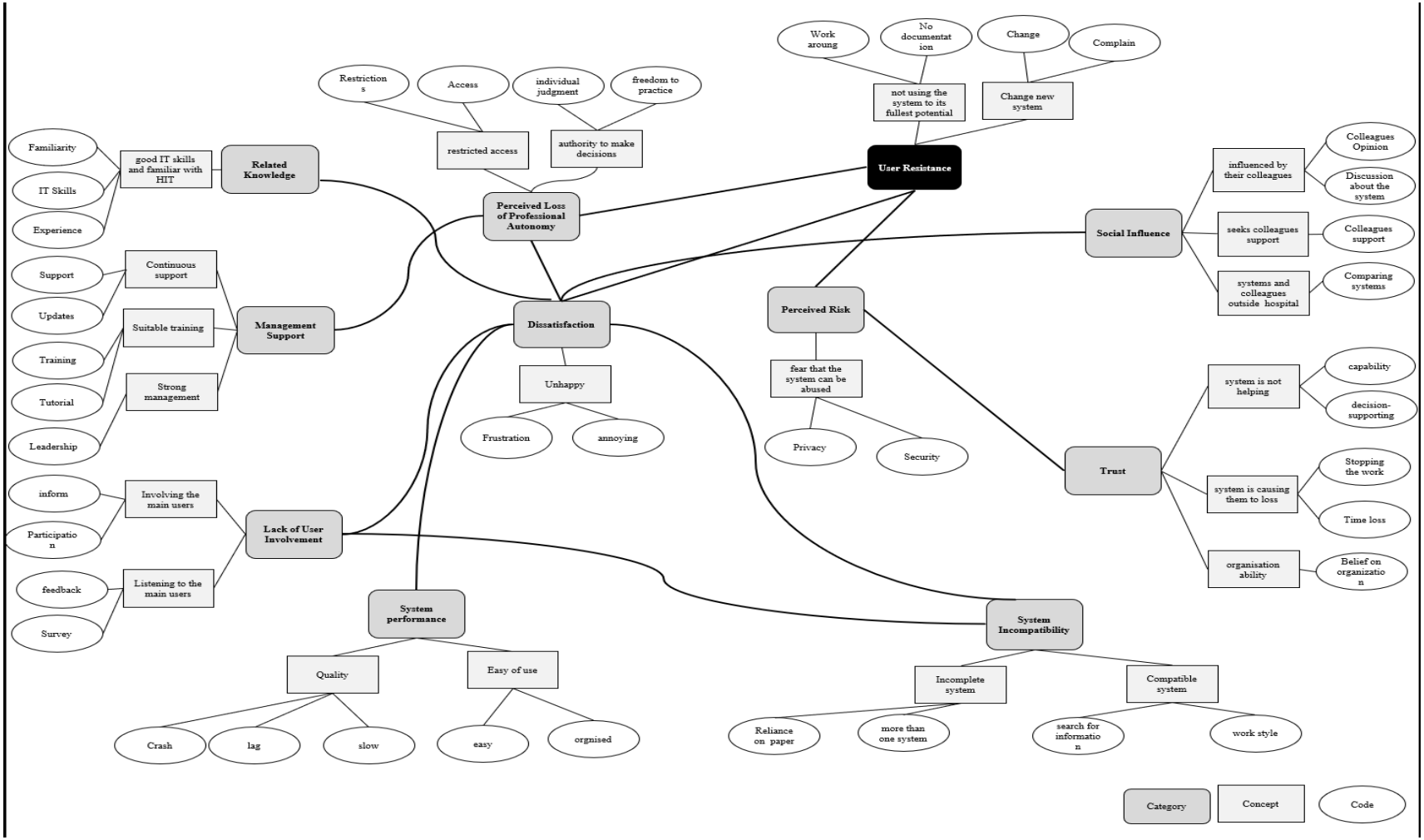


Figure 1.2 Analysis and findings

In scientific research, researchers must demonstrate that their qualitative data analysis is rigorous in terms of reliability and validity (Lacey and Luff, 2009; O'Connor and Gibson, 2003). The data must be valid in the sense that it measures what it intended to measure and produces representable results (O'Connor and Gibson, 2003). Further, the data must be reliable, which means that the findings are reproducible and consistent (Lacey and Luff, 2009). Researchers argue that this step should not be treated as a separate step but should be ongoing throughout the analysis, and a principle that is employed throughout the research process (O'Connor and Gibson, 2003). Researchers must interpret, present the data, and explain in detail what the data means, as well as the findings and discoveries from the data analysis (Daymon, 2010).

The researcher of this study supported the reliability and validity of the findings by using a chain of evidence technique (Beaudry and Pinsonneault, 2005; Lapointe and Rivard, 2005; Yin, 1994), which allowed the researcher to group the quotations from each physician and nurse in the study. Using a chain of evidence, the researcher was able to present and support the findings with data from the interviews. Moreover, the number of quotations in each category in the chain of evidence was calculated. This calculation was used to generate meaning and recognise patterns in the data (Sandelowski, 2001). Using numbers in qualitative research adds value by making claims such as *many, most, and higher* more precise (Maxwell, 2010).

1.6 Thesis Structure

The thesis comprises a series of research papers. It includes six main chapters.

1.6.1 Chapter One

Chapter One introduced the overall thesis, including the structure of the thesis, the motivation, objectives, research question, and key contributions. The remainder of Chapter One will cover

the research background and methodology, which were not fully discussed within the series of papers due to length limitations in most journals and conferences.

1.6.2 Chapter Two: Literature Review

Chapter Two presents the literature review. The title of the study is 'User resistance to information technology: An "organising" review of the literature.' The paper is under review with the journal, *Behaviour and Information Technology*.

This first paper, presented in Chapter Two, reviews the previous research on user resistance and aims to understand how user resistance is conceptualised in the literature and identify gaps in that literature. The paper contributes to the IS community by utilising compositional semantics to examine how user resistance is defined in the IS literature because there is no agreed-upon definition for the term at present. Further, it summarises the existing theoretical insight regarding user resistance, identifies several critical gaps in understanding user resistance, and provides a roadmap for future research in the field.

The paper is an 'organising review' (Leidner, 2018) that synthesises literature with the aim to uncover and extract insight from the IS literature, which could help future researchers better understand the problem. In total, 64 papers were reviewed and analysed. The paper highlights several important gaps in the IS literature. Most importantly, it identified a gap in our understanding of the antecedents of perceived threats. Further, the paper called for future researchers to focus on different types of users—such as nurses—and examine how different types of users could be different from each other. The paper highlights the need to examine how management's (personnel responsible for the implementation of IT) response to user resistance could affect users' resistance behaviour. Finally, the paper highlighted the need to focus more on the impact of user resistance beyond IT implementation failure.

1.6.3 Chapter Three: Theoretical Foundation and Model Development

Chapter Three presents the theoretical foundation of the study and the development of the preliminary model. This is a research-in-progress paper titled 'Investigating the antecedents of perceived threats and user resistance to health information technology: Towards a comprehensive user resistance model.' It is published in the *European Conference of Information Systems, 2018*. Portsmouth, UK

This paper builds on Chapter Two by beginning the model development process. The paper's main contribution is the development of a preliminary model for examining the antecedents of perceived threats and user resistance to HIT. By reviewing the IS literature on user resistance, this paper developed the model of the antecedents of perceived threats to HIT (Figure 1.3), which examines four perspectives: 1) personal factors, 2) organisational factors, 3) system-related factors, and (4) interaction factors. The factors are defined in Section 3.4.

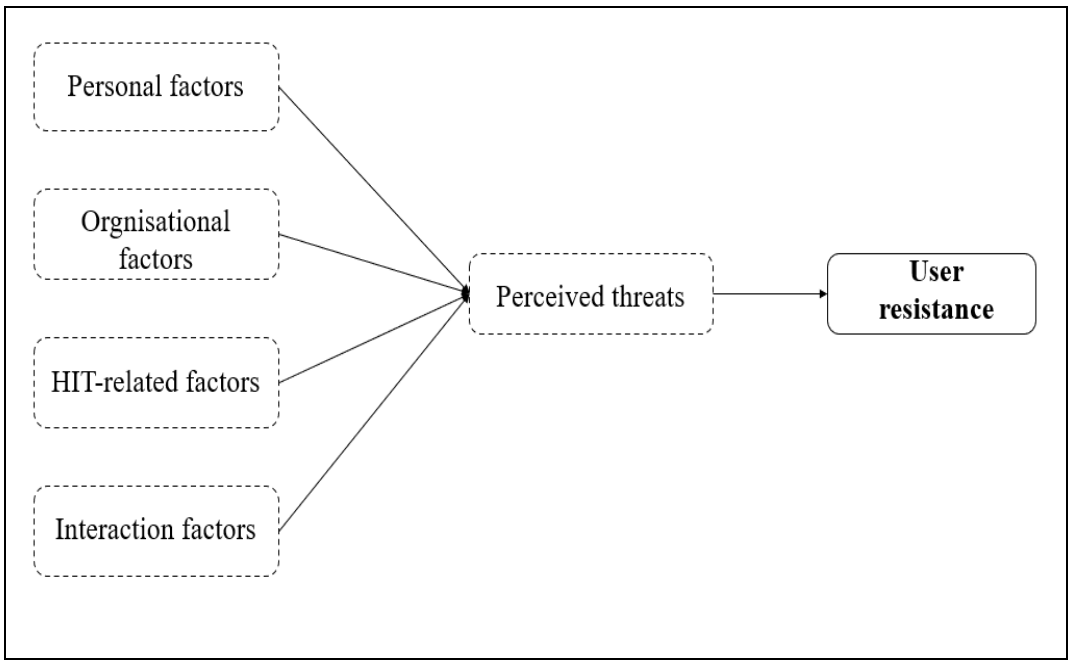


Figure 1.3 The antecedents of perceived threats and user resistance

1.6.4 Chapter Four: First Case Study

Chapter Four presents the first case study in a paper titled ‘Physicians and nurses’ perceived threats towards health information technology: A military hospital case study.’ This paper was accepted by IFIP Working Group 8.6 Transfer and Diffusion of IT.

This paper presents the first case study of this research, which is a military hospital in the Middle East. The study aims to identify the antecedents of perceived threats and user resistance to HIT that emerged from analysing the first case. The study took a post-implementation perspective to study user resistance to HIT. The data were collected through semi-structured interviews with physicians and nurses in a military hospital. In this case, 13 physicians and 15 nurses were interviewed. The interviews were guided by the model developed in Chapter Three. The data were analysed by applying open, axial, and selective coding techniques, following the recommendation of Strauss and Corbin (1990). This approach provided comprehensive data analysis and was considered appropriate for this research because it allows for flexibility and rigour (Sarkar et al., 2000). Further, it provides a structured approach for analysing the phenomenon of interest (Day et al., 2009). The data revealed that dissatisfaction and risks are the main components of perceived threats of HIT for physicians and nurses in this case study. Further, the analysis of data revealed that the antecedents of perceived threats are system incompatibility, management support, related knowledge of HIT, and lack of trust. The findings were supported by a chain of evidence. This study provided insights into how physicians and nurses may perceive HIT negatively and how such perceptions lead to resistance.

1.6.5 Chapter Five: Second Case Study

Chapter Five presents the second case study in a paper titled 'Investigating the antecedents of perceived threats and user resistance to health information technology: A case study of a public hospital,' published in the *Journal of Decision Systems*.

This presents the second case study of this research, a public hospital. The study identifies the antecedents of perceived threats and user resistance to HIT that emerged from analysing the second case. Similar to the first case, this study took a post-implementation perspective to study user resistance to HIT. In this case, 15 physicians and 15 nurses were interviewed using semi-structured interviews. The interview was guided by the model developed in Chapter Three. The data were analysed by applying open, axial, and selective coding techniques following the recommendation of Strauss and Corbin (1990). This approach provided comprehensive data analysis and was considered appropriate for this research because it allows for flexibility and rigour (Sarkar et al., 2000). Further, it provides a structured approach for analysing the phenomenon of interest (Day et al., 2009). Data analysis revealed that perceived dissatisfaction and loss of professional autonomy are the main components of perceived threats of HIT for physicians and nurses in this case study. Further, five factors that influence these perceptions are identified, including related knowledge of HIT, management support, user involvement, system performance, and social influences. The paper discusses these factors and how they influence perceived threats and user resistance. The findings were supported by a chain of evidence. This study provided insights into how physicians and nurses may perceive HIT as a threat and how such perceptions could lead to resistance.

1.6.6 Chapter Six: Cross-case Analysis

Chapter Six presents a cross-analysis of the previous two cases. The paper is titled 'Understanding resistance to health information technology: The antecedents of perceived threats,' and is under review in the journal *Information and Organization*.

This paper presents the two-case cases and a cross-case analysis of the cases. The data were analysed to identify the differences between the two cases and how these differences influence the antecedents of perceived threats and user resistance between the two cases. Analysis of the data focused on comparing the two cases, the differences between physicians and nurses, and the differences between the levels of physicians.

When comparing the two cases, the analysis revealed that the antecedents and the perceived threats to HIT varied between the cases because of the differences in organisational culture, management styles, and because of the differences in the organisation's control over the development of HIT. Further, the study examined and explained how the differences between physicians and nurses, and between the levels of physicians, influence their perceptions of HIT.

This study contributes to the IS field in general, and to user resistance research, by showing how organisational factors, personal traits of the users, HIT-related factors, and factors related to the interaction between physicians, nurses, and the organisation can influence how physicians and nurses perceive HIT. Additionally, by utilising a cross-case analysis, the study examined how differences in the organisational culture and individual differences between the users can influence user resistance. The paper develops a model of the antecedents of perceived threats and user resistance to HIT (Figure 1.4)

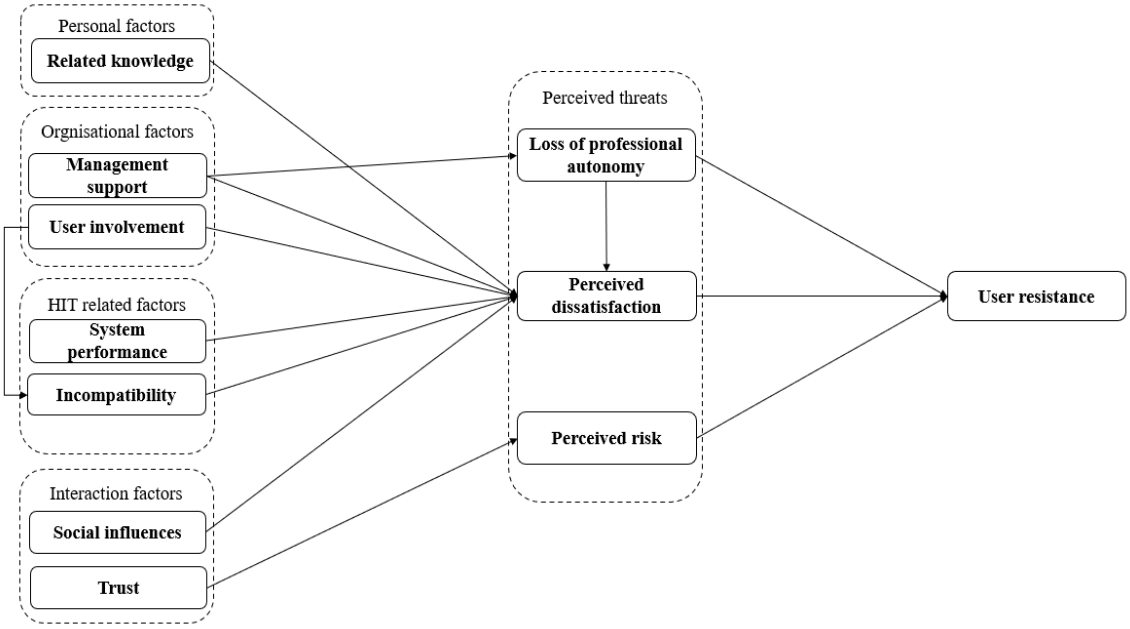


Figure 1.4 The antecedents of perceived threats and user resistance

1.6.7 Chapter Seven: Discussion and Conclusion

Chapter Seven is the final chapter of this thesis. It discusses the findings of this study and compares the findings with those in the literature. In this chapter, the research objective and the research question is answered. Finally, the chapter concludes by summarising findings, discussing the theoretical and practical contribution of the study, outlining the limitations of the study, and discussing possibilities for future research.

1.7 Conclusion

This chapter introduced the research topic and set the scope and boundaries. It established the main elements of the research by outlining the research objective and questions, and summarised the main contributions of the study. It described the research structure, summarised each chapter, and discussed the research methodology.

The remainder of this thesis contains a collection of papers that outline the research story, starting with a review of the literature (Chapter Two), development of a primary model of the

antecedents of perceived threats and user resistance (Chapter Three), the findings of the first case study (Chapter 4) followed by the second (Chapter Five), and a cross-case analysis of the two cases (Chapter Six). The thesis ends with a concluding chapter that presents a discussion and the main contribution of the thesis (Chapter Seven).

2. Chapter Two: Literature Review

User Resistance to Information Technology: An 'Organising' Review of the Literature

2.1 Abstract

Despite the extensive research on user resistance to date, this complex behavioural phenomenon still leads to information technology (IT) implementation failure, suggesting a need to investigate the causes of resistance from different perspectives. This paper conceptualises user resistance through compositional semantics and extracts theoretical insight from existing information systems (IS) research. In doing so, this paper contributes to the research by highlighting a number of critical issues and gaps in our understanding of user resistance, and provides a roadmap for future research on the phenomenon. It identifies several critical gaps in our understanding of user resistance, notably the need to examine the antecedent of users' perceptions and the impact of user resistance, and examines how management response influences resistance behaviour. This paper encourages future researchers to further examine the problem of user resistance to improve understandings of the important issues highlighted herein.

Keywords: user resistance, literature review, organising review

2.2 Introduction

There has been a sharp increase in the implementation of information technology (IT) across many types of industries in the last decade. For instance, in 2011, the US government spent $37 billion US dollars on IT implementation across their civilian agencies, while this increased

to $50 billion in 2019 (Executive Office of the President, 2019). This has enabled organisations to improve user experience and engage in digital ecosystems (Weill and Woerner, 2015), as well as to remain competitive and improve their efficiency in a dynamic market (Tsai et al., 2019; Vrhovec, 2016). However, the implementation of IT still faces many challenges and often suffers from cost and time overrun (Bhatnagar et al., 2017; Hsieh and Lin, 2019; Kim and Kankanhalli, 2009). Further, many implementations of IT fail because of unanticipated negative consequences such as user resistance, which many researchers consider to be a major cause of IT implementation failure (Berente et al., 2019; Hsieh and Lin, 2019; Hsieh, 2016; Lapointe and Rivard, 2005; Li et al., 2016). Further researchers (Craig et al., 2019; Hsieh, 2016; Ilie and Ture, 2019) have indicated that a lack of understanding of user resistance to IT could lead to organisations losing the desired benefit of IT implementation, such as improved user and organisational efficiency (Tsai et al., 2019; Vrhovec, 2016). Therefore, information systems (IS) researchers have paid considerable attention to user resistance to IT.

In general, IS literature on user resistance has examined the causes of resistance (Ferneley and Sobreperez, 2006; Hossain et al., 2019; Klaus and Blanton, 2010), user resistance behaviour (Hsieh and Lin, 2019; Klaus et al., 2010; Laumer et al., 2014) and how to overcome user resistance (Adams et al., 2004; Ilie and Turel, 2019; Rivard and Lapointe, 2012). Further, various perspectives and theories have been adopted by IS researchers to investigate user resistance and improve understandings of the subject (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Kim and Kankanhalli, 2009; Markus, 1983). Despite the fact that user resistance has been extensively studied, the problem of resistance persists. Therefore, there is a need for further research that examines user resistance from different perspectives.

To this end, an ‘organising review’ (Leidner, 2018) is conducted herein. This organising review synthesises literature to uncover and extract insights from the IS literature in an effort to help future researchers better understand the problem of user resistance and therefore how to

minimise it. According to Leidner (2018), ‘organising reviews do not claim to be comprehensive, but do try to make a large stream of literature understandable’ (p. 554). This paper examines user resistance to IT in particular, specifically how user resistance is conceptualised and operationalised in existing IS literature. This will lay the groundwork for the future theorisation of user resistance, as it is essential to understand how IS researchers interpret and define user resistance concepts (Weber, 2012).

This paper makes several essential contributions. First, it utilises compositional semantics to examine how user resistance is defined in the IS literature. It shows that researchers define user resistance differently, and the lack of a common definition hinders the cumulative theoretical development of the subject (Weber, 2012). Therefore, the study proposes a more comprehensive definition of user resistance. Second, it summarises the existing theoretical insights on user resistance, identifies several critical gaps in understandings of user resistance and provides a roadmap for future research in the field.

The paper is structured as follows: Section 2.3 describes the methodology adopted in the literature review. Section 2.4 explores how user resistance is defined in IS literature. Section 2.5 discusses and summarises user resistance theories. In Section 2.6, the findings and observations from the review are presented, along with future research directions.

2.3 Methodology

This paper performs and reports on an organising literature review (Leidner, 2018) about user resistance to IT implementation in the IS literature. Organising reviews, according to Leidner (2018), are used when a study intends to cover a broad phenomenon with vast literature that comes from several disciplines. In this case, user resistance is a broad phenomenon that is studied in many disciplines, including political science (Cunningham, 2017), management (Ford et al., 2008) and sociology (Hollander and Einwohner, 2004). For such a review, a

comprehensive review that covers all literature written on the subject is difficult to achieve (Leidner, 2018). Therefore, this paper is not intended to be a comprehensive or systematic review that covers all papers written on user resistance, but instead examines a wide range of that literature.

The Association for Information Systems (AIS) library was searched using the keywords ‘user resistance’ and ‘resistance’. Additionally, Webster and Watson’s (2002) approach of going backward and going forward was employed using Google Scholar. The review only included papers that focus on user resistance. Papers in which the word ‘resistance’ was briefly mentioned as a cause of failure without any further examination or suggestion for the reasons for user resistance were excluded from the study.

In total, 64 papers were identified as relevant to the study; these were analysed using a concept-centric review, as recommended by Webster and Watson (2002). The concept-centric approach determined the framework of the review and allowed the researcher to synthesise the literature (Webster and Watson, 2002). Of the 64 papers identified, 55 are empirical studies, seven conceptual papers, and two literature reviews.

2.4 Conceptualising Resistance

To lay the groundwork for the future theorisation of any given concept, it is essential to understand how IS researchers interpret and define the concept (Weber, 2012). Using compositional semantics, definitions of user resistance can be understood by the meaning of its words and how they were put together (adapted from Sugita and Tani, 2004). Compositional semantics can, therefore, reveal common ground among the existing definition of user resistance by breaking down the definitions into smaller concepts (Lapointe and Rivard, 2005). By applying this novel approach, it might help us better understand the concept of user resistance (Table 2-1).

2.4.1 Analysing Existing Definitions of User Resistance

Analysing the definition of user resistance in IS literature reveals that many definitions of user resistance resemble one another; however, IS researchers have used different words to define resistance. Analysis of the definitions using compositional semantics reveals that the concept ‘user resistance’ can be best understood by breaking its definitions down into three parts: (1) What is user resistance? (2) Why does it happen? and (3) Users’ reasons for resisting. In parallel, definitions of the nature of user resistance fall into four categories (behaviour, opposition, cognition and action) based on the words used in the definition, to explain what user resistance is. This breakdown of the definitions into smaller components (Table 2-1) will allow us to find commonalties among the definitions and identify a unifying definition of user resistance that can be used by future researchers.

Category	What is resistance?	Why does it happen?	Users' reason for resisting	Source
Behaviour	Behavioural reactions	Situation perceived as negative	Alter the status quo	Meissonier and Houzé (2012); Van Offenbeek et al. (2013)
	Behaviour	Fear and stress	(NA)*	Marakas and Hornik (1996)
	Behaviour	(NA)*	Show discontent with IT	Rivard and Lapointe (2012)
	Behaviour	(NA)*	Prevent system implementation	Markus (1983)
	Emotional behaviour	Threats	Stop change	Lapointe and Rivard (2005)
	Behavioural response	Seek to be in control	Attempts to subvert or circumvent a control measure	Murungi et al. (2019)
	Range of different behaviours	(NA)*	Stall and ultimately end a project	Bhattacherjee et al. (2017)
	Undesirable behaviours	The gap between change initiators and employees	Maintain the status quo	Shang (2012)
	Behavioural expression	(NA)*	Express opposition to a system implementation	Klaus and Blanton (2010)
Opposition	Opposition	(NA)*	Disruption to processes or initiatives	Ferneley and Sobreperez (2006)
	Opposition	Psychological contract breach	Alter the status quo	Lin et al., (2018)
	Oppose	Perceptions of the change	Alter the status quo	Laumer et al. (2016b)
	Opposition	Change	(NA)*	Kim and Kankanhalli (2009)
	Opposition	Change	Stop implementation	Hsieh (2016)

	Opposition and challenge	(NA)*	Disruption to processes or initiatives	Choudrie and Zamani (2016)
	Oppose	Pressures	Counter to change	Kavanagh (2004)
	Opposition to innovation	Potential change	Not use technology	Leong et al. (2019)
	Opposition	(NA)*	Avoiding change	Kim and Lee (2016)
Cognition	Cognitive force	Expected adverse consequences of change	Keep status quo	Bhattacherjee and Hikmet (2007)
Action	Reactive response	The unveiling of what was taken for granted	Neutralise some decisions or actions	Rodon et al. (2012)
	Reactive process	Perceived threats	(NA)*	Mehrizi et al. (2012)
	Response	Threats	(NA)*	Laumer et al. (2016); Hsieh and Lin (2019)
	User actions	(NA)*	Express opposition to the system implementation	Klaus et al. (2015)
	Act	Fear loss of autonomous control and power	Subverting IT	Alvarez (2008)
	Conduct	Pressure	Maintain the status quo	Samhan (2017)
	Reject	(NA)*	(NA)*	Balci (2015); Hsieh and Lin (2017)
	Protest	(NA)*	(NA)*	Mahmud et al. (2017)
**Not explicitly stated in the definition*				

Table 2-1 Breakdown of user resistance definitions

As shown in Table 2-1, resistance can be defined by breaking down the definitions into three components: (1) What is user resistance? (2) Why does it happen? and (3) Users' reason for resisting. The following subsections discuss each of the three components.

2.4.1.1 What Is User Resistance?

Definitions of the nature of user resistance are divided into four categories: behaviour, opposition, cognition and action. First, IS researchers commonly define 'user resistance' as a behaviour. Behaviour is understood by researchers as the manner in which humans change or respond to their surroundings (Rosenblueth et al., 1943; Umeda et al., 1990). To describe user resistance, the terms 'behavioural reaction' (Meissonier and Houzé, 2012; Van Offenbeek et al., 2013), 'behavioural response' (Murungi et al., 2019) and 'emotional behaviour' (Lapointe & Rivard, 2005) are used by many researchers.

A second group of researchers used the word 'opposition', or similar words, to describe resistance. Opposition is challenging or disrupting a process (Laumer et al., 2016b). For example, to define resistance, researchers used words such as 'opposition' (Kim and Kankanhalli, 2009; Laumer et al., 2016b), 'opposition and challenge' (Choudrie and Zamani, 2016) and 'opposition toward innovation' (Leong et al., 2019). Ferneley and Sobreperez (2006) explain that resisting IT implementation is challenging or distributing a process or an initiative. User resistance could be conscious or subconscious decisions made by potential users (Polites and Karahanna, 2012).

Only one researcher described user resistance as cognition (Bhattacherjee and Hikmet, 2007). In their seminal paper, Bhattacherjee and Hikmet (2007) argue that 'resistance is not a behavior but a cognitive force precluding potential behaviour' (Bhattacherjee and Hikmet, 2007, p. 728). Cognition can be explained as the mental activity of knowing by involving consciousness

(Davern et al., 2012). Finally, many researchers have described resistance as an ‘action’. The word action means a group of particular occurrences over a particular period towards a particular situation (Halper and Masuch, 2003). Researchers have used words such as ‘response’ (Hsieh and Lin, 2019), ‘conduct’ (Samhan, 2017) and ‘reactive process’ (Mehrizi et al., 2012). Some researchers have explained that resistance is an action or reaction to new IT implementation. Rodon et al. (2012) explain that action is a process that aims to achieve something; in the case of user resistance it is an attempt to prevent IT implementation.

2.4.1.2 Why Does Resistance Happen?

As part of their definition, some researchers have explained why user resistance occurs (Table 2-1). Some have stated that a user resists because of a situation perceived to be negative (Van Offenbeek et al., 2013), because of ‘fear and stress’ (Marakas and Hornik, 1996) and because of ‘pressure exerted by change’ (Kavanagh, 2004; Kim and Kankanhalli, 2009). IS researchers further argue that a user resists IT implementation because they believe this will bring negative consequences to them (Bhattacherjee and Hikmet, 2007).

2.4.1.3 Purpose for Resisting

In terms of intent, researchers have different explanations for the end goal of resistance (Table 2.1). For example, some argue that people resist to maintain the status quo (Samhan, 2017), to show discontent with IT (Rivard and Lapointe, 2012) and to prevent IT implementation (Bhattacherjee et al., 2017). Some researchers view resistance as a positive or functional phenomenon that points to misalignment between organisational goals and IT (Bagayogo et al., 2013). Others view it as neither negative nor positive but a natural phenomenon, because people tend to dislike change (Ferneley and Sobreperez, 2006; Van Offenbeek et al., 2013). However, most researchers view user resistance as a negative or dysfunctional phenomenon that disrupts work and delays IT implementation (Lin et al., 2018; Shang, 2012). Figure 2.1 is

a visual representation of how IS researchers view user resistance as a positive or functional phenomenon, a natural phenomenon or a negative or dysfunctional phenomenon. This figure could help future researchers understand how some IS researchers view user resistance.

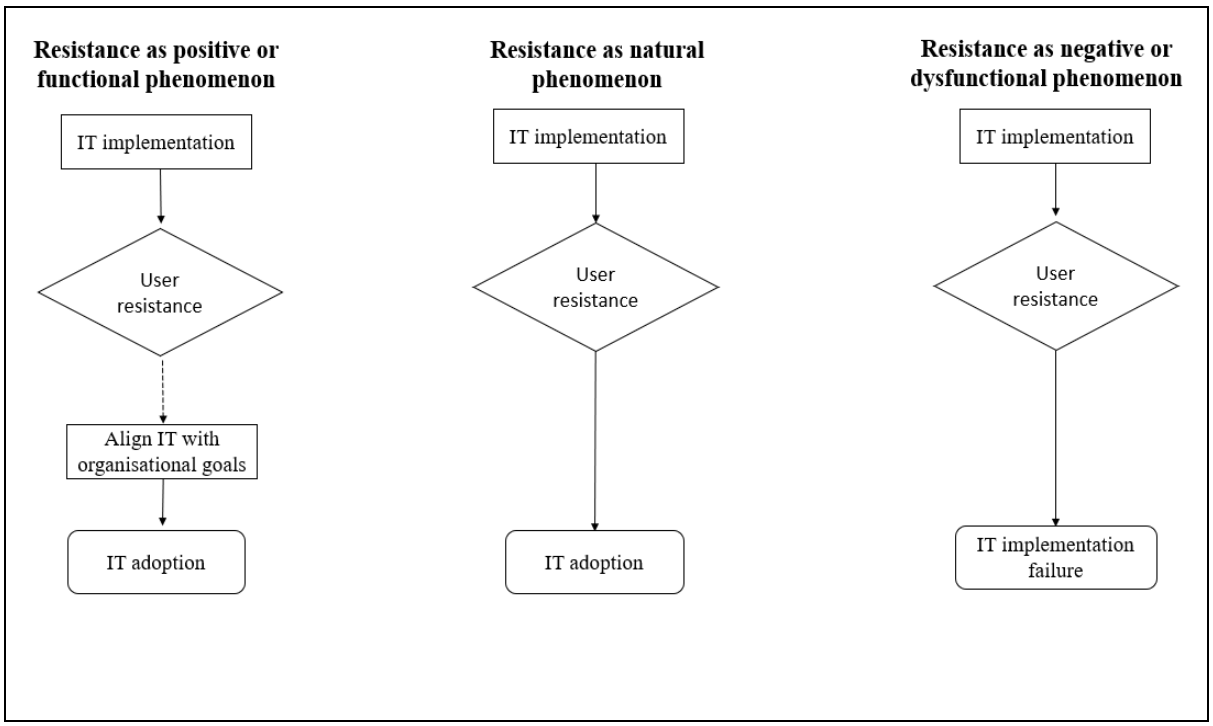


Figure 2.1 How IS researchers view user resistance

2.4.2 Defining User Resistance

Figure 2.1 and Table 2-1 highlight the fact that resistance behaviours are complex and not always negative; therefore, a fresh perspective is required that acknowledges that complexity and potential for improving adoption. Additionally, there is no agreed-upon definition of user resistance. This lack of an explicit definition hinders the cumulative theoretical development of the subject (Weber, 2012). It is unlikely that researchers will be able agree upon a definition of such a complex phenomenon as user resistance. However, employing compositional semantics, as illustrated in Table 2-1, can help find a commonly agreed-on definition that will improve understandings, as it will serve as a reference point for future studies and a starting point for expanding the conceptualisation and development of user resistance theories. This study aims to find common ground between the different definitions by combining common

elements of existing definitions (De Vido, 2019; Ejnefjäll and Ågerfalk, 2019; Lapointe and Rivard, 2005). As demonstrated in Table 2-1, when describing resistance, researchers have used words such as behaviour, opposition, cognition and action. However, it can be argued that not all of these words accurately describe resistance. On the one hand, words such as opposition and action may imply that resistance is always overt, where users actively resist using a system. On the other, a word such as cognition may imply that resistance is covert and users will passively resist a system. For that reason, a word such as behavioural is considered to be a primary dimension of resistance (Lapointe and Rivard, 2005; Meissonier and Houzé, 2010). The word behaviour represents resistance more accurately as it encompasses a wide range of resistance behaviour. Additionally, behaviour was used by many researchers in their definitions, so behaviour should be part of the definition. Moreover, the word expression can be used to describe how users express their feelings towards IT implementation. Finally, as this paper focuses on user resistance to IT implementation, IT implementation should also be included in the definition of user resistance. It is proposed that the concept of user resistance be defined as *'the behavioural expression of a user's opposition to change(s) associated with IT implementation.'*

With a definition now in place, this paper will discuss user resistance theories to better understand the level of maturity in the literature on user resistance and to comprehend the concept of user resistance and its principles and relations (Kuhn 1962). Then, the paper will present the observations from the review and suggest future research directions.

2.4.3 User Resistance Behaviour

After defining resistance as a behavioural expression it is important to understand the range of resistance as a behaviour. Understanding the different types of resistance behaviour will help future researchers understand and examine the phenomenon. A number of researchers

have indicated that user resistance behaviour includes a broad range of behaviours, ranging from overt to covert behaviours (Bhattacherjee et al., 2017; Marakas and Hornik, 1996).

Studies have shown that resistance can be covert (apathy resistance, passive resistance) or overt (active resistance, aggressive resistance) (van Offenbeek, 2012). Distinguishing between the different forms of resistance behaviour can be difficult as some overlap, and users' resistance behaviour can vary over time (Lapointe and Rivard, 2005). For example, the resisting behaviour can start as mild resistance during the first stages of implementation, then escalate to a more active or aggressive form of resistance at the latter stages of system implementation (Lapointe and Rivard, 2005).

Category	Type of Behaviour	Definitions	Example	Reference
Covert	Apathy	Users are aware of the change but show neither positive nor negative attitudes, instead showing inaction or a lack of interest	Show signs of annoyance; gossiping or using humour to describe the situation	Lapointe and Rivard (2005); Lapointe and Beaudry (2014); Selander and Henfridsson (2012)
	Passive	Mild or weak form of opposition to change where users adopt behaviours to slow down changes through persistence of previous behaviours and withdrawal from the situation	Missing system training sessions, delays finishing assigned tasks	Jiang et al. (2000); Lapointe and Rivard (2005); Meissonier and Houzé (2010); Marakas and Hornik (1996)
Overt	Active	Users practice strong but not destructive behaviours	Forcefully complain about the new system and refuse to use it. Form coalitions to stop or delay system implementation	Joseph (2010); Lapointe and Beaudry (2014); Selander and Henfridsson 2012); Meissonier and Houzé (2010)
	Aggressive	Users resort to disruptive and destructive behaviours with the objective of blocking the situation and preventing new system implementation	Boycotts, strikes and blackmail; criminal acts such as destruction of hardware	Meissonier and Houzé (2010); Lapointe and Beaudry (2012); Kumar et al. (2019); Selander and Henfridsson (2012)

Table 2-2 Description of user resistance behaviours

Table 2-2 shows that user resistance behaviour includes a broad range of behaviours, ranging from overt to covert behaviours, provides a definition for each type and gives examples to clarify the different behaviours. Distinguishing between the different forms of resistance behaviour can be difficult as some overlap, and users' resistance behaviour can vary over time (Lapointe and Rivard, 2005). Table 2-2 can be used by future researchers to better understand user resistance. It will help when researching the phenomenon and observing user resistance behaviour, especially covert resistance behaviour.

2.5 Theories of Resistance

User resistance is a complex problem, so IS researchers have developed various theories to improve understandings of it. Theories developed in scientific research indicate the maturity of a field of knowledge (Kuhn, 1962). Theories allows researchers to understand concepts, principles and relationships (Kuhn, 1962; O'Connor et al., 2016). Theories are defined as 'a set of interrelated concepts, definitions, and propositions that present a systematic view of events or situations by specifying relations among variables, in order to explain and predict the events or situation' (O'Connor et al., 2016, p. 2). According to Gregor (2006), there are five types of theory in IS research: analysis, explanation, prediction, explanation and prediction, and design and action. Even though these types of theories are different in nature, they provide clarity and advance the area under study (O'Connor et al., 2016; Gregor, 2006).

In user resistance research, theories help us understand how, when and why some users resist IT, therefore enriching our understanding of user resistance and its different manifestations. Some overlapping theories present an opportunity to develop a unifying framework that extends user resistance concepts and leads to a unifying theory of user resistance (Joshi, 1991; Kim and Kankahnalli, 2009; Marakas and Hornik, 1996). A review of the literature reveals

common features in these theories. First, it explains some of the root causes of user resistance and indicates that user resistance is the result of interaction between people, systems and the organisational environment (Markus', 1983). Second, it suggests that negative perceptions are the leading cause of user resistance (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005). Third, it highlights that user resistance can occur during pre-implementation (Kim and Kankahnalli, 2009), implementation (Bhattacherjee and Hikmet, 2007; Klaus and Blanton, 2010) and post-implementation of the system. Additionally, using Gregor's (2006) classification of theory types, some user resistance theories aim to predict (Bhattacherjee and Hikmet, 2007) and explain (Klaus and Blanton, 2010; Lapointe and Rivard, 2005; Marakas and Hornik, 1996), but the theory type of explanation and prediction is most common in user resistance research (Joshi, 1991; Kim and Kankanhalli, 2009; Laumer et al., 2016a, 2016b; Markus, 1983; Martinko et al., 1996). These theories have advanced the field of user resistance and helped improve understandings of the phenomenon. The following section discusses user resistance theories, will improve understandings of user resistance and help identify future research opportunities.

2.5.1 Theories: Perception and User Resistance

Many researchers have discussed the role of users' perception on user resistance (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Laumer et al., 2016a; Klaus and Blanton, 2010). Markus (1983) and Lapointe and Rivard (2005) see resistance as a power struggle between users and an object of resistance. Markus' (1983) interaction theory explains user resistance in terms of the interaction between a new system, the context of its use and the users. The theory suggests that users will resist the system if they believe it will cause a loss of power, and explains that resistance is a result of power relationships among members of the organisation; users will support or oppose IT implementation depending on their view of how it affects their position of power within the group. This theory suggests that

resistance is the result of personal, system and interaction factors. Markus' (1983) research provides one of the earliest theoretical explanations of user resistance in the IS literature. Markus' view that resistance stems from the fear of losing of power is embraced by many researchers, as seen in Table 2-1

Although no definition specifically used the word 'power', it can be argued that some of the words or phrases imply a fear of losing power, such as 'seek to be in control' (Murungi et al., 2019), 'perceived threats' (Mehrizi et al., 2012) and 'expected adverse consequences of change' (Bhattacherjee and Hikmet, 2007).

Lapointe and Rivard's (2005) theory was developed after using a longitudinal study of an implementation of health information technology (HIT). They suggest that user resistance is subsequent to perceived threats caused by the interaction of initial conditions, which are subjective to personal differences and a given object. Their study shows that user resistance has different causes and manifestations that can change over time. Lapointe and Rivard's (2005) theory indicates that resistance can increase or decrease during system implementation depending on the object of resistance. They suggest that an inappropriate management response can provoke resistance escalation. Bhattacherjee and Hikmet (2007) also explain that perceived threat is a key element of user resistance to change. Like Lapointe and Rivard (2005), they studied the implementation of HIT. Their theory was tested using quantitative methods, and they identified perceived threats as a major reason for user resistance.

Klaus and Blanton's (2010) psychological contract theory is another theory explaining how user perception influences resistance. The authors used a qualitative method to study resistance during enterprise system implementation. They found that user resistance is the result of users' perceptions of a breach of the psychological contract The theory suggests that users will evaluate their situation in comparison with other employees in similar positions. If users

perceive that their situation after the system implementation will be worse than that of other employees in a similar position, they consider this a breach of contract from the organisation and user resistance will follow. They explain that a psychological contract is not a legal contract but rather a subjective feeling based on employees' expectations or beliefs about what employers are obligated to provide (Klaus and Blanton, 2010). Klaus and Blanton (2010) explain that individual, systems, organisational and process issues influence the user's perception of the breach of psychological contract. Laumer et al. (2016a) also studied how users' perceptions influence user resistance. They explained that user resistance is induced by changes in the work process and routine after IT implementation. They used quantitative methods and studied user resistance at the pre-implementation stage of a human resource information system (HRIS) in an automotive company. Laumer et al. (2016a) introduce the perceived ease of and usefulness to executing work routines as a construct that directly affects user resistance.

Some researchers have investigated how the personality traits of users and user experience affect user resistance (Laumer et al., 2016b; Martinko et al., 1996). In their conceptual study, Martinko et al. (1996) developed a theory that suggests user resistance is caused by negative experiences with a previously failed system implementation. Their study explains that user resistance depends on the interaction of internal and external factors, along with users' former experience with IT. Such factors influence users' expectations, which in turn influence their reactions towards IT. Martinko et al. (1996) suggest that some management actions, or lack thereof, can cause user resistance. Laumer et al. (2016b), in their theory of dispositional resistance to change, suggest that perceived ease of use and perceived usefulness are major factors in user resistance. However, they go further than other theorists (e.g. Bhattacherjee and Hikmet, 2007; Laumer et al., 2016a) and explain how user personality traits affect perceived ease of use, perceived usefulness and resistance to change. Their theory explains that users'

personality traits – such as routine seeking, emotional reaction, short-term focus and cognitive rigidity – directly affect how users perceive the new system and decide whether they resist or accept it. The theory was validated using quantitative methods to examine the implementation of HRIS in an automotive company. Their study examined resistance at the pre-implementation stage.

2.5.2 Theories: Change and User Resistance

Several researchers have discussed the role of change in user resistance and have explained how users evaluate change and decide to resist a given system (Joshi, 1991; Kim and Kankahnalli, 2009; Marakas and Hornik, 1996). Joshi's (1991) equity-implementation theory explains how a user evaluates change and decides to adopt or resist change. Joshi (1991) used case studies published by previous researchers to explain their theory, which suggests that individuals evaluate change in terms of inputs and outcomes. If an individual believes the outcomes are less than the inputs, they will resist the change. Further, users evaluate how the change will affect their outcome compared to other users. Marakas and Hornik (1996), in their theory of passive resistance misuse, view resistance from a psychological perspective. They suggest that resistance is not dysfunctional but rather related to people generally disliking change. Their conceptual paper suggests that the implementation of new IT exposes users' tendency to dislike change, especially when coupled with feelings of stress and fear.

Building on the theories of Joshi (1991) and Marakas and Hornik (1996), Kim and Kankahnalli (2009) adopted the status quo bias theory to explain why users prefer to maintain their current situation over change. Their theory explains the decision-making process of user resistance and highlights the significant effect of switching costs (e.g., the time users spend learning a new technology) and switching benefits (e.g., benefits users get from learning a new technology) on the perceived value of IS-related change. The theory suggests that among other variables,

perceived value has a significant negative effect on user resistance. According to Kim and Kankahnalli (2009), perceived value is determined by switching benefits, which has a positive effect on perceived value, and by switching cost, which has a negative effect on perceived value and a positive effect on a user's resistance. Their theory was validated using quantitative methods to study resistance in private organisations, and examined user resistance at the pre-implementation stage.

2.5.3 Summary of User Resistance Theorising

To summarise, researchers have developed theories that examine user resistance from different perspectives. These theories have explained a number of reasons for resistance, such as loss of power (Markus, 1983), change of outcome (Joshi, 1991) and general dislike of change (Marakas and Hornik, 1996). Further, user resistance theories were developed after studying resistance to IT in the pre-implementation stage (Kim and Kankahnalli, 2009; Laumer et al., 2016b), during IT implementation (Bhattacherjee and Hikmet, 2007; Klaus and Blanton, 2010) and at multiple stages of IT implementation (Lapointe and Rivard, 2005). These studies were conducted in a variety of contexts, including healthcare (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005) and private organisations (Laumer et al., 2016a, 2016b). A common theme in user resistance theories is that user resistance emerges from the interaction between people, systems and the organisation (Markus, 1983; Lapointe and Rivard, 2005; Klaus and Blanton, 2010). Moreover, they introduced constructs to explain how users evaluate change, such as changes in outcomes and inputs (Joshi, 1991) and switching costs and benefits (Kim and Kankanhalli, 2009). User perception was also highlighted as a major factor influencing user resistance, including perceived threats (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005), perceived breach of contract (Klaus and Blanton, 2010) and perceived ease of executing work routines (Laumer et al., 2016a).

After examining how user resistance is conceptualised (Section 2.4) and discussing the several theories of resistance (Section 2.5), Section 2.6 presents the findings of this organising review and suggest future research that could expand existing user resistance theories and improve understandings of user resistance.

2.6 Findings and Future Research Directions

The main objective of this study is to uncover the research gaps in user resistance literature. To achieve this objective, it was first necessary to understand how user resistance is conceptualised in the IS literature. Notwithstanding the richness of contributions in the existing user resistance research, several research opportunities are identified for future research. While this review identified a significant theorisation of user resistance, it further identified several critical areas and issues that must be addressed by future researchers. First, this literature review shows that future researchers need to expand, build on and validate existing theories by examining user resistance at different stages of implementation and in different contexts. Second, the findings highlight the need to identify the antecedents of perceived threats. Third, this review emphasises that future researchers should aim to examine users that have not been extensively studied by user resistance researchers. Fourth, it discusses the need to improve the existing operationalisation of user resistance by adopting a qualitative and mixed-methods approach. Fifth, the findings reveal that future research should aim to examine the impact of user resistance beyond just IT implementation failure. Finally, the findings illustrate the need to study how management response impacts user resistance behaviour.

The following sub-sections will discuss these areas that need to be addressed by future user resistance researchers.

2.6.1 Future Theorisations of User Resistance

Future researchers could aim to expand and further validate these theories, such as by examining user resistance at different stages of implementation and in different contexts. For instance, researchers could examine the longer-term factors that may lead to user resistance by focusing on user resistance from a post-implementation perspective. This is because, at the post-implementation stage, users will re-evaluate their initial perception of the system based on their direct interaction and experience with the system.

Examining user resistance in a different context can also improve existing user resistance theories (Bhattacherjee and Hikmet, 2007; O'Connor et al., 2016). For example, by examining user resistance in a public organisation. Several unique characteristics of public organisations can provide insight into the problem of user resistance. First, in some public organisations, employees receive their salary from the government and not the organisation or institution they work for; hence, some employees might feel less allegiance to the organisation and its IT initiatives and be more likely to resist (Bhattacherjee and Hikmet, 2013). This may also be why people working in a public environment tend to resist change (Agasisti and Erbacci, 2018). Second, when selecting an IT system, public organisations prefer the most economical option, even though this might not always be the best. Hence, the selected IT might not be a good fit for the organisation and is likely to face resistance.

2.6.2 Extending User Resistance Theories: Antecedents of Perceived Threats

Analysing user resistance theories reveals two major factors that lead to user resistance: (1) user perception about the technology and (2) user evaluation of the change. Table 2-3 provides a list of common constructs used in user resistance theories.

Category	Construct	Reference
Users' Perception	Perceived threat	Lapointe and Rivard (2005); Bhattacherjee and Hikmet (2007); Hsieh and Lin (2017); Smith et al. (2014)
	Perceived compatibility	Bhattacherjee and Hikmet (2007)
	Perceived usefulness	Bhattacherjee and Hikmet (2007); Laumer et al. (2016a, 2016b); Ilie and Turel (2019); Norzaidi et al. (2008)
	Perceived ease of use	Bhattacherjee and Hikmet (2007); Laumer et al. (2016a, 2016b); Ilie and Turel (2019)
	Perceived unmet	Klaus and Blanton (2010)
	Perceived breach of contract	Klaus and Blanton (2010)
	Perceived ease of executing work routines	Laumer et al. (2016a)
	Perceived usefulness to work routines	Laumer et al. (2016a)
	Perceived value	Kim and Kankanhalli (2009); Hsieh and Lin (2017); Hsieh (2016); Mahmud et al. (2017); Hsieh and Lin (2019)
	Perceived novelty	Leong et al. (2019); Kim and Lee (2016)
	Perceived net benefit	Balci (2015)
	Perceived controllability	Xue et al. (2015)
	Perceived risk	Smith et al. (2014)
Evaluation of Change	Equity Comparison	Klaus and Blanton (2010)
	Loss of worth-based	Craig et al. (2019)
	Loss of competence	Craig et al. (2019)
	Loss of authenticity	Craig et al. (2019)
	Switching benefits	Kim and Kankanhalli (2009); Kim and Lee (2016); Laumer et al. (2016)
	Switching cost	Kim and Kankanhalli (2009); Kim and Lee (2016); Laumer et al. (2016)
	Changes of outcomes	Joshi (1991)
	Changes of input	Joshi (1991)
	Regret avoidance	Hsieh and Lin (2017)
	Sunk cost	Hsieh (2016)
	Transition costs	Hsieh (2016); Li et al. (2016)
	Loss aversion	Li at al. (2016)
	Uncertainty costs	Hsieh and Lin (2019)
	Performance expectancy	Samhan (2017)
	Effort expectancy	Samhan (2017)

Table 2-3 Common constructs used in user resistance theories

The first stream of researchers stated that users might perceive new IT implementation as a threat (Bhattacherjee and Hikmet, 2007; Lin et al., 2012; Lapointe and Rivard, 2005; Markus, 1983), as a problem that can cause inequity in the organisation (Lin et al., 2012) or as the leading cause of dissatisfaction in the workplace (Ngafeeson and Midha, 2014). These perceptions have a significant influence on users' resistance (Bhattacherjee and Hikmet, 2007; Lin et al., 2012; Lapointe and Rivard, 2005; Ngafeeson and Midha, 2014). Moreover, numerous factors can influence user resistance, and most researchers do not claim to be able to explain all causes of resistance (Bhattacherjee and Hikmet, 2007; Chong et al., 2015; Kim and Kankanhalli, 2009). Other variables and factors that influence user resistance must be investigated. For example, some of the constructs in user resistance research, such as perceived threats (Bhattacherjee and Hikmet, 2007), may have antecedents that determine them. By examining the constructs used by researchers (Table 2-3), it can be argued that regarding users' perceptions, perceived threats are the leading factor of resistance, as many of the constructs mentioned in Table 2-3 fit into the 'threats' category, such as perceived controllability (Xue et al., 2015) and perceived risk (Smith et al., 2014). Future researchers should explore the antecedents of perceived threats to provide a better picture of user resistance, which will allow for better understanding of user resistance.

Various user resistance theories also explain how users evaluate change and decide to resist (Joshi, 1991; Kim and Kankanhalli, 2009; Klaus and Blanton, 2010; Laumer et al., 2016b; Marakas and Hornik, 1996). Users evaluate change by determining the switching benefits and costs (Kim and Kankanhalli, 2009), as well as by evaluating their situation compared to other employees in similar positions (Klaus and Blanton, 2010). However, similar to theories that discuss user perception and resistance (e.g., Bhattacherjee and Hikmet, 2007; Lin et al., 2012; Lapointe and Rivard, 2005; Ngafeeson and Midha, 2014), theories that explain how users evaluate change (e.g., Joshi, 1991; Kim and Kankanhalli, 2009; Klaus and Blanton, 2010) do

not explain how important factors such as organisational culture, the different personalities of users and the system itself can influence how users evaluate change. Future research should examine how such factors can lead users to dislike change. It is envisioned that such an understanding of the antecedents of users' perceptions and evaluation of change will help organisations avoid user resistance by addressing the root causes of the problem.

2.6.3 Focus on Users

Analysing the studies reveals that IS researchers have examined user resistance in a wide variety of contexts, including health (Doolin, 2004; Geiger et al., 2017), education (Alvarez, 2008; Craig et al., 2019) and the private sector (Heinze et al., 2017; Kuisma et al., 2007; Laukkanen et al., 2009). However, these studies usually focus on one or two types of user. Table 2 4 Overview of types of users in user resistance research highlights the different types of users examined in user resistance research.

Context	Users	Number of studies	References
Healthcare	Physicians	11	Bhattacherjee et al. (2013, 2017); Bhattacherjee and Hikmet (2007); Doolin (2004);* Hossain et al. (2019); Hsieh and Lin (2017); Ilie and Turel (2019);* Kane and Labianca (2011); Lapointe and Rivard (2005);* Ngafeeson (2014);* Smith et al. (2014)
	Managers	4	Adams et al. (2004); Doolin (2004);* Geiger et al. (2017); Murungi et al. (2019)
	Patients	5	Bhatnagar et al. (2017); Hsieh (2016); Samhan (2017); Tsai et al. (2019);* Van Offenbeek et al. (2013)
	Healthcare professional	2	Hsieh and Lin (2019); Xue et al. (2015)
	Nurses	4	Doolin (2004);* Ilie and Turel (2019);* Lapointe and Rivard (2005);* Ngafeeson (2014)*
Private Organisation	Managers	10	Campbell and Grimshaw (2016); Choudrie and Zamani (2016); Ferneley and Sobreperez (2006);* Jiang et al. (2000);* Joia et al. (2014);* Li at al. (2016);* Mahmud et al. (2017); Markus (1983); Mehrizi et al. (2012);* Selander and Henfridsson (2012)*
	Employee	10	Ferneley and Sobreperez (2006);* Kim and Kankanhalli (2009); Laumer et al. (2014, 2016a, 2016b, 2016c); Li at al. (2016);* Mehrizi et al. (2012);* Meissonier and Houzé (2012); Selander and Henfridsson (2012)*
	Customers	6	Balci (2015);* Heinze et al. (2017); Kim and Lee (2016); Kuisma et al. (2007); Laukkanen et al. (2009); Leong et al. (2019)
Educational Organisation	Students	2	Craig et al. (2019); Polites and Karahanna (2012)
	Employee	2	Alvarez (2008); Klaus et al. (2015)*
	Manager	1	Klaus et al. (2015)*
Public Organisation	Managers	4	Ferneley and Sobreperez (2006);* Jiang et al. (2000);* Joia et al. (2014);* Norzaidi et al. (2008)
	Customer	1	Balci (2015)*
Multiple Organisations	Multiple users	7	Berente et al. (2019); Joshi (1991); Klaus and Blanton (2010); Klaus et al. (2010); Lin et al. (2018); Rivard and Lapointe (2012); Shang (2012)
* ***Studies examine multiple users***			

Table 2-4 Overview of types of users in user resistance research

Future researchers should focus on other types of users to improve understandings of user resistance (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Laumer et al., 2016b). Different types of users could have various reasons for resisting a system (Vrhovec, 2016). Therefore, understanding the differences between users and how these influence user resistance would improve understandings of the complex nature of user resistance (Laumer et al., 2016a). For example, future researchers should focus on other users in the healthcare sector. In the healthcare setting, there is a dearth of research that examines HIT user resistance from patients', administrative staff and nurses' perspectives. Additionally, research in healthcare offers an ideal opportunity to observe resistance at different levels (e.g., physicians versus nurses). Hospital settings can be an ideal research domain in which to examine user resistance because of their unique characteristics, such as (1) the fact that hospitals have several actors that are clearly identified and in continuous interaction, such as physicians, nurses, health professionals and administrators (Lapointe and Rivard, 2005); (2) the sensitivity and pressure medical professionals face to provide quality healthcare (Poon et al., 2005); and (3) the high level of power and professional autonomy of medical professionals (Boonstra et al., 2014). These factors make it especially challenging to manage and overcome user resistance to HIT (Samhan, 2015).

Nurses, for instance, should be studied because they are a significant stakeholder in HIT (Zadvinskis et al., 2018). Researchers indicate that nurses are different from other groups involved in HIT, such as physicians (Lapointe and Rivard, 2005). Several studies suggest that HIT has the potential to improve nursing practice by reducing paperwork, improving accurate recording and increasing nurses' free time (Darbyshire, 2004; Buntin et al., 2011). However, there have been incidents of nurses resisting HIT (Buntin et al., 2011; Lapointe and Rivard, 2005). It is important for a successful HIT implementation to overcome nurses' resistance, as their resistance can cause HIT implementation to fail (Chong et al., 2015). For these reasons,

IS researchers should focus on solving the problem of nurses' resistance to HIT, as this will improve the level of HIT adoption, thus improving the quality of healthcare. Similarly, future researchers should focus on a patient's resistance as the rapid the rapid advancement of HIT facilities more advanced technologies, such as health mobile applications, can improve people's quality of life (Samhan, 2017). Future researchers must shed light on why such potential users of IT could resist it.

2.6.4 Operationalisation of User Resistance

To examine users' resistance, a number of studies have applied both qualitative (Meissonier and Houzé, 2010; Rivard and Lapointe, 2012; Selander and Henfridsson; 2012) and quantitative research (Jiang et al., 2000; Kim and Kankanhalli, 2009; Lin et al., 2012). Out of the 64 reviewed papers that examined user resistance, 55 were empirical papers, 28 chose quantitative methods, 23 qualitative methods, and four used mixed-methods. While quantitative methods are best to test the validity and generalisability of user resistance theories (Sutton and Staw, 1995), the current operationalisation of user resistance does not capture the full aspects of user resistance. For instance, Kim and Kankanhalli (2009) operationalised user resistance as the extent to which users refuse to comply with changes to a new way of working. Similarly, Bhattacherjee and Hikmet (2007) operationalised user resistance as the extent to which users did not want new IT implementation to change how they worked. These two operationalisations were adopted by many other researchers (e.g. Hossain et al., 2019; Hsieh, 2016; Joia et al., 2014). However, this operationalisation only captures and measures part of the user resistance behaviour as it represents overt resistance behaviour. As discussed in Section 2.4, user resistance behaviour can take many forms and can be overt or covert. Measuring covert resistance behaviour is difficult when using quantitative methods. When it comes to covert resistance, users show a lack of interest or use humour to describe their annoyance about the situation (Lapointe and Beaudry, 2014; Selander and Henfridsson, 2012).

Therefore, to capture the full picture of a complex topic such as user resistance, future researchers should focus more on examining user resistance using mixed-methods. Qualitative methods can help researchers gain an in-depth understanding of user resistance that might not be available in quantitative research (Rivard and Lapointe, 2012). Moreover, the wide range of resistance behaviour requires a nuanced qualitative approach that captures meaning by allowing staff to express resistance without seeming to obstruct the organisation (Cassell and Symon, 2004). Future researchers are encouraged to use qualitative methods to study user resistance, to improve current theorisation of user resistance, and develop constructs that can be operationalised to test the validity of their theories using quantitative methods.

2.6.1 Impact of Resistance

Previous research on user resistance to IT has focused on the causes of resistance, resistance behaviour and how to overcome user resistance. Researchers identified a wide range of factors for user resistance such as fear of loss of power (Bhattacherjee et al., 2013; Lapointe and Rivard, 2005), fear of loss of status (Klaus and Blanton, 2010) and fear of losing control (Bhattacherjee and Hikmat, 2007). Further, researchers have identified a number of strategies to overcome user resistance. However, analysis of the literature revealed that very few studies have focused on the impact of user resistance (Table 2-5).

Focus of Papers	Number of Papers	Example References
The causes and process of resistance	43	Alvarez (2008); Balci (2015); Bhatnagar et al. (2017); Bhattacherjee and Hikmet (2007); Campbell and Grimshaw (2016); Choudrie and Zamani (2016); Craig et al. (2019); Doolin (2004); Ferneley and Sobreperez (2006); Geiger et al. (2017); Heinze et al. (2017); Hossain et al. (2019); Hsieh (2016); Hsieh and Lin (2017); Joia et al. (2014); Joshi (1991); Kim and Kankanhalli (2009); Kim and Lee (2016); Klaus and Blanton (2010); Kuisma et al. (2007); Lapointe and Rivard (2005); Laukkanen et al. (2009); Laumer et al. (2016a, 2016b, 2016c); Leong et al. (2019); Li at al. (2016); Lin et al. (2018); Mahmud et al. (2017); Markus (1983); Martinko et al. (1996); Mehrizi et al. (2012); Meissonier and Houzé (2012); Murungi et al. (2019); Ngafeeson (2014); Polites and Karahanna (2012); Rodon et al. (2012); Samhan (2017); Selander and Henfridsson (2012); Smith et al. (2014); Tsai et al. (2019); Xue et al. (2015)
Impact of resistance	4	Bagayogo et al. (2013); Kane and Labianca (2011); Kavanagh (2004); Norzaidi et al. (2008);
Resistance behaviour and strategies to prevent resistance	15	Adams et al. (2004); Berente et al. (2019); Bhattacherjee et al. (2013, 2017); Hsieh and Lin (2019); Ilie and Turel (2019); Jiang et al. (2000); Joseph (2010); Klaus et al. (2010); Klaus et al. (2015); Lapointe and Beaudry (2014); Laumer et al. (2014); Marakas and Hornik (1996); Rivard and Lapointe (2012); Shang (2012); Van Offenbeek et al. (2013)
Literature review	2	Ali et al. (2016); Kumar et al. (2019)

Table 2-5 Focus of user resistance research in IS literature

The IS literature recognises that user resistance leads to IT implementation failure (Ali et al., 2016; Campbell and Grimshaw, 2016). Nevertheless, a number of researchers have revealed that user resistance could lead to other unforeseen issues (e.g., Bagayogo et al., 2013; Bhattacherjee et al., 2013; Norzaidi et al., 2008). For example, Lapointe and Reviard's (2005) study of IT implementation in healthcare shows that user resistance created conflicts between physicians and nurses on the one hand, and between physicians and managers on the other. Such conflict could have long-lasting damage on the relationship between employees and decision makers in an organisation. This is a major research gap in the user resistance literature. Future research should aim to focus more on the impact of user resistance beyond just IT implementation failure. The impact of user resistance could be more severe than just IT

implementation failure, as it could damage the relationship between managers and employees. Future researchers should uncover the impact of user resistance, which will contribute to both research and practice.

2.6.2 Management's Actions and Resistance Behaviour

Analysis of the literature reveals that resistance research tends to focus on the causes of resistance, resistance behaviour and management responses to resistance separately from each other. Table 2-5 shows how previous researchers have examined user resistance. As indicated in Section 2.4.3, there are four different types of user resistance. Little research focuses on how management's responses to user resistance can impact the level of user resistance behaviour. The majority of the literature discusses actions to prevent a user from resisting IT (Berente et al., 2019; Jiang et al., 2000; Ilie and Turel, 2019). However, few studies document how managers' responses and actions that aim to overcome user resistance could influence user resistance behaviour. Future researchers should examine how managers' actions, or lack thereof, can actually affect the level of user resistance behaviour. A number of researchers have studied how management actions and interventions can prevent resistance (e.g., Bhattacherjee et al., 2013; Hsieh and Lin, 2019; Ilie and Turel, 2019). As indicated in Table 2 2 Description of user resistance behaviours

, some researchers have explained that resistance can be overt or covert, and that resistance behaviour can include apathy and passive, active and aggressive resistance (Lapointe and Rivard, 2005; Lapointe and Beaudry, 2014; Selander and Henfridsson, 2012). Few researchers have studied how management's responses after user resistance affects the levels of user resistance. Rivard and Lapointe (2012) proposed a taxonomy of management response to resistance, including inaction, acknowledgement, rectification and dissuasion. Several studies (Jiang, 2010; Meissonier and Houzé, 2010; Mosadeghrad, 2014; Vrhovec,

2016) suggest that management responses have an impact on user resistance. Based on the review of the literature Figure 2.2, presents a conceptual model (Lapointe and Rivard, 2005; Rivard and Lapointe, 2012) that could be employed by future researchers examining user resistance to IT implementation to see how and why management response to resistance affects the level of user resistance behaviour.

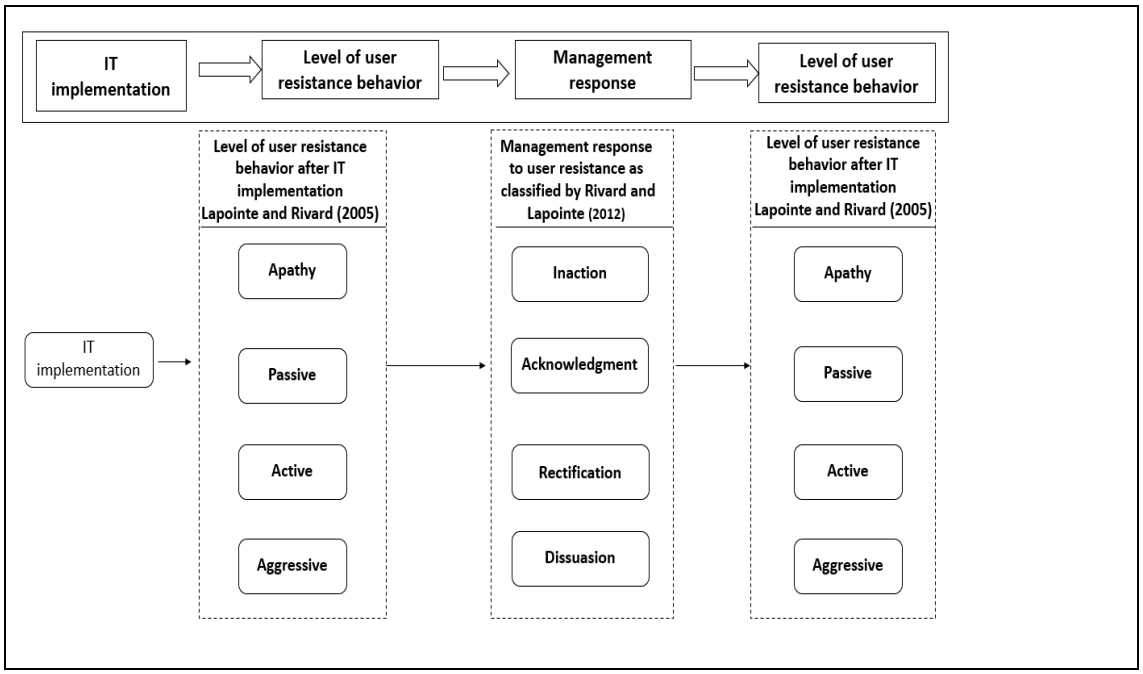


Figure 2.2 How management response impacts user resistance behaviour

If users showed signs of passive resistance behaviour and managers decided to respond with rectification, would this lead users to change their resistance behaviour? Additionally, future researchers should study how management responses that aim to prevent user resistance from occurring in the first place – such as training, communication and user involvement – could impact user perceptions of the technology, thus impacting user resistance (Laumer et al., 2016b).

2.7 Conclusion

This paper presented an organised review of user resistance to IT in the IS literature. It sought to understand how user resistance is conceptualised and what theories are used to improve

understandings of the phenomenon. The paper used compositional semantics (2.4) to analyse how user resistance is conceptualised in IS literature and further synthesised user resistance theories and analysed the literature to highlight critical research gaps. It highlighted six areas that future researchers should focus on. First, they should aim to expand, build on and validate existing theories of user resistance by examining the subject at different stages of implementation and in different contexts. Second, this paper highlighted the need to identify the antecedents of perceived threats. Third, it emphasised that future researchers should aim to examine users who have not been extensively studied by user resistance researchers. Fourth, it discussed the need to improve existing operationalisation of user resistance by adopting qualitative and mixed-methods approaches. Fifth, the paper encouraged future researchers to examine the impact of user resistance beyond just IT implementation failure. Finally, this literature review illustrated the need to study how management response impacts user resistance behaviour. It encouraged future researchers to investigate user resistance further to improve understandings of this complex issue. Future researchers should dig deeper into the problem and understand the important issues highlighted in this paper.

This paper has some limitations; as it is an organising review, it does not cover all literature written on the subject of user resistance. Further, it only reviewed IS literature to examine how user resistance is conceptualised and operationalised. Notwithstanding these limitations, this paper contributes to IS research by laying the groundwork and forming a research agenda for the future. The implications of such research would greatly improve understandings of user resistance and could help improve the chances of successful IT implementation with minimum user resistance.

3. Chapter Three: Theoretical Foundations and Model Development

Investigating the Antecedents of Perceived Threats and User Resistance to Health Information Technology: Towards a Comprehensive User Resistance Model

3.1 Abstract

Health information technology (HIT) has the potential to improve healthcare delivery by reducing medical errors, improving service quality and lowering healthcare costs. Despite the evident integration benefits of HIT, use of HIT by medical staff and hospitals remains low, partly due to user resistance. The literature indicates that user resistance to HIT is predicated by their perceptions. However, we do not fully understand how some users' perceptions are formed. In this study, we aim to investigate organisational factors, the personal traits of the user, HIT-related factors, and factors related to the interaction between physicians, nurses and the organisation that lead to perceived threat, risk and dissatisfaction. The study develops a comprehensive model that builds on and extends existing theories of user resistance. The model will be developed by studying user resistance from a post-implementation perspective via a qualitative approach, in which qualitative data collection and analysis methods will be used. The study will lead to a better understanding of the phenomenon as it will contribute to identifying the core reasons for resistance, which in turn will help organisations solve the root causes of the problem.

Keywords: user resistance, health information technology, post-adoption, perceived threats

3.2 Introduction

Health information technology (HIT), such as computerised patient order entry (CPOE) and electronic medical record (EMR) systems, have the potential to improve the quality of healthcare delivery by reducing medical errors, increasing patient safety, improving service management and lowering healthcare delivery cost (Beglaryan et al., 2017; Gewald et al., 2017; Koppel, 2016). Harnessing the potential benefits of HIT is a unifying goal of government agencies, healthcare providers and patients (Brenner et al., 2015; Hersh et al., 2016). Despite the evident benefits of HIT and governmental support for HIT investment (Beglaryan et al., 2017), medical staff and hospital adoption of HIT remains low (Almoaber and Amyot, 2017; Esmaeilzadeh et al., 2015; Gagnon et al., 2016). User resistance is a major reason for the low use of HIT (Ben-Zion et al., 2014; Kruse et al., 2016; Samhan, 2015). There are many examples of promising information technologies that failed to diffuse widely because of user resistance (Bhattacherjee et al., 2013; Lapointe and Rivard, 2005; Ngafeeson and Midha, 2014). For example, a hospital failed to implement an EMR system because of user resistance related to conflicts between nurses and physicians as well as between physicians and administration (Lapointe and Rivard, 2005). Similar patterns of organisational conflict resulting in resistance have been encountered at various other hospitals (Bhattacherjee et al., 2013; Esmaeilzadeh et al., 2015; Samhan, 2015).

User resistance is one of the most significant causes of failure across all types of information technology (IT) projects (Ali et al., 2016; Elmes et al., 2005; Meissonier and Houzé, 2010). There is a common conception among information systems (IS) scholars that user resistance must be mitigated to gain the desired benefit from new IT projects (Lin et al., 2012; Selander and Henfridsson, 2012). Organisation managers and IT project implementers must take into consideration IT user resistance when they introduce new IT projects to an organisation (Rivard and Lapointe, 2012). To better manage the implementation of new IT projects, it is imperative

to recognise behaviours of resistance and understand the reasons for user resistance (Ngafeeson and Midha, 2014; Shang, 2012; Smith et al., 2014).

In the IS literature, a significant number of studies focus on IS resistance, in contrast to studies that focus specifically on user resistance to HIT (Samhan, 2015). There are some important differences between user resistance to IT in general and user resistance to HIT specifically. For example, Lapointe and Rivard (2005) explain that one of the major differences between IT user resistance and HIT user resistance is the power physicians hold in hospitals. In general, physicians have more freedom of choice to use a given system than other types of users (Lapointe and Rivard, 2005). Moreover, the organisational and political culture in hospitals is different from other organisations; this suggests that the reasons, behaviours and responses to user resistance to HIT would be different to other IT user resistance (Bhattacherjee and Hikmet, 2007). The unique characteristics of a hospital environment are: (1) the fact that hospitals have several actors that are clearly identified and in continuous interaction, such as physicians, nurses, health professionals and administrators (Lapointe and Rivard, 2005); (2) the sensitivity and pressure medical professionals face to provide quality healthcare (Poon et al., 2005); and (3) medical professionals' high level of power and professional autonomy (Boonstra et al., 2014). These factors make it especially challenging to manage and overcome user resistance to HIT (Samhan, 2015). Consequently, this paper focuses on understanding the problem of physicians' and nurses' resistance to HIT. Shedding light on this problem could improve HIT adoption and thereby possibly attain the promised improvements in healthcare.

The objective of this research is to theorise how physicians and nurses perceive HIT as a threat, and how perceived threats lead to user resistance.. The user resistance literature indicates that resistance to HIT is predicated on users' negative perception of the technology (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Ngafeeson and Midha, 2014; Smith et al., 2014). However, very few studies have examined and explained how user perception is formed.

Moreover, several researchers have called for further studies to identify the factors that contribute to user perception and resistance (Ali et al., 2016; Hsieh, 2015; Laumer et al., 2016b). This work-in-progress (WIP) paper addresses this gap by building on Lapointe and Rivard's (2005) framework, which indicates that perceived threat evolves from the interactions of initial conditions with the object of resistance. Therefore, this study aims address this gap and extend understandings of user resistance by deconstructing the initial conditions into the effects of organisational factors, personal user traits, HIT-related factors and factors related to interactions between physicians, nurses and their organisations. Understanding the role of these factors in the perception of threat, risk and dissatisfaction with HIT is the object of this study.

This study examines user resistance from a post-implementation perspective. Some researchers (Mahmud et al., 2017; Wong, 2013) suggest that the majority of user resistance literature focuses on the post-implementation stage of IS. However, we did not find this. Many studies (Lin et al., 2012; Mahmud et al., 2017; Mehdi et al., 2012) did not specify whether they take a pre- or post-implementation stance. Further, the methods used in user resistance literature were found to be overwhelmingly quantitative. Given the heightened chances of meeting resistance to change during the pre-implementation and implementation phases, where disruption to existing processes is most prevalent, this research studies user resistance from a post-implementation perspective (12 months after the system go live). This will allow for the examination of longer-term factors that could lead to user resistance and potential system abandonment (Eden et al., 2014; Fryling, 2015). Further, at the post-implementation stage, users will normally re-evaluate their initial perceptions of the system based on their direct interaction and actual experience with it (Orlikowski and Gash, 1994; Saeed et al., 2010), providing researchers with an opportunity to study the actual causes of user resistance.

This research examines user resistance in the healthcare sector by examining the antecedents of perceived threats from a post-implementation perspective, and aims to answer the following research question:

*Why do users perceived HIT as threat, and how does perceived threats lead to user resistance?*The potential contributions of this study are:

- Theoretical contributions via a comprehensive user resistance model that builds on, and extends, existing theories of user resistance.
- The development of a better understanding of user resistance and user perceptions in healthcare sectors.
- The design of resistance mitigation plans for hospital managers responsible for developing and implementing IT projects, especially in the healthcare sector, which will increase the likelihood that HIT will be adopted and used widely.

The following Section 3.3 reviews user resistance theories and defines user resistance. The proposed model is described in Section 3.4 and Section 3.5 discusses the proposed methodology. Finally, Section 3.6 concludes this study.

3.3 Theoretical Background

3.3.1 Definition of User Resistance

The term resistance has been used across IS reference disciplines such as psychology, sociology and change management (Hollander and Einwohner 2004; Mullins, 2007; Oreg, 2003). The IS literature defines resistance based on those reference disciplines (Lapointe and Rivard, 2005). In our attempt to define IT user resistance, it is important to first look at how some IS reference disciplines define resistance. First, ‘resistance’ is defined by the Oxford English Dictionary as, ‘dislike of or opposition to a plan, an idea, etc.; refusal to obey’ (Oxford Learners’ Dictionaries,

2017). In psychology, resistance is defined as ‘an individual’s tendency to resist or avoid making changes’ (Oreg, 2003, p. 680). Sociologists define resistance as actions that oppose someone or something, and it can be expressed verbally, cognitively or physically (Hollander and Einwohner, 2004).

Management literature defines resistance as a force against change at the individual and organisational levels that brings delays and disruptions to the process of change (Mullins, 2007), and as an intentional act that can emerge at either the individual or organisational level to challenge the wishes of others (Ashforth and Mael 1998; Gibson, 2003). Some management researchers argue that resistance is a natural reaction to anything that upsets the status quo (Hiatt and Creasey, 2003). Others suggest that it can be a positive reaction where employees provide positive feedback to managers with the intention of improving the proposed change (Piderit, 2000). Nevertheless, much management literature defines resistance as negative employee behaviours that serve to maintain or re-enforce the current status quo (Waddell and Sohal, 1998).

Reviewing the IS literature shows that there is no clear agreement on a definition for IT resistance. Moreover, many researchers do not provide a clear definition of how they understand IT user resistance (Lapointe and Beaudry, 2014). Some researchers define user resistance as cognition, such as Bhattacherjee and Hikme (2007), who define it as ‘a cognitive force precluding potential behaviour’ (p. 727). Others view user resistance as opposition to change (Kim and Kankanhalli, 2009). However, the majority of IS literature defines user resistance as a behavioural reaction aimed at preventing change or expressing dissatisfaction with a situation perceived as negative (Lapointe and Rivard, 2005; Markus, 1983; Van Offenbeek et al., 2013). On the one hand, researchers argue that user resistance is more specific than overall resistance to change because user resistance is associated with new IS implementation (Kim and Kankanhalli, 2009; Klaus and Blanton, 2010). On the other, some

researchers argues that it is not limited to specific IT but a consequence of the change to the status quo (Bhattacherjee and Hikmet, 2007; Van Offenbeek et al., 2013). Moreover, studies have shown that resistance occurs when users perceive change as a threat to the security of their job, causing stressful feelings (Meissonier and Houzé, 2010) and resulting in a loss of power (Lapointe and Rivard, 2005).

A definition of user resistance can be achieved by breaking down the existing definitions in IS literature into smaller components. Doing so will enable us to find common ground in the existing definitions (Lapointe and Rivard, 2005). This breakdown aims to address what resistance is, and why and when it happens. In defining user resistance for this study, 17 peer-reviewed journals that defined user resistance were analysed. This analysis showed that the word 'behaviour' is found in the majority of definitions. Therefore, this should be an indispensable part of a definition of user resistance. Further, the majority of the literature describes resistance as a negative, and sometimes emotional, reaction. Thus, 'expression' is an appropriate word for describing the negative emotional reaction to user resistance. Additionally, studies show that the purpose of resistance is to stop change from taking place. Thus, 'opposition' is a suitable word for describing the purpose of resistance behaviour. Many researchers believe that IS implementation is the object of user resistance, so it should also be included in the definition of user resistance. 'User resistance' in this study is defined as:

The behavioural expression of a user's opposition to change(s) associated with IS implementation.

3.3.2 Overview of User Resistance Theory

User resistance is a complex phenomenon. IS researchers have developed various theoretical models to improve understandings of user resistance. A number of user resistance theoretical models consider user perception to be an important factor in user resistance, such as the role of

perceived threat (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Lin et al., 2012; Markus, 1983), perceived usefulness (Bhattacherjee and Hikmet, 2007; Laumer et al., 2016a; Lin et al., 2012), perceived compatibility (Bhattacherjee and Hikmet, 2007; Laumer et al., 2016a), perceived ease of use (Bhattacherjee and Hikmet, 2007; Laumer et al., 2016a, 2016b) and perceived dissatisfaction (Ngafeeson and Midha, 2014). These models explain that user resistance is caused by users' negative perceptions of a new system's implementation. They suggest that users who perceive that a system will have a negative impact on them, their work or their position within their organisation will resist the new system (Laumer et al., 2016a; Lin et al., 2012; Ngafeeson and Midha, 2014). However, few explain how user perception is formed and how it affects user resistance. For instance, Laumer et al.'s (2016b) dispositional resistance to change model went further than other models to explain how user personality traits affect user perception. The model explains that users' personality traits – such as routine seeking, emotional reaction, short-term focus and cognitive rigidity – directly affect how users perceive new systems and decide whether to resist or accept them. Laumer et al.'s (2016b) model was one of the first to measure the influence of personality traits on user resistance.

Researchers have conceptualised that physicians' and nurses' negative perceptions of HIT – such as perceived threat to professional autonomy (Walter and Lopez, 2008), perceived risk (Smith et al., 2014) and perceived dissatisfaction (Ngafeeson, 2013) – lead to user resistance. The proposed model of this research (Figure 3.1 The antecedent of perceived threat) builds on and extends user resistance theoretical models, such as those by Bhattacherjee and Hikmet (2007) and Lapointe and Rivard (2005). Bhattacherjee and Hikmet (2007) theorised that perceived threat of HIT is a key element of user resistance to HIT. Further, Smith et al. (2014) and Ngafeeson (2013) indicate that perceived risk and perceived dissatisfaction lead to user resistance. Lapointe and Rivard's (2005) model posits that user perception, such as perceived threat, evolves from the interaction of initial conditions with the object of resistance. However,

these models did not indicate how user perception is formed. This study helps address this gap and builds on these models. It develops a comprehensive model to identify the antecedent of physicians' and nurses' perceptions of HIT**.**

3.4 Model Development (Antecedents of Perceived Threat of HIT)

To develop the model, we drew from user resistance literature and empirical data to identify the factors that could influence physicians and nurses to perceive HIT as a threat, a risk and a source of dissatisfaction. User resistance literature suggests that four factors can influence users' perception of technology. These are organisational, system and personal factors, and the interaction between these three factors. The main constructs of the conceptual model will be defined next.

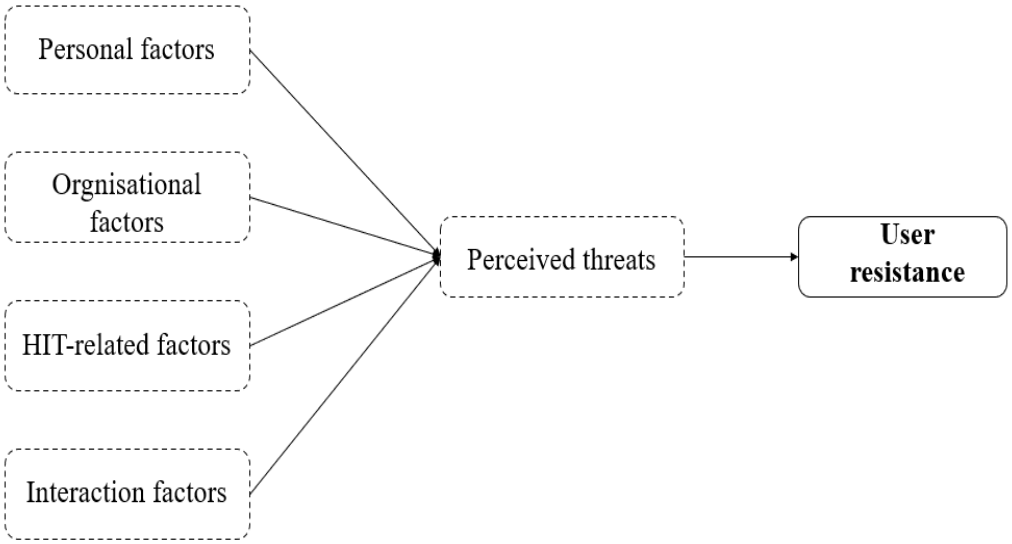


Figure 3.1 The antecedent of perceived threat

3.4.1 Personal Factors

Personal factors refer to the internal and external factors of people and groups, such as cognitive style, personality traits and the natural human tendency to resist change (Bhattacherjee, 2012; Markus, 1983). Certain characteristics – such as age, gender and background – contribute to an individual's perception of technology (Agarwal and Prasad, 1999; Jiang et al., 2000; Laumer et al., 2016b; Thatcher and Perrewe, 2002). Personal related factors suggest that resistance can be due to a user's perceived lack of capability because they lack confidence in their IT skills, or because they have received minimal training on the new system (Bhattacherjee et al., 2013; Klaus and Blanton, 2010). HIT systems are very complex and sophisticated systems that require users to be comfortable with computers, email and other online systems (Bhattacherjee and Sanford, 2006). Studies have shown that users who were more familiar with HIT systems, such as CPOE, felt more confident and comfortable using them (Bhattacherjee and Hikmet, 2007; Mettler, 2012), while physicians and nurses with insufficient computer knowledge were more likely to feel emotional, uncomfortable in the workplace and anxious about the new system (Esmaeilzadeh et al., 2015; Ngafeeson, 2013). Users who did not believe in their ability to use the system did not feel they were in control of the situation and the future outcome, and were less motivated to attend technology training sessions, and therefore were more likely to resist the system (Ngafeeson, 2013; Poon et al., 2005).

3.4.2 Interaction Factors

Interaction factors refers to the interaction between characteristics related to people, the organisation and the system (Markus, 1983). HIT will allow patient information and medical records to be shared across different departments and physicians in a hospital, leading to socio-technical and political factors that can lead to resistance. Socio-technical reasons suggest that new systems can lead to change in organisational structure, thus changing organisational

culture and job structure (Markus, 1983). Consequently, users feel they might lose their social influence in the organisation (Kim and Kankanhalli, 2009). Political factors suggest that new system implementation causes a redistribution of power and resources, such as changing department budgets, individual authority and employees' roles or positions (Bhattacherjee et al., 2013; Markus, 1983). Moreover, physicians and nurses seek to be in control but fear a new system could cause a loss of power (Lapointe and Rivard, 2005; Mosadeghrad, 2014), status (Klaus and Blanton, 2010), control over strategic organisational resources (Bhattacherjee and Hikmet, 2007) and revenue (Hsieh, 2015), and threaten professional autonomy (Ben-Zion et al., 2014). In general, physicians are considered to have high professional autonomy where they have the freedom to practice their work based on their individual judgement and without evaluation or oversight from others (Boonstra and Broekhuis, 2010; Boonstra et al., 2014; Lapointe and Rivard 2005; Walter and Lopez, 2008). Physicians and nurses are sensitive to any changes that threaten their professional autonomy because this is considered a privilege associated with their social status and income (Walter and Lopez, 2008). Introducing HIT to a hospital could lead physicians to believe they will lose control over how they make medical decisions, or that those decisions will be assessed or challenged (Boonstra and Broekhuis, 2010).

3.4.3 Organisational Factors

Organisational factors refer to factors related to the culture, structure or management of an organisation. The implementation of IT projects such as HIT can change a job's structure (Bhattacherjee et al., 2013) and work routines (Laumer et al., 2016a; Maier et al., 2013). Hospitals must have the capacity to accept changes that could arise through the implementation of new HIT (Ingebrigtsen et al., 2014). Successful implementation of HIT requires strong, supportive management (Keshavjee et al., 2006; Ludwick and Doucette, 2009). In healthcare, managers are legally and morally responsible for patients' safety and for ensuring high-quality

healthcare (Parand et al., 2014). They play a vital role in the success of large IT implementation, such as the implementation of HIT (Wu et al., 2008). Management support includes moral support, such as motivating users to engage with the system (Boonstra and Broekhuis, 2010), communicating openly and honestly with users (Jiang et al., 2000; Shang, 2012; Wu et al., 2008) and leading by example (Grublješič and Jaklič, 2015). This is important because, as shown in Lapointe and Rivard's (2005) case study, medical professionals tend to dislike change in their work environment and reject advice from other professionals, such as HIT developers. As well as management support, this problem can be mitigated by involving the user in HIT development and implementation. That is because user involvement ensures several important factors critical for successful HIT implementation and user satisfaction. For example, user involvement helps ensure the system meets requirement specifications, improves the system design and gives the user a sense of empowerment and ownership (Kappelman and Guynes, 1995; Vang, 2008). User involvement gives the user a feeling of control over the development and implementation of the system, helps them develop realistic expectations of the system and commits the user to the system from the early stages of development (Baronas and Louis, 1988; Markus, 1983).

3.4.4 HIT-related Factors

HIT-related factors refer to factors related to the technology itself (Jiang et al., 2000). This includes user interface design (Kaplan, 1997), the complexity of the system (Klaus and Blanton, 2010), the reliability of the system (Jiang et al., 2000), system compatibility with work requirements (Bhattacherjee et al., 2013; Klaus and Blanton, 2010) and the system's privacy and security (Angst and Agarwa, 2009). In the healthcare context, researchers suggest that inflexible HIT systems and systems that do not meet the work requirements of the user are more likely to face resistance (Staggers, 2009) because physicians and nurses are usually overworked (Silver, 2016; Wen et al., 2016). HIT that is inflexible and incompatible with work

requirements could lead to an increase in users' mental workload (Staggers, 2009; Boonstra and Broekhuis, 2010; Gagnon et al., 2010) and lead them to believe they must put more time and effort into learning and using the system (Boonstra and Broekhuis, 2010). The system-determined factors suggest that user perception is induced by external factors, which are the system design and the technology (Jiang et al., 2000). Further analysis suggests that system-determined factors are subjective to users' practical experience with the system and their knowledge of the technology. For example, if physicians and nurses know systems similar to the newly implemented one, they are more likely to find it useful and easy to use (Marinko et al., 1996). This research will examine how HIT-related factors influences user perception.

3.4.5 Perceived Threat

Perceived threat refers to users' fear of the future because of the expected negative consequences of new HIT implementation, such as the fear of losing power (Lapointe and Rivard, 2005; Markus, 1983), revenue (Hsieh, 2015), status (Klaus and Blanton, 2010) and control (Bhattacherjee and Hikmet, 2007). Several researchers have indicated that perceived threat is a significant cause of user resistance (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Hsieh, 2015; Lin et al., 2012). Perceived threat can result in an emotional reaction caused by emotional pain or a perception of a dangerous situation (Lapointe and Rivard, 2005). Perception can be understood as 'a process through which a person receives information or stimuli from the environment and transforms it into psychological awareness' (Oo and Usami, 2020, p. 3). Researchers view perception as cognitive and subjective process in which individuals understand and give meaning to a situation or environment (Oo and Usami, 2020; Ou, 2019). Users' perceptions are different from one person to another based on various factors, such as cultural background and language (Ou, 2019). In healthcare, physicians and nurses can perceive a system as a threat for several reasons. For example, they are sensitive to the risk factors that HIT might cause because of their sensitive work environment that requires them to

deal with people's lives (Smith et al., 2014). Such risk could be the fear or belief that HIT will have a negative impact on their job performance (Phichitchaisopa and Naenna, 2013). For instance, HIT users can believe that HIT will cause them to loss time learning the new technology and distract them from performing their tasks (Ngafeeson and Midha, 2014). Additionally, there can be a fear of system flaws that can put patients' lives at risk (Cocosila, 2009; Smith et al., 2014; Lapointe and Rivard, 2005). This research examines how physicians and nurses may perceive a system as a threat.

3.5 Proposed Methodology

To meet the objective of this study, we adopt a qualitative methodological approach to further identify the major factors and to develop the model. When observing user resistance, previous studies have tended to use quantitative methods to study user resistance. However, user resistance can be best observed and analysed using qualitative methods. User resistance can be covert or passive (Lapointe and Beaudry, 2014; Selander and Henfridsson, 2012) and require a nuanced qualitative approach that captures meaning by allowing staff to express resistance without appearing obstructive to the organisation (Cassell and Symon, 2004). Qualitative research methods are well-suited to answering our research question because they allow for the exploration of new ideas, capture new phenomena and identify the rich contextualised detail of complex concepts such as physicians' and nurses' resistance (Bhattacherjee, 2012; Cassell and Symon, 2004). This research uses semi-structured interviews to build three case studies of three types of hospital (university, public and private) that have implemented and used a HIT system. Interviews are useful in allowing people to be free to describe their perceptions (King, 2004), so are effective in allowing the interviewer to understand the perceptions of physicians and nurses, and the circumstances that lead them to view HIT negatively. The focus of this study is physicians and nurses, so we interviewed physicians and nurses who have professional

experience and knowledge of HIT. A snowball sampling strategy was used to identify subsequent respondents, wherein each initial respondent was asked to suggest other respondents who are knowledgeable about HIT. This research adopts a case study method, where case studies of different types of hospital are used to provide optimal analysis and results, as they allow comparison and maximise variation (Lapointe and Rivard, 2005). Additionally, case studies can be used to develop theories from qualitative data (Eisenhardt, 1989). To analyse the data, we followed qualitative data analysis techniques. For a comprehensive data analysis, we used the approach recommended by Strauss and Corbin (1990), in which three coding procedures are used to analyse qualitative data: open, axial and selective coding. This approach is considered appropriate for this research because it allows for flexibility and rigour, which are required for research engaged in theory building (Sarkar et al., 2000).

3.6 Conclusion

The aim of this research is to investigate the circumstances that lead physicians and nurses to perceive HIT as a threat to their professional autonomy, as a risk and as a source of dissatisfaction, thus leading to user resistance. A conceptual model was developed to situate the research objective within existing theory. A literature review of the main issues and causes of user resistance was presented. It is intended that this research will extend our knowledge and understanding of physicians' and nurses' resistance to HIT. Previous research has focused on examining how users' negative perceptions of IT influence user resistance, but this research focuses on the antecedents of user perceptions and resistance in a healthcare context, which is different from other contexts due to the high level of power and professional autonomy of medical professionals (Boonstra et al., 2014). Examining the antecedents of physicians' and nurses' negative perceptions will help hospital managers adopt pre-emptive implementation strategies that will anticipate and mitigate against resistance, thereby allowing them to focus

more on the organisational outcomes of investment in HIT. This will also inform theory and practice on user resistance to IT in other non-healthcare settings.

4. Chapter Four: A Case Study of a Military Hospital

Physicians' and Nurses' Perceived Threats Toward Health Information Technology: A Military Hospital Case Study

4.1 Abstract

The potential of health information technology (HIT) to increase the quality of healthcare delivery is well documented but improvements can be hindered if physicians and nurses resist HIT. However, the technology still faces resistance. The literature suggests that user resistance to HIT is predicated on their perception of its impact. However, we do not fully understand how users' perceptions are formed. This study investigates the antecedents of perceived threats by examining organisational factors, the personal traits of users, HIT-related factors, and factors related to the interaction between physicians, nurses and the organisation that lead to perceived threats. This study uses a case study of a military hospital to understand the antecedents of perceived threats and user resistance. The findings indicate that dissatisfaction and risks are the main components of perceived threats of HIT for physicians and nurses. Further, the study suggests that the antecedents of perceived threats are system incompatibility, management support, related knowledge of HIT and lack of trust. This research contributes to identifying the core reasons for resistance and will lead to a better understanding of the phenomenon, so can help organisations solve the root causes of the problem.

Keywords: user resistance, health information technology, perceived threats

4.2 Introduction

The potential of health information technology (HIT), such as computerised patient order entry (CPOE) and electronic health records (EHR), to increase the quality of healthcare delivery is well documented (Beglaryan et al., 2017; Carvalho et al., 2019). However, even with the recognised benefits of HIT, the technology still faces user resistance (Barrett, 2018; Kruse et al., 2016; Safi et al., 2018). There are a number of examples of failed HIT implementation because of user resistance (Bhattacherjee et al., 2013; Lapointe and Rivard, 2005; Ngafeeson and Midha, 2014). Further, various studies have shown that user resistance is a contributor to time and budget overruns (Alsharo et al., 2018; Mahmud et al., 2017). Therefore, user resistance must be taken into consideration by the managers of organisations and IT project implementers (Rivard and Lapointe, 2012). Awareness of the factors that influence user resistance and recognition of resistance behaviour will enable managers to better manage new IT projects (Ngafeeson and Midha, 2014; Smith et al., 2014). It is hoped that such understanding will improve the likelihood of successful HIT implementation and continued use of the technology, thereby helping the attainment of the improvements in healthcare that HIT can provide.

The unique organisational and political culture of hospital settings highlights the need to study user resistance to HIT, as it is expected that the reasons, user behaviours and proper responses to user resistance would be different than IT user resistance in other sectors, and especially challenging (Bhattacherjee and Hikmet, 2007; Samhan, 2015). Some of the unique characteristics that apply to hospitals are: (1) in general, physicians hold some power in hospitals and, as a result, physicians have some freedom to choose a system when compared to other types of IT users (Sligo et al., 2017); (2) physicians and nurses have different but well-defined rules in hospitals and are required to interact with each other to perform their jobs, and it is predicted that the introduction

of HIT could change the relationship between physicians and nurses as the method of interaction changes (Lapointe and Rivard, 2005); (3) physicians and nurses have sensitive jobs in which patient welfare is primary, so they are under significant pressure to provide quality healthcare, especially as resources are often constrained (Poon et al., 2005). Such unique factors highlight the need to study HIT user resistance.

The user resistance literature indicates that resistance to HIT is predicated on users' negative perceptions of the technology (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Ngafeeson and Midha, 2014; Smith et al., 2014). However, very few studies have examined and explained how user perceptions are formed (Esmaeilzadeh et al., 2015; Laumer et al., 2016b). Additionally, a number of researchers have highlighted the need for more studies the help our understanding of the issues that lead to negative user perception and resistance (Ali et al., 2016; Hsieh, 2015; Laumer et al., 2016b). To address this gap in the literature, this study aims to investigate the conditions that lead physicians and nurses to perceive HIT as a threat, thus leading to user resistance. This paper derives from Bhattacherjee and Hikmet's (2007) model, which indicates that perceived threat leads to users' resistance to change. This research was conducted in a military hospital, which presents unique understandings of user resistance via several important factors. For example, studies have shown that physicians and nurses working in military hospitals have high professional autonomy and control over their work practice (Alshahrani et al., 2018; Foley et al., 2002). The introduction of HIT is likely to reduce power and autonomy, so physicians and nurses might perceive HIT as a threat and resist the system (Walter and Lopez, 2008). Second, the unique relationship between management, that tends to comprise military personnel, and between physicians and nurses, who are mostly civilians (Alshahrani et al., 2018), suggests that managing the change brought by HIT could be more challenging due to the different backgrounds

between management and most users (Feaver and Kohn, 2000; Hall, 2011). These factors will present an interesting dynamic and will provide new insights into our understanding of user resistance.

This study examines user resistance in the healthcare sector by examining the antecedents of perceived threats. It answers the following research question:

Why do users perceive HIT as threat, and how do perceived threats lead to user resistance?

Thus, the study may help hospital managers understand user resistance better and create the right policies and actions to mitigate resistance and increase the likelihood of HIT adoption. The cost of healthcare is rising (Einav et al., 2018; Kohli et al., 2012), and in many hospitals, investment in IT represents a considerable percentage of the overall budget (Chaudhry et al., 2006; Joia et al., 2014). Therefore, understanding user resistance and the antecedents of user perception is crucial as resistance is a major cause of HIT implementation failure (Kruse et al., 2016).

The remainder of this paper is structured as follows. Section 4.3 addresses the theoretical underpinnings of the study and presents the literature review. In Section 4.4, the research methodology is presented, and the findings in Section 4.5. Section 4.6 presents the discussion, implications and limitations of the study.

4.3 Literature Review

User resistance has been the subject of much research, and in recent years IS researchers have developed various theoretical models that offer new insights and improve understandings of user resistance. A number of these theoretical models consider the role of user perceptions of a new system as the leading factor in user resistance, including the role of perceived threat (Bhattacherjee

and Hikmet, 2007; Lapointe and Rivard, 2005; Lin et al., 2012; Markus, 1983), perceived compatibility (Bhattacherjee and Hikmet, 2007; Laumer et al.,2016a), perceived ease of use (Bhattacherjee and Hikmet, 2007; Laumer et al.,2016a; Laumer et al.,2016b) and perceived dissatisfaction (Ngafeeson and Midha, 2014). These theoretical models explain that users who believe that a system will negatively impact them, their work or their status within their organisation will resist it (Laumer et al., 2016a; Lin et al., 2012; Ngafeeson and Midha, 2014). However, few of the user resistance models explained how user perception is developed and how it affects user resistance. This study identifies some of the factors that can influence perceived threats. It will go further than existing user resistance research by exploring the antecedents of user perception and explaining how user perception is formed.

Perceived threats can be characterised as users' fear of HIT implementation because of expected negative consequences, such as fear of losing power, revenue or control (Bhattacherjee and Hikmet, 2007; Hsieh, 2015; Klaus and Blanton, 2010; Lapointe and Rivard, 2005). Some researchers have shown that perceived threat can cause emotional pain or perception of an unfavourable situation; thus, it can be deemed by the user as a reason for resisting IT implementation (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Hsieh, 2015; Lin et al., 2012). Physicians and nurses are sensitive to the possible risks of HIT, such as a negative effect on their job performance (Phichitchaisopa and Naenna, 2013) or system defects that endanger patients (Cocosila, 2009; Smith et al., 2014; Lapointe and Rivard, 2005). This study examines how and why physicians and nurses may perceive HIT as a threat.

A review of user resistance literature indicates that four general factors can influence perceived threats and user resistance to technology: personal, organisational and system factors, and the interaction between people, the system and the organisation. Personal factors refer to the internal

and external factors of people, such as their personality traits, cognitive style and the natural human tendency to resist change (Bhattacherjee, 2013; Markus, 1983). Personal traits suggest that an individual's perception of technology can be influenced by specific characteristics such as gender, age, background, lack of confidence and lack of IT skills (Klaus and Blanton, 2010; Laumer et al., 2016b; Thatcher and Perrewe, 2002). HIT is complex and advanced technology and requires users to be comfortable using computers (Bhattacherjee and Sanford, 2007). Studies have found that the more familiar users are with HIT, the more likely it is they will feel confident using the system (Bhattacherjee and Sanford, 2006), whereas users who lack IT skills or do not believe in their ability to use the system are more likely to feel anxious about a new system and be unhappy in the workplace. Consequently, it is likely that these users will resist the system (Esmaeilzadeh et al., 2015; Ngafeeson, 2013; Poon et al., 2005). This study identifies and explains the personal factors that could lead physicians and nurses to perceive HIT as a threat.

Organisational factors refer to factors related to the culture, structure or management of an organisation (Ali et al., 2016; Alshawi et al., 2011). Introduction of large IT projects such as HIT may lead to several organisational changes in terms of the general culture of the organisation, the job structure, job description and the work style of employees (Bhattacherjee et al., 2013; Laumer et al., 2016a; Maier et al., 2013). These changes require organisations to have the capacity to accept changes, as well as active and supportive management to lead the change (Ludwick and Doucette, 2009). Lapointe and Rivard's (2005) case study shows that physicians and nurses tend to be sensitive about changes in their work environment. Therefore, strong leadership that can motivate users; fostering open and honest communication and leading by example are crucial for successful HIT implementation (Boonstra and Broekhuis, 2010; Grublješič and Jaklič, 2015; Wu et al., 2008).

This study will identify and explain how organisational factors can cause physicians and nurses to perceive HIT systems as a threat.

HIT-related factors refer to factors related to the system itself (Jiang et al., 2000). This can include the design of the interface (Kaplan, 1997), system reliability (Jiang et al., 2000), the complexity of the system (Klaus and Blanton, 2010), the compatibility of the system with existing work requirements (Bhattacherjee et al., 2013; Klaus and Blanton, 2010) and the system's security (Angst and Agarwa, 2009). In healthcare, physicians and nurses are usually overworked (Silver, 2016; Wen et al., 2016), so inflexible HIT that is not compatible with the work requirements of the user is more likely to increase the user's mental workload, cause frustration and lead to resistance (Alexander and Staggers, 2009; Boonstra and Broekhuis, 2010; Gagnon et al., 2010). HIT-related factors can be subjective to the user's knowledge of the technology and their practical experience with HIT. Physicians and nurses who are more familiar with HIT are more likely to find it easy to use and useful (Marinko et al., 1996). This study identifies and explains how HIT-related factors can cause physicians and nurses to perceive HIT system as a threat.

Finally, interaction factors refer to the interaction between characteristics related to people, the organisation and HIT (Markus, 1983). It is expected that HIT implementation could change the dynamics of an organisation and lead to changes in the relationships between employees (Menachemi et al., 2015, Markus, 1983; Laumer et al., 2016a). Typical interactions between people could affect how people perceive things. For example, the IS literature has suggested that social influences, such as the opinions of colleagues and other IT users, are a key predictor of user behaviour (Eckhardt et al., 2009). Further, interaction factors could be related to the interactions between individuals and their organisation. For instance, trust is often discussed in the IS literature as a critical element of the relationship between employees, the organisation and its leaders (Oreg,

2003). Additionally, it can be claimed that trust directly affects individuals' behaviour and intentions (Boonstra and Broekhuis, 2010; Wu et al., 2008). This study identifies and explains how interaction factors can cause physicians and nurses to perceive HIT systems as a threat.

The user resistance literature suggests that perceived threat is influenced by personal, organisational and HIT-related factors, as well as factors related to the interactions among physicians, nurses and their organisations.

4.4 Methods

A single exploratory case study approach was employed to meet the objective of theorising and understanding the major factors that influence physicians' and nurses' perceived threats of HIT. The case was a military hospital that had recently implemented and used HIT. The HIT is an EHR system that grants physicians and nurses access to patients' records and allows them to enter and retrieve data such as patients' treatment plans and medication. Additionally, it allows physicians to request and obtain test results, such as lab exams and X-rays. The research context and the case study will be presented further later.

A qualitative research method was selected because it was well-suited to answering the research question as it facilitates the exploration of new ideas and captures new phenomena and rich contextualised details of complex concepts such as physicians' and nurses' resistance (Bhattacherjee, 2012; Cassell and Symon, 2004). User resistance behaviour can range from covert to overt (Lapointe and Rivard; 2005). It is important for researchers and organisational managers to understand user resistance behaviour to effectively respond to it. A nuanced qualitative approach is appropriate as it allows users to express their feelings without appearing obstructive to the

selected organisation (Cassell and Symon, 2004). Additionally, it allows researchers to better identify and understand user resistance behaviour.

This study takes a post-implementation perspective (6–12 months after the system go live). User resistance during the pre-implementation and implementation phases is very high and well documented because of the widespread disruption to existing processes (Bhattacherjee and Hikmet, 2013; Meissonier and Houzé, 2010). Further, little research focuses on the post-implementation phase (Alohali et al., 2018), and addressing this gap allows us to examine the longer-term factors that could lead to user resistance and potential system abandonment (Eden et al., 2014; Fryling, 2015). Moreover, after their direct interaction and actual experience with the system, users will likely re-evaluate their initial perceptions of the system (Orlikowski and Gash, 1994; Saeed et al., 2010), thus providing us with an opportunity to study the actual causes of user resistance.

4.4.1 Data Collection

Semi-structured interviews were conducted in May and June 2018 with physicians and nurses in a military hospital. The interviews captured socio-demographic information and were guided by the factors presented in the literature review. Open-ended questions were asked. These questions were developed from the factors discussed previously in the literature review section (4.3). The questions provided valuable insight into the participants' perceptions of HIT. The interviews allowed the subjects to freely describe their perceptions (King, 2004), so were effective in allowing the researcher to comprehend the perceptions of physicians and nurses, and the conditions that led them to view HIT negatively. A snowball sampling strategy was used to identify subsequent respondents, where each initial respondent was asked to suggest other physicians and nurses working in the hospital. The respondents were physicians and nurses who were familiar with the

hospital HIT and represented a subset of the hospital population. The data collection process ended at the point of redundancy. Some of the interviews were conducted in Arabic depending on the English-language level of interviewee. All interviews were transcribed word-by-word and those conducted in Arabic were translated into English by a third party in order to avoid bias. The transcripts were then reviewed with the recording in order to supply any missing words. Finally, the transcripts were reviewed to ensure that they were true to the meaning of the original interview. In total, 13 physicians and 15 nurses across four different departments were interviewed. The study received ethical approval from the Social Research Ethics Committee at University College Cork (UCC)

4.4.2 Data Analysis

For a comprehensive data analysis, the data were analysed based on Strauss and Corbin's (1990) recommendations. Three coding procedures were used to analyse qualitative data: open, axial and selective coding. This approach was considered appropriate for this research because it allows for flexibility and rigour (Sarkar et al., 2000). Further, it provides a structured approach for analysing the phenomenon of interest (Day et al., 2009). Each interview was transcribed and coded on a line-by-line basis using NVivo 9.0 to help in the analysis of the data and to identify themes for analysis. The codes were grouped together to form categories or themes through comparative analysis across interviews. Axial coding was then used to establish relationships between categories and themes. Finally, selective coding was used to build a story through identification of core categories, the relationship between categories and explanation of the categories that need further development and refining.

4.4.3 Case Background

The case study was conducted at a large, 500+ bed military hospital that provides primary to tertiary care to military personnel and their families. The majority of the physicians and nurses are civilians, while the majority of high-level managers are military personnel.

In 2008, hospital management decided to modernise the hospital by implementing HIT and established a new IT department to develop its new HIT in-house. The first module was launched in 2010 and was very simple, as the system only issued patients' ID number and stored a scanned version of doctors' notes under the patients' names. Physicians and nurses sent their notes to a scanning department, where they were scanned and uploaded to the system that allowed physicians and nurses to retrieve them. However, the system suffered from technical problems and was slow. Physicians and nurses were dissatisfied with the system and complained as they did not find it useful, and it did not end their reliance on paper.

The hospital and the IT department continued to update the system, adding new features to it. In 2018, the hospital implemented the latest update to the system, which allowed physicians and nurses to write clinical notes and diagnoses in the system. Currently, the system is an automated workflow system that allowed physicians to enter, track and retrieve notes and orders in the system. This included laboratory tests, X-rays and pharmaceutical orders. The system was significantly different from the first version that was introduced in 2010. At one point, the system allowed physicians and nurses remote access, including allowing them to access patients' information from home. However, this feature was later removed because of security breaches, and the hospital only allowed consultants to have remote access to the system.

4.5 Results

The results show there were signs of resistance towards HIT among physicians and nurses in the military hospital. Various forms of resistance behaviour emerged during the interviews, such as sarcasm and scepticism about the usefulness of the system, compatibility with their working style and the system's safety. This scepticism can be considered a negative behaviour and an overt form of resistance, as some users were uncooperative and forcefully complained about it (Coetsee, 1999; Lapointe and Rivard, 2005). Further, this scepticism led some physicians and nurses to complain about HIT during department meetings. It was not easy to identify perceived threats because users often communicated indirectly during the interviews, such as through humour or by referencing others to describe their dissatisfaction with the system. The results of the study shown in ***Figure*** 4.1 indicate that perceived dissatisfaction and perceived risk were the main perceived threats of HIT, and four core categories emerged, which are considered to be antecedents to perceived dissatisfaction and perceived risk: 1) related knowledge of HIT; 2) management support; 3) system incompatibility; and 4) trust. The findings are subsequently presented in more detail and with empirical chains of evidence.

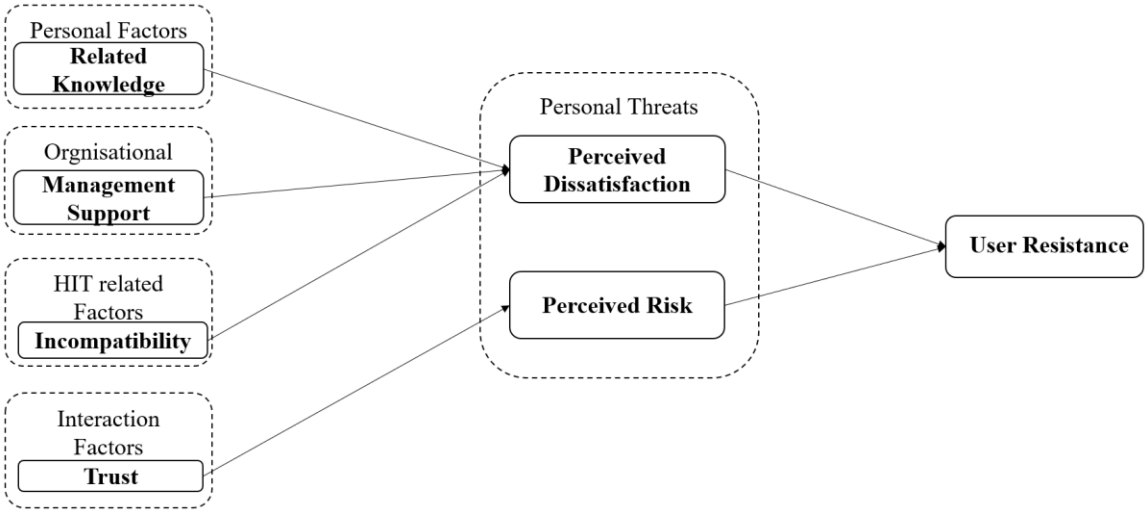


Figure 4.1 The antecedents of perceived threats and user resistance

4.5.1 Personal Factors: Related Knowledge of HIT

The findings show that physicians' and nurses' related knowledge of HIT influence perceived dissatisfaction. Table 4-1 shows a sample of the chain of evidence linking related knowledge with perceived dissatisfaction. Related knowledge, in this study, refers to previous user experience with HIT and understanding of HIT concepts. Physicians and nurses who are more familiar with HIT systems, such as her, felt more confident and comfortable using the system. One nurse said:

In my previous work, we had a system similar to the one we have here, so, for me, it was easy to learn how to use the system. I am happy that we have this system in the hospital. (Nurse 6)

Some physicians and nurses who had not used HIT before, or who had insufficient computer knowledge and skill, were dissatisfied with the system:

Whatever you do, some people will never change. Maybe, they are not quite familiar with the computer; they haven't used it enough. (Physician 2)

In this instance, the lack of related knowledge of HIT led physicians and nurses to perceive the system negatively.

Related Knowledge of HIT	Perceived Dissatisfaction
Physician 3: 'Our generation are familiar with electronic stuff. So, it's easier for us to write everything on the computer.'	**Nurse 4:** 'From the start, the system was difficult, I am trying to learn… everybody's complaining blah-blah. And even me, hard time for us. I hope it gets better for us.'
Nurse 2: 'I find people there who are in their fifties and late fifties; they don't even know how to use their phones.'	**Nurse 2:** 'Even if it's better, I know people will complain. But once we do it, and people will have to do it because it's mandatory, they will know the results and its advantages.'
Nurse 5: 'Some of them were not familiar with technology, they cannot type fast, so naturally they have some difficulty.'	**Nurse 7:** 'It's the first time, so we need to adjust. So, at first, we didn't like it because you have to use the system all the time. Now we are starting to adjust.'

Table 4-1 A sample of the chain of evidence linking related knowledge with perceived dissatisfaction

4.5.2 Organisational Factors: Management Support

Management support, in this study, refers to the extent to which managers are willing to provide the necessary resources and authority or power important for a successful HIT implementation. Support includes motivation and training. The results show a link between lack of management support and physicians' and nurses' perceived dissatisfaction. Table 4-2 presents a sample of the chain of evidence linking management support with perceived dissatisfaction. In a large IT project such as HIT, managers play a vital role in the successful development and implementation of HIT. However, in this case study, physicians and nurses felt that managers were not supportive and did not prepare them for HIT. For example:

We are extremely busy. I needed some time to learn how to use it and I had to stay for extra hours to teach myself. They should have given [physicians] time to adjust and not put us under pressure to start using it almost immediately. (Physician 7)

The lack of support shown by the management caused physicians and nurses to be dissatisfied with the system, as they felt they did not have sufficient training, enough time to learn and adjust to the system, and that there was a lack of open and honest communication. As one nurse explained:

It will also be good if [management] tell us about any new changes and explain to us why they made those changes and how the changes will help us. (Nurse 2)

This lack of support from managers led physicians and nurses to feel irritated and frustrated with HIT.

Management Support	Perceived Dissatisfaction
Nurse 11: 'You had to call the department by phone; they tell you where to go. After, I suppose because of the load they've faced, they have added a tutorial that helped us.'	**Nurse 13:** 'They didn't say any reasons, just said that they put a new system. It would have helped if they told us about the changes. We were happy with the old one, so why did they change it? They need to give us some reasons.'
Physician 3: 'They must let us know before any update or change on the system, and they must give us time to adjust to the change.'	**Nurse 2:** 'To be honest, in the beginning, we were annoyed with the changes as we were used to paper.'
Nurse 7: 'We have to be oriented on what to do and give us time to learn. So, we will get used to it.'	**Physician 13:** 'Even training sessions wouldn't be useful. Imagine that you've been writing manually for 30 years, can you move to a machine overnight?'

Table 4-2 A sample of the chain of evidence linking management support with perceived dissatisfaction

4.5.3 HIT-Related Factors: System Incompatibility

Some physicians and nurses felt that the HIT was not compatible with their work style, needs or environment. The findings revealed that system incompatibility is the leading HIT-related factor influencing perceived dissatisfaction. Table 4-3 provides a sample of the chain of evidence linking system incompatibility with perceived dissatisfaction. Hospitals have many departments, and everyone requires a specific feature in the system. For example, one physician explained:

The neurology department might need a whole body where we [physicians] can make points indicating the weakness, et cetera. So, every department has its requirements. For example, the otorhinolaryngology department might need an image of the nose, the throat, et cetera. These are requirements that you need in the clinic. The dermatology [Department] needs, for instance, specific images. (Physician 4)

The system was the same for all departments. Hence, physicians and nurses working in departments with special requirements found the system limited and to not meet their needs. One nurse stressed this problem, saying:

We have other papers that we fill. For every patient, there are 21 pages just for anaesthesia that we have to fill manually because it is not in the system. (Nurse 2)

Additionally, some physicians and nurses felt that HIT affected their relationship with patients because it reduced eye-to-eye contact:

I've noticed that [the system] affects communication with the patient; my eyes are focused on the device. The patient is talking and, although physically with him, he feels that I am not with him because I'm looking at the device, as I can't type without looking. So, in order to save time, I sacrifice the patient's well-being. (Physician 8)

When you type like that [looking at the computer] and you just listen to what they say, you're not interacting eye-to-eye. (Nurse 11)

These issues caused physicians and nurses to be dissatisfied with the system as they had to work around the limitations of the system to perform their job correctly. They thought the system was incompatible with their work as it did not have the charts, forms or pictures required to perform

their job, thus leading to a negative impact on their relationship with their patients. As a result, they were dissatisfied with the system.

System Incompatibility	Perceived Dissatisfaction
Physician 7: 'Another missing feature is the ability to search. If we had a search feature for the analyses, it would make things much easier for us.'	**Physician 3:** 'I have a problem – with each order, you have to put the information in again. For example, we have to enter the diagnoses for education, you have to enter the diagnoses for the lab… Supposed to be once, why I have to put it again every time!'
Nurse 11: 'The parents ask us to show them the previous growth chart of the patients, their son or daughter. But we do not have it in the system, so, as I said, it is limited.'	**Physician 13:** 'We have to write our notes on paper, and that bothers us. And I do not understand why we do this; I think it is a very simple step to change the system, so we can write our note on the system.'
Nurse 2: 'We have other papers that we fill. For every patient, there are 21 pages just for anaesthesia besides triage papers, medication papers, et cetera.'	**Physician 9:** 'It's hard for me, crowded as the clinics are, to take time to open every cardiology visit and see what happened… Many doctors give patients, especially chronic patients, a medical report that they can present in every clinic they go. Other patients don't get this privilege! So, we have to search and find which visit corresponds to a certain report, and that's annoying.'

Table 4-3 A sample of the chain of evidence linking system incompatibility with perceived dissatisfaction

4.5.4 Interaction Factors: Lack of Trust

In this study, trust is referred to as physicians' and nurses' confidence in HIT and the organisation's decisions. In this case, trust is strongly linked with perceived risk. Table 4-4 presents a sample of the chain of evidence linking trust with perceived risk. The data analysis indicates that physicians and nurses did not have complete trust in the organisation's and management's ability to develop and implement quality HIT, which influenced their perception of HIT. This lack of trust could be because of an earlier version of HIT that was implemented, which some physicians and nurses considered to be a failure and therefore leading to a lack of trust. For example:

I cannot blindly trust the system. For example, if a patient's results show that he is improving and the previous visits show the same, but the system gave the visits before that when they were sick. So, of course, these things influence my decision. (Physician 10)

The failure of the system to show recent visits leads users to distrust the system, feel uncertain about new changes and resist new system updates because they feel the organisation is unable to implement complex systems, and system failure could lead them to make a wrong decision.

Trust	Perceived Risk
Physician 11: 'Honestly, the problem with the system. It should be perfect. The system we have is not perfect, and I see this as a huge problem.' **Physician 5:** 'I am always extra careful. I don't trust the system; I have to check by myself.' **Physician 10:** 'I suppose it can be improved, but the recall will become an issue; its recall is very bad. I can't depend on it to keep a record for the last two or three years.'	**Physician 3:** 'The information you get from the system isn't accurate since it doesn't include the complete file and sometimes the file is not in order, so you want to see the notes of the last visit of the patients? You might not find it.' **Nurse 13:** 'The problem with the system is that if you give your password and your username, which is a problem because if some of your colleagues know your password or username, automatically they can access anything here.'

Table 4-4 A sample of the chain of evidence linking trust with perceived risk

4.5.5 Perceived Threats: Perceived Dissatisfaction

Perceived dissatisfaction, in the context of this study, refers to the frustration and irritation caused by HIT. Physicians and nurses were not happy with the system and felt it was a source of irritation and displeasure. Data analysis reveals that physicians and nurses perceived dissatisfaction with HIT directly influences user resistance. Table 4-5 presents a sample of the chain of evidence linking perceived dissatisfaction with user resistance. Many physicians and nurses felt that HIT was causing them frustration, irritation and displeasure; thus, they showed signs of resistance, exemplified in the following comments:

The problem it has is that it did not end our reliance on paper documents and files. Sometimes we have to go back to paper notes to review a patient file. We have to write a paper note on a daily bias. (Physician 4)

Physicians and nurses must search both paper notes and notes on HIT for complete information about their patients. This double burden is compounded by the workload necessary to transcribe manual notes into the HIT.

Everyone knows the load of work among nurses, honestly. The nurse in inpatient… imagine she's taking care of six patients, and she has to leave patients to write all these 100 papers in the system. (Nurse 2)

After the last version of the system was introduced, management issued a mandate requiring all employees to use it. The order was not received positively by physicians and nurses and generated strong reactions. It was common for physicians and nurses, during department meetings and training sessions, to complain about the system and point out, in an objective manner, any minor flaws in the system. Overall, most physicians and nurses reluctantly used the system after the mandate. However, the system is not optimal, and considerable resentment and dissatisfaction persisted.

Perceived Dissatisfaction	User Resistance
Physician 6: 'This system would annoy me if I was sitting at home, so surely it would annoy me when I am working and have patients waiting for me.'	**Physician 12:** 'I write the notes electronically to try to avoid the issue of missing notes. But I don't finish the notes in the system. Guilty as charged.'
Physician 2: 'It might seem like a small thing, but it makes a huge difference, I am not trying to complain for the sake of complaining.'	**Physician 9:** 'Between doctors, there is a problem of compliance; maybe they don't fill out the notes, maybe they are just so busy working.'
Physician 7: 'There is a sense of frustration; we were still trying to get familiar with the new system.'	**Nurse 2:** 'Many people were not happy about the system, and some are trying to avoid using it.'

Table 4-5 A sample of the chain of evidence linking perceived dissatisfaction with User resistance

4.5.6 Perceived Threats: Perceived Risk

Perceived risk, in the context of this study, refers to physicians' and nurses' fear of the risk factor they associated with HIT, such as a fear that it will pose a risk to patients, a loss of privacy and reduce work efficiency. Perceived risk can be considered an element of perceived threat, and is directly linked with user resistance. Table 4-6 presents a sample of the chain of evidence linking perceived risk with user resistance. Physicians and nurses are sensitive to the risk factors that HIT might cause because of the sensitive work environment that requires them to deal with people's lives. Such a risk could be the fear or belief that HIT will harm their job performance. Also, physicians and nurses fear unauthorised use of their account in HIT. One physician said:

They had to dismiss a physician and a pharmacist because of this issue; the doctor said that someone used his account and that it wasn't him who made the order, whereas the pharmacist claimed that he has received the order from that person and that he carried it out. (Physician 9)

In the example above, both the physician and the pharmacist lost their jobs because of unauthorised use of HIT. According to one physician, sometimes physicians and nurses share their passwords with each other to speed up the work process, such as ordering medical exams, and this could lead

to unauthorised use of HIT. Moreover, physicians and nurses felt the system did not protect patients' privacy.

Honestly… look, any patient's file can be reached, and their privacy violated. (Physician 12)

These factors lead physicians and nurses to perceive the system as a threat and a risk, consequently, leading to resistance.

Perceived Risk	User Resistance
Nurse 2: 'Everyone in the hospital has access to the patient's file and can view their personal information. This is something I have witnessed myself.' **Nurse 4:** 'To be able to view the patient's medical file is normal; everyone should view it. However, the patient's personal info, I don't recommend it to be viewed by anyone other than the clinic's doctor. They are the only ones who should view the personal things in the file.' **Nurse 9:** '[The system is] exposed to everyone. It's not private enough. Anyone can view it.'	**Physician 11:** 'We had [remote access] at a certain time, but then, actually, a virus went inside the system; that's why I think it is not safe to rely on these systems. It does not protect the patient's information. We should not use these systems unless they are perfect.' **Nurse 13:** 'The system is not protecting us [physicians and nurses] nor the patients, doctors are giving their passwords to nurses. Then nurses log in to the doctor's system and order medications, and any fault was always upon the nurses. I think the system only created problems and conflicts.'

Table 4-6 A sample of the chain of evidence linking perceived risk with user resistance

4.6 Discussion and Conclusions

4.6.1 Key Findings

The purpose of this study was to investigate the circumstances that lead physicians and nurses to perceive HIT as a threat. To this end, a case study of a military hospital that uses HIT was presented. This study provides insights into how physicians and nurses may perceive a new HIT implementation negatively. It investigated the role of the organisation, personal user traits and HIT on physicians' and nurses' perceptions of HIT. While previous research showed the effect of user

perceptions on user resistance to HIT (Bhattacherjee and Hikmet, 2007; Hsieh, 2015; Laumer et al., 2016; Walter and Lopez, 2008), this study went further and investigated the antecedents of perceived threat. The main findings explain that perceived dissatisfaction and perceived risks of HIT are the main perceived threats for physicians and nurses. Further, four factors that influence perceived dissatisfaction and perceived risks were identified: related knowledge, management support, system incompatibility and lack of trust. The study explained how these factors could influence physicians' and nurses' perceptions of HIT.

The results of this research align with those of previous literature (Hsieh, 2015) that indicates that trust influences perceived risk, which influences user resistance. Trust is considered to be an essential component in the relationship between the employee, the organisation and its leaders (Oreg, 2003). Trust has a direct effect on individuals' behaviour and intention (Boonstra and Broekhuis, 2010; Wu et al., 2008). Some physicians and nurses expressed their concerns regarding inaccurate results in HIT, as well as privacy issues. This lack of trust could be because of an internal organisation problem that leads to trust issues between management and employees. Such internal organisation problems could arise due to the different backgrounds of hospital managers (who are mostly from a military background) and employees (who are mostly civilians). One way to increase physicians' and nurses' trust in HIT is by providing management support. In large IT projects such as HIT, managers are responsible for supporting and ensuring a successful implementation by providing the required training to use the new system (Ali et al., 2016; Venkatesh et al., 2011), and by allowing HIT users sufficient time to familiarise themselves with the functionality of the new system (Cotea, 2010). As well as this management support, trust is also increased by moral support, such as motivating users to use the system (Boonstra and

Broekhuis, 2010), communicating openly and honestly with users (Jiang et al., 2000; Wu et al., 2008) and leading by example (Grublješič and Jaklič, 2015).

Many physicians and nurses felt that HIT was incompatible with their work. Most of the work done in hospitals follows routinised paths (Berg, 1999). The introduction of HIT to physicians' and nurses' work will influence their practices and might disrupt their work routines (Darbyshire, 2004). The military hospital developed and implemented HIT in-house, which had some advantages and disadvantages. One advantage was that the system was very simple and most physicians and nurses were happy that it was easy to use. Nevertheless, due to lack of experience in HIT development, many felt that the HIT was incompatible with their work requirements and were, therefore, dissatisfied with the system as it did not end their reliance on paper to complete work requirements. Managers and HIT developers should seek to develop HIT which are customisable and compatible with physicians' and nurse's needs. Further, they should consider how HIT can affect the relationship between physicians, nurses and their patients. HIT reduces eye-to-eye contact between physicians, nurses and their patients because physicians and nurses turn to face the computer to write notes or order exams and medications, rather than facing the patient.

The results of this study differ from other research that has suggested that HIT implementation could lead physicians and nurses to perceive a loss of autonomy (Cresswell and Sheikh, 2013; Sligo et al., 2017), power (Lapointe and Rivard, 2005; Bhattacherjee et al., 2013) and control (Lapointe and Rivard, 2005). The differences between the results could be due to the unique characteristics of a military hospital that inherited aspects of military culture. In general, military organisations are bureaucratic, hierarchical and meritocratic (Holmberg and Alvinius, 2019). Thus, it is less likely that physicians and nurses will have significant autonomy, power and control even

before the implementation of a new system. Most physicians and nurses interviewed in this case study were civilians but had been working in the hospital for many years, so it is possible they have conformed to the bureaucratic and hierarchical culture of a military organisation. Therefore, a fear of loss of autonomy, power and control was not a factor of user resistance in this case study.

4.6.2 Theoretical Implications

This study extends the scope of existing user resistance literature (Bhattacherjee and Hikmet, 2007; Lin et al., 2012; Lapointe and Rivard, 2005; Smith et al., 2014; Laumer et al., 2016) by investigating the antecedents of perceived threats. Little research has been done to examine the antecedents of user perception. This research provides the foundation and highlights needed to further examine the core reasons of user perceptions that lead to user resistance, especially in healthcare settings. The paper has shown that perceived dissatisfaction and perceived risks of HIT are major components of perceived threats, and could lead to physicians' and nurses' resistance. Further, this study shows that system incompatibility, management support, related knowledge and lack of trust are antecedents of perceived dissatisfaction and perceived risks of HIT.

4.6.3 Managerial Implications

For practitioners, this study provides a better understanding of user resistance and user perception in the healthcare sectors. This understanding will help hospital managers responsible for developing and implementing IT projects, especially in the healthcare sector, to design resistance mitigation plans. Such plans should consider perceived dissatisfaction and perceived risks as a cause of user resistance; hence, it could be a cause of HIT implementation failure. First, managers should develop HIT that is compatible with physicians' and nurses' needs while considering that each department in the hospital could have different needs. Second, managers should provide the

required support to physicians and nurses to help them adapt to HIT, such as providing training and quickly resolving any HIT-related problems. Third, trust is a crucial factor in determining HIT usage. Therefore, managers should seek to develop trust between physicians and nurses and HIT. This will reduce the adverse effects of perceived risk, dissatisfaction and user resistance behaviours. It is envisioned that explicit attention paid to the factors presented in this study will reduce HIT resistance among physicians and nurses.

4.6.4 Limitations and Future Research

The study was based on a single case study of a military hospital, and used physicians and nurses as its subjects. The uniqueness of military organisations that are bureaucratic, hierarchical and meritocratic require caution when generalising the results of this study to other hospital settings, such as public or private hospitals. The results are also subject to interpretation. Caution is required when generalising the findings. It is recommended that future research conducts another study to expand and re-evaluate the results of this research. The problem of user perception and user resistance is complex, and this case study only addressed part of the picture. Multiple case studies of system implementation in different settings that focus on different types of users would improve the external validity of this study.

5. Chapter Five: A Case Study of a Public Hospital

Investigating the Antecedents of Perceived Threats and User Resistance to Health Information Technology: A Case Study of a Public Hospital

5.1 Abstract

Health information technology (HIT) can improve the quality of healthcare, but improvements are likely to be hindered if physicians and nurses resist it. This study investigates the antecedents of the perceived threats to HIT and user resistance by examining the organisational factors, the personal traits of users, HIT-related factors and the factors related to the interaction between physicians, nurses and the organisation. By conducting an in-depth case study of a public hospital, this study develops a conceptual model. The main findings suggest that perceived dissatisfaction and loss of professional autonomy are the main perceived threats of HIT for physicians and nurses. Five factors that influence these perceptions were identified: related knowledge, management support, user involvement, system performance and social influences. The study will ensure a better understanding of the phenomenon as it contributes to identifying the core reasons for resistance.

Keywords: user resistance, health information technology, perceived threats

5.2 Introduction

There is a wide range of evidence recognising the potential of health information technology (HIT) – such as computerised patient order entry (CPOE) and electronic medical record (EMR) – to

improve the quality of healthcare delivery by reducing medical errors, lowering healthcare delivery costs and improving service management (Bogaert et al., 2018; Carvalho et al., 2019). Despite the evident benefits of HIT and support from governments (e.g., funding, incentives), HIT failure is very high and hospital adoption of HIT remains low (Norton et al., 2019; Vitari and Ologeanu-Taddei, 2018). A number of studies have indicated that user resistance is a root cause of HIT failure (Barrett, 2018; Handayani et al., 2018). To benefit from new HIT projects and to increase HIT adoption, user resistance must be mitigated (Hsieh and Lin, 2018; Samhan, 2018). Being aware of the factors that influence user resistance and recognising resistance behaviours will help managers better manage new HIT projects (Ngafeeson and Midha, 2014; Smith et al., 2014).

In the information system (IS) literature, a significant number of studies focus on IS resistance but fewer focus on user resistance to HIT (Samhan, 2015). Several unique characteristics make managing and overcoming user resistance to HIT especially challenging (Samhan, 2015). The unique organisational and political culture in hospitals makes HIT user resistance different from user resistance to other types of IT implementation. Consequently, the reasons, behaviours and responses to user resistance to HIT differ from other IT user resistance (Bhattacherjee and Hikmet, 2007). The unique characteristics of hospital settings are: (1) the power held by physicians in hospitals, who have more freedom of choice to use a given system than other types of IT users (Handayani et al., 2017); (2) the fact that physicians and nurses have well-defined roles in the hospitals and are continuously interacting with each other (Lapointe and Rivard, 2005); and (3) the fact that physicians and nurses have a sensitive job where patient welfare is crucial and resources are often constrained, leading to considerable pressure to provide quality healthcare (Poon et al., 2005). It is important to understand the problem of physicians' and nurses' resistance to HIT, as shedding light on this problem will improve the chances of increased HIT adoption and

its continuous use, thereby improving the chances of achieving the promised improvements in healthcare.

In IS literature, user resistance is viewed as the outcome of a conscious and reasoned decision based on their perceptions about IT, such as perceiving IT as a threat (Bhattacherjee and Hikmet, 2007; Lin et al., 2012; Lapointe and Rivard, 2005), perceived compatibility (Bhattacherjee and Hikmet, 2007; Laumer et al., 2016a), perceived ease of use (Bhattacherjee and Hikmet, 2007; Laumer et al., 2016a) and perceived inequity (Lin et al., 2012). While a relatively large body of literature examines how user perceptions influence user resistance, little addresses how user perception is formed (Esmaeilzadeh et al., 2015; Laumer et al., 2016b). Several researchers have called for further studies to identify factors that contribute to user perception and user resistance (Ali et al., 2016; Hsieh, 2015; Laumer et al., 2016b).

The objective of this study is to theorise why physicians and nurses perceive HIT as a threat, and how perceived threats lead to user resistance. In doing so, this paper uses Bhattacherjee and Hikmet's (2007) model, which indicates that perceived threat leads to resistance, which leads to change. This study extends the current understanding of user resistance by deconstructing perceived threats to HIT, identifying the antecedents of perceived threats and answering the research question:

Why do users perceive HIT as threats and how do perceived threats lead to user resistance?

This study will help hospital managers better understand user resistance, create the right policies and actions to mitigate resistance, increase the likelihood of HIT adoption and ensure the continuous use of HIT. With the rising cost of healthcare (Einav et al., 2018; Kohli et al., 2012) and considering that IT investments represent a substantial proportion of organisations' budgets

(Chaudhry et al., 2006; Joia et al., 2014), understanding user resistance and the antecedents of user perception is crucial as resistance is a major obstacle to HIT implementation (Kruse et al., 2016).

5.3 Theoretical Background

This section defines user resistance, provides an overview of previous user resistance research, discusses the different user resistance behaviours and gives an overview of user resistance theories.

5.3.1 Understanding User Resistance

It is important to clearly define the phenomenon under study to give meanings to words and to manage readers' expectations (Dunleavy, 2003; Eisenhardt, 1989). In this section, 'user resistance' is defined. The term 'resistance' is transdisciplinary and has been used across IS reference disciplines, including psychology, sociology and change management (Hollander and Einwohner, 2004; Mullins, 2007). To understand the subject, it is necessary to define user resistance more precisely. There are a number of different definitions for user resistance in the IS literature. However, for the purposes of this paper, user resistance is defined as 'the behavioural expression of a user's opposition to change(s) associated with IS implementation' (Alohali et al., 2018, p. 5). This definition is appropriate as it describes user resistance as a behaviour that negatively affects IS implementation. Therefore, it will support the intended topic of user resistance to HIT.

There are different types of user resistance behaviour. Resistance behaviours can be covert or overt, so it is vital for researchers and organisation managers to understand the different types of user resistance behaviours in order to overcome the problem and put in place the appropriate implementation strategy (Lapointe and Rivard; 2005). Covert resistance behaviour is when users show inaction or a lack of interest in a new system (Coetsee, 1999; Lapointe and Rivard, 2005; Selander and Henfridsson, 2012). Users exhibiting covert resistance will try to distance themselves

from the situation or use humour to describe their displeasure with a system (Lapointe and Beaudry, 2014; Laumer and Eckhardt, 2012). Covert resistance is a problem for large organisations because it is hard to recognise and will prevent them from getting the most out of their employees and the new system (Lapointe and Beaudry, 2014). On the other hand, overt resistance behaviour can range from passive to active to aggressive resistance (Lapointe and Rivard, 2005). First, passive resistance behaviour is a mild form of opposition to change, wherein users slow down changes by continuing previous behaviours (Coetsee, 1999; Lapointe and Rivard, 2005). For example, users will intentionally miss system training sessions, delay finishing assigned tasks and argue in favour of the old system (Meissonier and Houzé, 2010; Lapointe and Rivard, 2005). Second, in active resistance behaviour, users practice strong but not destructive behaviours (Coetsee, 1999), such as forcefully complaining about the new system, refusing to use it and not complying with managers' requests (Lapointe and Beaudry, 2014; Lapointe and Rivard, 2005). Finally, aggressive resistance is the most extreme type of resistance, wherein users resort to disruptive and destructive behaviours with the objective of blocking a situation and preventing the implementation of a new system (Meissonier and Houzé, 2010; Rivard and Lapointe, 2012). Organisations must understand the differences between the different user resistance behaviours to be able to respond. Moreover, it is important for researchers to understand the different types of resistance behaviour as this will help them identify user resistance when conducting their research.

5.3.2 Overview of User Resistance Theory

Various theories on user resistance have improved understandings of this complex phenomenon. Largely, users feel stressed by and fearful of change, and a new IT event – such as HIT implementation – exposes users' tendency to dislike change (Laumer et al., 2016b; Marakas and Hornik, 1996). Several user resistance theories explain how users evaluate change and decide to

resist (Joshi, 1991; Kim and Kankanhalli, 2009; Klaus and Blanton, 2010; Laumer et al., 2016b; Marakas and Hornik, 1996). Earlier models of user resistance suggested that individuals evaluate the change in terms of inputs and outcomes (Joshi, 1991). If individuals believe outcomes are less than inputs, they will resist change (Joshi, 1991). However, it is difficult to measure change with only inputs and outputs. To combat this difficulty, recent user resistance models have explained that users evaluate change by determining the switching benefits and costs (Kim and Kankanhalli, 2009) and by evaluating their situation compared to other employees in similar positions (Klaus and Blanton, 2010).

A significant number of user resistance theories consider the role of user perception as an important factor in user resistance. For instance, some theories have suggested that user resistance is shaped by perceived threat (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Lin et al., 2012), perceived value (Samhan and Joshi, 2017), perceived compatibility (Bhattacherjee and Hikmet, 2007; Laumer et al.,2016a) and perceived dissatisfaction (Ngafeeson and Midha, 2014). These theories have indicated that users will resist the new system when they perceive it as a threat or that it will have a negative impact on them, their work or their position within their organisation.

Some theories have indicated that user perception is a subjective process that develops through the interaction between initial conditions and an object of disturbance, such as a new system (Lapointe and Rivard, 2005; Laumer et al., 2016a). Few researchers have attempted to examine the initial conditions that lead users to perceive a system negatively. For example, Laumer et al. (2016b) explained that personality traits such as routine seeking, emotional reaction, short-term focus and cognitive rigidity are some of the conditions that directly affect how users perceive new systems and decide whether to resist or accept them.

This research proposes a model (Figure 5.1) and identifies the antecedents that impact perceived threats. It deconstructs how physicians and nurses might perceive the implementation of new HIT as a threat. The model developed builds on and extends user resistance theoretical models, such as that of Bhattacherjee and Hikmet (2007), who theorised that the perceived threat of HIT is a key element of user resistance to HIT. In short, this study present a model that examines the antecedent of physicians' and nurses' perceptions of HIT.

5.4 Model Development (the Antecedent of Perceived Threat to HIT)

On the basis of Bhattacharjee and Hikmet's (2007) model, it is theorised that user resistance to HIT is influenced by their perception of HIT as a threat. Through an extension of previous work, this paper identifies the antecedents of perceived threats to HIT and examines how physicians and nurses perceive HIT as a threat. User resistance literature suggests four major factors influencing user perception and user resistance to technology: personal factors, organisational factors, system factors, and factors related to the interaction between people, the system and the organisation. Each factor will be discussed below.

5.4.1 Personal Factors

In the context of this study, personal factors refer to internal and external aspects of people, such as their personality traits, cognitive style, demographics and education (Bhattacherjee, 2012; Markus, 1983). The effect of personal factors and individual characteristics on user perception and attitude are well recognised in IS literature (Hawryszkiewycz and Binsawad, 2018; Robb and Shellenbarger, 2014). User perceptions of technology can be influenced by a number of individual characteristics, such as confidence level with the technology, background and social environment

(Agarwal and Prasad, 1999; Klaus and Blanton, 2010; Laumer et al., 2016b). The complexity of HIT makes it crucial for users to be comfortable using computers (Bhattacherjee and Sanford, 2006). Studies have indicated that users who are more familiar with HIT feel more confident using the system (Bhattacherjee and Sanford, 2006; Robb and Shellenbarger, 2014), and users who do not believe in their ability to use the system feel emotional, anxious and uncomfortable in the workplace and are more likely to resist the system (Esmaeilzadeh et al., 2015; Poon et al., 2006). This study identifies and explains how personal factors can cause physicians and nurses to perceive HIT systems as a threat.

5.4.2 Organisational Factors

Organisational factors, in this study, refer to factors related to the culture, structure or management of an organisation (Ali et al., 2016). IS literature shows that large information technology (IT) projects, such as HIT, lead to some significant changes in organisations, such as changes in culture, job structure and employee work routines (Bhattacherjee et al., 2013; Laumer et al., 2016a; Maier et al., 2013). Employees will resist these changes if organisations are unable to manage change or encourage them to accept them (Dezdar and Ainin, 2011; Ludwick and Doucette, 2009). Active and supportive managers who motivate employees, communicate openly and honestly, lead by example and involve employees in decision-making are critical to the success of HIT implementation and user satisfaction (Boonstra and Broekhuis, 2010; Grublješič and Jaklič, 2015). Typically, managing the change associated with the implementation of HIT is complicated. Lapointe and Rivard (2005) argue that physicians and nurses tend to be sensitive to changes in the work environment, making it difficult to implement HIT in hospitals. This study identifies the organisational factors and explains how these can lead physicians and nurses to perceive HIT as a threat.

5.4.3 HIT-related Factors

HIT-related factors refer to factors related to the system itself. In IS literature, factors related to the system itself include the design of the interface, reliability and complexity of the system, compatibility of the system with existing work requirements and the security of the system. These all influence users' perceptions and behaviours (Angst and Agarwa, 2009; Bhattacherjee et al., 2013). In the healthcare context, physicians and nurses work in an intense environment; they are often overworked and under constant stress (Silver, 2016; Wen et al., 2016). Therefore, it is very likely that complex, unreliable and incompatible HIT will increase users' mental workload, cause frustration and lead to resistance (Boonstra and Broekhuis, 2010; Gagnon et al., 2016). HIT factors are subjective and depend on users' abilities to use technology and their practical experience with it. Physicians and nurses who are more familiar with HIT are more likely to find it easy to use and will find it quite useful (O'Connor and O'Reilly, 2018). This study identifies HIT-related factors and explains how these can lead physicians and nurses to perceive HIT as a threat.

5.4.4 Interaction Factors

Interaction factors are factors related to the interaction between characteristics related to people, the organisation and HIT (Markus, 1983). The introduction of large IT projects, such as HIT, changes the dynamic of the organisation and can lead to changes in the relationship between physicians and nurses (Menachemi et al., 2015, Markus, 1983; Laumer et al., 2016a; Lapointe and Rivard, 2005). Interaction factors are those related to the interaction between people. For example, in IS literature, social influences (such as colleagues' opinions) are a key predictor of user behaviour (Eckhardt et al., 2009). Research suggests that colleagues' opinions are one of the most important references for people in terms of their opinion about HIT (Kim and Kankanhalli, 2009).

Concurrently, interaction factors could be related to the interaction between the organisation and the people. For instance, IS literature discusses trust as an essential component of the relationship between employees, the organisation and leaders (Oreg, 2003). Further, trust has a direct effect on individuals' behaviours and intentions (Boonstra and Broekhuis, 2010; Wu et al., 2008). Studies have shown that an increase in trust between employees and the organisation is more likely to lead to an increased willingness to accept organisational decisions and to decrease the likelihood of conflicts (Ash et al., 2001; Oreg, 2003). This study identifies the interaction factors that cause physicians and nurses to perceive a HIT system as a threat and to adopt a stance of user resistance.

5.4.5 Perceived Threats

Perceived threats can be defined as users' fear of HIT implementation because of expected negative consequences (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005). Researchers have suggested that perceived threats can lead to emotional pain and perception of a dangerous situation; thus, they are considered a major cause of user resistance (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Hsieh, 2015; Lin et al., 2012). IS researchers have explored a number of perceived threats that lead to user resistance. For example, some users perceive IT as a threat out of fear for the security of their job (Meissonier and Houzé, 2010), fear of losing power (Lapointe and Rivard, 2005), fear of changes in their work routine and habits (Lin et al., 2012), loss of status (Klaus and Blanton, 2010), loss of control over strategic organisational resources (Bhattacherjee and Hikmet, 2007) and loss of revenue (Hsieh, 2015). In a healthcare context, physicians and nurses are sensitive to the possible risks of HIT, such as the fear that HIT will negatively impact their job performance (Phichitchaisopa and Naenna, 2013), or the fear that system flaws could put patients at risk (Cocosila, 2009; Smith et al., 2014). This study identifies perceived threats to HIT and explains these threats.

The literature indicated that perceived threats are influenced by personal factors, organisational factors, HIT-related factors and factors related to the interactions among physicians, nurses and their organisations (Figure 5.1). Subsequent sections identify these factors in detail.

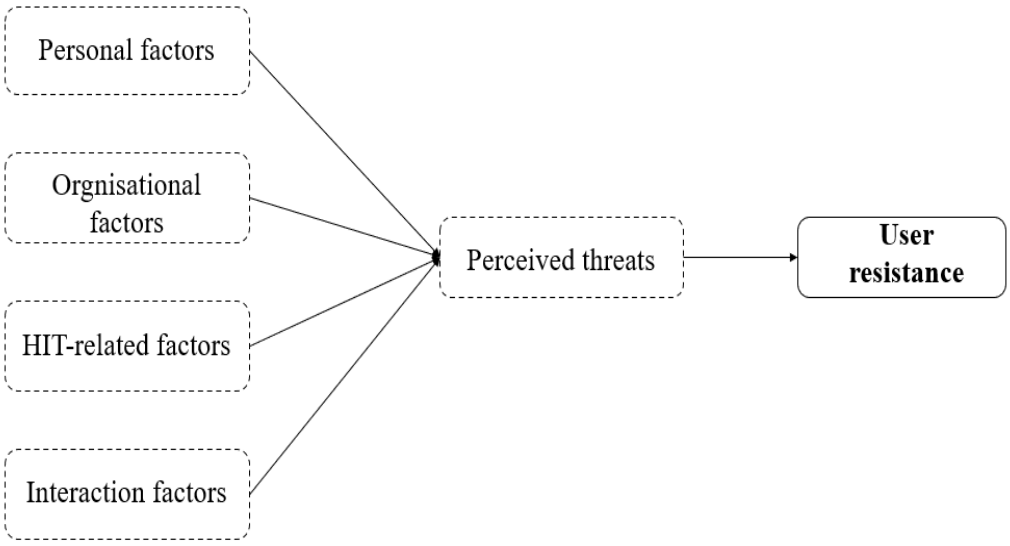


Figure 5.1 The antecedents of perceived threats and user resistance (Alohali et al., 2018)

5.5 Methodology

A single exploratory case study approach was used to meet the objective of this study – To theorise why physicians and nurses perceive HIT as a threat, and how perceived threats lead to user resistance (Eisenhardt, 1989). The case consists of a large hospital in the Middle East that has implemented and used HIT for less than a year. The system allows physicians and nurses to retrieve or enter patient data, enter and observe treatment plans and request and obtain test results. The research context and the case study will be presented in detail later.

To answer the research question and to understand people's complex, ambivalent and changing behaviours, a rich data set was required. Previous studies used quantitative methods to study user resistance; while those studies answered the question of what influences user resistance

(Bhattacherjee and Hikmet, 2007; Klaus and Blanton, 2010), this study examines why some people choose to resist a system. Moreover, user resistance can be best observed and analysed using qualitative methods. User resistance can be covert or overt (Lapointe and Beaudry, 2014; Selander and Henfridsson, 2012), requiring a nuanced qualitative approach that captures meaning by allowing the staff to express resistance without obstructing the organisation (Cassell and Symon, 2004). Hence, a qualitative research method was selected to answer the research question. A qualitative research method can produce data from which processes, relationships and richer explanations about how and why processes and outcomes, such as user resistance, can occur (Bhattacherjee, 2012; Cassell and Symon, 2004).

This research examines the antecedents of the perceived threats and user resistance after its implementation (6–12 months after the system go live). User resistance before implementation and during the early stages of implementation is very well documented because of the widespread disruption to existing processes (Bhattacherjee and Hikmet, 2013; Meissonier and Houzé, 2010). Little research has focused on the phase after implementation (Alohali et al., 2018). By addressing this gap in existing research, we will be able to examine the longer-term factors that could lead to user resistance and potential system abandonment (Eden et al., 2014; Fryling, 2015).

A large public hospital was chosen for several reasons. For example, there is likely to be internal tension in a hospital where physicians and nurses have professional autonomy while administrative support is managed more bureaucratically (Southon and Dampney, 1999; Walter and Lopez, 2008). Physicians and nurses might believe that HIT would threaten their professional autonomy, so might be more likely to resist IT implementation (Walter and Lopez, 2008). In public hospitals, physicians and nurses receive their salary from the government and not the hospital. Therefore, some physicians and nurses might feel less allegiance to the hospital and its HIT initiatives and be

more likely to resist HIT (Bhattacherjee and Hikmet, 2013). This may also be the reason why people working in a public institution tend to resist change (Agasisti and Erbacci, 2018). When selecting HIT, public organisations prefer the most economically suitable option, even if it might not always be the best. Hence, a HIT system might not be a good fit for the hospital and is likely to face resistance (Boonstra et al., 2014). For these reasons, a public hospital was selected for this research as it was considered to be more likely to experience resistance to HIT, thus serving the purpose of this study.

5.5.1 Case Description

The case study was conducted at Multipublic Hospital (a pseudonym) in the Middle East. The hospital has 800+ beds and provides primary to tertiary care to all patients of the region. In 2012, the hospital decided to implement a new HIT to reduce medical errors, lower healthcare delivery costs and improve management of service. The hospital formed a multidisciplinary committee comprised of department managers, physicians, nurses and IT professionals to evaluate HIT systems on the market and identify the most suitable one for the hospital. After an exhaustive search, the committee selected an electronic health records (EHR) system called Birtex (a pseudonym). The system was unknown to most of the staff in the hospital but the committee considered it to be affordable and a good fit for the hospital.

Birtex was first introduced to the hospital in 2014; it allowed physicians to enter, track and retrieve laboratory results, X-rays and pharmaceutical orders. However, Birtex contained four separate systems. The main system was Birtex, which could only be accessed by physicians, and it allowed them to request labs, X-rays and pharmaceutical orders. The second system, BirtexTrack, could only be accessed by nurses, and it allowed them to view patients' information and to see the labs, X-rays and medications ordered by physicians but not to see the results of these orders. The third

system, BirtexView, could only be accessed by certain physicians, and it allowed them to view patients' X-rays. The fourth system, BirtexLab, could only be accessed by certain physicians, and it allowed them to view patients' lab results. But, the hospital was not fully paperless, and physicians and nurses had to rely on paper for important information, such as their exam, interview and emergency room sheets. Therefore, physicians and nurses had to use paper along with Birtex.

In early 2018, the hospital introduced BirtexNG (New Generation), which allowed the hospital to become completely paperless. The four separate components were also integrated into a single system. It allowed physicians and nurses to enter and retrieve their notes through the system. These notes contained patient information such as tests, anaesthesia, details on what they were eating and drinking and their medications. BirtexNG was considered a significant update to the existing HIT and managers were sure it would improve the quality of the hospital.

However, BirtexNG suffered from numerous technical problems and was not received positively among physicians and nurses; it generated strong reactions. Many physicians and nurses complained about and criticised the system publicly and in official meetings. A few months after BirtexNG was introduced, the hospital decided to temporarily suspend the system and revert to the older version of Birtex. The hospital's plan was to fix the problems experienced by BirtexNG users and address physicians' and nurses' complaints, gradually moving from Birtex to BirtexNG. However, in late 2018, the hospital announced that it was going to completely abandon Birtex and look for a new system. Early in 2019, the hospital announced it had signed a contract with a different reputable HIT vendor that is known worldwide and popular among physicians and nurses.

5.5.2 Data Collection

Data were collected between May and June 2018. Data sources were semi-structured interviews with physicians and nurses in a public hospital. The interview guide for the semi-structured interviews was formulated using the factors presented in the conceptual model (the interview guide appears in Appendix A). Semi-structured interviews were chosen because they provide a platform for instant feedback and follow-up of questions during the interaction between researchers and respondents (Myers and Newman, 2007). Further, semi-structured interviews provide valuable insights into participants' perceptions of HIT and allowed researchers to comprehend the perceptions of physicians and nurses and the conditions that led them to view the HIT negatively.

As this research examines user resistance from a post-implementation perspective, data was collected 6–12 months after the deployment of HIT. This allowed users to re-evaluate their initial perceptions of the system based on their direct interaction and actual experience with it (Orlikowski and Gash, 1994; Saeed et al., 2010), and provided the researchers with the opportunity to study the actual causes of user resistance. A snowball sampling strategy was used to identify subsequent respondents, where each initial respondent was asked to suggest other physicians and nurses working in the hospital. The respondents were physicians and nurses who are familiar with the hospitals' HIT and represented a subset of the hospital population. In total, 15 physicians and 15 nurses across four departments were interviewed. The name and location of the hospital are kept private to protect the privacy of the hospital and the participants.

5.5.3 Data Analysis

Data were analysed qualitatively based on the recommendations of Strauss and Corbin (1997): three coding procedures were used in the process of analysing qualitative data: open, axial and

selective coding. This approach allowed for flexibility and rigour, which is required for research engaged in theory building, and provided a structured approach for analysing the phenomenon in question (Day et al., 2009); thus, it was considered appropriate for this research.

After the transcription of the audio files, data analysis was initiated using open coding with NVivo 9.0, which assisted in the analysis of the data and identifying themes for analysis. Each interview was analysed on a line-by-line basis and composed into codes that surmised our understanding and interpretation of the data. Afterwards, codes were grouped based on abstract categories through an analysis of similarities and differences across all interviews. Axial coding was then applied simultaneously with open coding (Bhattacherjee, 2012; Strauss and Corbin, 1997). At this stage, categories were refined and linked with subcategories using the coding paradigm model suggested by Strauss and Corbin (1997). During this phase, emerging themes were noted. The coding paradigm model allows researchers to think systematically about their data so they can relate pieces of the data to other pieces (Strauss and Corbin, 1997). In the last stage of the analysis, selective coding was used. At this stage, the potential core categories were identified; then, the core categories were related to categories that accrued in the axial coding. A coherent picture of the phenomena emerged after cross-validating the core category against the raw data.

5.6 Findings

Analysis of the data revealed that physicians and nurses at Multipublic Hospital exhibited signs of resistance to HIT. Several forms of resistant behaviour emerged during interviews, such as scepticism that the HIT could or had improved the delivery of healthcare or reduced physicians' and nurses' stress and workload. Scepticism and stress are considered an attitudinal and emotional response, and a manifestation of resistance behaviour. As discussed previously, resistance can be

covert, passive, active or aggressive. In this case, physicians and nurses exhibited passive and active resistance, as some users forcefully and publicly complained about the system, and many were uncooperative, such as by not attending HIT training sessions, which eventually led to system abandonment. Identifying perceived threats was not easy because physicians and nurses were often hesitant to express their true, honest feelings about HIT during interviews, and often communicated indirectly, through humour or by referencing others to describe their dissatisfaction with the system. This is to be expected when studying complex phenomena such as user resistance, where staff would not want to appear obstructive to the organisation. Analysis of the data indicates that dissatisfaction and perceived loss of professional autonomy were the main perceived threats to HIT, and five core categories emerged as antecedents to the perceived dissatisfaction and perceived loss of professional autonomy: (1) related knowledge, (2) management support, (3) user involvement, (4) system performance and (5) social influences.

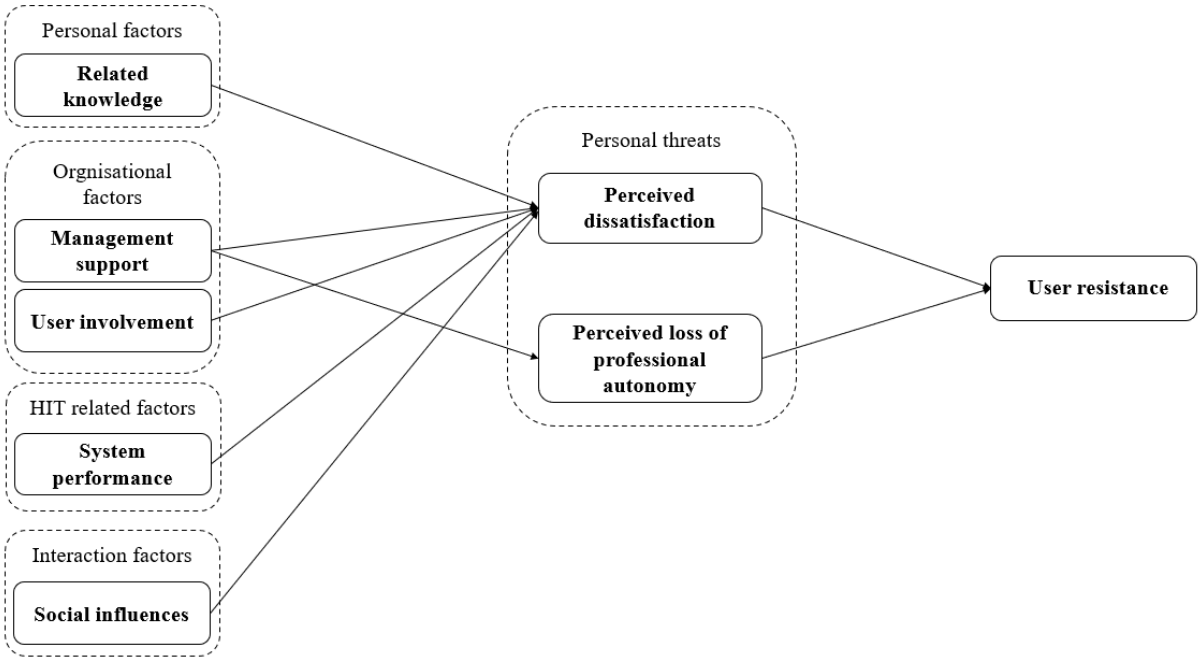


Figure 5.2 The antecedents of perceived threats and user resistance

5.6.1 Personal Factors: Related Knowledge

Analysis of the data shows that the related knowledge of physicians and nurses influenced their perceived dissatisfaction, wherein physicians and nurses without related knowledge of HIT are more likely to perceive HIT negatively (a sample of the chain of evidence linking related knowledge with perceived dissatisfaction appears in Appendix B-1 Chain of Evidence). In the context of this study, related knowledge is the previous experience of users with HIT and their understanding of HIT concepts. The data shows that physicians and nurses who have used HIT previously are more likely to accept it. For example, during interviews, a nurse explained that she was happy with the hospital's HIT because she had used a similar system before joining the hospital:

I used a similar system to the one we have here, so I quickly learned how to use this system. So for me, this is better; the system is good. (Nurse 6)

Further, the analysis shows that physicians and nurses who are confident in their IT skills and use technology like HIT regularly felt more confident using it compared to those who believed that they did not have good IT skills:

You know now, as of this time, a lot of people are very good with technology. They can get it in a second – smart people with good computers skills. (Nurse 13)

On the other hand, physicians and nurses who did not have good IT skills and had no prior experience with HIT were dissatisfied with the system. One physician explained that physicians with low IT skills were not happy with HIT:

We have another doctor that has been in the department for a long time, maybe 60 years. She can't type; she's not used to it. She's so slow, so she did not like the system and complained a lot. (Physician 6)

Related knowledge influences users' perceptions; physicians and nurses who have low IT skills and no prior experience with HIT felt dissatisfied with the system.

5.6.2 Organisational Factors: Management Support

Management support refers, in the context of this study, to the degree to which managers are willing to provide the necessary resources, authority and power that are important for successful HIT implementation, such as motivation and training. Analysis of the data indicates that management support is negatively linked with perceived dissatisfaction and perceived loss of professional autonomy, where the less management support is provided to physicians and nurses, the more likely they are to have perceived dissatisfaction and perceived loss of professional autonomy (a sample of the chain of evidence linking management support with perceived dissatisfaction and perceived loss of professional autonomy appears in Appendix B-1). Some physicians and nurses felt they did not receive strong management support to help them adapt to and accommodate the changes brought on by the new HIT. One physician said:

We are already under a lot of stress and we are overworked; we need extra time to adjust to the system. So they should introduce the change gradually and in a friendly environment considering our situation. (Physician 5)

Further, many felt they did not receive enough training for the new HIT:

I think they need to bring specialists to sit with us and give full instructions about the system. (Nurse 14)

Additionally, the restrictions that management placed on the system caused some physicians and nurses to feel they were not trusted by management because they no longer had the privilege of accessing certain parts of the HIT:

Some people might feel that they are not trusted because of these restrictions. (Physician 12)

The lack of management support caused physicians and nurses to be dissatisfied with the system and led some to feel they no longer had the professional autonomy they needed to perform their job quickly and effectively.

5.6.3 Organisational Factors: User Involvement

User involvement refers, in this study, to the participation of the users or their representatives in the development and implementation of HIT. The results show a negative link between user involvement and physicians' and nurses' perceived dissatisfaction; the lower the user involvement is, the more likely the perceived dissatisfaction (a sample of the chain of evidence linking user involvement with perceived dissatisfaction appears in Appendix B-1). In a large IT project such as HIT, user involvement gives the user a feeling of control over the development and implementation of the system and helps the user develop realistic expectations of the system. However, in this case study, physicians and nurses felt left out of decision-making. One physician expressed his dissatisfaction with not being involved in the development process of HIT by saying:

I think that before they make any changes, they have to discuss it with us and take our requirements. They have to ask people on the front line, the people who use the system on a daily basis. (Physician 2)

Further, a lack of user involvement caused some physicians and nurses to feel they were not appreciated because they were not involved in making big decisions that will affect their work, such as HIT implementation. For example:

I think if they ask, we can give some good suggestions. It will make us feel better, feel like you are worth something [laughs]. (Nurse 2)

The lack of user involvement caused physicians and nurses to feel dissatisfied with the system, as they felt they did not have a chance to give suggestions and explain what they needed from HIT. All of these causes led physicians and nurses to be dissatisfied and to feel irritated and frustrated with the HIT.

5.6.4 HIT-related Factors: System Performance

System performance refers, in the context of this study, to the ability of HIT to accomplish the required task quickly, accurately and efficiently. Data analysis indicates that system performance is strongly linked with perceived dissatisfaction, where bad system performance leads to a higher likelihood that physicians and nurses will be dissatisfied with HIT (a sample of the chain of evidence linking system performance with perceived dissatisfaction appears in Appendix B-1). In this case, physicians and nurses felt the HIT was not performing the tasks they needed quickly, accurately and efficiently. For example:

The system is slow, so our progress is very slow. Sometimes there are many patients waiting to see the doctor, and the patients don't know what's happening; we are the ones who suffer. But, them too, they can suffer from delayed doctor appointments, for example. (Physician 7)

In large hospitals – such as that in this case study – HIT must have the capacity to handle a large number of transactions. It must be able to handle important transactions, such as the retrieval of

patient information, quickly. Slow HIT or HIT those crashes often could slow physicians' and nurses' progress and, in critical situations, could put patients' lives at risk. As one nurse stated:

I encounter some difficulties in the system; like, for example, sometimes there is system downtime, sometimes it's a very long wait before the software opens. So sometimes the patients have to wait until we fix the system. (Nurse 13)

Some physicians and nurses felt that HIT affected their relationship with patients because it increased waiting times for patients:

The system can break down sometimes; then we're waiting for the system to be fixed in order to receive the patient. So they get upset, then we get upset. (Physician 6)

These problems caused physicians and nurses to be dissatisfied with the system because they negatively impacted their work. Further, they caused frustration and irritation with HIT, and had a negative impact on their relationship with their patients.

5.6.5 Interaction Factors: Social Influences

Social influences refer, in the context of this study, to the extent to which users' attitudes and behaviours are impacted or influenced by other people's opinions of HIT. Social influences are considered an interaction factor because they are related to personal and HIT factors. The findings from this case study revealed that social influences led to physicians' and nurses' perceived dissatisfaction (a sample of the chain of evidence linking social influences with perceived dissatisfaction appears in Appendix B-1). The findings suggest that physicians and nurses can be influenced by their co-workers, colleagues at other hospitals and by the reputation of HIT itself. When these groups have a negative perception of HIT, it is more likely that physicians and nurses

will be dissatisfied with HIT. Mostly, physicians and nurses consider HIT an important part of their work and life. Therefore, they regularly talk about it:

We discuss the system among ourselves; it is something that we care about. (Physician 6)

Such talk leads to system comparison. If physicians and nurses believe the HIT at their hospital is inferior to that used at other hospitals, they are likely to be dissatisfied with the system:

I know that other hospitals have this feature in their system: they can access patient files and request what they need from anywhere they like. I have one of my friends working in another hospital, and he can access the system and check on his patients even when he travels outside the country. Our system should have something like this; it makes things easier. (Physician 4)

This physician thought the HIT at their hospital lacked essential and useful features that other hospitals had, which led them to be dissatisfied with their HIT.

The reputation of a HIT system will also influence physicians and nurses. HITs with a bad reputation or unknown HITs are likely to have a bad influence on physicians and nurses. As this physician stated:

I think [user resistance to HIT] is true with systems that aren't well-known. That's not the case when the doctor is told that [a well-known system] will be brought. Maybe that was the case in [Hospital X]. The system they bought was a Korean system that nobody knew or had heard anything about. So there was maybe apprehension about it. This time, the [new] system has a good reputation. So we are excited to use it. (Physician 2)

Colleagues' unfavourable opinions of a HIT system, system comparison and HIT with a bad reputation will lead physicians and nurses to be dissatisfied with HIT.

5.6.6 Perceived Threat: Perceived Dissatisfaction

Perceived dissatisfaction refers, in this study, to frustration and irritation caused by HIT. Analysis of the data shows that physicians' and nurses' perceived dissatisfaction with HIT directly impacts user resistance, whereby the more physicians and nurses were dissatisfied, the more likely they were to resist (a sample of the chain of evidence linking perceived dissatisfaction with user resistance appears in Appendix B-1). Some physicians and nurses were not happy with HIT and felt it increased their stress level. This is exemplified in the following comments:

I want a decent thing that is able to progress my work; I don't want a system that I can't log in to because of constant lagging. It might have some slight lagging or delay, but it's not working at all! That's a little hard. (Physician 1)

Others felt the system was increasing their workload rather than decreasing it. This was frustrating as they had believed that HIT would decrease their workload and make them more productive:

Technology should make things easier not harder. What bothers me is that if a thing reaches a certain price, a very high price, and has an advanced technology and all of this and in the end, it lags! And we have to wait for it to be fixed! (Nurse 9)

The last HIT the hospital implemented was not received positively by physicians and nurses. It generated strong reactions as they expected that the HIT upgrades were going to improve their work. When it did not, many physicians and nurses complained and criticised the system publicly and in official meetings, which eventually led hospital managers to completely abandon it and search for a new one.

5.6.7 Perceived Threat: Perceived Loss of Professional Autonomy

Perceived loss of professional autonomy refers, in this study, to physicians' and nurses' fear that HIT implementation will reduce their authority and freedom to make decisions. Analysis of the data shows that physicians' and nurses' perceived loss of professional autonomy with HIT directly impacts user resistance, whereby the more physicians and nurses perceived loss of professional autonomy, the more likely they were to resist (a sample of the chain of evidence linking perceived loss of professional autonomy with user resistance is in Appendix B-1). Some physicians and nurses felt that they lost some authority and freedom to make decisions after HIT implementation. This is exemplified in the following comments:

We do not have access to the progress notes, which is something we need. So sometimes when we are in the treatment room doing dressings and other things and we meet something we don't know, we want to go back and see what the doctor has written. (Nurse 15)

Many felt that HIT denied them access to patients' information when there was a need to make clinical decisions. Moreover, some felt that HIT slowed down their work because they had to wait for physicians or nurses with a higher authority to approve their clinical decisions or provide them with access to the required patient's information. As a nurse stated:

I think we know when the patients need new dressing, so we should be able to order it without going back to the doctor. It will make things go faster. (Nurse 10)

Some physicians and nurses felt that system restrictions and lack of professional autonomy increased the workload and mental stress of physicians and nurses with more authority, such as consultants and registered nurses, because they not only had to do their own job but also had to approve others' orders as well. As a physician said:

If I see that the patient needs sick leave, I still have to talk to the consultant. I'm not the one who's in trouble, but rather the consultant. For example, he would have patients, and I would call him every now and then to tell him that someone needs a referral. (Physician 5)

Physicians and nurses believed that this loss of professional autonomy slowed their progress, which frustrated some of them. It increased the workload for consultants and registered nurses. These factors eventually led to user resistance.

5.7 Discussion and Implications

This study investigates the circumstances that cause physicians and nurses to perceive HIT as a threat, and answers the research question:

Why do users perceived HIT as threats and how does perceived threats lead to user resistance? In doing so, a case study of a public hospital that uses HIT was presented. In this case study, physicians and nurses exhibited both covert and overt resistance behaviour. The study developed a model to better understand the antecedent of the perceived threats to HIT and user resistance among physicians and nurses. Moreover, the study identifies two factors of perceived threat: perceived dissatisfaction and perceived loss of professional autonomy. The Bhattacherjee and Hikmet (2007) model was extended by deconstructing perceived threats and identifying the antecedents of perceived threats. Additionally, the study investigates the role of the organisation, HIT and the interaction between people, HIT and the organisation on physicians' and nurses' perceptions of HIT. While previous research showed the effects of user perception on user resistance to HIT (Bhattacherjee and Hikmet, 2007; Hsieh, 2015; Laumer et al., 2016; Walter and Lopez, 2008), this study went further and investigated the antecedents of the perceived threat.

The main findings of the study are that perceived dissatisfaction and perceived loss of professional autonomy are the primary perceived threats of HIT for physicians and nurses. These findings are consistent with IS literature, which indicates that, in general, physicians have high professional autonomy and have freedom to practice their work based on their individual judgement and without evaluation or oversight from others (Boonstra and Broekhuis, 2010; Boonstra et al., 2014; Lapointe and Rivard, 2005; Walter and Lopez, 2008). Several characteristics related to the culture of public organisations may explain why some physicians and nurses perceived that HIT would lead to a loss of professional autonomy. In general, rigid hierarchies and centralisation of power are common in public organisations (Bannister, 2001), and may have led physicians and nurses to believe that hospital management are aiming for more centralisation of power by implementing HIT. Studies have shown that physicians are more likely to support elements and polices that increase their professional autonomy, and fight or resist elements and polices that threaten their autonomy (Borkowski et al., 2003; Walter and Lopez, 2008). Further, physicians are sensitive to any change that threatens their professional autonomy because this autonomy is considered a privilege associated with their social and economic status (Doolin, 2004; Esmaeilzadehet et al., 2015). This study shows that physicians and nurses are more likely to support elements and polices that increase their professional autonomy, and fight or resist elements that threaten their autonomy. While restricted access to HIT was implemented by hospital management to protect patients' privacy and reduce medical errors, it is vital to consider how restrictions could influence physicians' and nurses' perceptions of HIT. In this case study, restricted access to HIT – which denied physicians and nurses access to certain information and prevented them from ordering certain medications without the approval of their superior – clearly frustrated them, reduced their professional autonomy and led to user resistance. Managers should regularly review these

restrictions to ensure they are achieving the goal of such restrictions, and to limit their impact on physicians' and nurses' performance and professional autonomy.

Although various previous studies have examined factors affecting user perception and user resistance (Bhattacherjee and Hikmet, 2007; Laumer et al., 2016a; Lin et al., 2012), little is known about the antecedents that affect the perceived threats of HIT. Therefore, we targeted this research gap and found that related knowledge, management support, user involvement, system performance and social influences have a great impact on user perception and perceived threats, especially perceived dissatisfaction and perceived loss of professional autonomy.

The findings of this study indicate that management support is a vital way to help physicians and nurses adapt to HIT while reducing user resistance. Managers should provide training and time for physicians and nurses to familiarise themselves with the functionality of a new system (Ali et al., 2016; Venkatesh et al., 2011). Management support does not only include user support but also includes championing HIT itself. This means that managers should believe that HIT will improve their organisation and should push for total use of the technology by all types of users (Boonstra and Broekhuis, 2010). Some researchers found that employee satisfaction, well-being, motivation and training is not valued in public organisations, in contrast to other organisations such as private organisations (Alshmemri et al., 2016; De Simone et al., 2016; Haider et al., 2019), which in turn could explain why many physicians and nurses believed they did not receive enough management support and were dissatisfied with HIT. Management support is one of the most important factors in successful IS implementation, as it creates an environment that is ready for change (Mahmood et al., 2000). Managers should provide the resources, guidance and motivation required for HIT implementation (Kim and Kankanhalli, 2009). All of these roles of managers are important in creating and influencing user perceptions about HIT.

Moreover, organisations can help reduce the effect of perceived threats of HIT on physicians and nurses by involving them in the decision-making process. The bureaucratic culture of public organisations may have influenced this factor, as decision-making is centralised and controlled by top management (Leidner and Kayworth, 2006; Nurdin et al., 2010), explaining why some physicians and nurses felt they were not involved in the decision and implementation process of HIT. A number of studies indicate that user involvement gives users a feeling of control over the development and implementation of a system, helps the user develop realistic expectations of the system and commits the user to the system from the early stages of development (Baronas and Louis, 1988; Markus, 1983). User involvement has been credited with influencing users' perception of control and satisfaction (Baronas and Louis, 1988; Turan et al., 2015). Hence, this research indicated that in HIT implementation, an increase in user involvement would lead to a decrease in users perceiving HIT as a threat.

The results of this research align with previous literature indicating that social influences – such as colleagues' opinions – are one of the most important references for people when it comes to work-related issues, such as their opinion about HIT (Kim and Kankanhalli, 2009). Social influence impacts individuals' behaviour and motivation to use technology (Grublješič and Jaklič, 2015). Further, social influence suggests that users will behave according to their beliefs about how other users might view them (Venkatesh et al., 2003). This suggests that social influence, especially colleagues' opinions, can influence user perception of technology (Kim and Kankanhalli, 2009). Additionally, external influences from outside the organisation (such as the reputation of the HIT) can influence physicians' and nurses' perceptions. In this case study, physicians and nurses were very disappointed that their hospital had implemented an unknown HIT because they expected them to implement a popular and well-known HIT. Organisation

managers should consider the reputation of the HIT they plan to implement and how it will affect physicians' and nurses' perceptions of the technology. Further, they should recruit active and influential physicians and nurses to champion HIT implementation and support their colleagues, as doing so could help reduce negative social influences. In brief, a favourable opinion of a colleague towards a new IS-related change can alter original negative perceptions of the change and reduce uncertainty (Martins et al., 2014; Phichitchaisopa and Naenna, 2013) and unfavourable opinions of HIT.

5.7.1 Theoretical Implications

This research offers several implications and contributions to theory. First, it identifies the antecedents of the perceived threats and user resistance to HIT (Figure 5.2) and explains how these factors may influence user perception and resistance. The study is derived from Bhattacherjee and Hikmet's (2007) model, and examines in more detail the perceived threats of HIT among physicians and nurses. This research uncovers two main sources of perceived threat among physicians and nurses: perceived dissatisfaction and perceived loss of professional autonomy.

The study extends the body of literature by showing how organisational factors, personal traits of the user, HIT-related factors and factors related to the interaction between physicians, nurses and the organisation can influence how physicians and nurses perceive HIT. Previous studies on user resistance have often neglected to explore the antecedents of user perception. This research fills this gap by taking a post-implementation perspective to examining how perceived threats are formed and extend our understanding of user resistance. The results of the study indicate that management support, user involvement, system performance and social influences impact how physicians and nurses may perceive HIT.

5.7.2 Practical Implications

The study has practical implications for managers and IT developers, especially in the healthcare sector. First, in a broad sense, knowing and understanding the factors that lead to perceived threats and user resistance will help managers design resistance mitigation plans. Managers should develop appropriate strategies that reduce user resistance and dissatisfaction and maximise HIT adoption. Based on the findings in this research, it is recommended that managers should understand the source of user resistance and how users perceive the system. The five root causes of perceived threats and user resistance are related knowledge, lack of management support, lack of user involvement, bad system performance and unfavourable social influences.

Managers should provide the required support to physicians and nurses to help them adapt to HIT, such as providing training and quickly resolving any problems. Support from management includes moral support such as motivating users to use the system, communicating openly and honestly with users and leading by example. Further, this study shows the importance of user involvement on physicians' and nurses' perceptions of HIT. Hospital managers should seek to involve users as much as possible. This can be done through surveys that ask physicians and nurses their opinions and by discussing future hospital plans with them during hospital and department meetings. Physicians' and nurses' involvement in the decision-making process and implementation of HIT will ensure several important factors that are critical for successful IT implementation and user satisfaction: giving users a feeling of control over the development and implementation of the system, helping them develop realistic expectations of the system, and committing them to the system from the early stages of development. Finally, this study shows that managers should pay attention to problems with HIT and seek to develop and implement HIT that is able to perform the required tasks and transactions quickly and accurately. It is envisioned

that if explicit attention is paid to the factors presented in this study, HIT resistance will be reduced among physicians and nurses.

5.7.3 Limitations and Further Research

As with all research, this study is not without its limitations. First, this is a single case study of user resistance to one specific HIT within a specific hospital. Consequently, there might be differences in user resistance within different settings. Thus, the focus on one specific case limits the generalisability of our results to other contexts or domains. Second, this study only focuses on physicians and nurses as its focal group. In hospitals, physicians and nurses hold positions of hierarchical power and they have more freedom than other employees or users to choose whether they adopt a given system. As a result, caution is required in generalising the findings to other domains or contexts. Finally, the research is of a qualitative nature, so the results are subject to interpretation.

To address these limitations, it is recommended that future research should expand the model. User resistance and user perception is a complex subject, and this case study only covered part of it. A cross-case analysis of different hospital types – such as private, military and educational hospitals – will greatly improve understandings of the topic. Moreover, a case study of system implementation in different settings focusing on different types of users would improve the external validity of the model. It is also recommended that future researchers test the model using quantitative methods to allow for generalisability of the study. Future research could examine differences between physicians' resistance and nurses' resistance. It should also examine how organisational culture can cause users to dislike change. Additionally, researchers should study the role of managers' actions in leading to user resistance, and examine how previous system implementation failure may influence user perception and user resistance.

6. Chapter Six: A Cross-Case Analysis

Understanding Resistance to Health Information Technology: The Antecedents of Perceived Threats

6.1 Abstract

Health information technology (HIT) reduces operational costs and increases clinical efficiency. However, user resistance can arise from negative user perceptions of information systems (IS) in healthcare. The antecedents of these negative perceptions have not been thoroughly examined, nor their relationship with a perceived threat. This research examines this relationship from four perspectives: organisational factors, the personal traits of users, HIT-related factors and factors related to the interaction between physicians, nurses and the organisation. Using qualitative methods and cross-case analysis, this study improves understandings of how physicians and nurses perceive HIT as threats. It identifies the antecedents of perceived threats and user resistance and highlights how differences between the cases caused by differences in the cultures of the organisations, management styles and the organisational decision of whether to develop HIT in-house or to buy it influences the antecedents of perceived threats and user resistance. Additionally, this study shows how differences between physicians and nurses and across the levels of physicians influenced the antecedents of perceived threats.

Keywords: user resistance, health information technology, perceived threats, continuous use, post-implementation

6.2 Introduction

Technological advancement brought about by information technology (IT) has led to improvements in organisational efficiency and effectiveness (Meri et al., 2019; Sabi et., 2018). In healthcare, the introduction of health information technology (HIT) reduces costs and increases administrative and clinical efficiency by allowing for integration and communication between different hospital departments, as well as across different healthcare organisations (Atasoy et al., 2019; Jones et al., 2014; Sönnichsen et al., 2016). However, many cases of the challenges of HIT implementation, leading to HIT failure, have been documented (Kumar et al., 2019; Lin et al., 2018; Sligo et., 2017). In particular, user resistance to HIT can result in a conflict between physicians, nurses and decision makers in a hospital, disrupting the flow of work. (Barrett, 2018; Kruse et al., 2016; Lapointe and Rivard, 2005; Safi et al., 2018).

Many studies have considered user resistance to be one of the primary reasons for IT failure across all fields (Ali et al., 2016; Kim and Kankanhalli, 2009; Meissonier and Houzé, 2010), and several researchers have studied and conceptualised user resistance to improve understandings of the phenomena (Bhattacherjee and Hikmet, 2007; Kim and Kankanhalli, 2009; Lapointe and Rivard, 2005; Laumer et al., 2016). However, despite extensive research on user resistance, the problem of resistance persists (Ali et al., 2016; Berente, 2018; Craig et., 2019), suggesting a need to look at the problem through a different lens. Additionally, user resistance has been dominated by studies on resistance to IT in general (Agasisti et al., 2018; Lin et al., 2018; Mahmud et al., 2017). Knowledge gained and lessons learned from such studies may not be applicable to physicians' and nurses' resistance to HIT. For instance, physicians and nurses hold more power and freedom when choosing to use a given system compared to other types of IT users (Handayani et al., 2017). The sensitivity of physicians' and nurses' jobs as they relate to patient welfare is primary, outranking

all other work considerations in importance. Further, healthcare is often delivered through public agencies and resources are often constrained, so physicians and nurses face considerable pressure to provide quality healthcare (Heavin, 2017; Poon et al., 2005). These unique characteristics suggest that the reasons, behaviours and responses to user resistance to HIT will be different from other IT user resistance (Bhattacherjee and Hikmet, 2007).

A number of explanatory models have been developed to improve understandings of user resistance. Generally, user resistance models are based on different theoretical foundations; hence, they take different approaches to illuminating how, when and why some people choose to resist a new IT project. Some researchers have explained that user resistance is the result of a shift in power dynamics within an organisation after system implementation (Markus, 1983). Others have suggested that resistance stems from user perceptions of a violation of psychological contract, or perceptions of an unfair exchange between the organisation and the user (Joshi, 1991; Klaus and Blanton, 2010).

Many users resistance theoretical models have examined the effect of negative user perceptions on user resistance, such as the role of perceived threat (Bhattacherjee and Hikmet, 2007; Lin et al., 2012; Lapointe and Rivard, 2005; Markus, 1983), perceived inequity (Lin et al., 2012) and perceived dissatisfaction (Ngafeeson and Midha, 2014). These models explain that user resistance is influenced by users' negative perceptions of the implementation of a new system (Bhattacherjee and Hikmet, 2007; Lapointe and Rivard, 2005; Markus, 1983). Additionally, they suggest that users who perceive that a system will have a negative impact on their position or role within the organisation will resist it (Lin et al., 2012; Laumer et al., 2016a; Ngafeeson and Midha, 2014).

Notwithstanding the contribution of these user resistance models, some gaps must still be addressed to solve the issue of resistance (Kumar et al., 2019; Samhan, 2018). One important gap

is that these models do not explain how negative user perception is formed and what influences users to view a new system negatively. Some theories indicate that negative user perception is a subjective process that develops through the interaction between initial conditions and an object of disturbance, such as a new system (Lapointe and Rivard, 2005; Laumer et al., 2016a). Researchers have called for a new conceptualisation of user resistance that goes beyond current user resistance theories (Samhan, 2018).

Motivated by the need to understand the core reasons for user resistance to HIT, this study investigates the circumstances that leads physicians and nurses to perceive HIT as a threat, thus leading to user resistance. In doing so, it builds on existing user resistance research that indicates that perceived threats lead to resistance to change (Bhattacherjee and Hikmet, 2007; Hsieh and Lin, 2018; Lapointe and Rivard, 2005; Ngafeeson, 2015; Wild et al., 2012).

This study expands the knowledge on user resistance by examining the antecedents of perceived threats and identifying factors that logically precede users' perception of threats. To this end, it examines user resistance from a post-implementation perspective (6–12 months after implementation), allowing the researcher to examine the longer-term factors that could lead to user resistance and potential system abandonment (Eden et al., 2014; Fryling, 2015). At the post-implementation stage, users are likely to re-evaluate their initial perception of the system after having had the chance to interact directly with it and gain actual experience with it (Orlikowski and Gash, 1994; Saeed et al., 2010), thus allowing the researchers to study the core reasons for perceived threats and user resistance.

Here, a cross-case analysis of a military and a public hospital that have recently implemented HIT is presented. A cross-case analysis allows for the examination of differences between the two hospitals. Through cross-case analysis, this study identified how organisational culture,

organisational control and ownership over the development and implementation of HIT, and individual differences affect user resistance among physicians, nurses and their organisations. Additionally, it allowed for the examination of how these factors influence covert and overt resistance behaviours.

This research improves understandings of user resistance and will help hospital managers develop approaches that will help counter user resistance and create policies and strategies that can minimise and mitigate resistance while increase the likelihood of HIT acceptance and continued use. The increasing costs of healthcare (Einav et al., 2018; Jayaraman et al., 2019) and being funded by the state increases the burden on taxpayers. Concurrently, spending on HIT, if resisted by stakeholders, is a further waste of financial resources. Health outcomes for patients are impacted by ill-advised spending on technology that engenders frustration among physicians and nurses.

The remainder of the paper is structured as follows. In Section 6.3, existing research on user resistance will be summarised, followed by a presentation of the research methodology and case studies (Section 6.4). Then, the cross-case analysis will be discussed and the antecedents of negative user perception model developed (Section 6.5). A cross-case analysis will be presented in (Section 6.6), and (Section 6.7) concludes with the discussion of findings and implications for both theory and practice.

6.3 Literature Review

Here, our definition of user resistance is introduced, then a synthesis of user resistance model is presented, followed by a discussion of gaps in the literature and how this study will fill this gap.

6.3.1 Definition

A number of researchers have conceptualised user resistance (Bhattacherjee and Hikmet, 2007; Joshi, 1991; Kim and Kankanhalli, 2009; Klaus and Blanton, 2010; Lapointe and Rivard, 2005; Laumer et al., 2016a; Marakas and Hornik, 1996; Markus, 1983). However, not all share the same definition of user resistance. Some view resistance as a cognitive force that leads to a behaviour (Bhattacherjee and Hikme, 2007), while others as opposition to change (Kim and Kankanhalli, 2009) or, most commonly, as an adverse behavioural reaction, with the intention to prevent change (Lapointe and Rivard, 2005; Markus, 1983; Van Offenbeek et al., 2013). This paper employs the definition of user resistance proposed by Alohali et al. (2018): 'The behavioural expression of a user's opposition to change(s) associated with IS implementation' (p. 5).

There are different types of user resistance behaviour, ranging from covert to overt (Kim and Kankanhalli, 2009; Laumer and Eckhardt, 2012; Selander and Henfridsson, 2012). Covert resistance is when users show inaction or a lack of interest in system implementation, such as showing signs of annoyance, gossiping about the system and intentionally missing system training sessions (Lapointe and Rivard, 2005; Selander and Henfridsson, 2012). Users exhibiting overt resistance behaviour would more forcefully resist a system, such as by forcefully and publicly complaining about it and refusing to use it (Selander and Henfridsson, 2012; Meissonier and Houzé, 2010).

6.3.2 The Antecedent of Perceived Threats

Reviewing IS research on user resistance provides us with four perspectives through which to examine perceived threats and user resistance (Ali et al., 2016; Joia et al., 2014; Klaus and Blanton, 2010; Markus, 1983): personal factors, organisational factors, system-related factors and

interaction factors (Alohlai et al., 2018). The personal factors approach suggests that user resistance stems from internal and external aspects such as individual characteristics, background and attitude towards IT (Klaus and Blanton, 2010; Laumer et al., 2016b; O'Connor and O'Reilly, 2018). Organisational factors suggest that internal organisational factors – such as the culture and management of an organisation – will influence user resistance (Bhattacherjee et al., 2013; Laumer et al., 2016a; Maier et al., 2013). System-related factors indicate that issues are related to the system itself, such as the design, reliability, complexity and compatibility of the system with the work style of the users, which together influence user resistance (Angst and Agarwa, 2009; Bhattacherjee et al., 2013). Interaction factors suggest that factors related to the interaction between individuals, the organisation and the system lead to user resistance (Markus, 1983; Laumer et al., 2016a; Lapointe and Rivard, 2005). IT implementation could change the dynamics of organisations, so could result in changes in the relationships between employees on the one hand and changes in the relationships between employees and their organisation on the other (Menachemi et al., 2015; Markus, 1983; Laumer et al., 2016a; Lapointe and Rivard, 2005).

This paper identifies the antecedents of perceived threats and examines how these factors influence perceived threats and user resistance (Figure 6.1). To this end, a cross-case analysis of two hospitals that have recently implemented HIT is presented. A preliminary model of user resistance can be derived by identifying the antecedents of perceived threats and by deconstructing perceived threats of HIT from physicians' and nurses' perspectives. Such a model will extend our understanding of user resistance and help organisations achieve the desired benefits from IT implementation.

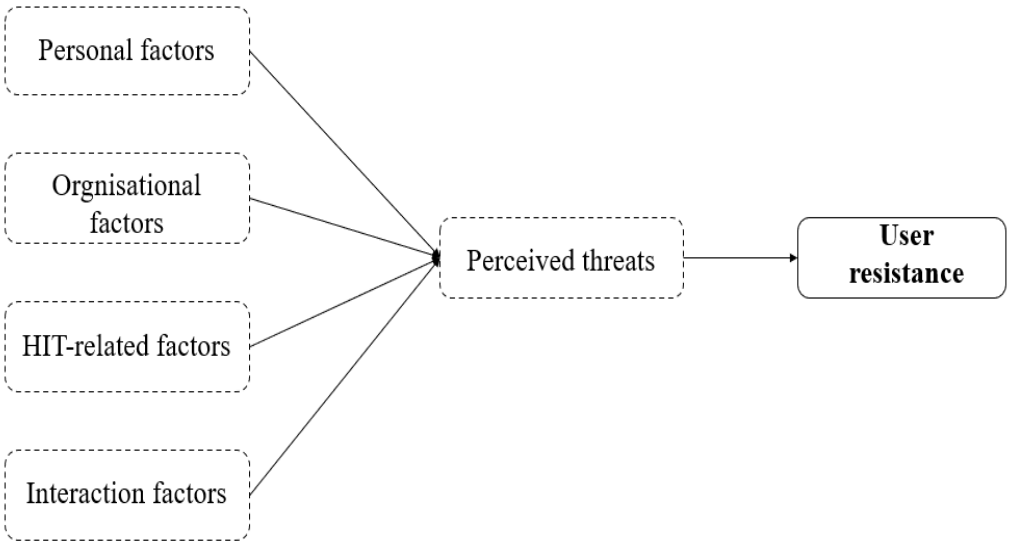


Figure 6.1 Preliminary model of the antecedents of perceived threats and user resistance. Adapted from Aloahli et al. (2018, p. 5)

6.4 Research Approach

This study aims to understand the complex phenomenon of physicians' and nurses' perceived threats and user resistance to HIT; thus, a qualitative approach is considered appropriate as it provides a rich data set (Yin, 2011) and allows for a deeper understanding of the factors influencing physicians and nurse's perceived threats related to HIT. The selected method of research was case studies, as these offer a rich picture of physicians' and nurses' perceptions of new HIT and help understand the antecedents of their perceptions. Case studies allow the researcher to obtain an in-depth understanding of the phenomenon as they are exploratory in nature (Cavaye, 1996; Marshall and Rossman, 2014). Two case studies (a military hospital and a public hospital) that had implemented HIT 6–12 months prior to data collection were selected for this study. Multiple case studies allow for the investigation of the phenomena in diverse settings (Yin, 2011), so these research sites were selected to allow for comparison and to maximise variations (Lapotine and Rivard, 2005).

In term of similarities, the two hospitals had recently implemented HIT (6–12 months prior to data collection). In both cases, physicians and nurses have a high level of professional autonomy, so it is expected that HIT implementation will cause tensions in the organisation because physicians and nurses might believe that HIT threatens their professional autonomy; consequently, they are more likely to resist it than other types of IT users (Walter and Lopez, 2008; Xue et al., 2015). Table 6-1 summarises the similarities and differences between the cases. A further discussion of the differences between the cases will be presented in Section 6.6.

Characteristics	***Case 1***	***Case 2***
Size of hospital	500+ beds	800+ beds
Type of hospital	Military	Public
Type of HIT	Electronic health records (EHR)	EHR
HIT development	In-house	Commercially purchased
Organisational culture/	Bureaucratic, hierarchical, meritocratic, predictable, rational, focused on education and training, greedy attitude toward members of the organisation (Holmberg and Alvinius, 2019)	Rigidity of hierarchies, centralisation of power is common in public organisations, under-resourced and understaffed, tight control over finances by the health ministry, high job security, focus on procedures and internal rules (Bannister, 2001; Iliuta, 2013; Nwanzu, 2017)
Management	Mostly from a military background	Civilian
Service provided	Primary to tertiary care to military personnel and their families	Primary to tertiary care to all patients of the region

Table 6-1 Similarities and differences between the cases

6.4.1 Overview of Case Study Sites

6.4.1.1 Case 1: Military Hospital

Case 1 is a military hospital, a large 500+ bed hospital that provides primary to tertiary care to military personnel and their families. In 2008, the hospital management decided to implement an EHR system to improve the quality of care provided in the hospital. Hospital management decided to develop this new HIT in-house. The hospital gradually added features to the system over the years. In 2018, the hospital's HIT allowed physicians and nurses to write clinical notes and diagnoses in the system. At the time of data collection, the system was an automated workflow system that allowed physicians to enter, track and retrieve notes and orders in the system, including laboratory, X-rays and pharmaceutical orders. At one point, the system allowed physicians and nurses to remotely access the system, which allowed them to access patients' information from home. However, this feature was later removed because of security breaches and the hospital only allowed consultants to have remote access.

6.4.1.2 Case 2: Public Hospital

Case 2 is a public hospital with a capacity of 800+ beds that provides primary to tertiary care to all patients of the region. Decision makers in the hospital decided to implement a new EHR with the goal of reducing medical errors, lowering healthcare delivery costs and improving management of services. The hospital formed a committee to select the most suitable HIT on the market. The system was unknown to most of the hospital staff but the committee considered it affordable and a good fit for the hospital. The system was first introduced to the hospital in 2014. The hospital gradually added features to the system. In 2018, the hospital became completely paperless, thanks to the way its HIT worked. The HIT allowed physicians and nurses to enter and retrieve patient notes through the system, order laboratory exams and request medication. However, the HIT was

not received positively by physicians and nurses, who complained about and criticised the system publicly and in official meetings. A few months after its introduction, the hospital decided to temporarily suspend the system and revert to an older version. In late 2018, the hospital announced that it was going to completely abandon the system and look for a new one.

6.4.2 Data Collection

In both cases, data was collected through semi-structured interviews between May and June of 2018. Semi-structured, face-to-face interviews were conducted with physicians and nurses working in the hospitals who were familiar with the hospital's HIT and represented a subset of the hospital's population. Semi-structured interviews were selected because they provided an opportunity for the researchers to get instant feedback and ask follow-up questions during interviews (Myers and Newman, 2007).

This research examined user resistance from a post-implementation perspective (i.e., data collection occurred 6–12 months after the implementation of HIT). At the post-implementation stage, it is likely that users will have re-evaluated their initial perceptions of the system after they have had the chance to interact directly with it and gain actual experience with it (Orlikowski and Gash, 1994; Saeed et al., 2010), thus allowing the researchers to study the core reasons for perceived threats and user resistance. A snowball sampling strategy was used to identify subsequent respondents, where each initial respondent was asked to suggest other physicians and nurses working in the hospital. In total, 28 physicians and 30 nurses across four departments in each hospital were interviewed. Table 6-2 provides a summary of physicians and nurses interviewed.

	Case 1: Military Hospital	Case 2: Public Hospital	Total
Total no. of interviews	13 physicians 15 nurses	15 physicians 15 purses	28 physicians 30 nurses
Level of interviewee	Resident 6 Specialist 3 Consultant 4 Nurse 15	Resident 5 Specialist 3 Consultant 7 Nurse 15	Resident 11 Specialist 6 Consultant 11 Nurse 30
Departments of interviewee	Surgery 10 Emergency 8 Family medicine 5 Paediatric 5	Surgery 8 Emergency 8 Family medicine 9 Paediatric 5	Surgery 18 Emergency 16 Family medicine 14 Paediatric 10

Table 6-2 Summary of physicians and nurses interviewed

Questions for the semi-structured interviews were guided by the conceptual model presented in Figure 6.1 (an interview guide is attached in Appendix A: Interview Guide. Data collection ended at the point of redundancy, as no new information was being added (Lincoln and Guba, 1985). Interviewees were given, and consented to, complete freedom over what they wanted to say and how they said it. All interviews were recorded and subsequently transcribed. Some of the interviews were conducted in Arabic depending on the English-language level of interviewee. All interviews were transcribed word-by-word and those conducted in Arabic were translated into English by a third party in order to avoid bias. The transcripts were then reviewed with the recording in order to supply any missing words. Finally, the transcripts were reviewed to ensure that they were true to the meaning of the original interview. All recorded interviews were deleted after transcription to protect the interviewees' privacy. This study received ethical approval from the Social Research Ethics Committee at UCC. The names and locations of the hospitals are kept confidential to protect the privacy of the hospitals, physicians and nurses.

6.4.3 Data Analysis

Data were analysed in two stages. First, a within-case analysis of the data was undertaken to provide the researchers with a rich and clear understanding of each case and to allow unique patterns to emerge from each case. Three coding procedures were used in the process of analysing qualitative data, following Strauss and Corbin's (1997) recommendations: open, axial and selective coding. The information obtained using this method provided the flexibility and rigour required for the research study. Additionally, this analysis method provides a structured approach for analysing the phenomenon of interest (Day et al., 2009). The transcripts of the interviews were examined line-by-line, and 72 codes were generated at the first phase of this analysis. Then, through comparative analysis across interviews, similar codes were grouped to form concepts and themes that resulted in the generation of 28 concepts, which were grouped into 11 categories through comparative analysis. The analysis of data focused on identifying physicians' and nurses' negative perceptions of HIT and on identifying the organisational, personal, HIT and interaction factors that lead physicians and nurses to perceive HIT as a threat and resist the system.

At the second stage of analysis, cross-case analysis was conducted, wherein researchers examined similarities and differences across the two cases. Cross-case analysis allowed for general themes and patterns in both cases to be identified (Eisenhardt, 1989*)*. Moreover, it helped build a general explanation while developing the model and improved the initial perceptions of categories and relationships that emerged at the within-case analysis (Eisenhardt, 1989). At the cross-case analysis stage, categories and themes were identified (see Appendix Figure E-4 Mind map of analysis and findings) and then searched for similarities and differences across the cases.

After data analysis, a chain of evidence technique was used to allow the researchers to group the quotations from each participating physician and nurse. The chain of evidence allowed the

researchers to present and support their findings with data from the interviews. Moreover, the number of quotations in each category in the chain of evidence was calculated. For example, the number of quotations from physicians and nurses who felt they were not involved in the development and implementation of HIT was calculated (a sample of this calculation is presented in Appendix C-1). This calculation was used to generate meaning and recognise patterns in the data (Sandelowski, 2001). Using numbers in qualitative research adds value to the research by making claims such as *many*, *most* and *higher* more precise. (Maxwell, 2010).

6.5 Cross-Case Analysis: The Antecedents of Perceived Threats

6.5.1 Introduction to Findings

This section discusses the antecedents of perceived threats and user resistance. Analysis of the data indicates that perceived loss of professional autonomy, perceived dissatisfaction and perceived risk are the main perceived threats of HIT. Further, seven core categories emerged from the data that are considered to be antecedents to perceived threats: related knowledge, management support, lack of user involvement, system performance, system incompatibility, trust and social influences. Table 6-3 defines each of the antecedents of perceived threats in the context of this study, and Table 6-4 defines perceived threats in the context of the study. Moreover, the data and the link between the factors is supported by a chain of evidence presented in Appendix D. Figure 6.2 proposes a model for the antecedents of perceived threats and user resistance.

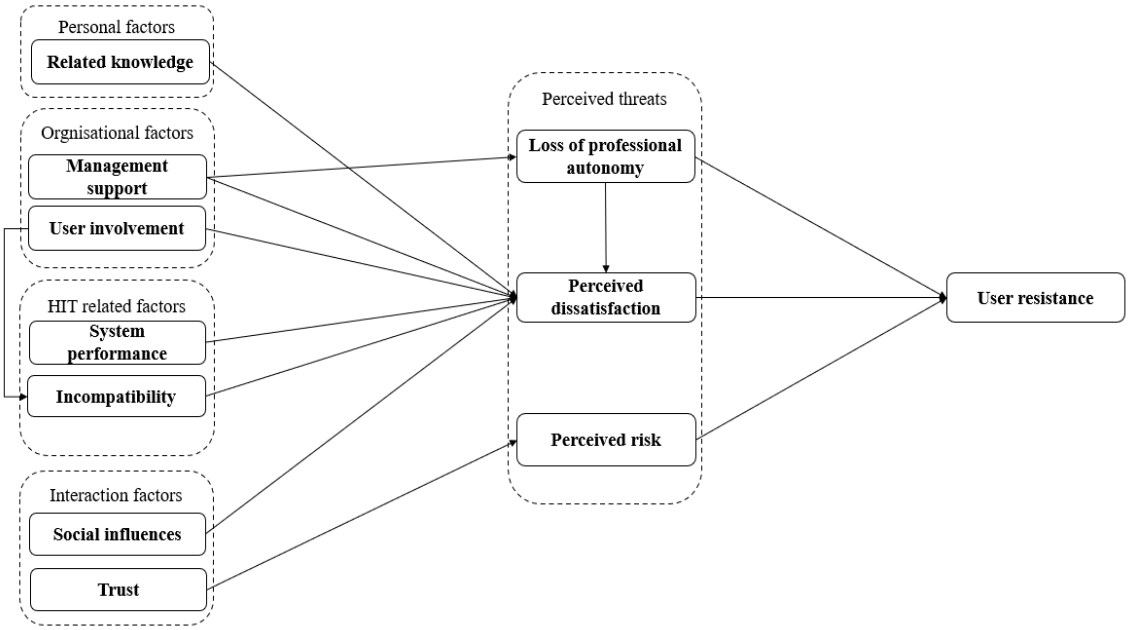


Figure 6.2 The antecedents of perceived threats and user resistance

Perspective	Factors	Definition	Influence
Personal	Related knowledge	Users' experience, familiarity and proficiency with using HIT	Perceived dissatisfaction
Organisational	Management support	Managers' willingness and ability to provide the necessary resources and support that can ensure successful HIT implementation, such as motivation and training	Perceived dissatisfaction and perceived loss of professional autonomy
	Lack of user involvement	Refers to the lack of user participation in the selection or development of HIT	Perceived dissatisfaction
HIT-related Factors	System performance	The ability of HIT to accomplish the required task accurately and quickly	Perceived dissatisfaction
	System incompatibility	Users' belief that HIT does not fit their work style, needs or environment	Perceived dissatisfaction
Interaction Factors	Lack of trust	Lack confidence in HIT's ability to improve the quality of healthcare delivery	Perceived risk
	Social influences	Influenced by the attitudes and behaviour of colleagues	Perceived dissatisfaction

Table 6-3 Definition of the antecedents of perceived threats

Perspective	Factors	Definition	Influence
Perceived Threats	Perceived loss of professional autonomy	Users fear that HIT implementation will reduce their authority and freedom to make decisions	User resistance and perceived dissatisfaction
	Perceived dissatisfaction	The frustration and irritation caused by HIT	User resistance
	Perceived risk	Fear that HIT could pose a risk to patients' health and, as a result, be a risk for physicians' and nurses' careers	User resistance
User resistance	User resistance	'The behavioural expression of a user's opposition to change(s) associated with IS implementation' (Alohali et al., 2018, p. 5)	

Table 6-4 Definition of the perceived threats to user resistance

Both hospitals implemented HIT in their organisation over an extended period. For the most part, they had similar experiences with user resistance to HIT, but there were some differences due to variations in organisational culture and the HIT they used (see Section 6.6). In both cases, the goal of implementing HIT was to improve the quality of healthcare delivery. However, each took a different approach to achieving their goals. In this section, the antecedents of physicians' and nurses' perceived threats to HIT are identified.

Analysing the cases and the data indicates that in both cases, physicians and nurses showed signs of resistance towards HIT. Various forms of resistance behaviour emerged during interviews, such as scepticism about the usefulness of the system, incompatibility with working style and reliability of the system. There is some difference with regard to the antecedents of perceived threats and user resistance between the two cases due to various factors (discussed in Section 6.6). Some physicians and nurses showed covert resistance behaviour as many expressed their annoyance of HIT, and some missed training sessions. As one physician stated: 'training isn't taken very

seriously; some say: “Did you bring me from home to teach me [how to use] the computer? I’m better off doing something else”’ (Case 1, Physician 11).

Overt forms of resistance were also detected in the analysis of the data, as some interviewees stated that physicians and nurses publicly complained about the system. For instance, a physician explained that ‘most of us complain [about the system]; for us privacy for the patient is so important. Besides, the system regularly malfunctions, this why [we are always complaining]’ (Case 2, Physician 6). It was not simple or straightforward to identify perceived threats because during the interviews physicians and nurses often communicated indirectly by using humour, sarcasm or referencing their colleagues’ opinion to describe their dissatisfaction with the system. For the most part, physicians and nurses did not express their resistance directly so as not to appear obstructive to the organisation. However, perceived threats and their antecedents were identified through deep analysis of data using within-case and cross-case analysis to identify patterns that emerged from each case, and by examining similarities and differences across the two cases.

6.5.2 Exploring the Antecedents to Perceived Threats

6.5.2.1 Personal Factors: Related Knowledge

At the initial implementation of HIT, physicians and nurses who had related knowledge of HIT or excellent computer skills were happy with HIT, whereas those who did not have this knowledge had a negative perception of HIT. Related knowledge in the context of this study refers to users’ familiarity with HIT (a sample of the chain of evidence linking related knowledge with perceived dissatisfaction appears in Appendix D-1 **A sample of the chain of evidence linking related knowledge to HIT with perceived dissatisfaction**). Physicians and nurses who had used HIT previously were more likely to be happy with the HIT and to accept it. For example, during

interviews a nurse explained that she had used HIT in her previous hospital, so she felt happy with her hospital's HIT:

before coming here, I worked in a hospital that uses a similar system. So, it was easy to learn the system. So far, I am happy with it, it is good. (Nurse 12, Case 1)

Further, physicians and nurses with good IT skills and who regularly use other computer technology felt positive about HIT and were more confident using it:

Nowadays, most people are very good with technology, they can understand technology because they use the internet and have smartphones; so, I think that's why we are happy with the system. (Physician 13, Case 1)

On the other hand, physicians and nurses who lacked IT skills and who had not used HIT previously were dissatisfied with the system. One nurse explained that she did not have related knowledge of HIT from her previous work, so she was dissatisfied with HIT:

'I haven't worked in another hospital before, so it was the first time for me [using HIT]. It is difficult, and I was not happy because I am slower than the other nurses.' (Nurse 10, Case 2)

Lack of related knowledge of HIT led physicians and nurses to perceive it negatively as it slowed down their work process and threatened their job.

6.5.2.2 Organisational Factors: Management Support

Management support, in this study, refers to managers' willingness and ability to provide the necessary resource support – such as motivation and training – that can ensure successful HIT implementation. Some physicians and nurses were not able to adapt quickly to the significant changes HIT brought to their organisations. Most physicians and nurses felt that managers needed

to provide support to help them transition to the new HIT. In both case studies, physicians and nurses felt they were not receiving enough management support to help them transition to HIT. One physician explained how this increased their stress:

We are working under a lot of stress, we are overworked, and above that, we have to put the extra time to learn and use the system. I think [management] should launch the system slowly considering our difficult situation. (Physician 5, Case 1)

Lack of management support led to the dissatisfaction of physicians and nurses with the system and the new situation, as they felt they were not receiving the training they needed and were not given time to learn and adapt to the new system, and they experienced a lack of open and honest communication. One nurse described her feelings by saying:

It's necessary to inform us that a new system will be introduced and offer us training about it, ahead of time. They should also tell us how the system will help us. (Nurse 2, Case 2)

The data analysis indicated that management support is negatively linked with perceived dissatisfaction and perceived loss of professional autonomy, where low management support led to perceived dissatisfaction and perceived loss of professional autonomy. A sample of the chain of evidence linking management support with perceived dissatisfaction and perceived loss of professional autonomy appears in Appendix Table D-2.

6.5.2.3 Organisational Factors: Lack of User Involvement

Lack of user involvement, in this study, refers to the lack of user participation in the selection or development of HIT. In the military hospital, managers decided to develop the system in-house, whereas the public hospital formed a committee including representatives of physicians and nurses to assess several available HIT systems on the market. However, some physicians and nurses felt

left out of the decision-making process. One physician voiced his dissatisfaction with not being involved or asked his opinion on HIT before implementation, saying:

[The managers] should have asked us before they made any changes. This is an important matter that should be discussed in the department and general meetings. They have to ask the users, the people who will have to use the system! (Physician 3, Case 2)

Physicians and nurses felt that the organisation made an important decision that would greatly impact their work without consulting them first. Further, some physicians and nurses felt they were not appreciated or valued by the hospital because they were not involved in decision-making. One nurse said:

I have some great suggestions that would make the system better. But no one asked me what I think. Honestly, I was a little disappointed that I was not asked [laughs]. (Nurse 12, Case 1)

The lack of user involvement led physicians and nurses to feel they were not in control of their work and environment. This led them to perceive HIT negatively, as they felt they did not have a chance to make suggestions or explain their points of view and what they needed from HIT. Analysis of the data indicates that lack of user involvement is positively linked to perceived dissatisfaction and system incompatibility. Specifically, the less involved physicians and nurses were in the development and implementation of HIT, the more likely they were to be dissatisfied and consider the system incompatible with their work needs. A sample of the chain of evidence linking lack of user involvement with perceived dissatisfaction and system incompatibility appears in Appendix Table D-3.

6.5.2.4 HIT-related Factors: System Performance

Many physicians and nurses complained about the HIT's ability to accomplish the necessary tasks quickly and accurately. Physicians and nurses considered the system to be inefficient for recording and viewing patients' files, and stated that it lengthened their work tasks, due to the slow response time of the system. One physician said:

the system is slow, it takes me a long time to check patients' files, especially if their condition is complicated, some patients get upset, they think we are not being urgent, but it's the system's fault, not ours! (Nurse 14, Case 2)

Hospitals have a large number of patients and perform a high volume of transactions. However, the system cannot rapidly execute large volumes of transaction. Further, the large number of transactions slow down the system and cause it to crash often, thus slowing down the work of physicians and nurses. Such delays are not accepted in a hospital environment, where patients' health and well-being could be at risk because of system delays. One nurse said:

Sometimes it takes a long time to load data, and if this system is not working properly there will be a hard time for us because we cannot do anything until the system starts working. It is hard for patients as well. (Nurse 7, Case 1)

The fact that the system is slow and prone to crashing creates friction between physicians and nurses and their patients because it increases patients' waiting times. One physician expressed her feelings by saying:

Patients get really angry when the system is down [laughs]. On some occasions, I had to send patients who do not have an urgent matter back home because there is no point them waiting until the system is back up. Also, I am going to have to attend to patients with urgent needs once the

system starts working. So, it is not a good situation. Some patients do not understand, and they blame [physicians] for this problem. (Physician 8, Case 2)

Such issues lead physicians and nurses to feel that the system negatively impacts the progress of their work. Additionally, it creates frustration and irritation with HIT and negatively impacts their relationship with their patients. Therefore, system performance is negatively linked with perceived dissatisfaction. A sample of the chain of evidence linking system performance with perceived dissatisfaction appears in Appendix Table D-4.

6.5.2.5 HIT-related Factors: System Incompatibility

Some physicians and nurses feel that the HIT does not fit with their work style, needs or environment. Most physicians and nurses were trained how to record and view patient information manually on paper. With HIT, they had to learn how to view and record patient records in an unfamiliar way. Therefore, some physicians and nurses believe that HIT is incompatible with their work style. Some claimed that HIT prevents them recording or viewing important patient information. One physician said:

In my departments, we have different needs than other departments. For example, I need to enter and check the vaccination records of my patients. But, there is no easy way to do that; I can either ask the patients, and most of them do not know what vaccination they had and when, or I have to scroll through all patients' notes to find this information. And I am sure that every department has a similar story. (Physician 9, Case 1)

This problem was magnified by the fact that HIT was standardised throughout the different departments in both hospitals, rather than customised to each department's needs.

Some physicians and nurses felt that HIT reduces eye-to-eye contact with patients, so is not suitable for their work environment. One physician explained:

Some patients get frustrated because they think I look at the screen more than them. But I am doing my job! I listen to them first, then I have to type my notes quickly, so I do not miss any important information. (Physician 2, Case 2)

Some physicians and nurses felt that reduced eye-to-eye contact with patients affected their relationship, as patients thought they were looking at and focusing on the computer rather than on them. These issues caused physicians and nurses to believe that HIT is not suitable for their work style as they must work around the limitations of the system to perform their job. As shown by the chain of evidence (Appendix Table D-4), system incompatibility is positively linked with perceived dissatisfaction.

6.5.2.6 Interaction Factors: Lack of Trust

Some physicians and nurses lack confidence in HIT's ability to improve the quality of healthcare delivery. Further, some did not trust the organisation's or management's ability to develop, implement and support quality HIT that can improve work progress and the work environment, thus influencing their perception of HIT. The lack of trust was probably influenced by what some physicians and nurses believed to be failures in the earlier implementation of HIT. Additionally, some believed the system could give inaccurate information about patients. One physician explained:

The system has flaws and it is disorganised. I cannot believe everything the system is showing me; I have to be careful and dig deep to make sure I did not miss any information. (Physician 7, Case 2)

System flaws and disorganisation cause users to feel uncertain about and cautious of the system. Some felt that their organisation does not address system problems properly and quickly. One physician said:

The system was updated and [the system developers] changed how patients' notes were organised. Luckily, I noticed that something was off with my patients' notes and realised that they changed some things. I thought that this could be a problem, so I suggested that they change it back to how it was. It took them a while but in the end they fixed the problem. (Physician 11, Case 1)

The new system updates also led some physicians and nurses to be distrustful of the system and the organisation, as they felt the HIT implementation had not been completely successful. Also, some felt that the system's failures and shortcomings could lead them to make incorrect decisions, and that their progress was slowed due to having to recheck everything and make sure the system is giving accurate information. As shown by the chain of evidence (Appendix Table D-5), a lack of trust is positively linked with perceived risk.

6.5.2.7 Interaction Factors: Social Influences

Some physicians' and nurses' perceptions of HIT were influenced by the attitudes and behaviour of their colleagues. Many consider HIT to be an important part of their work, so they regularly share their thoughts and feelings about it. One physician said:

we discuss the system among ourselves, it is something that we care about. (Physician 4, Case 1)

They also discuss this subject with their colleagues at other hospitals, who use different HIT. Such talk leads to system comparison, and some physicians and nurses believe the HIT at their hospital is inferior to that used by their colleagues at other hospitals. For example, one physician said:

I have talked before with a physician working in another hospital, they have a great system there, they can access their account from anywhere in the world to check on their patients, they can search patients' notes through the system, and they have many useful features that we do not have here. I have talked with the IT here to give them my suggestions and to see if they can add some of these features. (Physician 3, Case 2)

Here, the physician thought their hospital's HIT lacked the necessary practical features of other hospitals' HIT, which led them to be dissatisfied with their HIT. Moreover, in this case, the HIT used at both hospitals developed a bad reputation in the healthcare community and was one reason physicians and nurses viewed HIT negatively. One physician explained this, saying:

the system we have developed a bad reputation. When I talk with my colleagues, we often talk negatively about the system. I think [the system] is doing more harm than good. We need a new system that works and can make things better. (Physician 10, Case 2)

Colleagues' unfavourable opinions of HIT, system comparison and HIT with a bad reputation lead physicians and nurses to view HIT negatively. As illustrated by the chain of evidence in Appendix Table D-5, social influence is negatively linked with perceived dissatisfaction.

6.5.3 Exploring Perceived Threats to HIT

6.5.3.1 Perceived Threats: Perceived Loss of Professional Autonomy

To better organise work and reduce medical errors, hospital management put many restrictions on HIT. For example, residents were no longer allowed to request medicines, lab exams or approve patients' sick leave without approval from a consultant. Further, nurses were not allowed to view patients' progress notes or request anything related to patients, such as wound dressings. These restrictions led some physicians and nurses to perceive HIT as a threat. They felt they no longer

had the freedom they needed to make clinical decisions about their patients after HIT implementation. For instance, a physician said:

There are restrictions on the system, for example, on imaging. If I couldn't communicate with a consultant because he is not in the hospital or with a patient, it delays work because he must approve my request first. Even if he answers my call, I have to explain the situation to him and that takes time. (Physician 11, Case 2)

Such restrictions led some physicians and nurses to feel they were unjustifiably denied access to patients' information or the ability to request treatment for the patient, which prevented them from making clinical decisions. Many felt these restrictions delayed the progress of their work because they had to wait for physicians or nurses with higher authority to approve their clinical decisions or provide them with access to patient information. As one physician stated:

I can't relocate or refer the patient without taking permission from the consultant first because the patient is under his name. But, if he is busy I cannot do anything. We know when the patients need a referral, it is a small thing, we should have the authority to do many things without going back to the doctor, it will make things go faster. (Physician 12, Case 2)

Because of the lack of professional autonomy, physicians and nurses felt that HIT increases the workload and mental stress for physicians and nurses with higher authority, such as consultants and registered nurses, as they have to look after their patients and approve the work of other physicians, too. As one physician stated:

I feel that consultants are under a lot of stress. They have to approve everything [resident physicians] do, and there are many of us. So, it is a lot of work for them. (Physician 9, Case 1)

Physicians and nurses thought the loss of professional autonomy was increasing their workload and slowing down their work progress. This caused many to be frustrated so led to user dissatisfaction and user resistance. The analysis of the data indicates that perceived loss of professional autonomy is positively linked with perceived dissatisfaction and user resistance. Physicians and nurses who felt they had lost their professional autonomy were more likely to be dissatisfied with HIT and more likely to resist it (Appendix Table D-6).

6.5.3.2 Perceived Threats: Perceived Dissatisfaction

Most physicians and nurses initially adopted HIT. However, with time and as the system was updated to include more features, a general sense of frustration and irritation arose among physicians and nurses. Some explained that system updates were supposed to improve their job quality but, in reality, it only increased their stress, which frustrated them. This is exemplified in the following comments:

We need a system that is decent and works when we need it. I mean, it might seem like a small thing, but it makes a huge difference, it is really frustrating. (Physician 2, Case 2)

Further, a significant number of physicians and nurses complained that the system was not reducing their workload but increasing it. They felt that HIT was not improving the quality of their work and not helping them be more productive. For example, as one physician said:

The system is not flexible. It requires entering a lot of data and, sometimes, when something is missing, or I don't know the reason why, it doesn't accept the order. I need many steps to submit an order. What bothers me is that the system was supposed to make things better. I feel that now we have to deal with patients and the system. It is wasting my time and the patients'. (Physician 5, Case 1)

In both case studies, HIT was not received positively by physicians and nurses. Many complained about the system and criticised it in official meetings. HIT generated strong negative reactions from physicians and nurses, which ultimately led to the abandonment of the system, in Case 2. Physicians and nurses perceived that continued use of HIT would increase their dissatisfaction. As exemplified by the chain of evidence in Appendix Table D-6, perceived dissatisfaction is positively linked with user resistance.

6.5.3.3 Perceived Threats: Perceived Risk

Some physicians and nurses feared that HIT could pose a risk to patients' health and therefore be a risk to their careers. Analysis of the data reveals that some felt that HIT came with some risk factors that threatened their sensitive work environment in which they dealt with people's health. In both cases, physicians and nurses felt that HIT was not secure and could be used by an unauthorised person. One physician said:

To make things go faster, some physicians and nurses share their account with each other. Sometimes someone misuses this situation. I have heard of people getting dismissed because of a situation like this. (Physician 11, Case 1)

Such unauthorised sharing could lead to unauthorised use of HIT, which could in turn risk patients' health and physicians' and nurses' careers. Further, many physicians and nurses believed that HIT did not protect patients' privacy. As one nurse explained:

private patient information, such as their address, is not protected; any employee in the hospital can view private patient information. This must change. (Physician 14, Case 2)

Many felt that HIT had privacy and confidentiality issues and that it failed to protecting patients' private information. Such issues led some physicians and nurses to perceive the system as a threat

and a risk. As demonstrated by the chain of evidence in Appendix Table D-8, perceived risk is positively linked with user resistance.

In these two case studies, perceived loss of professional autonomy, perceived dissatisfaction and perceived risk are the main perceived threats of HIT. Seven core categories were identified as the antecedents to perceived threats: related knowledge, management support, lack of user involvement, system performance, system incompatibility, trust and social influences. As shown in the two cases, it is important to understand how physicians and nurses perceive HIT as a threat, as they have a significant impact on their decision to resist the system, affecting the success of HIT implementation. The next section presents an analysis of the data across the two case studies, and discusses the differences between physicians and nurses, and between the hierarchy level of respondents.

6.6 Cross-Case Analysis

This analysis of the two cases studies explores the differences in the antecedents of perceived threats and user resistance. The data were analysed to identify differences between the two cases, between physicians and nurses and across the level of interviewees. Appendix Figure E-1 Differences between interviewees in both cases reports the differences between the cases., and the following section provides a detailed examination and explanation of these differences.

6.6.1 Comparing the Two Cases

First, the data were analysed to identify the differences between the two cases and how these differences influence the antecedents of perceived threats and user resistance across them. Overall, analysis of the data revealed differences between the cases due to differences in the cultures of the organisations, management styles and the decision of whether to develop HIT in-house or buy it

from an outside vendor, which affected the hospital's control over HIT. For instance, in the military hospital, physicians and nurses are mostly civilians while the decision makers are mostly military personnel or come from a military background. This unique relationship suggests that managing the changes that occur after HIT implementation can be more challenging because of the differences in culture and background between management and most users. Another difference between the two hospitals is that when selecting HIT, the public organisations generally favoured selecting the cheapest option, even if the system is not the best or most suitable for the organisation. Therefore, the selected HIT may face resistance if it is not a good fit for the hospital. In contrast, the military hospital is better funded, so they were able to develop their own HIT system and customise it to their needs.

6.6.1.1 Organisational Culture and the Antecedents of Perceived Threats and User Resistance Across the Two Cases

Regarding perceived threats, in both cases the cross-case analysis indicates that physicians' and nurses' perceptions of dissatisfaction and risk were high, and that these perceptions influenced user resistance. However, differences between the two cases emerged in the perceived loss of professional autonomy. The cross-case analysis revealed that in the military hospital, only 32% (9/28) of physicians and nurses felt they had lost their professional autonomy after HIT implementation. In contrast, this number was much higher in the public hospital, as 60% (18/30) of physicians and nurses felt they had lost their professional autonomy after HIT implementation. These differences could potentially be attributed to the difference in organisational culture between the two cases, as illustrated in Table 6-1. Centralisation of power and rigid hierarchies are common in public organisations, whereas military organisations have a bureaucratic, hierarchical culture in which discipline and order are valued. Further, members of military organisations are expected to

conform to the values and culture of the organisation more than in other types of organisations (Holmberg and Alvinius, 2019). This could potentially explain why the perceived loss of professional autonomy is lower in the military hospital, as most physicians and nurses interviewed had been working in the military hospital for more than three years and had to conform to the values and culture of the organisation; they were used to military-style management with a strict command hierarchy.

In the public hospital, physicians and nurses mostly exhibited overt resistance behaviour while in the military hospital their resistance was mostly covert. Compared to the military hospital, a high number of physicians and nurses in the public hospital reported that they complained and criticised the system publicly and in official meetings, which eventually led to HIT abandonment. This could potentially be explained by the fact that physicians and nurses in the public hospital perceived the threat of HIT to be greater than their counterparts in the military hospital. Or, it could be because of the differences in organisational culture and the structure of the two hospitals. Two cultural and structural elements in the public hospital could explain why some physicians and nurse openly resisted the system. First, public organisations have high job security and most physicians and nurses in the public hospital received their salary from the ministry of health, not from the hospital they worked for. Therefore, these physicians and nurses were more willing to express their feelings about the system without fearing consequences. This could explain why some physicians and nurses openly resisted the system, and why the decision makers in the public hospital decided to abandon the system.

6.6.1.2 Management Styles

The data revealed that, in both case studies, physicians and nurses felt they did not receive enough management support to help them adapt and cope with the new HIT. This led to dissatisfaction

with the HIT and influenced resistance. In the military hospital, 50% (14/28) of physicians and nurses felt they did not receive management support, while this figure was 53% (16/30) in the public hospital. However, the lack of trust was higher in the military hospital than in the public hospital. This lack of trust expressed by physicians and nurses could be because of an internal organisation problem that led to trust issues between management and employees. Such internal organisation problems could result from differences in background between hospital managers with a mostly military background and civilian employees. In the public hospital, trust was not a major issue because both management and physicians and nurses are all civilians.

6.6.1.3 In-house Versus Commercial

The data analysis revealed that, in both cases, many physicians and nurses were not happy with the quality of HIT. In both cases, 57% (33/58) of physicians and nurses felt that their hospital's HIT was slow and prone to crashing. One major difference between the cases was in the number of physicians and nurses who felt that HIT was incompatible with their work style, needs or environment. In the military hospital, 64% (18/28) of physicians and nurses felt that the HIT was incompatible, while in the public hospital, this was 90% (27/30) (see Appendix Figure E-2 Comparing interviewees (by level of interviewee). Another major difference between the cases was in the number of physicians and nurses who felt they were uninvolved in HIT development. In the military hospital, only 39% (11/28) of physicians and nurses felt that they were uninvolved in HIT development, compared to 77% (23/30) of physicians and nurses in the public hospital.

A major reason for this difference was the fact that the military hospital developed their HIT in-house while the public hospital bought theirs from an outside vendor. As the military hospital developed their HIT in-house, it was easier for them to make changes to the system because the development team was part of the same organisation and the organisation had control over the

development process (Von Bary and Westner, 2018). Management made some changes to the HIT after its implementation, such as changes to the HIT's interface, in accordance with physicians' and nurses' requests. This made them feel that they were involved in the development of the HIT, and improved the compatibility of the system with physicians' and nurses' work style and environment. On the other hand, the public hospital bought their HIT from an outside vendor, so they did not have complete control over it and it was difficult and costly to make changes (Falaleeva, 2003; Nicholas-Donald and Osei-Bryson, 2017). This could explain why a significant number of physicians and nurses in the public hospital felt they were not involved in the development of HIT and thought it was incompatible with their work requirements, and therefore were dissatisfied with the system.

6.6.2 Differences Between Physicians and Nurses and Across the Level of Physicians

Analysis of the data found that physicians and nurses differed in two ways.

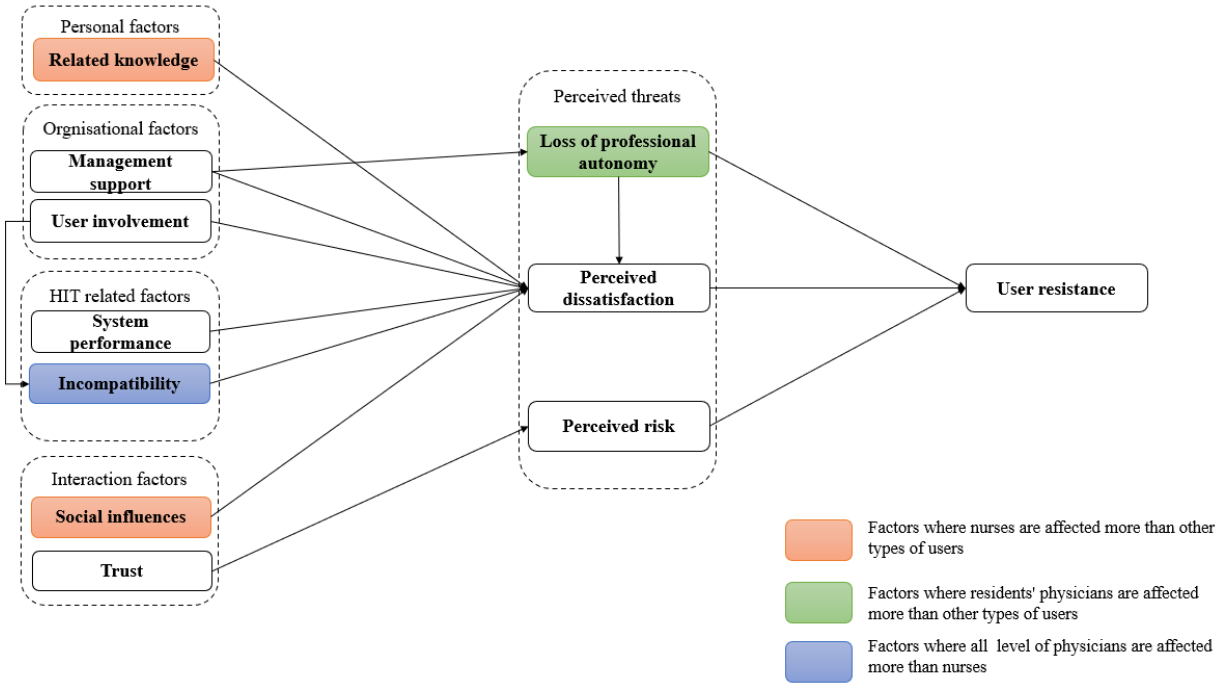


Figure 6.3 Difference between physicians and nurses

First, regarding personal factors, the data revealed that related knowledge was an important factor for physicians' and nurses' perceived dissatisfaction in both cases. However, in both cases, more physicians had related knowledge of HIT than nurses did, as 79% (22/28) of physicians said they had used HIT before working in their current hospital, compared to only 27% (8/30) of nurses. This could be because it is common for physicians to work and train in different hospitals early in their careers, giving them a chance to use different types of HIT. Not many nurses had the opportunity to work and train in different hospitals, so they lacked related knowledge of HIT, a strong reason that led some nurses to be dissatisfied with HIT.

Second, physicians and nurses differ in regard to social influence. The data analysis revealed that some physicians' and nurses' perceptions of HIT were influenced by outside influences, as many compared the HIT used in their hospital to that used in different hospitals, and many thought their hospital's HIT lacked essential or useful features that other hospitals had. Further, 77% (23/30) of

nurses in both hospitals mentioned HIT in other hospitals or a colleague's opinion of HIT, compared to 57% (16/28) of physicians. This suggests that nurses' perceptions are more likely to be influenced by social influences.

Further analysis of the data shows some differences between interviewees depending on their status and level in the organisation. In both cases, all resident physicians felt that their HIT was incompatible with their work environment, and the majority of resident physicians felt they no longer had professional autonomy to practice their work and make clinical decisions. This makes sense because resident physicians could no longer order anything in the system without the approval of a consultant physician. This influences their dissatisfaction with HIT and led them to resist the system. Moreover, this first experience of dissatisfaction may colour early career physicians' view of all HIT encountered thereafter.

6.6.3 Summary of Cross-Case Analysis

The cross-case analysis revealed that compared to the military hospital, the public hospital had stronger or more overt resistance to HIT. Several factors could explain this difference in the level of resistance and why the system was abandoned in the public hospital and not in the military hospital. First, the military hospital's decision to develop their HIT in-house allowed them to change and customise the system according to physicians' and nurses' recommendations. This was difficult to do in the public hospital as their HIT was purchased from an outside vendor, making it difficult and costly to change the system according to physicians' and nurses' recommendations. This led physicians and nurses to feel uninvolved in HIT development and made them think that HIT was incompatible with their needs and work style.

Second, the perceived loss of professional autonomy was higher in the public hospital, which could be due to the culture of the organisation, which has centralised power and rigid hierarchies, compared to the military hospital with its hierarchical culture where discipline and order are valued. Finally, overt resistance behaviour was more present in the public hospital because physicians and nurses have high job security and received their salary from the government. Consequently, physicians and nurses can express their feelings and openly resist the system with little fear of punishment from line managers.

6.7 Discussion

6.7.1 Contributions for Research

Previous researchers have discussed and examined how negative user perceptions of a technology influence user resistance (Bhattacherjee and Hikmet, 2007; Lin et al., 2012; Lapointe and Rivard, 2005; Laumer et al., 2016a). This study extends our knowledge of negative user perceptions and user resistance by examining the antecedents of negative user perceptions, particularly in healthcare settings. Understanding the antecedents of users' perception of technology is important for predicting and explaining user resistance to technology, and this study provides a foundation by examining the antecedents of perceived threats from the perspective of physicians and nurses. Further, the study examined user resistance from a post-implementation perspective, which permitted the examination of the longer-term factors that could lead to user resistance. Further, at the post-implementation stage, users re-evaluated their initial perceptions of the system based on their direct interactions and actual experiences with it, which provided an opportunity to study the actual causes of user resistance and understand the factors that lead to continuous use of HIT. The model (Figure 6.2) presented the main factors that lead physicians and nurses to perceive HIT as

a threat. It deconstructed perceived threats to HIT into perceived dissatisfaction, perceived risk and perceived threat to professional autonomy, which improved our understanding of how physicians and nurses perceived HIT as threats.

This study contributes to the IS field in general, and to user resistance research in particular, by showing how organisational factors, personal traits of users, HIT-related factors and factors related to the interaction between physicians, nurses and the organisation can influence how HIT is perceived. The study improved our understanding as it identified the main reasons for user resistance and examined how they influence users' perception of technology and user resistance. Previous research has examined factors such as related knowledge (Bhattacherjee and Hikmet, 2007; Handayani et al., 2017), management support (Bueno and Gallego, 2017; Elbanna, 2013), user involvement (Salih et al., 2013; Turan et al., 2015) and their impact on users' intention to use HIT. As this study looks at post-implementation, it extends this knowledge by showing that these factors influence users' continued use of a system, in addition to users' intention to use. The study confirms the findings of previous research that highlighted the importance of constructs such as related knowledge, management support, user involvement, system performance, system compatibility, trust and how social influences impact how physicians and nurses may perceive HIT.

This study identified a number of undocumented relationships between related knowledge of HIT, management support, lack of user involvement, system performance, system incompatibility, social influences and perceived loss of professional autonomy and between perceived dissatisfaction. The study also found that lack of management support lead to perceived loss of professional autonomy which lead to user resistance. By utilising a cross-case analysis, this study examined how differences in organisational culture and individual differences between users can

influence user resistance. It highlights the importance of cross-case analysis to validate research findings and to provide rich insights into an issue. For example, the findings indicate that differences in the organisational culture and structure of the two hospitals impacted the level of user resistance behaviour, where in the military hospital resistance was mostly covert and in the public hospital it was mostly overt. Additionally, this study demonstrates how numbers in qualitative research can be used to add value to the research by making claims such as 'many, most or higher' more precise. It also demonstrates how a chain of evidence technique can be employed to present and support research findings with data from interviews. For example, unpacking perceived risk through this approach revealed several layers of concern related to inappropriate system access or user behaviour, poorly configured systems and the confidentiality of patient data.

This study enables future theorising of the topic of the antecedents to negative user perception to technologies by bringing to light a range of connected themes and unfolding the identified theoretical constructs such as organisational factors, personal factors, HIT-related factors and interaction factors. These themes can inform subsequent qualitative research, which can expand upon these factors and further examine their influence on negative user perceptions of technology. Additionally, this research can lead to the development of quantitative scales for a potential survey-based field study to examine the statistical generalisability of this research's findings.

6.7.2 Contributions for Practice

This study makes practical contributions for the development and implementation of HIT. It addresses a topic that is relevant for many hospitals today, especially as an increasing number of hospitals transition to HIT. For hospitals seeking to implement HIT, this study provides a better understanding of user resistance and negative user perception in the healthcare sector. Primarily, this study's model provides guidance for practitioners responsible for the development and

implementation of HIT. The model highlights important areas that require attention to ensure successful implementation and continuous use of HIT.

The findings highlight the importance of developing HIT that is reliable, quick and that fits with the existing work style, needs and environment of hospitals. For instance, the problem of HIT incompatibility with physicians' and nurses' needs is one important issue emphasised in this study. Because of HIT incompatibility, physicians and nurses feel that HIT created a disconnect with their patients as it reduced eye-to-eye contact because while reading and writing notes, physicians are looking at and focusing on the computer rather than at the patient. Moreover, this study pointed to other negative effects that low system performance and incompatible HIT could have on the relationship between patients and physicians. Systems that are slow and prone to crashing create friction in the relationship between physicians and nurses and their patients because they increase waiting times for patients. Therefore, decision makers in hospitals should develop quality HIT that is compatible with physicians' and nurses' needs while considering the different needs of each hospital department.

Strong management support can reduce user resistance by helping physicians and nurses to acclimatise to HIT through training, sufficient time to learn the system, moral support, open and honest communication and quick resolution of any HIT problems or issues physicians and nurses face. Further, this study demonstrates the value of user involvement on physicians' and nurses' perceptions of HIT. It suggests that it is the responsibility of hospital managers to involve users as much as possible, such as by using surveys that seek physicians' and nurses' opinions of HIT, and by discussing with them future plans during hospital and department meetings. The study demonstrated how user involvement can impact system compatibility as well as the perceived dissatisfaction of physicians and nurses. As demonstrated by the cross-case analysis, decision

makers should consider how their decision to purchase HIT from an outside vendor can impact their ability to have complete control over it and be able to customise it based on the needs of users in their organisations. The ability to customise and change HIT after implementation will reduce physicians' and nurses' perceived dissatisfaction and user resistance.

This study also pointed to the influence of perceived loss of professional autonomy as an important factor that can affect perceived dissatisfaction and cause user resistance. To organise work and in an effort to reduce medical errors, decision makers in hospitals have placed many restrictions on HIT, such as restricting who is allowed to request certain medications. Such restrictions lead some physicians and nurses to feel they have lost professional autonomy as they no longer have the freedom they need to make clinical decisions regarding their patients. Decision makers should re-evaluate these restrictions and discuss them with physicians and nurses regularly, such as who is allowed to request medicines, lab exams or approve patients' sick leave. Further, decision makers should re-examine how such restrictions could impact work progress and the work environment. Revaluating system restrictions and discussing the reasons for these restrictions with physicians and nurses could potentially reduce users' perceived dissatisfaction and resistance. The research also reveals that when implementing HIT, hospitals should consider perceived dissatisfaction and perceived risks as negative perceptions that could influence user resistance and therefore be a cause of HIT implementation failure. When implementing HIT, managers should understand and take into consideration the antecedents of the perceptions presented in this study, to minimise user resistance and dissatisfaction and maximise the chances of HIT acceptance.

6.7.3 Limitations and Future Research Directions

This research has a number of limitations, although these do not negate its implications or contributions. First, even though a rich set of data was collected, it was only acquired from two

organisations within a specific setting. Hence, there might be differences in user resistance within different settings, such as a private or educational hospital, or in a different geographical location. The research could also benefit from a large-scale testing of the model (Figure 6.2) developed in this paper. Using the definitions developed in this paper (Table 6.3) and by examining the chain of evidence presented in Appendix D: Chain of Evidence future researchers can operationalise these constructs and test the validity of the model using quantitative methods. Second, this study only focuses on physicians' and nurses' perceptions of HIT. In hospitals, physicians and nurses hold positions of hierarchical power so have more freedom to choose whether they adopt a given system than other types of employees and users. As a result, caution is required in generalising the findings to other domains or contexts.

To address these limitations, it is recommended that further studies on the antecedents of negative user perception are done to expand the model. User resistance and negative user perception are complex subjects, and this study only covered part of them. Case studies and action research on system implementation in different settings that focuses on different types of users would improve the external validity of the model, such as an examination of user resistance in the private and public sectors.

7. Chapter Seven: Discussion and Conclusion

This chapter draws on previous chapters to discuss the findings of the study, highlight the research contributions, and make conclusions. It starts by answering the research question of this study. The research objective was to *theorise how physicians and nurses perceive HIT as a threat and how perceived threats lead to user resistance.* This was achieved by answering the research question:

Research Question*: Why do users perceive HIT as threats and how do perceived threats lead to user resistance?*

Section 7.1 focuses on answering the research question by providing a discussion of factors that lead physicians and nurses to perceive HIT as a threat and compares this study's findings with the existing literature. Section 7.2 highlights this study's contributions. The implications for theory and practice are presented in Section 7.3. The limitations of this thesis are presented in Section 7.4.

7.1 Research Question: Why do users perceive HIT as threats and how do perceived threats lead to user resistance?

To answer the research question, a preliminary model (Section 3.4) was developed from the user resistance literature to identify the factors that could influence physicians and nurses to perceive HIT as a threat. The user resistance literature suggests that four factors can influence users' perception of technology: organisational, system and personal factors, and the interaction between the organisation, system and personal factors. The preliminary model guided the data collection and analysis in this study. From the qualitative data analysis, seven core categories emerged that

are considered antecedents to perceived threats to HIT: related knowledge of HIT, management support, lack of user involvement, system performance, system incompatibility, trust, and social influences. Further, through cross-case analysis, the study identified how the culture of organisations, management styles, and organisational decisions about whether to develop HIT in-house or purchase it from an outside vendor could influence physicians and nurses' perceived threats. Moreover, the cross-case analysis identified how the differences between physicians and nurses and the differences across the levels of interviewees could influence perceived threats. The findings of the cross-case analysis revealed the differences between the cases in terms of user involvement, incompatibility, and trust. Additionally, the cross-case analysis revealed the differences between physicians and nurses in terms of related knowledge of HIT and social influences. Also, the cross-case analysis shows the differences between physicians depending on their status and level in the organisation. This section discusses these findings (Figure 7.1) and compares them with what has been reported in the user resistance literature and the wider information systems (IS) literature.

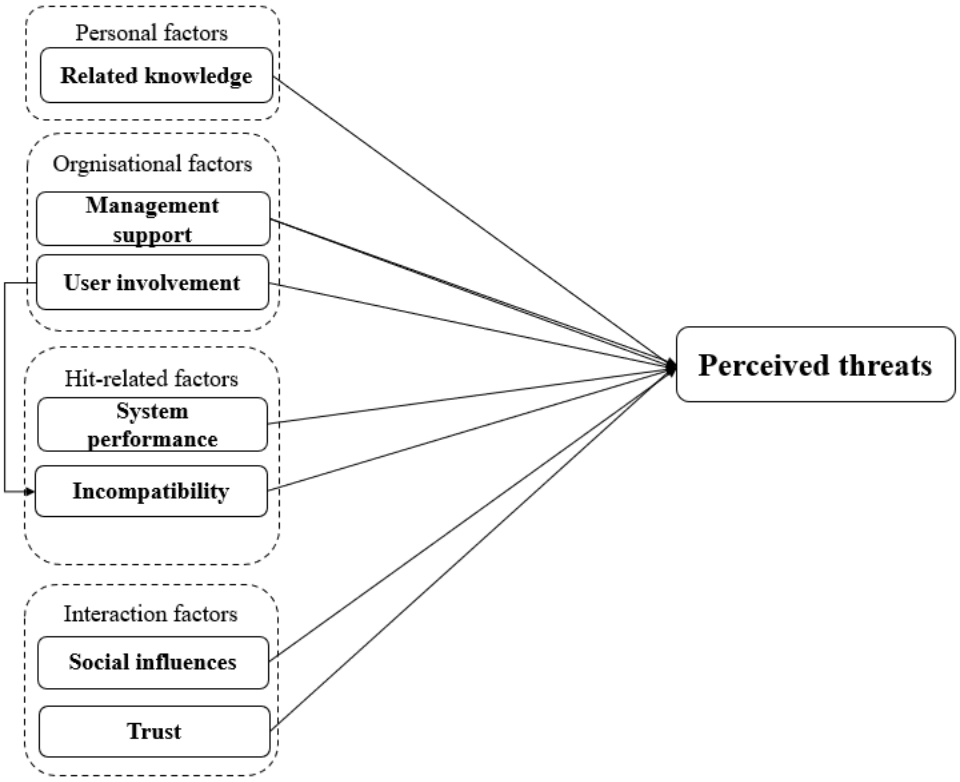


Figure 7.1 The antecedents of perceived threats

7.1.1 Related Knowledge of HIT

First, analysis of the data revealed that related knowledge of HIT is the personal factor that influences perceived threats of HIT. In the context of this study, related knowledge was defined as users' familiarity with HIT and its concepts. In the literature, researchers have discussed how similar factors could lead to user resistance, such as users' background, experience (Laumer et al., 2016b; Thatcher and Perrewe, 2002), and information technology (IT) skills (Bhattacherjee et al., 2013; Klaus and Blanton, 2010). Similar terms have been used by other researchers (Ngafeeson and Midha, 2014) who examined how users' self-efficiency lead to the perceived loss of control. Vitari and Ologeanu-Taddei (2018) also used the construct 'self-efficiency' and explained that it influences perceived ease of use.

Similar to this study, a number of researchers have examined related knowledge of HIT and its relation to users' perceptions (Bhattacherjee & Hikmet, 2007; Handayani et al., 2017). For instance, both Bhattacherjee and Hikmet (2007) and Handayani et al. (2017) found that related knowledge is a predictor of perceived ease of use and physicians' intention to use HIT. Both studies were conducted at the pre-implementation and implementation stages of HIT and identified that related knowledge of HIT influences users' intention to use HIT. Since this study looks at post-implementation, it extends this knowledge by showing that related knowledge of HIT influences users' continued use of a system, in addition to their intention to use HIT.

This study identified that related knowledge of HIT influences perceived threats. It went further than previous studies and examined the differences between physicians and nurses. The data revealed that related knowledge of HIT was an important factor for physicians and nurses' perceived dissatisfaction in both case studies. However, in both, more physicians had related knowledge of HIT than nurses did. This shows that individual differences enhance or diminish users' perceived threats of HIT. The differences between physicians and nurses could be because physicians work and train in several different hospitals during the first years of their careers, where they have a chance to use different types of HIT. Many nurses do not have the opportunity to work and train in different hospitals, so they lack related knowledge of HIT, which was the key reason for some nurses' dissatisfaction with HIT.

Based on these findings, it is recommended that during post-implementation, managers should provide all users with HIT educational materials such as video tutorials, step-by-step guides, and ongoing workshops that can help users learn about HIT at their own pace. This is imperative after updating HIT because when new physicians and nurses join the organisation, they will guide and coach users if they have difficulties using the system. Moreover, nurses have less related

knowledge of HIT than physicians, so managers should provide nurses with more time and opportunities to engage in the configuration of HIT packages so that they can broaden their skill set and sense of ownership. It is envisioned that such support will improve users' related knowledge of HIT, improve the chance of continued use, and help organisations gain the desired benefits of HIT.

7.1.2 Management Support

Management support is often seen as an important success factor that facilitates successful IT implementation and continuous use (Baronas and Louis, 1988; Buntin et al., 2011; Holt et al., 2007; Shao et al., 2016). Similar to this study, Kim and Kankanhalli (2009) found that the lack of organisational support directly leads to user resistance. They studied how employees evaluate change and resist the system in an IT service company and took a pre-implementation perspective. Analysis of the data in this study indicated that a lack of management support is negatively linked with perceived threats. The difference in findings between this study and Kim and Kankanhalli's (2009) could be attributed to the different contexts of the research, as this study focuses on physicians and nurses who perceive threats and user resistance to HIT in hospital settings and took a post-implementation perspective.

Much research has discussed the importance of management support for successful IT implementation (Bueno and Gallego, 2017; Elbanna, 2013; Sharma and Yetton, 2003). This study extends the idea that management support is an important factor at the pre-implementation stage and shows that it is also crucial at the post-implementation stage, as it can reduce user resistance and increase the chance of continued use. Further, previous research has examined the impact of management support on IT implementation and user resistance on various industries, such as the service industries (Lee and Lee, 2016), IT service companies (Kim and Kankanhalli, 2009), and

private companies (Wang and Lai, 2014). This research also shows that management support is vital for successful HIT implementation in the healthcare sector.

This study's findings reveal that a lack of management support influences both physicians and nurses' perceived threats of HIT in both case studies. This lack of management support led them to perceive dissatisfaction and loss of professional autonomy with HIT and influenced resistance. Post-implementation management support is a vital way of helping physicians and nurses adapt to HIT and increase the chance of continuous use. Managers should provide guidance as well as time for physicians and nurses to familiarise themselves with the functionality of the new system (Ali et al., 2016; Venkatesh et al., 2011). Management support does not only include user support but also includes championing HIT itself. This means that managers should believe that HIT will improve their organisation and should push for the total use of technology with all users (Boonstra and Broekhuis, 2010). Also, post-implementation, managers should be incentivised to resolve HIT issues, in particular, to understand and gain consensus on best practices across different HIT users. It is expected that users will have issues at the post-implementation stage, so engagement processes should always be in place to assist physicians and nurses to contribute to the continued use of HIT for improved patient outcomes.

7.1.3 Lack of User Involvement

Several research studies indicate that, at the pre-implementation stage, user involvement gives users a feeling of control over the development and implementation of the system, helping them develop realistic expectations about the system and committing them to the system from the early stages (Baronas and Louis, 1988; Markus, 1983). User involvement has been credited with influencing users' perception of control and user satisfaction (Turan et al., 2015). Some studies have explored how user involvement influences users' expectations, attitudes, and resistance (Salih

et al., 2013; Turan et al., 2015). This study adds to the current research on user resistance by showing that user involvement is also important post-implementation, as it influences perceived threats.

The data analysis revealed that a lack of user involvement is positively linked with perceived dissatisfaction and system incompatibility, whereby the fewer physicians and nurses are involved in the improvement of HIT, the more likely they are to have a perceived dissatisfaction and believe that the system is incompatible with their work needs. The study revealed that user involvement is vital post-implementation. Some physicians and nurses in both case studies complained that management did not address their suggestions, recommendations, or feedback about HIT. This suggests that to ensure continuous use of HIT and avoid eventual user resistance, managers should aim to involve physicians and nurses in a collaborative process with IT to improve and upgrade HIT post-implementation.

Further, this study found that user involvement could be related to organisational control over the development of IT. As indicated in Section 6.6.1.3, the public hospital bought their HIT from an outside vendor. They did not have complete control over their HIT, so it was difficult and costly for them to make changes to it (Falaleeva, 2003; Nicholas-Donald and Osei-Bryson, 2017). This can explain why a significant number of physicians and nurses in the public hospital felt they were not involved in the development of HIT and that it was incompatible with their work requirements, and were therefore dissatisfied with the HIT.

This study, through cross-case analysis, demonstrated that it is vital for decision makers to consider how their decision to purchase HIT from an outside vendor can impact their control over it and their flexibility to customise it to the needs of their physicians and nurses. This study demonstrated that the ability to customise and change the HIT post-implementation would reduce physicians and

nurses' perceived dissatisfaction and user resistance and ensure continued use of HIT. Decision makers should make efforts to involve users by discussing future hospital plans regarding HIT with physicians and nurses during hospital and department meetings. Dynamic collaboration techniques such as agile, participatory design, rapid prototyping, and design thinking can be adopted to better involve and incentivise physicians and nurses in improving and updating HIT. Further, post-HIT implementation, decision makers must involve users by identifying and addressing their needs and updating the HIT to meet those needs, which will allow them to adapt to the constantly changing environment of digitally enabled healthcare.

7.1.4 System Performance

This study identified system performance as an antecedent to perceived threats. It further defined system performance as HIT's ability to accomplish the required tasks accurately and quickly. Users in both case studies complained that the system was slow and prone to crashing. Such issues are not acceptable in all types of systems, especially when patients' health and well-being could be at risk because of system issues. Such issues frustrate users and make them irritated with the system. The data analysis revealed that post-HIT implementation, poor system performance is negatively linked with perceived dissatisfaction. Therefore, this study confirms existing IS research that argues that when systems slow down, users are often frustrated (Cotea, 2010; Greenhalgh et al., 2009). Moreover, some studies found that slow systems could have unintended consequences that lead to user resistance (Meehan, 2017; Yu et al., 2013), and other researchers have examined how system performance influences users' perception, such as perceived ease of use and perceived usefulness, as well as a users' behavioural intentions (Alenezi, 2019; Handayani et al., 2017; Liu and Ma, 2006). Since the data in this study was captured at the post-

implementation stage, it also adds to this knowledge by showing that system performance influences continuous use of HIT and user resistance.

This study identified that poor system performance leads to perceived dissatisfaction. The findings also point to other negative effects that poor system performance could have on the relationship between patients and physicians. Slow systems that are prone to crashing create friction in the relationship between physicians, nurses, and their patients because they increase patient waiting times. Such issues and friction between physicians, nurses, and their patients are likely to increase the chance of user resistance and reduce the chance of continuous use of HIT. Hence, decision makers should constantly monitor and work on improving the reliability and performance of HIT. Peak periods, such as flu seasons or pandemics, should be leveraged to stress-test processes and identify suitable process-strengthening measures (e.g., burst capacity from cloud platforms). Finally, backup plans should be in place for when HIT slows down or crashes. Such system performance enhancements will improve the chance of continued HIT use.

7.1.5 System Incompatibility

Analysis of the data revealed that system incompatibility is positively linked with perceived dissatisfaction. The study defined system incompatibility as users' belief that HIT does not fit their work style, needs, or environment. The findings showed that some physicians and nurses believe that HIT is incompatible with their work style, needs, or environment, and some felt that HIT reduces eye-to-eye contact with the patients, thus affecting their relationship as patients feel that physicians and nurses are looking at their HIT systems and focusing on the computer rather than them. Al-Jafar (2013) found that patients complained that physicians paid more attention to using and typing in the system than looking at them. Researchers have also discussed how computer placement could affect face-to-face interaction between healthcare providers and patients (Fonville

et al., 2010). Physicians and nurses work in an intense environment; they are often overworked and under constant stress (Silver, 2016; Wen et al., 2016). Therefore, incompatible HIT will increase users' mental workload, cause frustration, and lead to resistance (Boonstra and Broekhuis, 2010; Gagnon et al., 2016). System incompatibility was described by some researchers as an important factor for successful IT implementation (Boonstra et al., 2014; Cresswell et al., 2012; Takian et al., 2012). Previous research has examined the relationship between system compatibility and perceived usefulness, perceived ease of use, and the intention to use the systems (Bhattacherjee and Hikmet, 2007; Handayani et al., 2017; Vitari and Ologeanu-Taddei, 2018).

Similarly, this study indicated that system incompatibility influences users' perception, but that it leads to perceived dissatisfaction. Physicians and nurses felt that the system did not alleviate the huge amount of paperwork required of them. Such a high administrative burden leads to dissatisfaction with HIT by physicians and nurses. Therefore, decision makers should aim to redesign clinics in a way that allows eye-to-eye contact between physicians and nurses and their patients. They should continue to automate most of the administrative work related to patient records and enhance the user interface and device mobility so that nurses and clinicians are freed up to maintain eye contact with patients while using HIT to examine or record medical notes (Montague and Asan, 2014; Rathert et al., 2017). Voice dictation technologies can be utilised to reduce the amount of time physicians and nurses spend typing medical notes. Further, post-HIT implementation, it is essential to regularly examine the rapidly and constantly changing needs of physicians and nurses and to update HIT based on their needs to ensure that HIT is compatible with users' needs. This will provide organisations with the desired benefits of HIT, ensures that usage continues, and reduces the chance of user resistance.

7.1.6 Social Influence

Analysis of the data revealed that social influence is negatively linked to perceived threats. The findings suggest that post-HIT implementation, users were influenced by the attitudes and behaviours of their colleagues. In this study, physicians and nurses reported that they regularly share their thoughts and feelings about HIT between themselves and often compared the system used in their hospital with systems at other hospitals. The unfavourable opinion of colleagues towards HIT and system comparison leads physicians and nurses to view HIT negatively. In IS literature, social influences such as colleagues' opinions are a key predictor of user behaviour (Eckhardt et al., 2009). Research suggests that colleagues' opinions are one of the most important references for people in terms of their opinion about HIT (Kim and Kankanhalli, 2009). One study examined the effect of colleagues' opinions on switching cost and switching benefits, and how this could influence user resistance (Kim and Kankanhalli, 2009). A number of researchers have examined how social influences affect a user's behavioural intention (Phichitchaisopa and Naenn, 2013; Venkatesh et al., 2003). This study also added to previous research by highlighting that at the post-implementation stage, social influences impact continuous use as well as users' resistance. It showed that social influences impact various users differently. The cross-case analysis shows that physicians and nurses differ in regard to the impact of social influence on perceived threats. The findings show that the majority of nurses in both case study hospitals mentioned HIT in other hospitals, or a colleague's opinion of HIT, compared to only half of the physicians. This suggests that nurses' perceptions are more likely to be influenced by social influences than physicians' perceptions. Hence, managers should highlight to users, especially nurses, how HIT will support their work, and managers should promote their HIT by explaining how it improves the quality of healthcare. Also, post-implementation of HIT, decision makers should seek to recruit active and

influential physicians and nurses to champion HIT and support their colleagues. When HIT is updated and when new physicians and nurses join the organisation, these champions can assist them with the system. This will improve physicians and nurses' perceptions of HIT and ensure that organisations get the desired benefit of HIT by ensuring its continued use.

7.1.7 Lack of Trust

Analysis of the data revealed that lack of trust is positively linked with perceived threats. Some physicians and nurses lacked confidence in HIT's ability to improve the quality of healthcare delivery and were uncertain and cautious about the system. Trust has been extensively examined by IS researchers as it is considered an essential component of the relationship between the employee, the organisation, and its leaders (Ozmen, 2018). Studies have shown that an increase in trust between employees and the organisation is more likely to lead to an increase and willingness to accept organisational decisions and decrease the likelihood of conflicts and user resistance (Yue et al., 2019). Moreover, it has a direct effect on individuals' behaviour and intention (Boonstra and Broekhuis, 2010; Wu et al., 2008). This study extends this knowledge and shows that trust is also important at the post-implementation stage, as it contributes to HIT's continued use. Researchers have proposed that trusting the IT artefact is an important predictor for user resistance (Heath, 2015). This study confirms this finding and adds to this knowledge by showing that trusting the organisation managers and decision makers as well as the IT artefact is also an important predictor for user resistance. As highlighted in the findings, the lack of trust in HIT among physicians and nurses was higher in the military hospital than in the public hospital. This lack of trust could be because of an internal organisation problem that leads to trust issues between management and employees (Ozmen, 2018). Such internal organisation problems could result from differences in background between hospital managers, who mostly have military backgrounds, and employees,

who are mostly civilians. In the public hospital, trust was not a major issue for physicians and nurses because management, physicians, and nurses are all civilians. Post-HIT implementation, managers should seek to improve physicians and nurses' confidence in HIT. This can be done by highlighting how HIT implementation improves the quality of healthcare and patient outcomes. Further, managers should regularly discuss and address issues raised by physicians and nurses, such as privacy and security issues, which can be critical in the healthcare sector. Implementing fingerprint or facial recognition systems to allow access to HIT can improve physicians and nurses' confidence in HIT by reducing the chances of unauthorised access to HIT (Hathaliya et al., 2019). Improving physicians and nurses' confidence in HIT will reduce the chances of resistance and ensure the continued use of HIT.

7.1.8 Perceived threats

Lapointe and Rivard's (2005) theoretical model, which examined user resistance in the healthcare context, explains that perceived threats lead to user resistance. They explained that perceived threats are overwhelming emotional pain, the perception of a dangerous situation, or any fear of negative consequences (Lapointe & Rivard, 2005). Their theoretical model was adopted and extended by a number of researchers examining user resistance in the healthcare context (Bhattacherjee and Hikmet, 2007; Hsieh, 2015; Hsieh and Lin, 2018; Ngafeeson, 2015; Wild et al., 2012). Some researchers found that perceived threat is the strongest indicator for user resistance (Hsieh and Lin, 2018). Perception can be understood as 'a process through which a person receives information or stimuli from the environment and transforms it into psychological awareness' (Oo and Usami, 2020, p. 3). Researchers view perception as a cognitive and subjective process in which an individual understands and gives meaning to a situation or environment (Oo and Usami, 2020; Ou, 2019). Many researchers have conceptualised perceived threats as the extent

to which users fear that they will lose control over how they make decisions (Bhattacherjee and Hikmet, 2007; Hsieh, 2015; Hsieh and Lin, 2018). However, other studies have shown that perceived threats can be more than the fear of losing control. For instance, they could be the fear of losing power (Lapointe and Rivard, 2005), revenue (Hsieh, 2015), or status (Klaus and Blanton, 2010). Previous studies have examined perceived threats as a single construct, whereas this study identified perceived threats to HIT as three independent but complementary constructs. Additionally, this study took a post-implementation perspective, which allowed for the examination of the longer-term impact of user resistance (Eden et al., 2014; Fryling, 2015). At the post-implementation stage, users may re-evaluate their initial perceptions of the system based on direct interactions and actual experience with the system (Orlikowski and Gash, 1994; Saeed et al., 2010). This perspective helps to better understand the reasons for user resistance to HIT over time. The data analysis revealed that physicians and nurses perceive threats to HIT that lead to user resistance to comprise of three factors: perceived loss of professional autonomy, perceived dissatisfaction, and perceived risk (Figure 7.2). This study opens up physicians and nurses' perceived threats of HIT and explains how physicians and nurses may perceive HIT as a threat post-implementation.

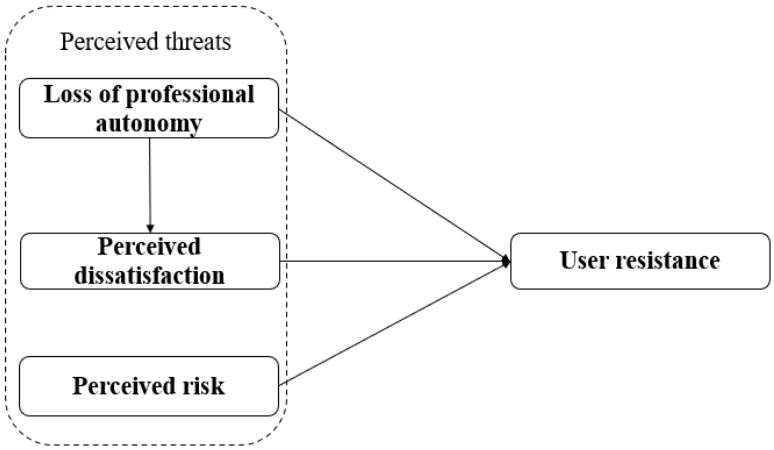


Figure 7.2 Perceived threats of HIT

7.1.8.1 Perceived Loss of Professional Autonomy

Analysis of the data indicates that perceived loss of professional autonomy is positively linked with perceived dissatisfaction and with user resistance, whereby physicians and nurses who felt they had lost their professional autonomy were more likely to be dissatisfied with HIT and resist it. Post-implementation, users felt that they were unjustifiably denied access to patients' information or the ability to request treatment for the patient, which prevented them from making clinical decisions. These findings are in line with IS literature, which indicates that, in general, physicians have high professional autonomy and have the freedom to practice their work based on their individual judgement and without evaluation or oversight from others (Bhattacherjee et al., 2017; Lapointe and Rivard, 2005; Sligo et al., 2017; Walter and Lopez, 2008). Some researchers have examined the relationship between perceived loss of professional autonomy and the perceived usefulness of IT, and users' intention to use (Esmaeilzadeh et al., 2015; Sambasivan et al., 2012; Walter and Lopez, 2008). For instance, Walter and Lopez (2008) developed the construct of perceived loss of professional autonomy and incorporated it into TAM model. Their quantitative research found that perceived loss of professional autonomy impacts physicians' perceptions and has a significant, negative direct influence on the perceived usefulness of IT and users' intention to use. Previous studies have only examined the impact of physicians' perceived loss of professional autonomy to HIT (Esmaeilzadeh et al., 2015; Sambasivan et al., 2012; Walter and Lopez, 2008).

This research extends the previous research as it explains that perceived loss of professional autonomy is present post-HIT implementation and impacts both physicians and nurses; it further found that it is positively linked with perceived dissatisfaction and user resistance, and that

perceived loss of professional autonomy impacts the continuous use of HIT, along with users' intention to use. Moreover, this study revealed that perceived loss of professional autonomy could be different depending on the organisation and the user's position in the hierarchy. The analysis of the data shows some differences between interviewees depending on their status and level in the organisation. In both case studies, the majority of resident physicians felt that post-HIT implementation, they no longer had professional autonomy to practice their work and make clinical decisions because resident physicians could no longer make clinical decisions or order anything (such as medication) in the system without the approval of a consultant physician. Additionally, through cross-case analysis, the study found that perceived loss of professional autonomy is much higher in the public hospital than the military hospital. Such differences could potentially be attributed to the difference in organisational culture across the two cases: the centralisation of power and rigidity of hierarchies are common in public organisations, whereas military organisations have a bureaucratic, hierarchical culture in which discipline and order are valued. Further, members of military organisations are expected to conform to the values and culture of the organisation more than the members of other types of organisations (Holmberg and Alvinius, 2019). This could explain why the perceived loss of professional autonomy is lower in the military hospital, as most physicians and nurses interviewed had been working in the military hospital for a while and had had to conform to the values and culture of the organisation, so they were used to military-style management with a strict command hierarchy.

To reduce the chances of perceived loss of professional autonomy post-implementation, the decision to place extra access restrictions on HIT (for example, to control who is allowed to request medicines, lab exams, or approve patients' sick leave) must be regularly re-evaluated. This re-evaluation should consider how such restrictions impact work progress, the work environment,

and users' perceived loss of professional autonomy. IT developers will usually add constraints to a system to guide users, as well as to prevent them from harming themselves and others (Norman, 2013). In both case studies, decision makers had put these restrictions and constraints on their HIT to ensure patient safety. The study findings show that such restrictions impact perceived loss of professional autonomy and could lead to perceived dissatisfaction and user resistance. Therefore, it is recommended that post-implementation, user permissions and restrictions should be the subject of in-depth organisational analysis, workflow mapping, and in-depth discussion between users and decision makers. Such discussions and analysis are essential, post-implementation, to increase the chances of continued HIT use. Further, decision makers must regularly examine the rapidly and constantly changing needs of physicians and nurses and utilise HIT to improve the quality of work for physicians and nurses, which will reduce the chances of user resistance and increase the chances of continued HIT use.

7.1.8.2 Perceived Dissatisfaction

The data analysis revealed that perceived dissatisfaction is positively linked with user resistance. Post-HIT implementation, users were frustrated with and irritated by the system. They explained that the system was supposed to improve their job quality and help them do their job effectively, but they perceived that it had only increased their stress level, which frustrated them. Studies have explained that high job satisfaction is an important indicator for high job performance (Avgar et al., 2010), so it is expected that physicians and nurses would resist any system that threatens their job satisfaction. Several studies have found that users' dissatisfaction would threaten the long-term success of system implementation (Bhattacherjee et al., 2017). The present study confirms this, as it has shown that perceived dissatisfaction, post-HIT implementation, can increase the chances of user resistance and thus negatively impact the continued use of HIT. The results of this study align

with those of Ngafeeson and Midha (2014), who found that perceived dissatisfaction leads to user resistance. They examined the impact of perceived dissatisfaction on users' resistance to HIT in a university hospital. This study confirms existing IS research and extends it by revealing that perceived dissatisfaction impacts user resistance in one large public and one military hospital. It is essential for managers to regularly examine how HIT impacts physicians and nurse's perception of HIT. Post-HIT implementation, managers should understand and take into consideration the antecedents of physicians and nurses' perceived dissatisfaction presented in this thesis. Understanding and addressing this perceived dissatisfaction with HIT and, crucially, the factors that lead to perceived dissatisfaction, will reduce the chances of user resistance, improve the chances of continued use of HIT, and help organisations gain the desired benefits of HIT.

7.1.8.3 Perceived Risk

Data analysis revealed that perceived risk is positively linked with user resistance. Some physicians and nurses feel that HIT has some risk factors that threaten their sensitive work environment. Some researchers have examined how perceived risk influences users' behaviour and intention to use. Additionally, some researchers have deconstructed perceived risk into five different factors—performance, social, time, financial and security risks—and examined how these affect subjective norm, users' attitude, and users' intention (Sanayei and Bahmani, 2012; Hsieh, 2015; Lee, 2009). Some researchers have used the terms 'uncertainty cost' and 'perceived risk' interchangeably (Hsieh and Lin, 2019; Hsieh, 2016). These studies revealed that uncertainty cost impacts user resistance (Hsieh and Lin, 2019; Hsieh, 2016). Smith et al. (2014) examined physicians' perceived risks of HIT during HIT implementation and found that perceived risk influences user resistance to HIT. This study extends this knowledge by revealing that perceived risk impacts users after the implementation of HIT and therefore, influences their continued use of

HIT. Moreover, this study extends Smith et al.'s (2014) findings by showing that perceived risk influences user resistance in nurses as well as physicians. This study highlighted that post-implementation, some physicians and nurses felt that HIT has some risk factors that threaten their sensitive work environment, which requires them to deal with people's health. In both cases, physicians and nurses thought that HIT was not secure and could be used by an unauthorised person. Moreover, studies have shown that physicians and nurses are reluctant to document clinical decisions where the diagnostic process pursues different angles, and physicians may not want their decision-making process to be open to scrutiny for fear of litigation (Fichman, 2011). This study supports these findings, as some physicians and nurses stated that they were concerned that they were not able to change their documentation after saving it to the system. Post-HIT implementation, it is imperative for decision makers to regularly examine and analyse physicians and nurses' perceived risk regarding HIT by improving security, tackling privacy issues, and working to protect patient confidentiality.

7.2 Research Contributions

This study offers a number of contributions to both research and practice. This section summarises the main contributions, as a detailed contribution was presented in the previous papers and chapters that comprise this thesis. This section first identifies the contributions this research makes to existing knowledge on user resistance, as well as the wider IS literature (Section 7.2.1). Next, the key contributions for practitioners will be discussed (Section 7.2.2). It is evident that this study makes a number of unique contributions that add to the existing knowledge.

7.2.1 Contributions to Theory

The research contributes to user resistance literature by developing a model that examines the antecedents of perceived threats and user resistance

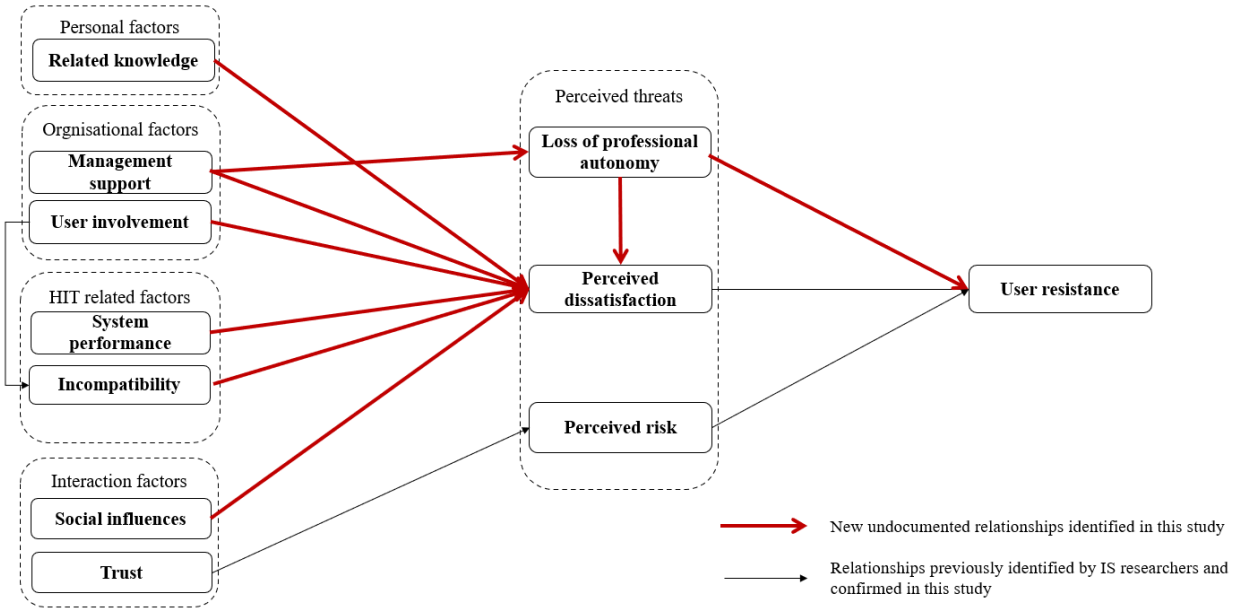


Figure 7.3 The antecedents of perceived threats and user resistance

Factors	Source of the factor	Relationship	Source of the relationship
Related knowledge	*The factor emerged from findings. Also, a number of researchers have examined how users' related knowledge influences user's perception of IT, such as (Bhattacherjee & Hikmet, 2007; 2018; Handayani et al., 2017; Vitari and Ologeanu-Taddei, 2018). This study supports these findings and shows that lack of related knowledge influences user's perception of IT and causes perceived dissatisfaction.*	Lack of related knowledge causes perceived dissatisfaction.	*New undocumented relationship in the user resistance literature emerged from the findings of this study* as shown in Appendix D-1 A sample of the chain of evidence linking related knowledge to HIT with perceived dissatisfaction.
Management support	*The factor emerged from findings. Previous researchers have revealed that management support is related to user resistance and successful IT implementation (e.g., Holt et al., 2007; Kim and Kankanhalli, 2009; Shao et al., 2016). These results are similar to the findings of this study, which showed that management support is important for the continued use of HIT and revealed that lack of management support leads to perceived dissatisfaction and perceived loss of professional autonomy.*	Lack of management support leads to perceived dissatisfaction and perceived loss of professional autonomy.	*New undocumented relationship in the user resistance literature emerged from the findings of this study* as highlighted in the chain of evidence linking management support with perceived dissatisfaction and perceived loss of professional autonomy, which appears in Appendix Table D-2.
Lack of user involvement	*The factor emerged from findings. Additionally, previous researchers have studied the relationship between user involvement and users' expectations, attitudes, and resistance (e.g., Salih et al., 2013; Turan et al., 2015). This study adds to the current research on user resistance by showing that user involvement is also important post-implementation, as it influences perceived threats and leads to perceived dissatisfaction.*	Lack of user involvement leads to perceived dissatisfaction.	*New undocumented relationship in the user resistance literature emerged from findings as indicated* in the sample of the chain of evidence linking lack of user involvement with perceived dissatisfaction and system incompatibility, which appears in Appendix Table D-3.
System performance	*The factor emerged from findings. Yet, previous researchers have reported that system performance influences users' perception, such as perceived ease of*	Bad system performance leads to perceived dissatisfaction.	*New undocumented relationship in the user resistance literature emerged from findings* as shown in the sample of the chain of

	use and perceived usefulness, as well as users' behavioural intentions (Alenezi, 2019; Handayani et al., 2017; Meehan, 2017). Similarly, *this study supports these findings and shows* that *poor system performance influences users' perception and leads to perceived dissatisfaction.*		evidence linking system performance with perceived dissatisfaction, which appears in Appendix Table D-4.
System incompatibility	*The factor emerged from findings. In addition, system incompatibility was examined by previous researchers in relation to perceived usefulness, perceived ease of use, and the intention to use the systems (Bhattacherjee and Hikmet, 2007; Handayani et al., 2017; Vitari and Ologeanu-Taddei, 2018).* Likewise, *this study supports these findings and show* that *system incompatibility influences users' perception and is positively linked with perceived dissatisfaction.*	System incompatibility is positively linked with perceived dissatisfaction.	*New undocumented relationship in the user resistance literature emerged from findings.* As shown by the chain of evidence (Appendix Table D-4), system incompatibility is positively linked with perceived dissatisfaction.
Lack of trust	*The factor emerged from findings. Also, previous researchers have reported that lack of trust has a direct effect on individuals' behaviours and intentions (Boonstra and Broekhuis, 2010; Wu et al., 2008). In the same way, this study has found that lack of trust influences users' perception and user resistance as it is negatively linked with perceived dissatisfaction.*	Lack of trust is positively linked with perceived risk.	*The relationship was identified in the literature*: Smith et al. (2014). Also, the finding of the study *supports this relationship* as shown by the chain of evidence (Appendix Table D-5) that a lack of trust is positively linked with perceived risk.
Social influences	*The factor emerged from findings. Similarly, previous researchers have demonstrated that colleagues could influence users' behavioural intentions and user resistance (e.g., Kim and Kankanhalli, 2009; Phichitchaisopa and Naenn, 2013). This study supports these findings and shows that social influences are positively linked with perceived risk.*	Social influence is negatively linked with perceived dissatisfaction.	*New undocumented relationship in the user resistance literature emerged from findings* as illustrated by the chain of evidence in Appendix Table D-5, which shows that social influence is negatively linked with perceived dissatisfaction.
Perceived loss of professional autonomy	*The factor emerged from findings. Also, previous researchers have studied the relationship between perceived loss of professional autonomy and the perceived usefulness of IT, and users' intention to use*	Perceived loss of professional autonomy is positively linked with	*New undocumented relationship in the user resistance literature emerged from findings of the study, which shows* that perceived

	(Esmaeilzadeh et al., 2015; Sambasivan et al., 2012; Walter and Lopez, 2008). This study supports these findings and shows that perceived loss of professional autonomy influences users' intention to use. More specifically, it showed that perceived loss of professional autonomy is positively linked with perceived dissatisfaction and user resistance.	perceived dissatisfaction and user resistance.	loss of professional autonomy is positively linked with perceived dissatisfaction and user resistance as shown in Appendix Table D-6.
Perceived dissatisfaction	*The factor emerged from findings. Further, several studies have found that users' dissatisfaction would threaten the long-term success of system implementation and lead to user resistance (Bhattacherjee et al., 2017; Ngafeeson and Midha, 2014). Likewise, this study supports this, as it has found that perceived dissatisfaction is positively linked with user resistance.*	Perceived dissatisfaction is positively linked with user resistance.	*The relationship was identified in the literature*: Ngafeeson, (2015). Also, the finding of the study *supports this relation* as exemplified by the chain of evidence in Appendix Table D-6 that perceived dissatisfaction is positively linked with user resistance.
Perceived risk	*The factor emerged from findings. Also, previous researchers have revealed that perceived risk affect subjective norm, users' attitude, and users' intention (Sanayei and Bahmani, 2012; Hsieh, 2015; Lee, 2009). In the same way, this study has identified that perceived risk influences users' intention to use and is positively linked with user resistance.*	Perceived risk is positively linked with user resistance.	*The relationship was identified in the literature*: Smith et al. (2014). Also, the finding of the study *supports this relation* as demonstrated by the chain of evidence in Appendix Table D-8 that perceived risk is positively linked with user resistance.

Table 7-1 Source of factors and relationship model figure 7.3 and contributions to the user resistance literature

This model examines a number of important undocumented relationships in the user resistance literature (Highlighted in Figure 7.3 and Table 7-1). The model was developed using a post-implementation perspective (6–12 months after initial HIT implementation) to explain and predict user resistance. The model builds on existing literature, indicating that perceived threats lead to resistance to change (Bhattacherjee and Hikmet, 2007; Hsieh and Lin, 2018; Lapointe and Rivard, 2005; Ngafeeson, 2015; Wild et al., 2012). This study expands the knowledge on user resistance by examining the antecedents of perceived threats and identifying the factors that logically precede a user's perception of threats. By examining the personal, organisational, and HIT-related factors and the factors related to the interactions among physicians and nurses, the study identified seven factors that influence users' perceived threats of technology. This model is one of the few models that examines the antecedents of perceived threats. A summary of the study's contributions to user resistance research is presented in Table 7-2.

	Summary of Contributions to User Resistance Research	What These Contributions Mean for User Resistance Research
Related Knowledge of HIT	Lack of knowledge related to HIT led to perceived dissatisfaction	Post-implementation, more coaching, and HIT education should be offered to nurses, with opportunities to explore other HIT packages so they get an opportunity to broaden their skillset and knowledge. Post-implementation-stage instructions and educational materials can be provided after updating HIT and when new physicians and nurses join the organisation. A step-by-step tutorial should be provided to guide and coach users when they have difficulties using the system.
	Related knowledge influences users' continued use of HIT	
	Nurses have lower related knowledge of HIT than physicians	
Management Support	Lack of management support leads to perceived dissatisfaction and perceived loss of professional autonomy	It is essential, post-implementation, for managers to provide guidance, allow time for learning the system, give moral support, and quickly address HIT problems or issues that physicians and nurses face. Also, managers should be open to discussing HIT problems and seek to understand and address the differences between the different HIT users. It is expected that users will have issues (e.g., technical issues) at the post-implementation stage, so support systems should always be in place to assist physicians and nurses, which will reduce the chances of user resistance and improve the chances of continued HIT use.
	Management support is crucial at the post-implementation stage of HIT as it can reduce user resistance and increase the chances of continued use	
Lack of User Involvement	Lack of user involvement leads to perceived dissatisfaction and HIT incompatibility	Decision makers should involve users after HIT implementation by discussing with physicians and nurses future hospital plans regarding HIT during hospital and department meetings. Dynamic collaboration techniques, such as agile, participatory design, and prototyping can be adopted to better involve physicians and nurses in updating and upgrading HIT. It is essential for decision makers to address users' needs and update HIT to meet the constantly changing environment of healthcare.
	User involvement is important at the post-implementation stage	
	Lack of user involvement was higher in the public hospital because the HIT was purchased off the shelf. Also, the organisation did not have full control over it, so it was difficult and costly to make changes	

		This will improve the chance of continued HIT use and reduce user resistance.
System Performance	Poor system performance leads to perceived dissatisfaction	Post-HIT implementation, decision makers should work on making HIT reliable, quick, and able to fit the needs of the hospital. They should constantly monitor the reliability and performance of HIT post-implementation and during difficult times when the load on HIT could increase, such as during the flu seasons. This will improve the chances of continued use of HIT and allow hospitals to get the desired benefits of it.
	System performance influences continuous use of HIT	
	Poor system performance could have a negative impact on the relationship between physicians and nurses and their patients	
System Incompatibility	System incompatibility leads to perceived dissatisfaction, which is an important factor for a successful IT system	Decision makers should aim to design the clinic in a way that allows physicians and nurses to look at their patients while using HIT to conduct examinations or record medical notes. Voice detection technologies can be utilised to reduce the amount of time physicians and nurses spend typing medical notes. Further, it is essential, at the post-implementation stage of HIT, to regularly examine the rapidly and constantly changing needs of physicians and nurses and update HIT based on their needs to ensure that organisations get the desired benefits of HIT and increase the chances of continued use.
	Compatible HIT contributes to continued use	
	System incompatibility is higher in organisations that purchase off-the-shelf systems and do not have control over the development and implementation of their system	
	Incompatible HIT could create friction between physicians and nurses and their patients	
Social Influences	Social influences lead to perceived dissatisfaction	Decision makers should aim to enhance the image of HIT by highlighting the benefits of its implementation. Post-implementation, HIT decision makers should seek to recruit active and influential physicians and nurses to champion HIT and serve as a support to their colleagues. They should always be in place to assist physicians and nurses, but especially when HIT is updated and when new staff join the organisation. This will improve the chances of organisations getting the desired benefit of HIT by ensuring continued use of HIT.
	Social influences impact continued use	
	Nurses are impacted more by social influences than physicians	
Lack of Trust	Lack of trust leads to perceived risk	Managers should seek to build confidence and provide assurance to physicians and nurses regarding HIT use. Managers should
	Trust is important for continued use of HIT	

	Trusting the organisation's managers and decision makers, as well as the system, is an important predictor of user resistance	discuss and address issues raised by physicians and nurses, such as privacy and security issues, which can be critical in the healthcare sector. Discussion of users' concerns and issues should happen regularly post-implementation. Managers should take such concerns seriously to reduce the chances of user resistance and improve the chances of continued HIT use
	Differences in the background between managers and employees could lead to internal problems and impact trust	
Perceived Loss of Professional Autonomy	Perceived loss of professional autonomy leads to perceived dissatisfaction and user resistance	Decision makers should regularly re-evaluate restrictions on who is allowed to request medicines, lab exams, or approve patients' sick leave. They must examine how such restrictions impact work progress and work environments. The findings of the study show that such restrictions impact perceived loss of professional autonomy and user resistance. Therefore, it is recommended that user permissions/restrictions should be the subject of in-depth organisational analysis and workflow mapping. Post-implementation, decision makers must regularly examine the rapidly and constantly changing needs of physicians and nurses to increase the chances of continued use of HIT and reduce the chances of user resistance.
	Confirmed that perceived loss of professional autonomy is important to physicians and extended this knowledge by showing that it is important to nurses, too	
	Perceived loss of professional autonomy impacts continuous HIT use	
	Demonstrated that perceived loss of professional autonomy could be different depending on the culture of the organisation and the hierarchy level of the user in the organisation	
Perceived Dissatisfaction	Confirmed that perceived dissatisfaction is positively linked with user resistance	Managers should aim to regularly examine and understand physicians and nurses' perceptions of HIT. Managers should understand and take into consideration the antecedents of physicians and nurses' perceptions presented in this thesis. Such examination should be in place post-implementation to ensure the continued use of HIT.
	Confirmed that perceived dissatisfaction impacts continuous HIT use	
Perceived Risk	Perceived risk is positively linked with user resistance	Managers should aim to understand and regularly examine physicians and nurses' perceived risk regarding HIT. Building trust between managers, physicians, nurses, and HIT will improve physicians and nurse's perception of HIT. It is vital that organisations continue building confidence and provide assurance to users post-implementation to ensure continued use.
	Perceived risk impacts users' post-HIT implementation, which influences their continued use of HIT	
	Extended existing knowledge by showing that perceived risk influences user resistance for nurses as well as physicians	

Table 7-2 Summary of the study's contributions to user resistance research

This study also contributes to the wider IS literature. The findings confirm IS research, highlighting the importance of users' perceptions on users' behavioural intentions towards IT and user resistance. For instance, it confirms the research that identifies that perceived loss of professional autonomy is related to the intention to use IT. Further, it confirms the research that identifies that perceived dissatisfaction and risk lead to user resistance, and extends this knowledge by showing that perceived loss of professional autonomy, perceived dissatisfaction, and risk impact user resistance and the continued use of HIT.

This study also sheds light on how the concept of user resistance can be defined and operationalised. Similar to many concepts in IS research, there are a variety of definitions of user resistance. This lack of an explicit definition of concepts hinders the cumulative theoretical development of the subject (Weber, 2012). This research utilised compositional semantics (Sugita and Tani, 2004) to reveal common ground among the existing definitions of user resistance by breaking down the definitions into smaller concepts (2.4). This technique can be utilised by future researchers to identify common ground for definitions of concepts and subjects where numerous definitions exist.

By using a theory-building approach, this study illustrated how existing theories could be extended to improve the understanding of a phenomenon.

Further, the study highlights the importance of cross-case analysis to validate research findings and provide rich insights into an issue. The findings of the cross-case analysis revealed how the organisational cultures, management styles, differences between users, and organisational decisions about whether to develop IT in-house or to buy it off the shelf could affect the findings of the study. Accordingly, decision makers should consider how such factors influence physicians and nurses' perceived threats to HIT and user resistance. Before implementing HIT, decision

makers should aim to resolve the issues presented in this research that influence physicians and nurses' perceived threats to HIT and continue to evaluate and resolve such issues post-implementation to ensure continued use of HIT.

Through a cross-case analysis, this study identified several important differences that contribute to the field. It revealed several differences between physicians and nurses in terms of knowledge related to HIT, HIT incompatibility, social influences, and perceived loss of professional autonomy (Section 6.6.2).

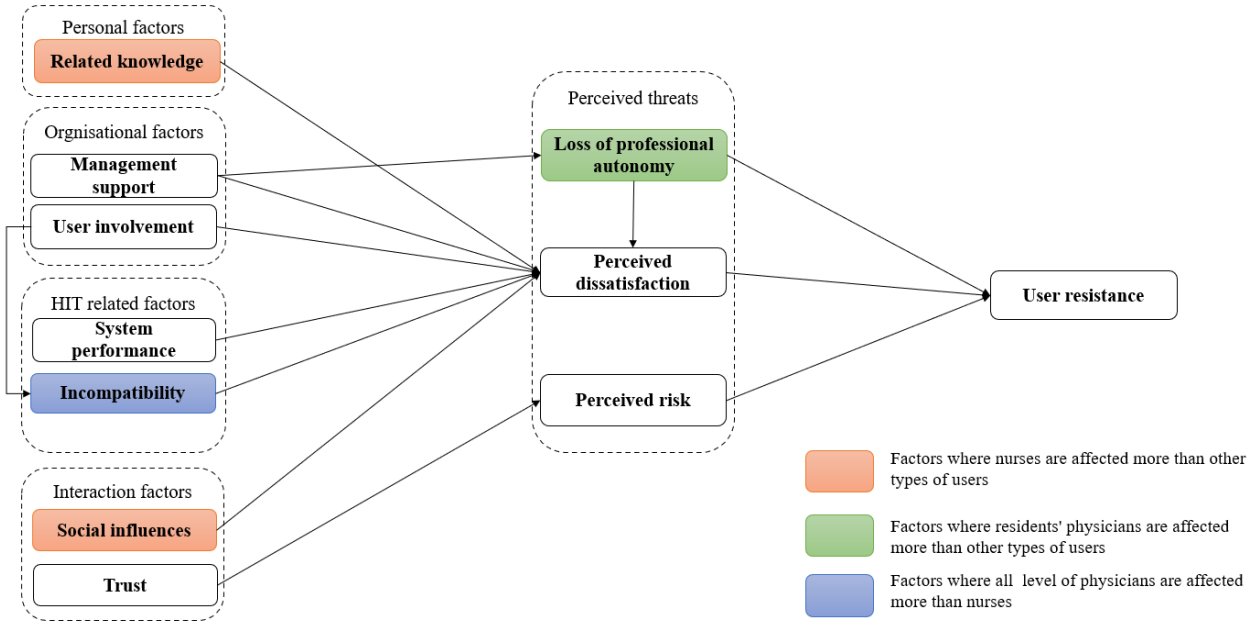


Figure 7.4 Differences between physicians and nurses

Data analysis revealed that perceived loss of professional autonomy and overt resistance behaviour were higher in the public hospital. As discussed in Section 6.6.1.1, this difference could be due to the differences in the organisational cultures and structures of the two case studies. Also, the cross-case analysis showed that HIT incompatibility and lack of user involvement were higher in the public hospital than the military hospital. This difference could be because the public hospital did

not have complete control of their HIT, as it was purchased off the shelf, whereas the military hospital developed their HIT in-house, so it had complete control over it, could involve users more, and could customise the system to meet users' needs (Section 6.6.1.3).

	A Summary of the Study's Contributions to IS Research
Model of the Antecedents of Perceived Threats	Develops a model of the antecedents of perceived threats to HIT.
	Illustrates how existing theories can be extended to improve our understanding of a subject.
	Confirms existing research that highlights the importance of perceived threats and examined previously undocumented relationship.
	Highlights the importance of examining IT at the post-implementation stage to understand the longer-term factors that could lead to user resistance.
Methodology	Demonstrates how numbers in IS qualitative research can be used to add value to the research by making claims such as *many*, *most*, and *higher* more precise.
	Sheds light on how concepts in IS research that have a variety of definitions and conceptualisations can be converged using compositional semantics to find common ground and advance theorisation in IS research.

Table 7-3 A summary of the study's contributions to IS research

7.2.2 Contributions to Practice

This study has practical implications for the development and implementation of HIT. It addresses a topic that is relevant to many hospitals today, especially as an increasing number of hospitals are transitioning to HIT. For hospitals seeking to implement HIT, this study provides a better understanding of user resistance and perceived threats to HIT in the healthcare sector. Primarily, the model in this study provides guidance for practitioners responsible for the development and implementation of HIT. It highlights important areas that require attention to ensure successful implementation and continued use of HIT.

The findings highlight the importance of developing HIT that is reliable, quick, and fits with the existing work style, needs, and environment of hospitals. For example, the problem of HIT incompatibility is an important issue emphasised in this study. Due to HIT incompatibility, physicians and nurses felt that HIT created a disconnect between them and their patients, as it reduced eye-to-eye contact: while reading and writing notes about patients, physicians must look at and focus on the computer rather than their patients. The location of the computer in the clinic may impact eye-to-eye contact between physicians, nurses, and patients. Decision makers should aim to design the clinic in a way that allows physicians and nurses to look at their patients while using the HIT. Voice detection technologies can also be utilised to reduce the amount of time physicians and nurses spend typing medical notes.

This study pointed to another negative effect that low system performance and incompatible HIT could have on the relationship between patients and physicians. Systems that are slow and prone to crashing create friction between physicians and nurses and their patients because they increase patients' waiting times. Decision makers should regularly examine the performance of their HIT to prevent it from slowing down and crashing. Hospitals should seek to collaboratively design quality HIT that is compatible with physicians and nurses' needs while considering the different needs of each hospital department. Further, hospitals should utilise HIT to alleviate the huge amount of paperwork required of physicians and nurses, which will reduce user resistance and allow them to put their patients first.

As shown in the cross-case analysis, decision makers should consider how their control over the development and implementation of HIT may impact user resistance. When purchasing HIT from an outside vendor, hospitals should seek to have control over the HIT after implementation so that they can change, upgrade, and customise it based on their users' needs. This could potentially

reduce physicians and nurses' feeling that the HIT is incompatible with their needs, increase their feelings of involvement, and therefore reduce the impact of perceived dissatisfaction and user resistance and potentially increase the chance of continued HIT use.

Strong management support can reduce user resistance by helping physicians and nurses acclimatise to HIT by providing training, allowing time for them to learn the system, giving moral support, and quickly addressing any HIT problems or issues that physicians and nurses face. Managers should seek to understand the differences between the different HIT users. The study revealed some differences between users. For instance, compared to physicians, a significant number of nurses had little related knowledge of HIT, so it is recommended that managers provide extra support and training to nurses.

This study demonstrates the value of user involvement on physicians and nurses' perceptions of HIT and its continued use. It is the responsibility of hospital managers to involve users as much as possible, such as by using surveys that seek physicians and nurses' opinions of HIT, and by discussing with them future plans for the hospital during hospital and department meetings. Dynamic collaboration techniques such as agile, participatory design, and prototyping (Helquist et al., 2011) can be adopted to better involve physicians and nurses in the development and implementation of HIT. The study demonstrated how user involvement could impact system compatibility as well as the perceived dissatisfaction of physicians and nurses.

This study emphasises trust and social influences as crucial factors in determining the use of HIT. Therefore, managers should seek to develop trust between physicians and nurses and HIT. Equally important, managers of organisations should consider the reputation of the HIT system they plan to implement and how it will affect physicians and nurses' perceptions of the technology. They should seek to recruit active and influential physicians and nurses to champion HIT

implementation and support their colleagues, as such champions could help reduce negative social influences. This will reduce the adverse effects of perceived risk, dissatisfaction, and user resistance behaviours.

This study highlighted the influence of perceived loss of professional autonomy as an important factor that can potentially cause user resistance. To organise work and in an effort to reduce medical errors, decision makers in hospitals have placed many restrictions on HIT, such as restricting who is allowed to request certain medications. These restrictions led some physicians and nurses to feel like they have lost their professional autonomy, as they felt they no longer had the freedom needed to make clinical decisions about their patients. As medical advancements and knowledge are changing rapidly, decision makers should regularly re-evaluate restrictions such as who is allowed to request medicines, lab exams, or approve patients' sick leave. Further, decision makers should re-examine how such restrictions impact the work progress and work environments. This study's findings suggest that user permissions or restrictions should be the subject of an in-depth organisational analysis and workflow mapping prior to any implementation.

This research also reveals that when implementing HIT, hospitals should consider perceived dissatisfaction and perceived risks as negative perceptions that could influence user resistance and therefore lead to HIT implementation failure. Therefore, when implementing HIT, managers should understand and take into consideration the antecedents of the perceptions presented in this paper in order to minimise user resistance and user dissatisfaction and maximise the chances of HIT acceptance. It is envisioned that paying explicit attention to the factors presented in this study will reduce HIT resistance among physicians and nurses.

7.3 Implications for Theory and Practice

This research has a number of implications for future research and practitioners. The antecedents of perceived threats identified in this research should enable future researchers to better understand the areas that need to be considered when implementing new IT and, crucially, when converting resistance into engagement over time. As the findings of this research came from both IS literature and case studies, future researchers could further validate these findings by conducting a wide-field survey to validate them and further examine the antecedents of perceived threats. Moreover, more research is required to identify other factors that influence perceived threats and user resistance.

The study developed a theoretical model that should be tested by future researchers. Twelve propositions can be derived from the study, which explain why some users perceive HIT as a threat, and how perceived threats lead to user resistance (Figure 7.5). This study identified seven factors that led to perceived threats and user resistance to HIT and explains how physicians and nurses perceive HIT as a threat. The following propositions should be further investigated and tested by future researchers to improve our understanding and help in re-evaluating the results of this research.

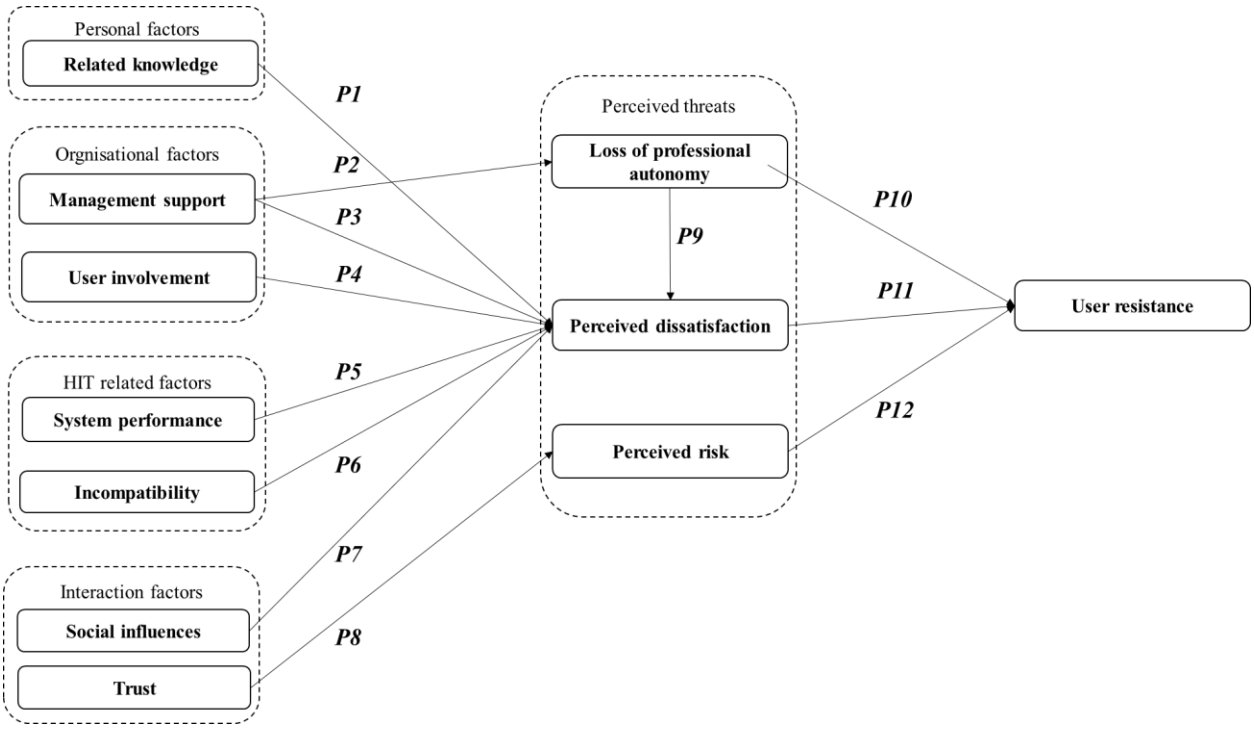


Figure 7.5 Propositions for the model of the antecedents of perceived threats and user resistance

This study revealed that lack of related knowledge of HIT led physicians and nurses to perceive HIT negatively, as it slowed down their work process and threatened their job. Furthermore, the study revealed that more physicians had related knowledge of HIT than nurses did. This could be because physicians work and train in several different hospitals during the first years of their careers, where they have a chance to use different types of HITs. Many nurses do not have the opportunity to work and train in different hospitals, so they lack related knowledge of HIT. Therefore,

> *Proposition 1: A decrease in users' related knowledge of HIT causes an increase in user perceived dissatisfaction.*

This study shows that physicians and nurses felt they were not receiving enough management support to help them transition to HIT. This lack of management support led to the dissatisfaction of physicians and nurses with the system and the new situation, as they felt they were not receiving the training, were not given time to learn and adapt to the new system, and experienced a lack of open and honest communication. Consequently,

> *Proposition 2: A decrease in management support causes an increase in user perceived dissatisfaction.*

> *Proposition 3: A decrease in management support causes an increase in user perceived loss of professional autonomy.*

This research shows that physicians and nurses view HIT as an important part of their job, and many of them felt left out of the decision-making process. Physicians and nurses felt that the organisation made an important decision that would greatly impact their work without consulting them first. This led them to feel that they were not appreciated or valued by the hospital. As a result,

> *Proposition 4: A decrease in users' involvement in the development of HIT causes an increase in user perceived dissatisfaction.*

Many physicians and nurses complained about the HIT's ability to accomplish the necessary tasks quickly and accurately. This study shows that when the system is slow and prone to crashing, it creates friction between physicians and nurses and their patients because it increases patients' waiting times. Thus,

> *Proposition 5: Poor system performance causes an increase in users' perceived dissatisfaction with HIT.*

This study shows that HIT may have unforeseen negative consequences. For instance, physicians and nurses felt that HIT reduced eye-to-eye contact with patients, which affected their relationship, as patients thought they were looking at and focusing on the computer rather than on them. These issues caused physicians and nurses to believe that HIT is not suitable for their work style as they must work around the limitations of the system to perform their job. Hence,

Proposition 6: A decrease in system incompatibility with work practices causes an increase in users' perceived dissatisfaction with HIT.

This study revealed that some physicians and nurses believe that the system is disorganised and could give inaccurate information about patients. Such flaws and disorganisation cause users to feel uncertain and cautious about the data in the system. Some felt that their organisation does not address system problems properly and quickly. Further, some felt that the system's failures and shortcomings could lead them to make incorrect decisions. Thus,

Proposition 7: A decrease in users' trust of HIT causes an increase in users' perceived risk.

This research showed that some physicians and nurses' perceptions of HIT were influenced by the attitudes and behaviours of their colleagues. Many consider HIT to be an important part of their work, so they regularly share their thoughts and feelings about it. They also discuss this subject with their colleagues at other hospitals, who use different HITs. Such talk leads to system comparison, and some physicians and nurses believe that the HIT at their hospital is inferior to that used by their colleagues at other hospitals. Moreover, HIT could develop a bad reputation in the healthcare community and was one reason physicians and nurses viewed HIT negatively. So,

Proposition 8: An increase in negative social influences causes an increase in user perceived dissatisfaction.

To better organise work and reduce medical errors, hospital management put many restrictions on HIT. For example, residents were no longer allowed to request medicines, lab exams, or approve patients' sick leave without approval from a consultant. Further, nurses were not allowed to view patients' progress notes or request anything related to patients, such as wound dressings. The hospital put these restrictions to reduce medical errors and protect patient's privacy. However, these restrictions led some physicians and nurses to perceive HIT as a threat. They felt they no longer had the freedom they need to make clinical decisions. In addition, many felt these restrictions delayed their work progress and overwhelmed their supervisors because they had to wait for physicians or nurses with higher authority to approve their clinical decisions or provide them with access to patient information. Therefore,

Proposition 9: An increase in Perceived Loss of Professional Autonomy causes an increase in user perceived dissatisfaction.

Proposition 10: An increase in Perceived Loss of Professional Autonomy causes an increase in user resistance.

This study highlighted that most physicians and nurses had a general sense of frustration and irritation because of HIT. Some explained that HIT was supposed to improve their job quality, but, in reality, it only increased their stress, which frustrated them. Further, a significant number of physicians and nurses complained that the system was not reducing their workload but increasing it and reducing productivity. So, many complained about the system and criticised it in official meetings. Therefore,

Proposition 11: An increase in user perceived dissatisfaction causes an increase in user resistance.

Some physicians and nurses feared that HIT could pose a risk to a patient's health and therefore be a risk to their careers. Physicians and nurses felt that HIT came with some risk factors that threatened their sensitive work environment in which they dealt with people's health. This study showed that physicians and nurses felt that HIT was not secure and could be used by an unauthorised person. Further, many physicians and nurses believed that HIT did not protect patients' privacy. Hence,

Proposition 12: An increase in user perceived risk causes an increase in user resistance.

This study focused on physicians' and nurses' perceptions of HIT. In doing so, the study revealed that HIT could have unexpected negative consequences that could create frictions between physicians, nurses, and their patients. Also, it could slow down the work progress, which contributes to user resistance. For instance, this study showed that physicians and nurses felt that HIT reduces eye-to-eye contact with patients; hence, it affected their relationship, as patients felt that they were not giving the care they need, as physicians and nurses were looking at and focusing on the computer rather than on them. Future researchers should examine how to solve this issue. For example, future researchers should examine if re-designing the clinic in a way that allows physicians and nurses to look at their patients while using HIT to consult or record medical notes would resolve this issue. Also, they should examine if voice detection technologies could be utilised to reduce the amount of time physicians and nurses spend typing medical notes, which would improve eye-to-eye contact between physicians and nurses and their patients.

Another issue that should be examined by future researchers is how HIT impacts the work progress. For example, this study revealed that some physicians and nurses felt that extra restrictions were put into HIT, which slowed down the work progress, as many medical decisions had to be approved by a supervisor. These restrictions were put into place by the organisation to reduce the chances of medical errors. Future researchers should examine how such restrictions impact the work progress of physicians and nurses, and how to resolve such impact. In addition, they should examine if these restrictions achieved their desired goal of reducing medical errors.

Moreover, while this study only focuses on physicians and nurses, future researchers should focus on other users of HIT, such as administrative staff, patients, and other healthcare professionals. Other technologies, data protection measures, and cloud delivery platforms are also used to improve healthcare delivery, including decentralised primary care. Therefore, researchers should examine how addressing antecedents to resistance could improve adoption in this evolving HIT context. Future research should employ the model developed in this study to investigate other users of HIT and other technologies used by healthcare practitioners. This would allow future researchers to compare their findings with the findings of this research and enhance their understanding of the subject, and contribute to the theoretical model. Also, the study examined the antecedents of perceived threats and user resistance from a post-implementation perspective. Future researchers should aim to examine this model at the pre-IT implementation stage and during implementation, as well as in a longitudinal study.

In terms of practice, this study can serve practitioners who work on IT implementation by helping them to better understand user resistance and negative user perception. The research addresses a topic that is relevant to many organisations today, as an increasing number of organisations transition to and upgrade their HIT. Primarily, the model in this study provides guidance for

practitioners responsible for the development and implementation of HIT. It highlights important areas that require attention to ensure successful implementation and continued use of HIT.

7.4 Limitations and Future Research

The researcher strove to achieve the objectives of this study with the highest level of objectivity, accuracy, and validity. However, this study is not without limitations, and the results should be interpreted in the context of these limitations. This research used cases studies, so the results only show part of the picture, as the case studies reflect the situation of the selected cases. Even though a rich set of data was collected, it was only acquired from two organisations—a military hospital and a public hospital—which are specific settings. Hence, there might be differences in user resistance within other settings, such as private or educational hospitals, or in a different geographical location. To address these limitations, it is recommended that future researchers conduct another study to expand and re-evaluate the results of this research. The problem of user perceptions and user resistance is complex, and this study only addressed part of the picture. Case studies on system implementation in different settings that focus on the different types of users would improve the external validity of this study. Further, the research could benefit from large-scale testing of the model developed in this research. Using the definitions developed in Table 6-3 and Table 6-4, and by examining the chain of evidence presented to support the findings of the study, future researchers can operationalise these constructs and test the validity and generalisability of the model using quantitative methods. Moreover, this study proposed 12 propositions (Section 7.3), which will facilitate the operationalisation of the model developed in this study.

7.5 Concluding Remarks

Understanding the problem of user resistance to HIT can play a major role in transforming and improving the quality of healthcare services. Many hospitals spend vast sums of money to transform their organisations by implementing HIT. However, many hospitals implementing HIT face resistance from physicians and nurses, leading to system failure or time and budget overruns that result in financial loss (Alsharo et al., 2018; Choudhary et al., 2018; Mahmud et al., 2017). The model developed and presented in this study identifies some of the root causes and potential positive outcomes of user resistance. The research employed qualitative data collection and analysis methods to gain a deeper understanding of the problem of user resistance. This allowed the researcher to obtain additional insights into and enhance the current understanding of user resistance. Consequently, the study reveals a number of significant contributions and implications for both theory and practice, and advances research within the user resistance and IS literature.

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Appendices

A. Appendix A: Interview Guide

A: Introduction and Welcome:

1. Thank the interviewee for agreeing to the interview.
2. Briefly outline the purpose and importance of the research.
3. Ask the interviewee to sign the participant consent form.
4. Restate your commitment to anonymity and confidentiality of the interviewee and provide verbal assurances that nothing will be attributed to the interviewee or the organisation.
5. Provide the interviewee with the opportunity to state any concerns or request additional information where clarification is required.

B: Demographic Questions:

1. Specialty:
2. Years of experience:
3. Years of working with the organisation:

C: Open-ended Interview Questions:

1. Could you provide some background information on your daily work practices? What IT tools/applications do you use?
2. Have you used a HIT (name of the system) in another organisation?
3. What features of (name of the system) do you use on a daily basis? What features do you not use and why?
4. Have you ever been involved in a discussion with your colleges over HIT? If so, what are the main points of the discussion pertaining to HIT?
5. What degree of change has the HIT had on your job? (For example: change in the work routine, communication, control over how you make decisions). How does it make you feel?

6. Are there any changes or updates that happen to the system? Do you participate in changing the system? Do you think there is a need to change the system or some of its features? If yes, what changes does the system need?
7. What measures can the organisation take to help you get more benefit from the system? (For example: continued training and updates to the system, support with any problems that come up with the system).
8. Are there any other issues about the adoption of a system that you perceive as important but that we have not discussed yet? What are they?

B. Appendix B: Chain of Evidence

Related Knowledge	**Perceived Dissatisfaction**
Physician 5: 'Well, I don't have any problem with the system because I am good with computers. So, the system suits me very well. Sometimes, I hear doctors that complain about the system because they are not familiar with computers.' **Nurse 11:** 'I prefer the system, maybe because we're millennial nurses.' **Nurse 9**: 'Even if I am good at this, if I'm not familiar. So, I need training. That's very important. Then I will be able to adjust.'	**Nurse 9:** 'since the system started, of course there were some difficulties, because I was learning. So, it was a difficult time, I was not happy with the system.' **Physician 6:** 'Honestly, I was a little concerned, I read a little about it [the system] and tried to learn the system. But it was not easy, and I wasted a lot of time learning how to use it.'
Management Support	**Perceived Dissatisfaction**
Nurse 1: '[management] have to raise some awareness that there is a new system and it's used to do these tasks, and they have to teach me the interface of the system and it's features.' **Physician 11:** 'I do not want [management] to come one day and shock us by telling us that from next week you have to use the new system. This will be a huge shock for us. Even if they gave us training on the new system because training is different than reality. We need time to adjust to the system.' **Physician 4:** 'the doctors and nurses should take a day to acquaint themselves with the system in order to avoid problems and to reduce the miscommunication that might occur.'	**Nurse 6:** '[managers] did tutorials for anyone who has any questions. But there are things that I haven't understood, they need to send someone to teach me how to deal with the system.' **Physician 10:** 'there are some problems with the system, I emailed the IT about it, but it seems they have no intention to fixing it. Right now, I am forced to deal with these problems.'
Management Support	**Perceived Loss of Professional Autonomy**
Physician 14: 'I have faced some difficulties. I have to communicate with the responsible department and the IT, so they can grant me some competences that I wasn't allowed before, such as some medications.' **Physician 8:** '[The system] has a few drawbacks. For example, if I request a sample or an ECG for a patient who has a tumour, I have to fill a written form. So, there are limitations.' **Nurse 13:** 'the system itself didn't update; [management] only removed some authorities from us [chuckle].'	**Physician 13:** 'there are unnecessary restriction as well, for example I cannot refer a patient to a different department. I mean, if I wanted to refer my patient to a dermatologist I cannot do it, I have to ask the consultants to do it for me, but I think [residents] need to have the ability to refer.' **Physician 14:** 'Even vitamin D is restricted for me. I am surprised since we [doctors in the department] prescribe vitamin D every day. There are also some other problems that I tried and am still trying to find a solution to.' **Nurse 5:** 'Before [the system] it is our privilege, like we can enter any laboratory. But now we don't have access to enter anything, like lab. For laboratory results, we should at least view the results, I think it's our right to view them.'
User Involvement	**Perceived Dissatisfaction**

Physician 6: ‘they should do a survey because we are the users, we are the ones who are supposed to benefit from [the system]. The more we benefit from it, the more we can benefit the people.’ **Nurse 5:** ‘[management] should ask what we need in the system. At least by department, by department they can ask by department.’ **Nurse 10:** ‘[management] have to ask us and get our feedback, check with the nurses, with the doctors; how is it going? We will give feedback; the system will be better this way.’	**Nurse 1:** ‘The most important thing is to involve us, [management] must make me part of the big picture, the idea of them coming and telling me that’s a new system, start working on it, no. Involve me first.’ **Physician 8:** ‘For the last year, I’ve noticed some flaws in the listening procedure. [Managers and the IT department] would, for example, come to our department and listen to the limitations that concern us; we tell them we would like some things to change. However, they tell us: “That has to do with the administration. We can’t change that.” I don’t feel that there is a collaboration or true listening.’ **Physician 10:** ‘the problem was we felt frustrated to be honest, [management] always said, meetings, meetings, meetings at last nothing happened, so frustration always there, we don’t know if what we say [about the system] will be used or not.’
System Performance	**Perceived Dissatisfaction**
Nurse 11: ‘it happens a lot, when I log in then try to open some file and it’s lagging or sometimes it’s too slow to open.’ **Physician 13:** ‘sometimes even if I entered the medication in [the system], it shows me that the medication is out of stock, sometimes it is wrong even if the medicine is available it gives me this message.’ **Nurse 1:** ‘The system hang a lot [stop responding] and sometimes there is unlisted information.’	**Physician 1:** ‘I want a decent system that will progress my work, I don’t want a system that I can’t log into because of constant lagging, it might have some slight lagging or delay but it’s not working at all, that’s a little hard to accept.’ **Nurse 5:** ‘To check the files I want to check like the procedure, or the examination that I have done before. That’s always difficult.’ **Physician 14:** ‘So, these are the issues that face us sometimes. Additionally, we sometimes find a problem prescribing medication or writing analyses. Sometimes, I am forced to write analyses four or five times because of the system malfunctioning. That’s hard for me and the patients.’

Social Influences	Perceived Dissatisfaction
Nurse 11: 'my friends told me that their hospital, in front of every room, there is a laptop that they use to make a nursing track. We do not have this here.' **Nurse 1:** 'We talk about the system among ourselves, we try to teach each other, it is something important for us.' **Physician 11:** 'I have worked in other hospitals. Compared with the one we have here in this hospital, I think those systems are much better. In terms of orders, and the ease of use. The system is causing big trouble for us.'	**Nurse 2:** 'I talk about the system with my colleagues. We would like the system to improve. Honestly, the discussion is mostly negative.' **Physician 10:** 'I discussed the system with doctors, we talk about how can we shorten the time it takes, as if it there was shortcuts [sarcasm], always there is negative impressions, always.' **Physician 3:** 'The system here isn't really good compared to the systems used in other hospitals. Since we know about the other system, we only talk about the drawbacks because we don't find the good features that we need in this system.'
Perceived Dissatisfaction	**User Resistance**
Nurse 1: 'So [the system] disappoints me a little, as this system lagged in important times. So, what do you think this lagging did to us? [sarcasm].' **Nurse 7:** 'once the system is okay, that's the time we have to re-enter again, so it's double job for us. So, this would be a hard time.' **Physician 5:** 'The flow isn't fast. You feel that there's time…A bit wasted, yes.'	**Nurse 1:** 'sometimes, when you log in, then you open some file and it's too slow to open. That's why some people complain, we have more important things to do than wait for the system to open.' **Physician 5:** 'some people didn't like it. For example, people judge the system to be a failure only because of minor defects or problems with it.' **Nurse 12:** 'They shouldn't install the system all of a sudden and ask us to immediately start working with it. That is why some people are resisting.'
Perceived Loss of Professional Autonomy	**User Resistance**
Physician 13: 'there are unnecessary restrictions as well, for example, I cannot refer a patient to a different department. I mean, if I wanted to refer my patient to a dermatologist I cannot do it, I have to ask the consultants to do it for me, but I think we [residents] need to have the ability to refer.' **Physician 7:** 'It's not me who's in trouble, but rather the consultant. For example, he would have patients and I would call him every now and then to tell him that someone needs a referral. Of course, I need to give him details as he's the one who will submit the referral using his name.' **Nurse 2:** 'Previously, we were able to enter patients' information and request some stuff, but they have removed that power and only left viewing. It's not ideal.'	**Nurse 4:** 'it was really difficult for doctors, they could not do all they want, like they could not give patients some medicine. So, they constantly complain to the managers about it, they are doubts about the system.' **Nurse 2:** 'sometimes patients need analyses at that very moment. So, I find myself forced to talk to someone else that I don't know or someone from the emergency to do the job [without going through the system]. And some of them accept and others refuse; I do not have enough time to call people to get analyses for my patients.' **Physician 15:** 'Honestly, I don't use the new system often, everything is restricted and has to be authorised by a consultant.'

B-1 Chain of Evidence

C. Appendix C: Sample of the Analysis and Calculation Process

Code	Quotation	Concept	Category	Number of Quotations
Involvement	**Physician 10:** 'I think it's good to ask for the employee's opinion; there is a probability that an employee suggests an idea that they don't have in the first place and it makes the system better.' **Physician 8:** 'if the update concerns paediatrics, it's good to have a meeting with us and take our views into consideration before implementing the update.' Physician 1: 'I know that it means more effort, more fatigue, spending more time taking people requirements, a possible and expected slowness in their work, but at the end, we will have a system that contains everything we need.' **Nurse 8:** 'I think that the hospital needs to discuss the system with us beforehand, because we are the end-users; we are the end-user; what are our preferences, what is suitable so far and what is not, so they have to do a survey.' **Physician 11:** 'I think if they go to residents and people who use it a lot like us, that would be good, I think we can give them good recommendations that will improve the system.' **Nurse 4:** 'Honestly, I've been here for two years and no one has asked me yet about the system [laughs]. They should ask, because we are the ones who use it the most and know what we do and don't need in it.'	Involving the main users	**Lack of user involvement**	*Physicians = 5* *Nurses = 6* *Total = 11*
Survey	**Nurse 10:** '[Management] should use a survey to evaluate the system, check if anything is lacking or maybe, something that can be better.' **Nurse 1:** 'they should give us an opportunity to give our suggestions, surveys for example. One part should be for all the all staff, through the email.'	Listening to the main users		

Feedback	**Nurse 12:** 'I have some great suggestions that would make the system better. But no one asked me what I think. Honestly, I was a little disappointed that I was not asked [laughs].' **Nurse 11:** 'All areas should be asked first. They need to do a survey, to find out what they need to improve.' **Physician 3:** 'they should ask each department. Then, [the department] study it. The department gives feedback.' **Physician 6:** 'I emailed the IT department a while ago about some suggestions I have, but I did not hear back. They should at least acknowledge my feedback.'			

C-1 Sample of the analysis and calculation process (military hospital case study)

D. Appendix D: Chain of Evidence

Related Knowledge		**Perceived Dissatisfaction**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Physician 12: 'a lot of us worked in different hospitals, so we are familiar with these types of systems. I personally used many different systems; I was looking forward to the new system.' **Nurse 3:** 'I thought that systems we use in the hospital for patient care are really easy because I worked at a hospital that has HIT before.' **Physician 11:** 'I worked in [a hospital that had HIT], but it was not an integrated system, it was so local and primitive. I did not like it. I think our system is better.'	**Nurse 12:** 'I am used to using emails, smartphones… and things like that. So, I don't feel [the system] is difficult.' **Physician 2:** 'For some people, using the system and noticing the difference helps them accept it even more.' Nurse 1: 'Because of [physicians' and nurses'] rotation and residency, they move around different hospitals, and they use all types of systems, so that's why I think they quickly adopted.'	**Nurse 3:** 'It is a new thing for me, it takes time, instead of doing it manually, like before, I have to go to the system and type everything and try to navigate the system. I am a little concerned because I feel that I am very slow now.' **Nurse 15:** 'I do not like it because I think it was a little easier before [this system].' **Nurse 14:** 'It is my first time [using HIT]. It was not easy to use the system. There are so many things we have to write in the system, our work is more difficult now.'	**Physician 2:** 'In this hospital, some people became happy about the new system. Maybe, because they are quite familiar with these types of systems.' **Nurse 1:** 'look, this system is not my thing, I tried to learn it, and I read little about it, but I am still not very comfortable.' **Physician: 7** 'I noticed that it takes me a lot of time to document everything about the patient. This is my problem. I wish I would have some free time to learn how to type faster.'

D-1 A sample of the chain of evidence linking related knowledge to HIT with perceived dissatisfaction

Management Support		**Perceived Dissatisfaction**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Physician 9: '[Management] promised to fix some problems we had with the system, but so far they did not.' **Physician 10:** 'we had to go through training, and they talked with us a lot about the system. I think there will be a disaster without training or communication.' **Nurse 12:** 'With every new system that's introduced, they must upload a video through which we learn how to use the system.'	**Physician 15:** 'In my opinion, we need more training and time.' **Physician 6:** 'I think they should reduce the number of patients in the clinics so as to allow the physician to get familiar with the system.' **Physician 13: '**they should send a guideline, something detailed I can go back to when I need something… like a protocol.'	**Nurse 12:** 'they talked with us in groups and explained the programme, but still, it was not enough, they did not do a good job explaining things to us. I thought it was very complicated.' **Nurse1:** 'the thing is, they did not allow us some time to learn its basics, and how to use it. They want us to learn it and use it right away!' **Nurse 3:** 'Maybe they should have trained us more! They should help us to transition. Take it step-by-step. The first few weeks were chaotic.'	**Nurse 4:** 'I know system updates are mandatory so there is nothing that can be done. But what frustrated me is that they did not teach us enough about the system.' **Physician 2:** 'the thing is, we have to do and learn all this by ourselves, there is no one to help us with it!'
Management Support		**Perceived Loss of Professional Autonomy**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Nurse 8: 'if we want more privilege and access to the system, [management] should try to fix the issue. We only ask if we really need it. Otherwise, we cannot do our job.'	**Physician 9:** 'we should have a regular meeting with the people responsible to discuss what we should be able to do in the system. What files we can access, what exams and	**Physician 7:** '[system restriction] is something that sets us back a little bit, it can distract us and slow us down sometimes because we have to talk to the pharmacy, try to	**Physician 6:** 'There are restrictions [on some medications] but we should be able to prescribe them. It is within our speciality. But, I guess because some medicines

Physician 13: 'recently, the system has flaws, we cannot order some medications. We have brought this to [management's] attention, we contacted the head of the department, and he contacted the IT, and they fixed the problem. But it took a long time to fix. And patients would be waiting for the problem to be fixed to get their medications.'	medications we can order. I think this should be a group decision. It's necessary indeed. And every department should have this meeting.' **Physician 7:** 'I think that awareness and communication is the most important thing. There have to be announcements when [management] plan to restrict us from ordering or requesting something in the system.'	explain to them our job and that we do use the medication in our speciality.' **Physician 10:** 'sometimes I am shocked when I order medications for my patients. Then I receive a call from the pharmacy, they say that "no, your department cannot order this medication." I mean… I am a doctor, I know what my patients need!'	are expensive, they want to impose a limitation on their use. I think this is wrong.' **Physician 4:** 'I think that the residents should be able to make referrals. We can request a referral. And there is no problem about. We do not need the consultant permission for everything we do!' **Nurse 8:** 'we should have more access to the system, for viewing purposes only, much better to… remove that limitation. Because when they… put limitations, we feel like they don't trust us. But we need to see lab results so we can answer patients when they ask us.'

Table D-2 A sample of the chain of evidence linking management support with perceived dissatisfaction and perceived loss of professional autonomy

Lack of User Involvement		**Perceived Dissatisfaction**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Nurse 10: '[Management] should use a survey to evaluate the system, check if there is anything lacking or maybe, something that can be better.'	**Physician 1:** 'I think they have to involve the doctors and the departments; for example, in the emergency department, to call each one of	**Nurse 13:** 'before any changes they must ask the first line, the people who have contact with patients, not the head! The	**Physician 14:** 'I think for sure it affected how we felt about the system. We could have demanded some features or make customisations because,

Nurse 11: 'All areas should be asked first. They need to do a survey, to find out what they need to improve.' **Physician 10:** 'I think it's good to ask for the employee's opinion; there is a probability that an employee suggests an idea that they don't have in the first place and it makes the system better.'	us, every physician and nurse. To help them with the implementation. Involving people makes them more motivated.' **Physician 9:** 'I remember that, a while ago, I gave feedback about the system. However, I didn't get any response and I don't remember that someone talked to me about it. I think they should listen to our feedback.'	people who use it, these are the people they should ask.' **Nurse 1:** 'I'm the one working on the ground, not [the managers]! You might find him in an executive role for years, he forgot how the work goes, he isn't related to the reality and what the work needs. I might help them with fundamental stuff in the work that they can't notice and that has a nice effect and is a great add-on to the system.'	as I have noticed, from time to time, there are some minor changes in the system. So, if we are consulted about these updates, things might get better for us.' **Physician 7:** 'I hated that they did not discuss the system with us and asked us about what we want in the platform. It never happened before. They didn't consult us about the physician notes for example!' **Nurse 1:** 'I know that they have this committee to improve the system, but they're not effective because they do not ask people about their opinion.'
Lack of User Involvement		**System Incompatibility**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Physician 8: 'if the update concerns paediatrics, it's good to have a meeting with us and take our views into consideration before implementing the update.' **Physician 1:** 'I know that it means more effort, more fatigue, spending more time taking people requirements, a possible and expected slowness in their work, but at the end, we	**Nurse 13:** 'they should ask us… the nurses. They should ask us what we need, what documentation we need, what kind of data we need to enter into the system.' **Nurse 15:** 'a survey would help, they can manage what is the problem. They should know from the staff who is using the system then they can fix the problem.'	**Nurse 3:** 'To be honest, in the beginning, when we started using the system, there were many things missing. We had to use the system and papers to record documents. After we talked about the issue, they sat with us and spoke about the missing things and then made changes.' **Physician 4:** 'they have to involve us… the things that we need. [For example], they	**Nurse 9:** 'Especially for us who will use it, if we don't…. because we know what to ask the patient, so I already gave you an example for the allergies and the weight. So, it's better if we're involved, not just those who are creating the programme.' **Nurse 5:** 'look, if they asked us… we work in vaccination and we don't have the record. We don't know where to record

will have a system that contains everything we need.' **Nurse 8:** 'I think that the hospital needs to discuss the system with us beforehand. because we are the end-users; what are our preferences, what is suitable so far and what is not, so they have to do a survey.'		should ask me: "What do you need?" I would say, as I mentioned earlier, that I need an image for the ear. This would make things much easier. [It would be helpful] to come to me before setting up the system.'	the vaccine. Now, since it's not in the system, we are putting it on paper.' **Physician 12:** 'every diabetic patient must be reminded to take his flu vaccine every year and every female above the age of 40 must take a breast x-ray every year… So we asked them to add something like that in the system. Because currently, we depend on our memory and the patients.'

Table D-3 A sample of the chain of evidence linking lack of user involvement with perceived dissatisfaction and system incompatibility

System Performance		**Perceived Dissatisfaction**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Nurse 4: 'The system can shut down anytime. So, if it shut down… we have to wait.' **Physician 3:** 'The problem is… sometimes, for us in paediatrics, in wintertime, it is a very busy time for us. So, our problem is that we [physicians] cannot all use the system at the same time, because the system would be very slow.' **Nurse 14:** 'the programme lags a lot, and the hospital had very	**Nurse 12:** 'At first we thought the system was good, but as time goes on probably because of the system overload. The system got slow.' **Physician 14:** 'Sometimes, after we save the document, the system malfunctions or displays an unusual message that the doctor, due to the patients' rush, clicks on the message. As a result, the message disappears and the doctor doesn't know whether	**Nurse 2:** 'It takes time. Instead of doing it manually, like before, when it used to take me like three to five minutes, now it takes me maybe ten minutes until I go in the system and document and record the vitals… it happens every time! So, it is difficult for us.' **Physician 2:** 'it makes a difference in terms of time with me, some of the clinics have more than 50 patients! If I access the file of every patient,	**Nurse 15:** 'patients get angry when the system is down [laughs] because sometimes they have to go to the lab and collect the results. So, it is annoying for us and the patients.' **Nurse 2:** 'we get angry sometimes, because it malfunctions.' **Physician 13:** 'After requesting one time, I get a message and, when I check again, I find that it's not requested, so I have to

old and slow computers [laughs].'	or not the document was saved.' **Nurse 9:** 'you know, the system breakdown and then… I think these systems are limited.'	then exit, and take the patient number, and wait for the page to load…. It is a waste of time.' **Nurse 15:** 'we are annoyed about that…. [The system] is so slow.'	request it again. As a result, it wastes our time a little bit. These things raise my blood pressure a bit [laughs].'
System Incompatibility		**Perceived Dissatisfaction**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Physician 3: 'when sitting down with the patient, ideally, I should be facing the patient and not the PC. But now, with the system, we face the PC more than the patient.' **Physician 1:** 'It should change to a completely paperless system; they should add the missing parts, it is not necessary to write on a paper then they scan it. since we are using the system, why are we not writing our notes on it.?' **Physician 5:** 'I want that from the clinic when I type otorhinolaryngology, for example, I get a list where I only have to fill cases I need, so that I won't forget any details when a patient visits me; everything will be ready in front of me and all I will need is to type the keyword. Now this is not the case, I also have	**Nurse 10:** 'we need something like a growth chart wherein we could monitor the growth chart alone. I think that is important in our department [paediatrics].' **Physician 10:** 'I have to check every visit, there is no graphs or list.' **Nurse 15:** 'it would be nice if everything is [integrated into one system]. But, for example, for the X-ray, I have to open another system. Same for labs, I have to open another system.'	**Physician 7:** 'There is another problem, though, which is that I felt there were some missing things; there were some options in the old system, such as some details I want to view, some small features that I could view in detail. These things are not available in the new system. I do not understand why they replaced a good system with something that is not as good!' **Physician 8:** 'To me, the major drawbacks, compared to the old [system], are the interface, fewer options and being less organised. I have to waste time to locate the information I am looking for.' **Physician 11:** 'I have to write all the consultations and the plans. It takes time. Two hours! Imagine if I had, like, 50 consultations per day. It is very difficult… too much.'	**Nurse 9:** 'I need the system to save patients' information, So I don't have to ask for it every time… and then the patient will also get upset, 'why do you always ask me that question? I already…' you know, [patients] think we are being lazy, or we do not care because we do not remember them.' **Physician 12:** 'The information is there, but you must work to find it, and I do not have time for this.' **Physician 15:** 'it takes time to search. So, it wastes time for the patient and the visit itself, especially if the clinic is busy… which is almost always.'

to fill information that I do not think is necessary.'			

Table D-4 Sample of the chain of evidence linking system incompatibility with linked with perceived dissatisfaction

Trust		**Perceived Risk**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Physician 13: 'sometimes, some patients' data are missing. That's because, as I said, the way the patient's data is entered, especially the medical record, doesn't allow me sometimes to get what I need. So, I have to be careful with these things.' **Physician 9:** 'the biggest hurdle was the previous visits, at first there was a problem that each encounter couldn't be entered on another encounter, like in 2018 it was put at visited in 2014. I need to make sure the records are correct. I cannot only rely on the system.'	**Nurse 5:** 'sometimes the visit number that we key in comes up for the other patient. There is a mix up or something.' **Physician 12:** 'the system can be hacked, a couple of months ago, the system went down because of a virus. We had to wait until they fixed it'.	**Physician 4:** 'Always, when dealing with a system, you have to confirm everything verbally. You have to check after submitting an order; you don't just submit an order and then leave just like that.' **Physician 13:** 'sometimes, there's a big problem with the system when the papers are not scanned. For example, if the note is not written directly electronically… there is missing information in the middle, or if the patient had visited the emergency and came that day to the clinic; when she came, the emergency papers aren't scanned yet. You know, we need to know everything about the patients,	**Nurse 1:** 'if the system crashes, we cannot make 100% right decisions, the decisions have some luck in being made.' **Physician 12:** 'I have seen physicians and nurses share their passwords with each other, I do not think they understand the consequences. We should have fingerprint access to make sure only authorised personnel access the system.'

		otherwise it could be dangerous.'	
Social Influence		**Perceived Dissatisfaction**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Physician 5: 'What I know from talking with my friends who work in other hospitals, almost all of them are using some sort of EHR. Sometimes we argue who has the better or worst system.' **Nurse 4:** 'we learned the system from each other. Some colleagues are teaching other colleagues [how to use the system].' **Nurse 6:** 'I learn how to use it from my colleagues, not from the orientation class or whatever.'	**Nurse 15:** 'we often talk about the system. Doctors usually tell me, "oh my god this system is taking too much time."' **Physician 5:** 'during the general meeting we'd say: "Oh, the system was slow today," "Some orders are messed up," "I wanted to submit an order and I didn't know how." If someone is good with the system they try to teach us how to use it better.' **Physician 13:** 'From what I hear, those who [worked in other hospitals], they say that our system is not better than the others.'	**Physician 11:** 'I read a lot [about this subject]. In online forums, a lot of physicians are disappointed with the system and all that, because they found themselves spending more time on these… clicking and entering and that. It seems like it's a common problem, it is frustrating because we are wasting a lot of time on the system.' **Physician 1:** 'the system of my friends [working in different hospitals] is definitely better, they can easily find all the information they need in the system. But here, it is not the same… it is very complicated.' **Physician 3:** 'It shouldn't be a worse system than other hospitals and one that doesn't meet our needs. After all, you wouldn't want to waste your time learning about something that you aren't going to benefit from!'	**Nurse 9:** 'I have friends in other hospitals, they're nurses. They can set up a notification to automatically contact the patients when they are due for immunisation, and the system will remind them automatically. It is a shame we do not have this in our system, it seems easy to do and would make our job easier, but we do not have it.' **Physician 6:** 'We do discuss the system often, I know many people are like me, we are not pleased with the system.' **Physician 7:** 'Compared to other systems used in other hospitals, the system is lacking many features. This is why we are annoyed. We need something as good as the others.'

Table D-5 A sample of the chain of evidence linking social influence with perceived dissatisfaction

Perceived Dissatisfaction		**User Resistance**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Physician 8: 'it is very annoying when the system freezes, it always happens at the wrong time [laughs].' **Physician 13:** 'If it's simple and smooth, no one will be annoyed.' **Physician 10:** 'Sometimes I order eight medications. It takes me a long time ordering, then, all of a sudden [the system] will freeze and I will be so angry because I have to do the process again.'	**Nurse 12:** 'the sad thing, it has not improved anything, the application should be improved, you know…. with shortcuts and everything, because sometimes it takes a long time write and to read through the notes.' **Physician 11:** 'every change they make is worse than the one before. In addition to the big requests with each order such as diagnosis, extension and consultations, there are a lot of forms I should do before I do any order!' **Nurse 6:** 'It frustrates me, especially if I have so many patients waiting. So, it takes time. It is wasting my time.'	**Nurse 1:** 'If they want to impose a new system on us, it has to make things better. Otherwise, we should go back to the old system.' **Physician 13:** 'What I love about [the system]? Honestly, nothing. Except, maybe, when the patient is new [chuckles], his file and notes are clean' [does not have to read the patients notes]. **Physician 8:** 'I need more than one step to find what I am looking for. It's not like some systems in other hospitals, where you can access the radiation results directly, just by one click. Maybe, this is the thing that… I do not like about the system, this why we complain.' **Nurse 4:** 'what if I didn't fill [the medical notes] in? I don't think that's important. Rather, we should focus on what happened to the patient, what I gave him. That's because we're here for the patient, not for the system.'	**Nurse 15:** 'They introduced it for a trial. It did not go well. This should have been the end of it. We cannot cope, they should go back [abandon the system].' **Nurse 3:** 'Actually… when [physicians] needed something related to the patient in specific cases, they would go to the nursing documentation, they wouldn't go to physicians' documentation. Okay? Because some physicians do not use the system! So, it is in fact good credit for nursing; at least someone… they appreciate what we are doing.' **Nurse 1:** 'the nursing administration together with the chief of the department in emergency has worked very hard to convince people to use the system, a lot of people were against the system.'

		Physician 11: 'training isn't taken quite seriously; some say: "Did you bring me from home to teach me [how to use] the computer? I'm better off doing something else."'	

Table D-6 A sample of the chain of evidence linking perceived dissatisfaction with user resistance

Perceived Loss of Professional Autonomy		**User Resistance**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Nurse 14: 'I think we are restricted from doing things we should be able to do. I am not a doctor, but I have long experience, but I am not allowed to do small things, like request new dressings for the patients.' **Physician 13:** 'If I submitted a medicine and want to make a modification or investigation, it won't be easy. It's not easy to cancel or discontinue. And if I want to change the dose after, for example, or add something to the note that I've written, I cannot do that. Sometimes the situation changes or the patient tell me something,	**Physician 3:** 'when patients come to the staff clinic, when I open their files, I get the family medicine visits… the staff clinic visits. But I don't get… For example, if I want to know what happened in his visit to other specialities, in dermatology, for example, I won't get this information.' **Physician 10:** 'once I have filled the note and approved it, I can neither make cancellations nor add information. Sometimes, I remember something, and I want to go back and add it, but I can't. This is against the nature of our work.'	**Nurse 10:** 'Sometimes we cannot do everything we need in the system; we have to find other ways or refer the patient to a specialist. Yeah, it's a problem. If we cannot do it through the system, we will make some calls. If it has to be done.' **Physician 4:** 'To be honest, the problem with our system is that… when the note is there, the inpatient doesn't know about it! Then why are we using the system! The benefit [of having a system] is so we can share notes. Otherwise, we should not be using it.'	**Nurse 5**: 'We cannot access all the information, that is why many of us are still using paper notes.' **Physician 13:** 'since the day we started using the system, notes sometimes aren't written, so you have to go and ask the patient. Some say that they cannot write a note in the system with their accounts, so they are forced to do it some other way, usually by writing a paper note and giving it to the patient.'

then I have to change my notes or medication.'			
Perceived Loss of Professional Autonomy		**Perceived Dissatisfaction**	
Case 1	***Case 2***	***Case 1***	***Case 2***

Nurse 11: 'In the beginning, we had almost access to everything… through the hospital's system. However, that stopped later; I don't know the reasons behind that. We have very limited access.' **Nurse 13:** 'They even removed one [system feature] that was making life easier for us, which was the clinic schedule. We could see how many open slots, and check who are the patients that will come to the clinic today; now we can't check that.'	**Physician 8:** '[The system restrictions] are a liability sometimes. In fact, some illnesses are considered general and can be treated by any consultant. For example, in the case of bronchial asthma, some types of inhalers are restricted to pulmonology and allergy/immunology, even though asthma is part of general paediatrics and can be treated even in my clinic. So, sometimes, I need such medications. There are other kinds of treatments that I cannot prescribe because they are restricted to a sub-speciality.' **Physician 9:** 'Sometimes, a patient comes to me and I can't order a restricted medication for him. It happened many times with us; for example, with certain diabetes medications.'	**Physician 7:** 'There is a restriction about certain medications, even though we very often prescribe it. So, this is the fault of the one who designed the system, Okay? Because he didn't know that certain medications are prescribed often in our speciality.' **Nurse 13:** 'It was an important point, it helps a lot, and we use it often. The nurses usually check the system after work at the end of the shift, so nurses can prepare for the next day, see if we have someone with a special case coming to the clinic. Now our hands are tied, we are not happy about it.' **Physician 15:** 'everything was restricted. It was a hard time for me because I had to rely on the family medicine consultant [to request medication, lab exams, referrals]. So, honestly, those weren't good times.'	**Physician 5:** 'We have a doctor that, if she finds any problem using the system, if she cannot order the medications she needs for her patients, she would be very mad and say "I hate this system?" [laughs].' **Nurse 10:** 'I think… in my opinion, we have limited access to the system. We need more access to the system. The doctors can be busy and they might not check the system on time. What if it is something urgent? If we had access to the system, we could do our job more quickly. Everybody would be happier this way, nurses and physicians.' **Nurse 2:** 'I know they are watching us from the system, how many patients we examined and so on. But I would like to be watched in something else, not particularly this. I would like that they watch my direct work and interactions with the patients. I wouldn't like them to watch papers or something that has no added value.'

Table D-7 A sample of the chain of evidence linking perceived loss of professional autonomy with the perceived dissatisfaction and with user resistance

Perceived Risk		**User Resistance**	
Case 1	***Case 2***	***Case 1***	***Case 2***
Nurse 8: 'the system is not secure, it does not protect patients' privacy. Anyone working in the hospital can view private patient information.' **Physician 3:** 'Sometimes, because of how the system is set up, I am forced to give my account to a colleague. And I fear that someone could abuse my account, so these things should be monitored, like who sent the order.'	**Nurse 9:** 'the system should make sure that the people who are able to see it are really healthcare provider. Yeah, they are the ones responsible… they know about the importance of patients' confidentiality.' **Nurse 5:** 'if the test is like a crucial test, like hepatitis C, HIV, right? It's the patient's right to have confidentiality. Only the requesting department should view it' only physicians and nurses should view this information.'	**Physician 13:** 'last month we were discussing some issues we had in the system in our department meeting. My issue was… one of my issues, when I submit a treatment, it gives me multiple choices. That's provocative because, sometimes, I am in a hurry and I still find those multiple choices. It really delays me. I fear that one day, because I am trying to fill the treatment as quickly as possible, I would make a mistake with these multiple choices.'	**Physician 9: '**if the patient has a big file, there is, for example, a visit today, tomorrow, after two to three days, et cetera. You can imagine how many visits are there in a year, or in ten years. The visit is not always organised correctly, so I prefer to request a printed file of the patient. I line them up on my desk, so I can understand the issue with the patients. If I only rely on the system, I am sure I will miss something.' **Nurse 10:** 'I know that there is missing information in the patients' file, I have emailed the IT department and the head of my department many times, they need to test the system before we use it.' **Physician 6:** 'most of us complain [about the system]; for us, privacy for the patient is so important. Besides the system's regular malfunctions, this is why.'

Table D-8 A sample of the chain of evidence linking perceived risk autonomy with user resistance

E. Appendix: Difference Between Cases

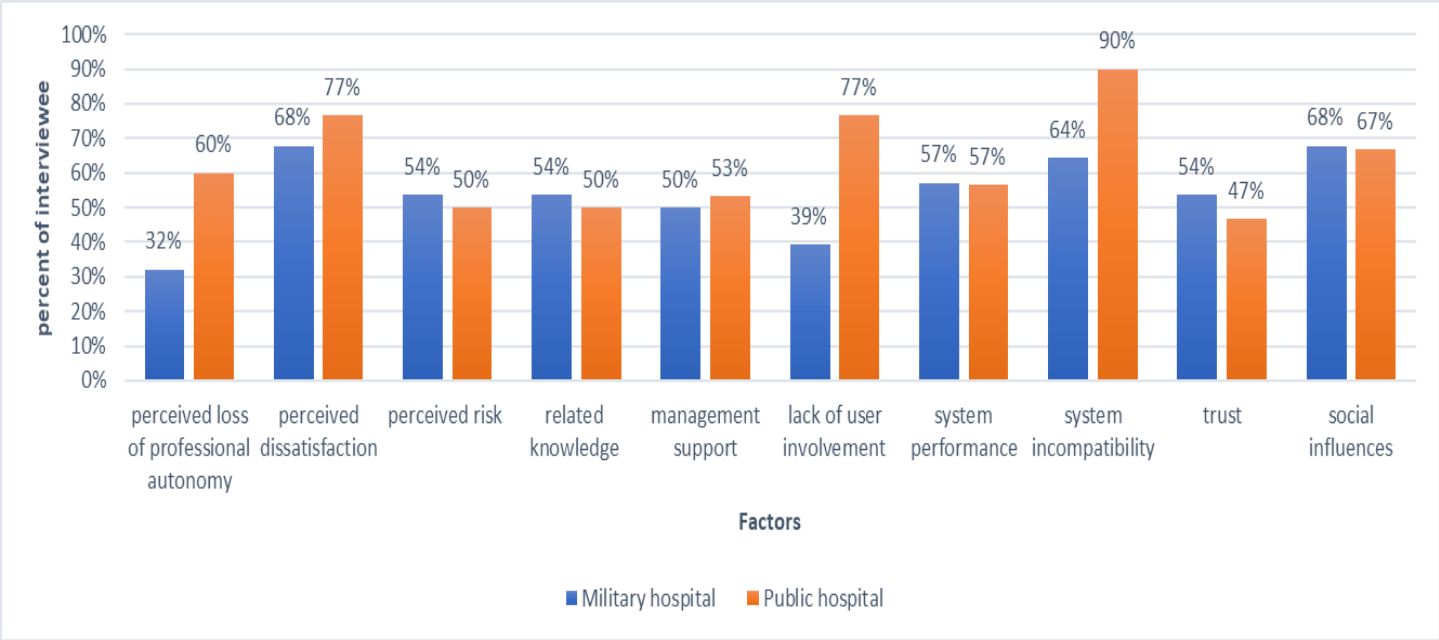


Figure E-1 Differences between interviewees in both cases

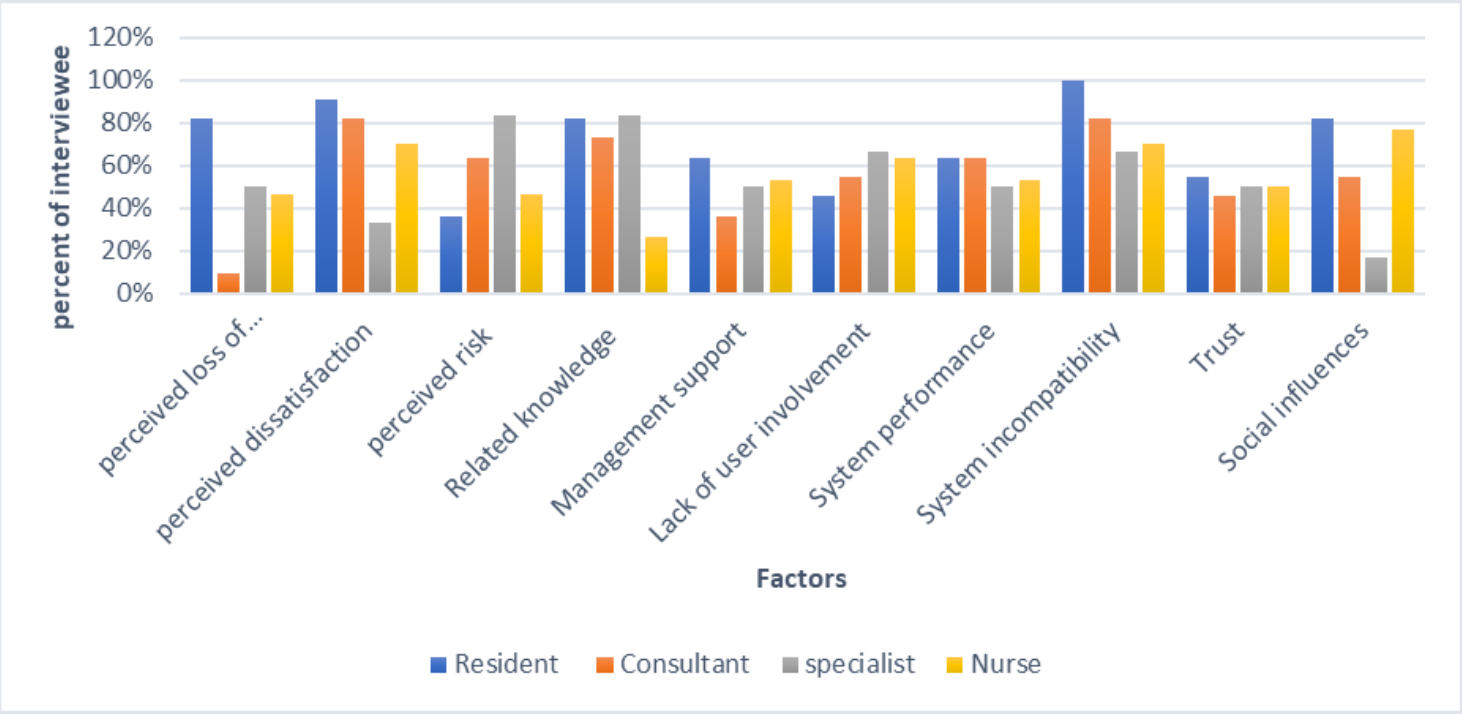


Figure E-2 Comparing interviewees (by level of interviewee)

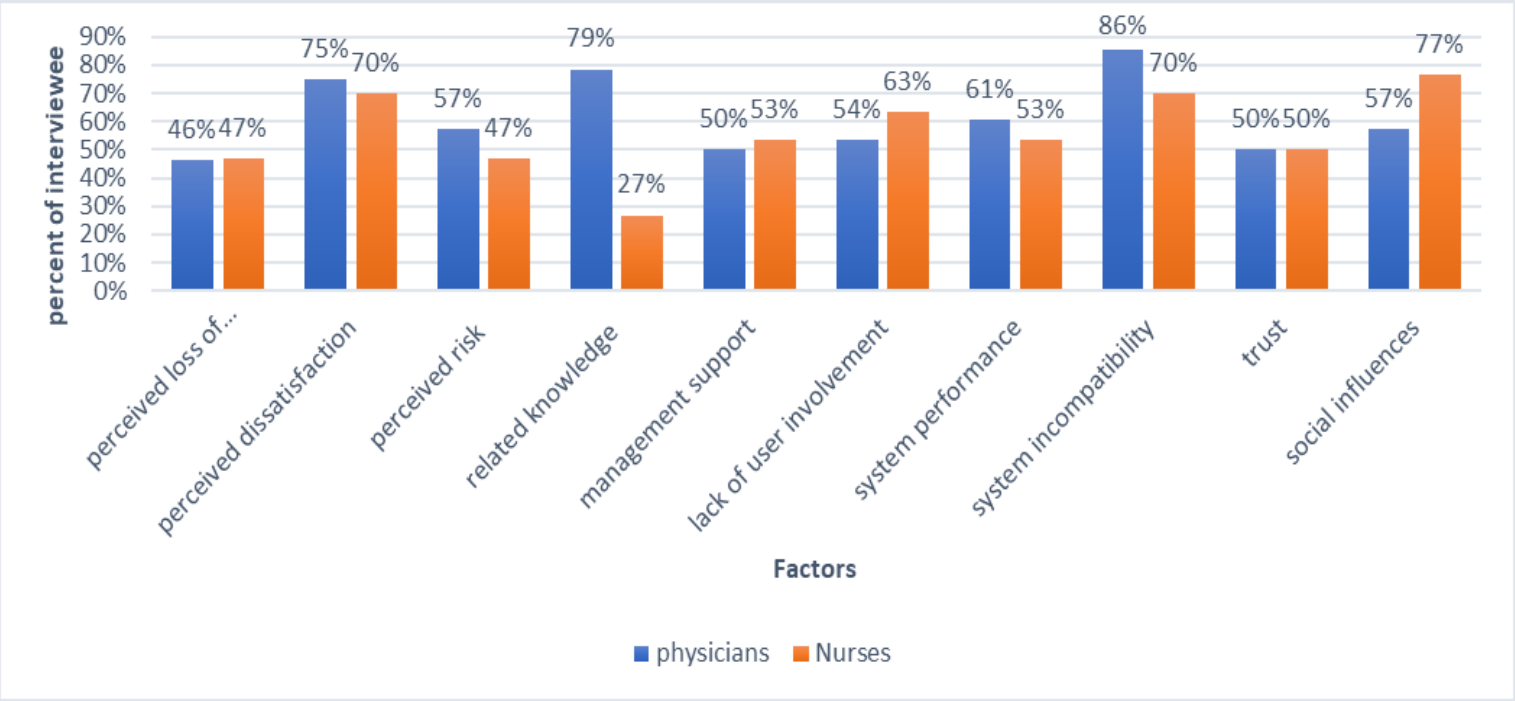


Figure E-3 Comparing physicians and nurses

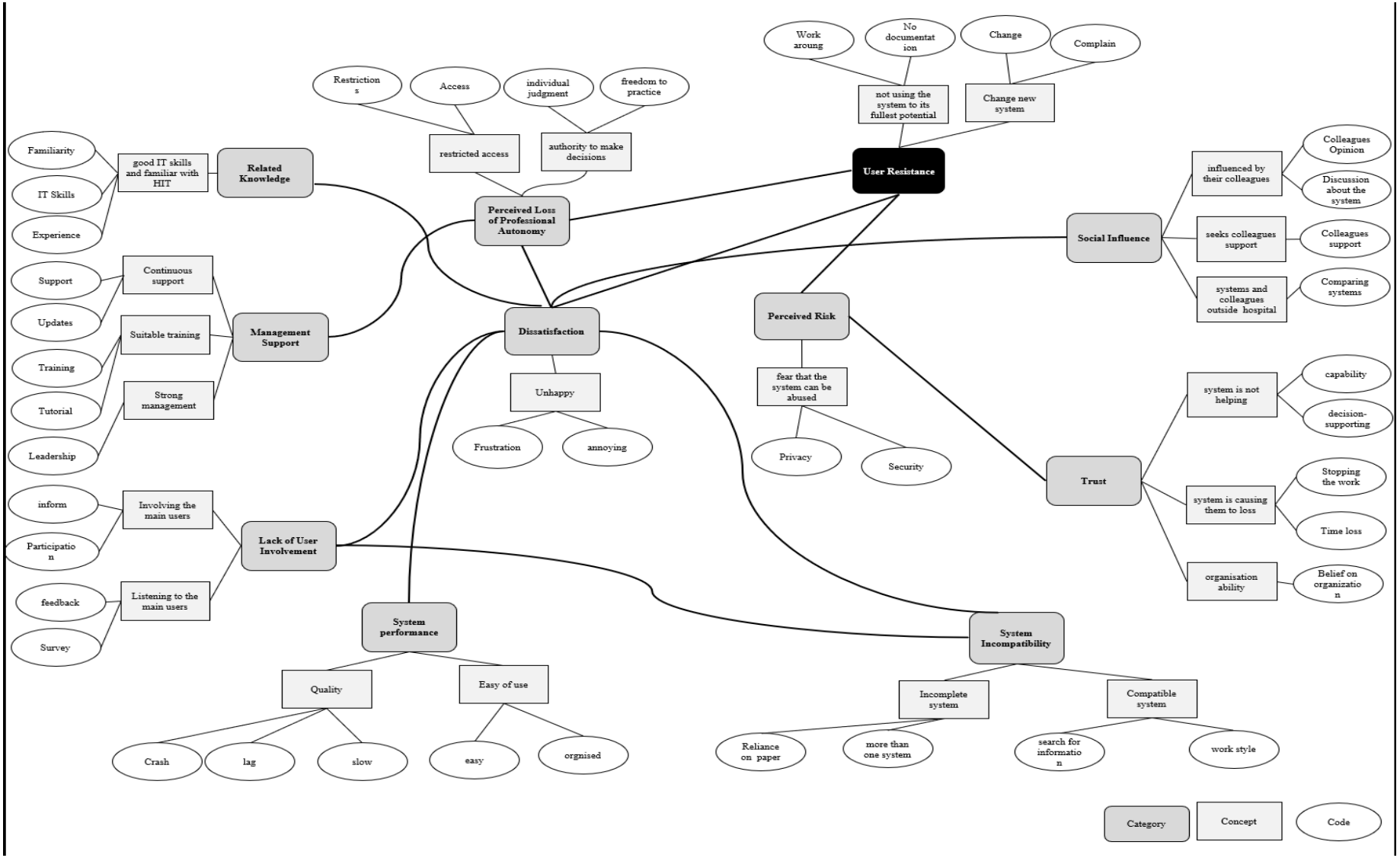


Figure E-4 Mind map of analysis and findings