Resistance of Healthcare Information Technologies: Literature Review, Analysis, and Gaps

Bahae Samhan
Washington State University
Bahae.Samhan@wsu.edu

K.D. Joshi
Washington State University
Joshi@wsu.edu

Abstract
The Implementing of Health Information Technology (HIT) in the healthcare industry is rapidly increasing, yet it is still argued that HIT is being resisted by both practitioners and patients. The hurdles of HIT adoption in this critical area is still considered as under-researched in the IS/IT literature. Research has mainly focused on the adoption aspect of the technology with limited effort towards explaining IT resistance especially in the healthcare setting. HIT investments are costly and expectations of getting better performance, after its implementation, are high. HIT and their applications, if widely spread and meaningfully used, are likely to change the way of applying healthcare services to benefit both patient care and organizational performance. The benefits of HIT in terms of its effect on the healthcare organization performance and patient care cannot be measured if the technology was resisted. This paper provides an extensive review of the literature to uncover the current status of the research in this area, to highlight the main research gaps that need to be addressed, and to reveal how relatively little attention has been paid to understand HIT resistance. Aiming to provide a research agenda that would encourage scholars to conduct research in this area.

1. Introduction

There is a dearth of prior studies investigating the phenomenon of resistance to HIT [11, 75], and despite the effort of IS researchers in this area, it still remains understudied [11, 48]. This paper provides an extensive review of the literature to uncover the current status of the research in this area, to highlight the main research gaps that need to be addressed, and to reveal how relatively little attention has been paid to understand HIT resistance. User resistance to information systems has been identified as one of the salient reasons for the failure of new systems [51]. This is evident in the healthcare setting, in 2004 Spil et al. [79] developed a ‘USE IT’ model describing four dimensions of HIT use based on users’ needs: resistance, relevance, requirements, and the availability of resources. The authors found that resistance was the strongest determinant of not-using the electronic prescription systems (EPS). The technology was not used in 72% of the cases, and that resistance was the cumulative consequence of the remaining three determinants. Another example was reported by Bhattacherjee et al. [14] on the Cedars-Sinai Medical Center at Los Angeles where doctors resisted to use the newly installed Computerized Physician Order Entry (CPOE) system, which caused the system to fail and result in a complete withdrawal from implementation after it was already implemented in two-thirds of the 870-bed hospital. System failure caused by resistance has a potential of negative impacts on users. This is very crucial in the healthcare setting where impacts are directly aimed on patients. Result could be life-threatening cases, for example, the resistance of using a blood sugar monitor by a type 2 diabetic patient may result in many health complications, especially if the patient is in rural area and must rely on a mobile monitoring device to alert the doctor and the patient when insulin is needed.

HITs are expected to increase patient safety, reduce cost of healthcare delivery, and improve efficiency in the healthcare industry [76], yet these technologies, in many cases, are facing wide resistance [55]. User resistance to new HITs needs to be understood and managed in order to mitigate HIT failures [75]. There is an extensive body of research that has focused on technology adoption. It started in 1989 when the Technology Acceptance Model (TAM) was first introduced by Davis [28]. Today, More than 345 articles focusing on technology acceptance have been published in the top 19 journals of the IS community in the last 20 years [86]. However, it is argued that technology in healthcare context has unique characteristics that makes it different from the more general “corporate environments” in which
technology acceptance models have been successfully tested in prior studies, therefore these models have less explanatory power when applied in healthcare settings [78]. Also, Practitioners usually use complex and difficult medical equipment, so “hard to use” fails to explain the non-acceptance for them [41]. Difficulty of use has a potential effect on patients’ perspectives towards using or resisting the HIT. However, no studies, that includes patients in the examination of HIT resistance, were found. Moreover, these theories are designed to explain voluntary IT usage and have limited capabilities in explaining mandated IT usage which is present in the healthcare settings [14]. Thus, it is believed that applying the acceptance models in healthcare settings is not sufficient to completely explain the individuals’ behaviors towards new HIT and a different perspective is still required to provide more insights regarding user resistance to HIT.

Some early IS research was conducted to uncover the concept of resistance, for example, [43, 50, 67]. However, the review conducted by Lapointe and Rivard [55], to better explain resistance to information technology implementation, looked into 20 IS/IT journals over the past 25 years and found 43 articles that considered resistance as an implementation issue. They reported that only 9 of the 43 articles had defined resistance. Resistance is not only under researched but also shapes a practice phenomenon in the healthcare sector, healthcare lags behind other industries in adopting information technology by as much as 10–15 years [40].

In this study we provide an extensive review of IT resistance literature in IS and healthcare disciplines to describe the current status of this literature and to analyze the literature to provide researchers with a clear understanding of the emerging research gaps that need to be addressed in future studies.

2. Methodology

To uncover the current status of the research and find the main research gaps, we examined the extant literature. As shown in figure2, we started with conducting an extensive search for technology resistance in different IS and healthcare journals and key IS conferences. The keywords used were: IS, IT, adoption barriers, resistance, rejection, and healthcare. This search resulted in 121 articles that covered the 4 areas of research depicted in figure1.
Section 1 included studies about HIT with no resistance behavior, so these papers were considered irrelevant to our research. Section 2 included papers about resistance to healthcare but not to the technology used. These papers were also considered irrelevant to our research. Section 3 included papers that looked into resistance to IT, in general, not specifically in healthcare settings. These papers are considered relevant to our research because HIT is merely a subset of IT and understanding the general issue of resistance to IT is vital in developing a better understanding of resistance in the healthcare settings. Section 4 included the most relevant papers of our research; these papers looked into the resistance behavior towards technology in healthcare settings. Only 47 studies were considered as relevant after eliminating all irrelevant articles. The 47 relevant articles include 30 articles on IT resistance and 17 on HIT resistance. Relevant papers were then coded, analyzed and synthesized in order to highlight the emerging gaps in this area.

3. Emerging Research Gaps

This study aims to uncover the research gaps in the IT resistance literature with a focus on HIT resistance. In order to reveal the research gaps of HIT resistance it was essential to uncover those of IT resistance in general, and then format it in the context of healthcare. To find those gaps, it was first necessary to characterize the current status of the IS research by summarizing the literature that studied IT resistance in both the general context and the healthcare context. It was clear that despite researchers’ attempts to understand IT resistance, this area is still considered under researched [57]. There are critical gaps in the IT resistance literature, especially in healthcare settings, that need to be addressed [75]. In the next section we provide a list of the research gaps revealed from the literature review and analysis. Table 1 provides a visual summary of these gaps.

3.1. Lack of a Unified Framework of Resistance

Prior research that examined IT resistance, explained the resistance to IT using a sub-set of factors that shape resistance behavior, such as loss of power [66], political concerns [62], evaluation of the net gain and the change in the status quo [47], fear of losing jobs because of the introduction to the new technology [88], bad experiences perceived from the change to a newer technology and lack of user involvement [38]. However, Karahanna et al., [48] argued that prior perspectives on IT resistance are still valuable, but the antecedents of IT resistance evolve and expanded over time as individuals start to use IT more regularly and on different scales in different areas. The study conducted by Bahattacherjee and Hikmet [11] found that the prior research on IT resistance is still limited and fragmented with no unified theory to explain the resistance behavior towards technologies. In a recent study, Laumer and Eckhardt [57] reviewed 9 IS models and theories of resistance and concluded that IS literature still lacks a unified theory of user resistance. The review conducted in this study indicates that the IS literature still needs to find ways to define and measure IT resistance beyond the prior perspectives and demands a unified framework explaining the IT resistance phenomenon and how similar or different is it from the HIT resistance phenomenon.

3.2. Patients Are Ignored as Potential HIT Users

Patients are major stakeholders in the healthcare process [18]. Today the technology is advancing rapidly and is facilitating healthcare options to patients through a variety of methods such as medical mobile apps that are widely spread and easily accessed by patients [3]. Also there is a wide spread of diagnostic tools that are available and easily accessed over the web [87]. However in most of the HIT studies such as [11, 47, 55] the focus was only on the practitioners, physicians, nurses, managers or Clinical laboratory personnel but not the patients. It is important to understand who is resisting the technology and why are they resisting it. This includes not only practitioners but also patients. Section 2 depicted in figure1 is the area of articles that looked into patients’ resistance to HIT. These patients could be resisting the HIT as a result of resisting the care itself. The indirect resistance of patients towards healthcare occurred via the technology. While examining patients’ resistance, it is crucial to explain what patients are actually resisting, and uncouple the resistance behavior to understand whether the patients are rejecting the technology or the care itself. The literature showed limited work on patients’ resistance to HIT. This is a major research gap and researchers are encouraged to include patients in their future research designs. Patients might have different reasons for resisting the technologies and uncovering these reasons will contribute to both research and practice.
3.3. Limited Work in the Healthcare Setting

HIT resistance is very critical as it has a direct effect on human health, the resistance of HIT may result in many medical errors that could lead to serious injuries and deaths [75]. However, HIT resistance is clearly present in the U.S. according to Jha et al., [45] that conducted a study comparing the level of HIT adoption in seven developed nations, and revealed that U.S.A ranked last along with Canada with only 10 to 30 percent adoption rate. Also, within the U.S. organizations, health technologies are being resisted more than technologies in different disciplines [40]. HIT resistance is still not well understood [57], and a better understanding of user resistance to HIT may help design better systems that are functional and also adoptable by their potential users [77], it will also help in conducting appropriate interventions to minimize the resistance behavior [75]. However, the review of the literature showed that very little attention has been given to the resistance of HIT. In 2004 Poon et al., [75] found that this critical area is was considered under researched in the IS literature. Ten years later, still very few studies are found on HIT resistance, only 17 articles were conducted in the healthcare setting. Researchers are encouraged to give more attention to this critical area and conduct research that will benefit academic research and provide practitioners with a better understanding of the phenomenon and potentially suggest solutions to avoid the HIT resistance behavior.

3.4. The Nature of Technology Support-System Functionalities and Supported Work Processes

The literature review uncovered a number of different technologies used when examining resistance. Understanding the functionality of the examined technology is important as the performed task has a potential impact on individuals’ behavior towards the technology [42], and could possibly change the behavior of potential users towards resistance. HIT used in prior research confined to electronic health records (EHR), computerized patient orders entry systems (CPOES) and other systems used for front desk clerk tasks such as admission, discharge, and transfer tasks. Exploring the different technologies used for different work processes, such as diagnostics, care giving, monitoring, etc., and examining resistance towards those technologies could provide us with a more nuanced understanding of the resistance behavior. Researchers are encouraged to expand their studies to include a wider variety of technologies and work processes.

3.5. The Resistance Construct is Multifaceted

The prior literature defined and conceptualized resistance in a variety of ways. Resistance behaviors were characterized by low levels of use, by lack of use, or by dysfunctional use [68]. One study conducted by Keen [50] defined resistance as “social inertia”. Some other definitions were based on the concept of resistance to change, e.g., [89], others defined it based on behavioral expressions and opposition to use, e.g., [67]. Not only defined differently, resistance was also explained in a variety of ways; Markus [67] explained the resistance behavior as a result of individuals perception on power gain or loss associated with the change. This perspective is similar to the net gain concept that Joshi [47] proposed in his findings, he posits that users react to change by evaluating their net gain based on change in their inputs and outcomes and comparing their relative outcomes with that of other user groups and the employer. Bahattacherjee and Hikmet [11] is one of the few papers that explains resistance to change as an important aspect of organizational change. They studied resistance in the healthcare setting and also explained resistance differently building on the dual factor structure of IT usage proposed by Cenfetelli [20] that posits inhibitors as the main reason of resistance, defining inhibitors as the negative factors that discourage IT usage when present, but have no effect when absent. This summary of IT resistance conceptualized in the extant literature illustrates that this construct is multifaceted and needs to be developed further. The IS scholars should strive for a more comprehensive yet integrated characterization of IT resistance. A lack of unified conceptualization of the resistance behavior will impede scholarship in the research area which is in its incipient stages. A rich and deep conceptualization of this multifaceted construct will allow researcher to instantiate it in diverse settings including healthcare.

3.6. The Role of Beliefs in IT Resistance Needs Greater Theorization

IS research has provided limited insights on the role of behavioral and social beliefs in shaping IT resistance. Prior research mainly focused on perceived threat as the belief that shifts individuals’
behavior towards resisting the technology [58]. This is evident in studies that focused on IT resistance as well as on HIT resistance. For example, Markas and Hornik [66] proposed perceived threat as an antecedent to IT resistance whereas Bahattacherjee and Hikmet [11] used it to explain HIT resistant. However, perceived threat is a broad concept that may include a number of antecedents and causes. Prior research has characterized threat differently, Bahattacherjee and Hikmet [11] explained threat as physician’s loss of control over their work, which is similar to that observed by Lapointe and Rivard [55]. Another attempt to explain resistance using the concept of threat is the work of Kim and Kankanhalli [51] who defined threat as the perceived costs versus the perceived benefits that potential users consider before rejecting the technology. This is similar to the findings of Joshi [47]. Perceived threat still has no one unified definition or explanation. Other beliefs were considered when explaining resistance; Cenfetelli [20] categorized potential users’ beliefs into inhibitors and enablers that would discourage or encourage the usage behavior. However, a general explanation was given to show how inhibitors discourage usage with no further investigation on what these inhibitors could be. Markas and Hornik [66] proposed that both fear and stress generated from the introduction of the technology into the world of the potential user has impact on the resistance behavior. They explained how we must be mindful that people “do not resist new technology, rather they resist the effect that the new technology may have on their own lives.” This goes in hand with the study of Martinko et al., [68] that also posited that resistance is affected by individuals’ beliefs. They explained that negative outcomes result from individuals’ beliefs towards technology usage. Enns et al., [33] studied how uncertainty and the loss of status can change the balance between acceptance and resistance. Not only behavioral beliefs require further theorization, also social beliefs impact must be considered when researching resistance. Opinions and behavior of individuals are influenced by their social networks [57]. This is explained by the social impact theory which shows how social influence has an important impact on individuals’ behaviors. Individuals’ decision towards technology adoption or resistance is extensively affected by the influence of other users [50]. However, limited attention has been devoted to the study of social influence on resisting technologies within organizations [58]. Also limited attention has been given to the social influence stemmed from private sources outside of the organization such as family and friends [57]. Our review found that only Eckhardt et al., [31] studied social influence on individual resistance. They expanded the work of UTAUT [84] to explain the impact of social influence on non-adoption intentions, and these influences were limited to work place colleagues and superiors not including the influence of other individuals outside of the organizations’ boundaries, such as friends and family. This is very important to examine, especially when measuring its impact on patients resistance to HIT. Patients, in most cases are not employees of the healthcare facility, and in some cases might be resisting these technologies while being remote from the healthcare facility, then the influence of employees at the facility has limited impact on patients’ decisions. Articles in section 2 of figure1 revealed that patients resist receiving care from the health providers for reasons related to their personal beliefs such as religion. When examining resistance to HIT, it is important to uncouple patients’ resistance to the technology and their resistance to the actual care based on their beliefs and previous experiences. Moreover, patients may be resisting care as a result of resisting the technology implemented. Both behavioral and social beliefs impact on resistance are interesting areas that still needs more investigating. The IS scholars should strive for a more comprehensive understanding of the role of individuals’ believes in IT resistance. Understanding the impact of beliefs on resistance and how these beliefs are related helps in developing a better understanding of resistance [57].

3.7. Individual Differences in IT Resistance

The review of prior literature indicates that not only demographic variables of the potential users affect IT resistance, but also personality factors such as levels of flexibility, desire for change and growth, and tolerance for ambiguity are closely related to resistance [65]. The case study of IT resistance at the Hmong American Partnership [83] revealed that “the one antecedent that withstood time in relation to user acceptance or rejection of information technology was individual indifferences, such as a user’s age, education, and gender”. IS research has considered individual differences in a variety of studies. However, few studies considered individual differences when examining IT resistance, according to Laumer [58] only one study [52] considered individual differences when examined IT resistance. The literature review confirms that few number of articles studied the impact of individual differences on IT resistance and none were conducted in the healthcare setting. Studying the impact of individual differences on IT resistance could result in interesting
findings that contributes to research as well as to practice.

4. Implications

4.1. Implications for Research

This study has a number of implications for research. First, our analysis of the current status of resistance in the IS literature was not only limited to HIT resistance, rather it provided a general analysis on IT resistance including healthcare settings. Second, it provides research gaps analysis and highlights a research agenda for future studies that are encouraged to build on the findings and address the emerging research gaps that were looked over in the past. Third, it summarized the comprehensive description of the core concepts of resistance to IT and HIT. Finally, the study encourages researchers to start aiming their work towards finding a unified theory of resistance that considers individual believes and differences, as well as to include patients as a major stakeholder when theorizing on HIT resistance.

4.2. Implications for Practice

This study provide implications for practice, by establishing a better understanding of user resistance to IT, system designers will be able to build better systems that are functional and also adoptable by their potential users [75]. Furthermore, understanding how resistance could be treated will have a positive impact on system success [51]. This paper seeks to find answers to IT resistance in general and focuses on the HIT resistance behavior. Reducing the resistance to HIT by patients and practitioners will help in avoiding catastrophic medical errors [53] and will help in improving the overall quality, efficiency and performance of the healthcare provider [12]. This study aims to encourage researchers to build on the emerging gaps to provide clear guidelines that potentially could help in building and implementing technologies with lower rates of resistance.

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Table1: Research gaps in HIT resistance literature vs IT resistance literature
5. Future Work

We hope that this study will spark interest in the IT resistance phenomena in general and in healthcare settings in particular and encourage researchers to conduct studies in this unexplored yet potentially fertile area of research. In particular, future work needs to design research studies that are patient centric. Future research needs to decouple the effects of the factors that contribute to patients’ resistance to healthcare from their resistance to IT used to support the care they are receiving. We encourage scholars to address the research gaps uncovered in this study by conducting empirical research in this area in an aim to discover the significant antecedents shaping the HIT resistance behavior. We also hope that this study will stimulate more theoretical contributions in this area to form a better understanding of the phenomenon which will help both researchers in formulating a unified understanding of technology resistance and designers in building more adoptable systems. The main contribution of this paper is in shaping the future research agenda by revealing the research gaps in this critical area. By revealing the research status this work encourages researchers to focus on the key research gaps while conducting studies related to IT and HIT resistance.

6. References


