Revisiting Technology Resistance: Current Insights and Future Directions

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Abstract

Nuance conceptualization of technology resistance is needed due to the different conceptualizations that exist in the extant literature. This paper calls for information systems (IS) researchers to begin exploring technology resistance using novel perspectives. The paper also provides a guideline for conceptualizing technology resistance away from the common existing conceptualization that is shaped through theories of adoption and resistance-to-change. The goal is to encourage future research to conceptualize technology resistance beyond the typical findings available in the literature and provide more insights in light of the provided arguments and suggestions.

Keywords: Technology resistance, Concept, Current insights, Future directions.

1 Introduction

The implementation of information systems (IS) has been steadily increasing within different industries. However, one of the main issues related to new technology is the difficulty of identifying significant factors that influences potential users to accept technologies developed and implemented by others (Lim & Ting, 2012). Nevertheless, there are evidence of technology resistance behaviours conducted by the same people who are expected to use the technology the most (Samhan, 2016). Technology resistance is found to be a prominent reason for system failure (Kim & Kankanhalli, 2009). An example, reported by Bhattacherjee et al. (2013), was from the Cedars-Sinai Medical Center in Los Angeles where doctors resisted to use the newly installed Computerized Physician Order Entry system (CPOE), which caused the system to fail and resulted in a complete withdrawal after it has been already implemented in two-thirds of the 870-bed hospital. This highlights the importance of understanding technology resistance causes and possible remedies.

For the past three decades, IS research has extensively investigated concepts related to the technology use and adoption while giving less attention to technology resistance topics. Despite the wide recognition of the technology resistance phenomenon, research in this field is still somewhat immature (Laumer & Eckhardt, 2012). Prior research in IS suggest a lack of research on factors that influence technology resistance (Samhan & Joshi, 2017). In general, major IS studies that referred to technology resistance as an important issue can be categorized into two main research streams: (1) studies explaining resistance as the opposite of adoption (e.g. Markus, 1983; Martinko et al., 1996; Cenfetelli, 2004) and (2) studies focusing on resistance to change (e.g. Hirschheim and Newman, 1988; Joshi, 1991; Kim & Kankanhalli, 2009; Marakas & Hornik, 1996).

Laumer and Eckhardt (2012) argue that resistance cannot be simply considered as "the reverse side of the acceptance coin." Therefore, studying acceptance alone will do little to provide insights into user resistance. Caroll et al. (2003) argue that technology acceptance and rejection are poorly understood and need to be investigated independently. Lapointe and Rivard (2005)

found that IS research has neglected the study of resistance phenomena. Their literature analysis of IS journals over the prior 25 years revealed that only 43 studies considered resistance as a key issue. These studies viewed resistance as a "black box" and only 9 of the 43 studies defined concepts of resistance. Further, only 4 studies explored the black box of resistance and suggested theoretical explanation of resistance (i.e. Joshi, 1991; Marakas & Hornik, 1996; Markus, 1983; Martinko et al., 1996). However, the work of Venkatesh and Brown (2001) broaden the technology adoption perspective by presenting preliminary evidence that non-adoption decisions are based on different critical barriers.

Additionally, in the second stream of research, we find that resistance to change studies focused on users' perspectives of the organizational and environmental agents influencing their decision of complying or resisting the change. This includes concepts related to the change such as locus of control, difference in power, net-gain, etc. While these studies provide important insights about individuals' perspective to IT-induced change, they fall short from explaining users' perceptions of the technology itself. Therefore, this research note serves as a call for IS researchers to direct focus on technology resistance behaviours. This includes exploring concepts related to the technology features, users' beliefs and attitudes about the technology and the general effects of the tasks accomplished using the technology.

2 Conceptualization of Technology Resistance

According to the Oxford English Dictionary, resistance is defined as the action of resisting, which means withstanding an action or effect and trying to prevent by action or argument. Prior IS research defined technology resistance as an action or intentional inaction that opposes the implementation of new technology (Laumer & Eckhardt, 2012).

Lapointe and Rivard (2005) suggest that users evaluate technology in terms of its features and existing conditions (as an individual and as an organization) and based on this evaluation users can make projections about the consequences of the potential use of the technology. This leads to an intention to accept or an intention to resist the technology based on perceived value and threat associated with the technology (Lapointe and Rivard, 2005).

According to IS literature, technology resistance is characterized by low levels of use, by a lack of use, or by dysfunctional (harmful) use (Martinko et al. 1996). Additionally, technology resistance may be manifested by an individual, a group or an entire organization (Saga & Zmud 1993). In general, IS research does not consider resistance as dysfunctional. The definition of resistance specifically states that it may occur over time (Laumer & Eckhardt, 2012). However, Knight and Burn (2011) argue that technology adoption theories fail to capture users' behaviour overtime—that is, the technology acceptance literature based on the intention to adopt suggests that a user may develop intentions to adopt or resist the technology based on the outcome of evaluating the acceptance and resistance arguments (Joshi, 1991).

Moreover, resistance behaviours could be distinguished between rejection and non-adoption. Rejection refers to the conscious decision made by the users to avoid the technology, as opposed to non-adoption, which implies potential future use (Cenfetelli, 2004). After the adoption stage, users can develop different usage behaviours based on their experience and continuous evaluation of the technology, which may include the manifestation of resistance behaviour towards the technology (Ferneley & Sobreperez, 2006).

Furthermore, it is important to recognize that resistance behaviour exists on a spectrum of various behaviours from the absence of the will to engage to the act of becoming physically destructive (Carnall, 1986; Marakas & Hornik, 1996; Lapointe & Rivard, 2005). Additionally, technology resistance may be manifested as a form of avoidance or workaround strategies (Samhan & Joshi, 2017).

To put this understanding into perspective, the conceptualization of technology resistance can be summarized as follows:

The conceptualization of technology resistance encapsulates the actions or intentional inactions that oppose adoption and usage of a particular technology, from the absence of willing to engage to becoming physically destructive, such as avoidance, rejection, and workaround strategies leading to lack, low, and sometimes dysfunctional levels of use, among others, which may be affected by the users'—as an individual, as a group, or as an organization—perceptions and evaluations of value and threat posed by that technology.

3 Contextualization of Technology Resistance

Outcomes of interactions with the same technology will be different when tested in different settings (Boiney, 1998). Gopal and Prasad (2000, p. 512) suggested that "technology cannot be studied outside its social context and that inconsistent results may be directly related to our lack of attention to this fact." Therefore, understanding the context of the study, in which resistance is being evaluated within, is a vital process. Orlikowski and Iacono (2001) argued that conceptualizing technology is unique to its context, and thus, what may be considered a resistance behaviour in one context may not be equally true when implementing similar technology in a different context. One reason may be related to how outcome demands and expectations may differ across contextual groups (Hong et al., 2013). Further, the context of the study's discipline and the characteristics of the type of users are important attributes of IS research (Hevner et al., 2004). IS researchers must also consider the different levels in which resistance may occur. In some cases, resistance may be manifested by individuals, which normally occurs when resistance is studied using a psychological lens (e.g. Joshi, 1991; Martinko et al., 1996; Marakas & Hornik, 1996). In other cases, technology resistance may be manifested by groups or organizations (e.g. Lapointe & Rivard, 2006; Markus, 1983; Ang & Pavri, 1994). Furthermore, the type of technology enforcement must be considered as well (i.e., voluntary vs. mandatory, utilitarian vs. hedonic systems, etc.) (Laumer & Eckhardt, 2012).

To put this understanding into perspective, the contextualization considerations of technology resistance can be summarized as follows:

The contextualization of technology resistance necessitates considerations pertaining to

(1) the demands and expectations of contextual groups, such as the types of IS users,

(2) the levels of resistance, such as at the individual, group or organizational level, and

(3) the type of technology enforcement, such as voluntary versus mandatory enforcement on utilitarian versus hedonic systems, among others.

4 Antecedents of Technology Resistance

One of the first antecedents of technology resistance (or resistance to change) was found by Ang and Pavri (1994). Other prior IS research explained technology resistance based on beliefs

and attitudes toward the technology (e.g. Martinko et al., 1996; Cenfetelli, 2004; Lapointe & Rivard, 2005). The main beliefs explored in IS research include perceived threats, technology inhibitors, and loss of power. Another important antecedent to resistance is social influence. Prior studies in IS that evaluated the impact of social influence on resistance have mostly focused on influence stemming from workplace peers only (e.g. Kim & Kankanhalli, 2009; Eckhardt et al. 2009), and ignored other sources of influence, such as workplace superiors (managers) and/or private referents, such as friends (Samhan, 2016). Thus, further research that considers exploration and investigations into other referent groups is encouraged to provide a better understanding of social influence on technology resistance.

Moreover, limited research in IS considered individual differences, such as age, gender and levels of education when exploring antecedents of resistance (Laumer & Eckhardt, 2012; Samhan & Joshi, 2014). Individual differences can influence one's attitude toward the technology (Venkatesh & Morris 2000). Moreover, user resistance may be predicted through other personal characteristics, such as risk tolerance (Judge et al. 1999), believed levels of control (Lau and Woodman 1995), self-esteem (Wanberg & Banas 2000) and the desire to achieve (Miller et al. 1994), and thus further research in this direction should be potentially fruitful.

5 Technology Resistance Theories and Findings in IS Research

While there are various perspectives on technology resistance in IS research, there is a general agreement that understanding resistance is important (Lapointe & Rivard, 2005; Kim & Kankanhalli, 2009). Table 1 provides an overview of technology resistance theories and models in IS research.

Theory	Description
Resistance to Change (Joshi, 1991)	This model uses the equity theory perspective to examine resistance to change. The equity-implementation model identifies a three-level process to evaluate change in terms of its effect on users' equity status. To assess the change in equity, users evaluate the net-gain associated with changes in their inputs and outcomes and comparing their relative outcomes with that of other users and the employer.
User Resistance Model (Kim and Kankanhalli, 2009)	This theory develop the construct "user resistance" and use the theory of status quo bias to explain user resistance prior to a new IS implementation. It explored resistance to change based on perceived value and its antecedents, organizational support, self-efficacy and social influence.
Revealed Causal Map of Resistance (Samhan & Joshi, 2017)	This model was revealed using qualitative analysis of interviewing healthcare providers about a newly implemented Electronic Health Records system. The model suggest that resistance is shaped by perceived value, perceived threat and circumvention availability.
Multilevel Model of Resistance to IT Implementation (Lapointe & Rivard, 2005)	In this model, perceived threat is the main antecedent to resistance behaviors. It results from the interaction between initial conditions and a given object.

Theory	Description
Power, Politics and MIS Implementation (Markus, 1983)	This model explains resistance in terms of interaction between the technology and its context. It suggests that a group of actors will be inclined to use the technology if they believe it will support their position of power. If a user thinks it might cause lose in power, he/she will manifest resistance.
Passive Resistance Misuse (Marakas & Hornik, 1996)	This model explains resistance behaviors as passive–aggressive responses to threats that users associate with a new system. The introduction of new technology exposes the rigidity of users toward change, and coupling it with feelings of resentment will lead to resistance behaviors.
An Attributional Explanation of Resistance (Martinko et al., 1996)	This theory suggest that variables associated with technology resistance can be conceptualized using an attributional perspective of achievement motivation. This model draws on the attribution theory, which suggests that new technology, internal and external variables, and an individual's experience evoke causal attributes. The theory suggests that the intensity of technology depends on the interaction of these factors.
The Dual Factor Model of Technology Usage (Cenfetelli, 2004)	This theory suggest that inhibitors discourage usage and enablers encourages usage. However, the absence of inhibitors does not encourage use. The inhibiting beliefs are independent from enabling beliefs and therefore can coexist and have consequent effects.
Physicians' Resistance toward HIT (Bhattacherjee & Hikmet, 2007)	This model incorporates the notion of resistance to change and its antecedents into a model of IT usage to explain physicians' reactions to healthcare information technology (HIT). It mainly explains resistance through the perceived threat lens.

Table 1 IS Theories on Technology Resistance

Figure 1 illustrates the current and future IS research insights derived from a review of prior research on technology resistance, including that which used IS resistance theories. Specifically, the figure depicts revealed reasons for technology resistance, methods to overcome technology resistance, current insights, extant gaps, and suggestions for future research.

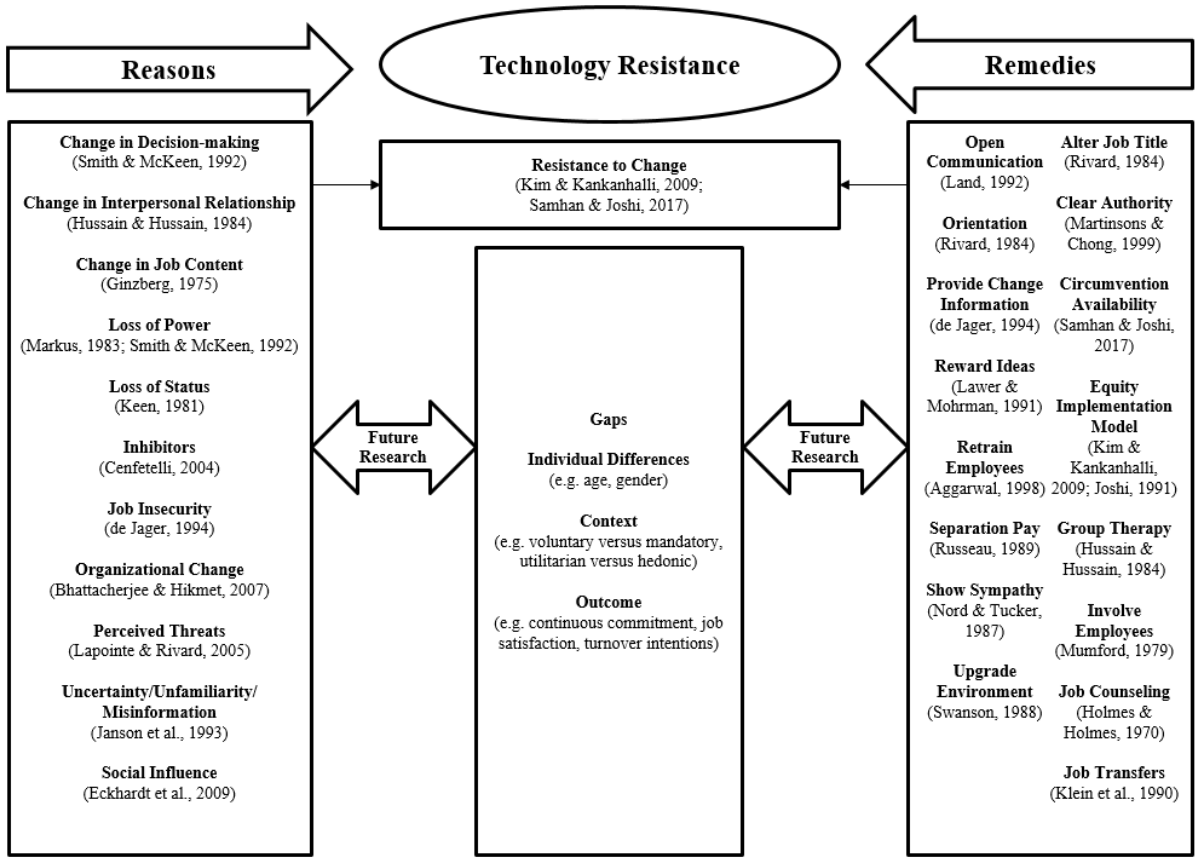

Figure 1 Current and Future IS Research on Technology Resistance

The review of the extant research on technology resistance in the IS literature reveals several implications for future research in this area.

First, technology resistance is a multifaceted construct, and thus IS scholars should aim for a more comprehensive characterization of technology resistance.

Second, a unified understanding of technology resistance is lacking in IS research, and thus suggesting a need for theoretical advancements in this area. To start unification work in this area, a useful starting point is to examine and build upon the multilevel model of resistance (Lapointe & Rivard, 2005).

Third, the limited connections and explanations between technology resistance (rather than implementation) and organizational change points to an area that needs further exploration. Fourth,

Fourth, existing studies on technology resistance have so far been concentrated on the beliefs and attitudes contributing to technology resistance, such as loss of power (Martinko et al., 1996), technology inhibitors (Cenfetelli, 2004), and perceived threat (Bhattacherjee & Hikmet, 2007), with limited work exploring the outcome technology resistance. Given that most IS researchers have only gone as far as conceptualizing user resistance as an outcome variable (Kim and Kankanhalli, 2009; Laumer & Eckhardt, 2012; Oreg, 2006), future research on technology resistance in IS should consider extending the investigated set of outcome-related constructs, such as continued commitment, job satisfaction and turnover intentions, among others.

Fifth, existing research on technology resistance has focused on explaining technology resistance using theoretical lens pertaining to resistance to change and non-adoption (Laumer and Eckhardt, 2012; Oreg, 2006). Indeed, these are important aspects of technology resistance, but it is also important that future research consider and use alternative theoretical lenses to reveal novel explanations of why people reject technologies (see Table 1 and Figure 2, which builds on the review by Laumer and Eckhardt [2012], for alternative theoretical lenses and antecedent-consequence-intervention relationships, and psychology and sociology journals for new ideas).

Sixth, existing studies on technology resistance have shown that social influence plays an important role in shaping technology resistance behaviour (Kim & Kankanhalli, 2009; Samhan & Joshi, 2017; Eckhardt et al., 2009). However, these studies have only considered workplace referents as the only source of social influence, and ignoring private referents, such as family or friends. Thus, future studies in this area are encouraged to consider further referent groups when aiming to frame social influence and its impacts in technology resistance research. Such studies should also account for potential differences in the context of the investigated technology (e.g. voluntary versus mandatory utilitarian versus hedonic technology), as well as individual differences, such as age, gender, tenure, and educational background, especially if there is a potential that these differences can influence the evaluation and attitude toward that investigated technology (Venkatesh & Morris, 2000).

6 Conclusion

A lack of unified conceptualization of technology resistance will impede scholarship in this area (Samhan & Joshi, 2015). This call for research highlighted the need for a deep and rich unified understanding of technology resistance. New perspectives of how and why technologies are being resisted may emerge when evaluating the resistance behaviour toward the technology itself rather than toward any other object of resistance such as change. Future research needs to pay attention to the different forms of resistance manifestation, the context in which resistance is being evaluated within, the object of resistance, and the potential antecedents that may predict resistance. Future researchers are encouraged to discuss how technology resistance may lead to different outcome variables by incorporating other potential outcomes, such as continuous commitment, turnover intentions, and job satisfaction, among others.

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