

# ARTICLES

Submitted 12.16.2016. Approved 08.08.2017

Evaluated through a double-blind review process. Guest Scientific Editor: Eduardo Diniz

Translated version

DOI: <http://dx.doi.org/10.1590/S0034-759020180105>

## PROCESS-BASED MODELLING OF THE INFORMATION SYSTEMS RESISTANCE PHENOMENON

*Modelagem processual do fenômeno da resistência a sistemas de informação*  
*Modelo procesual del fenómeno de resistencia a los sistemas de información*

### ABSTRACT

This article aims to propose a process-based modelling of the Information Systems resistance phenomenon. Accordingly, we wrote a literature review to categorize the main points set forth by the extant scientific texts relating to the process taxonomy: input, output, players, and the resistance phenomenon. Based on the modelling, this article provides theoretical implications in terms of improving the understanding of the phenomenon among academicians as well as practical and managerial suggestions related to its mitigation.

**KEYWORDS** | Information systems resistance, information system, information systems resistance process, information technology, model.

### RESUMO

*O presente artigo tem por objetivo propor a modelagem processual do fenômeno da resistência a sistemas de informação (SI). Para atingir esse objetivo, a partir de revisão de literatura acerca dessa temática, os principais pontos levantados nos artigos científicos analisados são categorizados segundo a taxonomia de processo: entradas, saídas, atores e o fenômeno da resistência. Ao final, como decorrência da modelagem processual proposta, são apresentadas as implicações acadêmicas e gerenciais derivadas deste trabalho, de modo que a resistência a SI seja mais bem compreendida pelos acadêmicos e mitigada pelos praticantes.*

**PALAVRAS-CHAVE** | Resistência a sistemas de informação, sistemas de informação, processo de resistência a sistemas de informação, tecnologia da informação, modelo.

### RESUMEN

*El presente artículo tiene como objetivo proponer el modelo procesual del fenómeno de resistencia a los sistemas de información (SI). Para alcanzar dicho objetivo, a partir de la revisión de literatura acerca de esa temática, los principales puntos planteados en los artículos científicos analizados son categorizados según la taxonomía del proceso: entradas, salidas, actores y fenómeno de resistencia. Finalmente, como resultado del modelo procesual propuesto, se presentan las implicaciones académicas y gerenciales derivadas de este trabajo, de modo que la resistencia a los SI sea mejor comprendida por los académicos y mitigada por los practicantes.*

**PALABRAS CLAVE** | Resistencia a los sistemas de información, sistemas de información, proceso de resistencia a los si, tecnología de la información, modelo.

ATILA ALVES INDALECIO<sup>1,2</sup>

atila.indalecio@uss.br

ORCID: 0000-0002-1432-2743

LUIZ ANTONIO JOIA<sup>1</sup>

luiz.joia@fgv.br

ORCID: 0000-0002-5903-5190

<sup>1</sup>Fundação Getúlio Vargas, Escola Brasileira de Administração Pública e de Empresas - Rio de Janeiro - RJ, Brazil

<sup>2</sup>Universidade Severino Sombra - Vassouras - RJ, Brazil

## INTRODUCTION

The information technology (IT) market in Brazil was worth 60 billion dollars in 2014, placing it in the seventh position in the world in terms of investment in this sector, and first in Latin America (ABES, 2015). The world market corresponds to about 2.09 trillion dollars, broken down as 49% in hardware, 20% in software, and 31% in IT-related services (Associação Brasileira das Empresas de Software [ABES], 2015). In addition, growth in IT investment in Brazil—6.7% from 2013 to 2014 (ABES, 2015)—shows that companies are continuing to invest in technology. However, the benefits of investing in information systems (IS) are intangible, and there are conflicting positions on the actual return on IT expenditure (Im, Dow, & Grover, 2001; Karr-Wisniewski & Lu, 2010; Tambe & Hitt, 2012). Even more worrying is the fact that approximately 70% of the world's IS projects fail in their implementation (Fortune & Peters, 2005). Because IT investment depends on structures and organizational culture to be effectively received and used (Engelbert & Graeml, 2013), an understanding of information systems resistance (ISR)—defined as “behaviors intended to prevent the implementation or use of a system or to prevent system designers from achieving their objectives” (Markus, 1983, p.2)—is critical for IT investment to generate positive returns.

In 1977, Bostrom and Heinen (1977) began their reflections on the phenomenon of ISR. Nonetheless, to date, the discussion of the problem appears to revolve mainly around its causes, as initially identified by Lin (1994) more than 20 years ago. However, as an organizational phenomenon, it is necessary that ISR be treated as a cognitive process, endowed with context, actors, activities, and temporariness (Bloom, Garicano, Sadun, & Reenen, 2014; Ericsson & Simon, 1980).

Based on this premise, the present work aims to develop a procedural modeling of the ISR phenomenon, from its emergence to its final consequences, by mapping its context, actors, activities, and temporariness. Therefore, we carried out a review of the literature on this subject, analyzing its main objectives and contributions. Then, through the basic components of the process, a procedural modeling is proposed. Thus, the research question of this article is as follows: How does the process of resistance to IS develop in organizations?

Accordingly, from an academic viewpoint, we intend this material presented here to fill a gap concerning the understanding of ISR as an evolving temporal process, and not just as a phenomenon derived from critical factors. In addition, from a managerial point of view, this work aims to provide practitioners with an integrated and systemic vision of what should be done to avoid, or at least mitigate, ISR in organizations.

## METHODOLOGICAL APPROACH

This article is of a theoretical-exploratory nature. In order to propose a procedural modeling of the ISR phenomenon, we started with a bibliographic search on the topic of resistance to IS, and developed a theoretical triangulation of the conceptual approaches (Patton, 2002; Scandura & Williams, 2000; Yin, 2005).

Initially, we carried out a literature review on the evolution of the concept of resistance to IS presented in the following section, based on bibliographical research of articles published in scientific journals, as well as theses and dissertations (Webster & Watson, 2002).

Our deepened understanding of the topic based on this research allowed us to critically reflect on the analyzed approaches. In this manner, we could identify the patterns of similarity and contradictions existing between them, and propose a procedural modeling of the phenomenon of resistance to IS.

For the critical analysis of the articles studied, we employed the principle of triangulation (Patton, 2002; Yin, 2005). In the social sciences, triangulation can be defined as a research strategy based on the use of several approaches to investigate the same phenomenon (Vergara, 2004). Thus, triangulation can be adopted to obtain new perspectives related to the object being studied (Vergara, 2004).

In particular, in the present article, we adopted this triangulation approach (Patton, 2002; Vergara, 2004; Yin, 2005) to analyze and compare the different theoretical perspectives of each ISR article studied, with the aim of generating a procedural model.

Our theoretical review for this article identified papers published in the major journals in the IS field, both nationally and internationally, and is based on the recommendations of Webster and Watson (2002). Globally, we included eight periodicals proposed by the Association for Information Systems (AIS): *European Journal of Information Systems*, *Information Systems Journal*, *Information Systems Research*, *Journal of AIS*, *Journal of Information Technology*, *Journal of MIS*, *Journal of Strategic Information Systems*, and *MIS Quarterly*. Regarding the national journals, we chose those listed in Qualis in the Administration area with the A2 classification, because this is the highest ranking of journals in the area at the time of writing this article. From this journal sample, we selected all the articles dealing with ISR. We then analyzed the references found in these articles, highlighting those that deserved inclusion in the discussion on the theme, regardless of periodical, author, geographical region, or even the field of specific knowledge (Webster & Watson 2002). Finally, we searched for works that cited the abovementioned references, determining which of them could provide additional contributions (Webster & Watson 2002). The search for plotting the

timeline of ISR publications (see Figure 1 below) was only finalized when the repeated execution of the procedure described above provided similar results (Levy & Ellis, 2006).

## TIMELINE OF THE CONCEPT OF RESISTANCE TO INFORMATION SYSTEMS

In the early days of computer use in companies, Gale (1968) discussed the pitfalls associated with IS implantation. According to Gale (1968), many organizations were excited about having computers that would help in decision-making, store important information, and work as a solution to various organizational problems. However, their use was still limited, and a return on investment was rarely achieved.

Among the factors cited by Gale (1968) for failures in IS implementation were efforts focused on computers rather than users, incorrect definition of the system users and their demands, deployment management errors, failure to communicate the purpose of the system, failure to analyze the impact of the system on power relations in the organization, and failure to understand the complexity of implementing a new system.

Based on research cited earlier, Kling wrote an article considered by many to be the basis of what was beginning to be called “social informatics”, that is, “the interdisciplinary study of the design, uses, and consequences of information technologies that takes into account their interaction with institutional and cultural contexts.” (Kling, 1999, p.1).

In a seminal paper, Kling (1980) proposed dividing the impacts of computing in society into two approaches: systems rationalism and segmented institutionalism. The first approach seeks to ascertain the impacts generated by information and communication technology from an optimistic point of view, verifying the benefits that computational capacity can bring to the everyday life of people and organizations. Segmented institutionalism verifies the legitimate and illegitimate aspects of the use of computational technologies, taking into account mimetic behaviors, status, and credibility. It assumes a much more critical position by analyzing impacts on equity, quality of life, and economic change.

In a metaphor suggested by Kling (1980), information systems should be compared to a “package” rather than a “tool,” because a package includes much more than a simple device, being an ecosystem of processes and structures that, embedded in complex systems of social relations, promote innumerable interactions of different magnitudes at all organizational levels, transforming themselves into a social object.

The questions posed by Kling (1980) led Markus (1983) to produce one of the earliest studies dealing with the phenomenon of system resistance as a byproduct of the interaction of a new technology with the organizational environment. According to Markus (1983), it is necessary to discuss the reason for the ISR; that is, to understand the possible origins of the resistive behavior. These origins are identified by the author as the individual or group, the system itself, and/or the user’s interaction with the system in the organizational context.

Individuals alone or the group of individuals that make up the organization have characteristics and idiosyncrasies that lead to resistant behavior, either because of fear of change, cognitive mechanisms, risk aversion, or even fear of obsolescence (Markus, 1983). Furthermore, an approach that places an emphasis on the characteristics of the system itself can generate resistive behavior, owing to the perception that the system is not friendly, useful, and/or efficient. Finally, the interaction between the user and the system can lead to resistance through a centralization or decentralization of power and a change in the working relationship. In any case, the introduction of IS leads to changes, and “the greater the implied change, the more likely the resistance.” (Markus, 1983, p. 2).

Resistance or resistive behavior to IS is defined by Markus as “behaviors intended to prevent the implementation or use of a system or to prevent system designers from achieving their objectives” (Markus, 1983, p. 2). According to Markus (1983), owing to this definition, ISR should not always be seen as a bad result, because it cannot be assumed that the objectives of the system or those implementing it are always good.

In fact, later studies, such as Bagayogo, Beaudry, and Lapointe (2013), emphasized the importance of not always conceptualizing ISR as bad, nor accepting it as always good, because a user can have the perception that a new IS may not be aligned with organizational goals and strategies.

Markus (1983) concludes her work with a series of suggestions on how to deal with resistance to IS in each of the different presented contexts. From the user’s point of view, she recommends focusing on user training and education, a coercive and persuasive practice of system use, and reinforcement through incentives for participation and commitment to the system. From the system’s point of view, she proposes that the IS developers and implementers undergo training in order to competently manage the organizational modifications resulting from the installation of the new system. Finally, faced with the organizational impact generated by its implementation, a strong emphasis is given to the interactionist approach, whereby all possible weak points in the organization need to be addressed prior to the implementation of a new IS. Furthermore, Markus (1983) draws attention to the need

to restructure user incentive mechanisms, making clear what is expected of them and the importance of their collaboration for the adequate implementation of the IS.

Hirschheim and Newman (1988) in turn demonstrate the complexity of the phenomenon of IS resistance in the organizational environment. For the authors, ISR cannot be seen as a rigid concept, and must be considered within a spectrum that can range from the physical sabotage of the system to its simple “non-use”. Furthermore, IS resistance cannot be treated as a totally new type of resistance, but rather as a variant of the diverse types of resistance already addressed in the field of organizational change.

Thus, basing their argument on organizational change theories, Hirschheim and Newman (1988) identified the following fundamental causes for IS resistance behavior. (a) Innate conservatism: resistance occurs because people are naturally risk-averse, and therefore will resist any interference that affects their *status quo*; (b) lack of felt need: the individual does not perceive the change as necessary; (c) uncertainty: the fear associated with the impacts caused by change, such as loss of job, friends, or performance; (d) lack of involvement in the change: an individual resists change because he or she has not been consulted about the change process itself; (e) redistribution of resources: change in the manner in which fundamental resources such as influence, workload, territory, and information will be distributed in the organization after the implementation of the new IS; (f) organizational invalidity: lack of congruence between the organizational objectives and the characteristics of the system; (g) lack of management support: the leader does not promote the necessary tranquility and encouragement during the various phases of change; (h) poor technical quality: the new information system fails in its characteristics, not being friendly, reliable, functional, or fast; (i) personal characteristics of the designer: source of resistance that occurs when those responsible for the development and implementation of the system sound unfriendly to users, due to excessive technicality, lack of empathy, and/or superiority.

Because the phenomenon of resistance presents itself in a complex manner, Hirschheim and Newman (1988) recommend an in-depth analysis of political and social processes for the successful implementation of a new IS.

Corroborating their view, the first article of Joshi (1997) on IS resistance argues that the phenomenon is not simple, it is not always negative, and its occurrence depends very much on the political and social conditions of organizations. Joshi's (1997) studies are based on equity theory, according to which ISR is born, or not, as a by-product of an evaluation process that occurs on three levels. First, the user evaluates the perceived personal losses and gains arising from the system change. Second, he or she

compares the relative result (the relationship between their effort and respective outcome) to the relative result of the organization. Finally, the user analyzes their relative result with that of the members of their reference group. If, after these comparisons, there is a perceived equity or advantage, then the change will not suffer resistance, even if it is of considerable magnitude or impact. However, on perceiving inequity the user will present resistance, even with changes that are small and of little impact.

Research developed by Martinko, Zmud, and Henry (1996) showed similar results, demonstrating that a user's previous experiences can both incite greater resistance to a new IS if negative, as well as reduce their resistance when positive. In addition, Martinko et al. (1996) reinforced the findings of previous authors by affirming that preexisting political-social characteristics are strong determinants of IS resistance behavior.

Until then, many studies had treated ISR as the final product of the system implementation (Coetsee, 1999, Joshi 1997, Marakas & Hornik 1996, Zorn 2002). That is, these articles focused on the investigation of the factors causing the ISR phenomenon. Beaudry and Pinsonneault (2005) modified this perspective by analyzing resistance as a process, with a beginning, middle, and end. In particular, they focused on the stage of the process in which users, perceiving a stimulus to resistance, choose between four adaptation strategies: maximization of benefits, satisficing of benefits, disturbance handling, and self-preservation (Beaudry & Pinsonneault, 2005). The results of these strategies can be to restore emotional stability, to minimize the perceived threats of the technology, and/or to improve user effectiveness and efficiency.

Although IS resistance had been researched prior to 2005 by several authors, directly or indirectly, the article published by Lapointe and Rivard (2005) is one of the most referenced in the field, and therefore deserves prominence in the research timeline. Lapointe and Rivard (2005) used a multilevel approach, seeking to understand the mechanisms of resistance at both the individual and group levels. For the authors, ISR should be observed and analyzed based on the object of resistance, the initial conditions, the interaction among those involved, the perceived threats, the type of resistance behavior adopted, and the level where the resistance occurs.

The results suggest that IS resistance is an unstable behavior that is sensitive to the presence of multiple incentives and varies in nature and intensity throughout the implementation, at first under the compulsion of individuals, but *a posteriori* also of groups (Lapointe & Rivard, 2005). The case studies analyzed by Lapointe and Rivard (2005) demonstrate that there are triggers that move resistance behavior from the individual level to the group level, comprising a kind of identification of common losses among the components of a group.

Although approaches to IS resistance have long contributed to the development of the subject, there has been little theorizing regarding behavior models explicitly developed to understand the varied perspectives of the user. Thus, recognizing the importance and relevance of Markus's (1983) approach, Joia (2007) developed a theoretical model of ISR, applying it to a multiple case study of an intra-organizational system (IOS) implementation between Brazil's Central Bank and Federal Senate, known as BacenSenado.

According to the proposed model, Joia (2007), based on Markus (1983), concluded that ISR occurs through three distinct approaches: people-based, IS-based, and interactionist based, with the latter subdivided into a socio-technical variant and a political variant. The implementation of BacenSenado was troubled, and the deployed system was effectively used for less than a year (Joia, 2007).

According to Joia (2007), several problems led to the resistance of senators to the use of the IS, such as a lack of user training, a lack of system flexibility, and problems of power distribution between organs. The analysis of the problems led to the proposal of three factors for the successful implementation of electronic systems of the government-government type (G2G): (a) security: ensuring that data is circulated and consulted in a secure and reliable manner; (b) organizational environment: analyzing the culture, values, and identity of the organization for the suitability of the IS, and (c) training: ensuring that users have the necessary support to adapt to the new technologies and processes.

In addition, arguing that ISR occurs when the user perceives a breach of the psychological contract between themselves and the organization, Klaus and Blanton (2010) proposed a new model antecedent to ISR, in which they expanded on the work of Markus (1983).

Returning to the importance of the IS implementers, Rivard and Lapointe (2012) proposed a taxonomy of the responses that these agents give in identifying a resistive behavior. According to the authors, there are four response categories, as shown in Exhibit 1.

In addition to the presented taxonomy, Rivard and Lapointe (2012) suggest through the results of a case study that from the possible reactions, the implementers only reduce ISR when they adopt the posture of congruent rectification or dissuasion, provided that the latter is believable.

Next, to better visualize the evolution of the ISR concept and to produce Figure 1, we identified the volume of articles published over time, as well as the chronological sequence in which they were published. In this figure, we can see a clear boost in ISR publications following the works of Markus (1983) and Lapointe and Rivard (2005), both recognized as outstanding articles, including their numbers of citations: 2,645 and 884, respectively, according to Google Scholar.

Exhibit 1. Taxonomy of responses to information system resistance

Response category		Description of implementer behavior
Inaction	Unawareness	Seeing no reason to do anything
	Deliberate ignorance	Not caring, <i>laissez-faire</i>
	Impotence	Feeling unable to do anything
Acknowledgment		Discussing problems, collecting data
Rectification	Congruent	Redesigning the system, training, making concessions
	Non-congruent	Fixing the system, providing explanations, adding personell
Dissuasion	Coercion	Forcing use by threatening users
	Authoritative persuasion	Reprimanding users or mandating use
	Supportive persuasion	Convince with reasons and explanations

Source: Adapted from Rivard and Lapointe (2012, p. 25).

## COMPONENTS OF THE ISR PROCESS ACCORDING TO THE SCIENTIFIC LITERATURE

Markus and Robey (1988) classified the logical structure of scientific studies into two types: process-based or variance-based. The latter type focuses on variations in the event under analysis arising from the interaction between various phenomena. That is, it analyzes the relationships between the perceived phenomena, as well as the factors that caused these variations. In other words:

1. given a variation in A,
2. what factors (B, C...K) can be linked to the first (by the respective interaction),
3. so that the variance in A can be linked to the variations in the factors (B, C,...K)? (Dubin, 1978, p. 92).

The process-based structure analyzes and investigates the temporal order associated with a series of discrete events, based on a story, case, or historical narrative (Huber & Veen, 1995, p. 7).

Thus, because this article aims to develop a holistic approach to the ISR phenomenon, we sought to classify the researched scientific studies in terms of the stage and actors of the appropriate IS resistance process.



## Exhibit 2. Selected papers in the bibliographic review

Publication	Actors	Inputs	ISR Devel.	Outputs
Gale (1968)		X		
Bariff and Galbraith (1978)			X	X
Kling (1980)			X	X
Markus (1983)	X	X	X	
Hirschheim and Newman (1988)		X		
Joshi (1997)	X	X		X
Markus and Keil (1994)				
Martinko et al. (1996)		X	X	
Marakas and Hornik (1996)		X		X
Markus and Benjamin (1996)	X		X	
Coetsee (1999)			X	X
Prasad and Prasad (2000)	X			X
Markus and Tanis (2000)		X		
Robey, Ross, and Boudreau (2002)		X	X	
Zorn (2002)	X	X		X
Cenfetelli (2004)		X		
Ash, Berg, and Coiera (2004)		X	X	
Gambôa, Caputo, and Brescian (2004)	X	X		
Lapointe and Rivard (2005)		X	X	
Joshi (2005)	X	X	X	
Pinsonneault and Beaudry (2005)	X	X	X	X
Boudreau and Robey (2005)		X	X	
Lapointe and Rivard (2006)	X		X	X
Ferneley and Sobreperez (2006)				X
Burton-Jones and Straub (2006)	X	X		
Davidson & Chismar (2007)	X	X		
Lapointe and Rivard (2007)	X	X	X	X
Joia (2007)	X	X	X	X
Azad and King (2008)	X	X	X	X
Joia and Magalhães (2009a)	X	X		
Kim and Kankanhalli (2009)	X	X		
Veenstra, Klievink, and Janssen (2009)	X	X		
Bruque, Moyano, and Eisenberg (2009)	X			
Beaudry and Pinsonneault (2010)	X	X	X	
Klaus and Blanton (2010)	X	X	X	X
Bartos et al. (2011)		X	X	X
Laumer (2011)	X	X		
Kane and Labianca (2011)		X		
Azad and King (2012)	X	X	X	X
Shang (2012)	X		X	X
Rivard and Lapointe (2012)	X		X	X
Fernandes, Joia, and Andrade (2012)	X	X	X	X
Fetzner and Freitas (2012)		X	X	X
Esteves and Alves (2013)	X	X		
Bagayogo et al. (2013)				X
Desmet and Parente (2014)		X	X	
Macêdo et al. (2014)	X	X		
Vinhais and Joia (2014)	X	X	X	X

According to Davenport (2013), a process is a set of activities structured in time and space, with the beginning, end, inputs, and outputs clearly defined. Based on this definition, the classification of the studies on ISR, in terms of the resistance stage of the process addressed, obeys the following taxonomy: (a) the actors involved in the process; (b) the process inputs, that is, their causes, origins, and antecedents; (c) the formation and development of ISR *per se*; (d) the process outputs, that is, the consequences and effects of the process, as well as a logical chain of activities in time and space.

Thus, using the fundamental components of a process as described by Davenport (2013), we classified the selected papers in the bibliographic review in terms of their main focus of research. The result is shown in Exhibit 2, and discussed below.

## PROCEDURAL MODELING OF THE ISR PHENOMENON

According to the main points presented in articles on this research topic, the present paper proposes a procedural modeling of the ISR phenomenon in order to describe the resistance process over time from its inception to its final consequences. The procedural modeling in question is composed of activities ( $A_i$ , where  $i$  = activity number) along with their relationships over time. These are presented in Figure 2, and the logic of their creation is explained below.

According to the presented theoretical review, ISR begins when the implementer informs the users that a new IS will be adopted to perform tasks in the organizational environment (Hirschheim & Newman, 1988; Joshi, 1997, 2005; Beaudry & Pinsonneault, 2005; Shang, 2012), characterized in the model as activity  $A_1$ .

From the activity  $A_1$ , and based on the information received in the IS presentation, the user evaluates the new system ( $A_2$ ) (Klaus & Blanton, 2010; Macêdo, Gaete, & Joia, 2014; Markus, 1983).

Thus, through self-reflection the user evaluates their personal and idiosyncratic characteristics, and their compatibility with the IS, constituting  $A_3$  (Hirschheim & Newman, 1988; Joia, 2007; Joia & Magalhães, 2009b; Kim & Kankanhalli, 2009; Macedo et al., 2014; Zorn, 2002). Within this “individual” category are found risk aversion ( $A_{3a}$ ) (Hirschheim & Newman, 1988; Joia, 2007; Joia & Magalhães, 2009a; Kim & Kankanhalli, 2009; Zorn, 2002), culture of use ( $A_{3b}$ ) (Esteves & Alves, 2013; Hirschheim & Newman, 1988; Joia & Costa, 2007), previous experiences ( $A_{3c}$ ) (Martinko et al., 1996), and expectations and comparisons ( $A_{3d}$ ) (Joshi, 1997, 2005).

In addition, the user evaluates the characteristics of the system ( $A_4$ )—the second source of ISR—analyzing its user-friendliness ( $A_{4a}$ ) (Hirschheim & Newman, 1988; Joia, 2007; Joia & Magalhães, 2009b; Beaudry & Pinsonneault, 2005; Shang, 2012), data security ( $A_{4b}$ ) (Hirschheim & Newman, 1988; Joia, 2007; Joia & Magalhães, 2009a), and the adherence of the IS to the objectives of the organization ( $A_{4c}$ ) (Hirschheim & Newman, 1988, Kim & Kankanhalli, 2009; Esteves & Alves 2013; Bagayogo et al., 2013).

Simultaneously to the previous evaluations, the user assesses the third and fourth sources of ISR, namely their political impact ( $A_5$ )—the possible changes in intraorganizational power distribution (Markus, 1983)—and the socio-technical impact, triggered by the evaluation of the effort undertaken to perform a job before and after the new system is introduced ( $A_6$ ).

To evaluate  $A_5$ , the user analyzes the direct impact of the deployment and use of the IS on the organizational *status quo* ( $A_{5a}$ ) (Kim & Kankanhalli, 2009).

For the evaluation of  $A_6$ , the user compares the amount of effort employed in the work against the reward received for the resultant work before and after the implementation of the new IS ( $A_{6a}$ ) (Joshi, 1997), as well as evaluating their effort compared to other members of their working group before and after the implementation of the new IS ( $A_{6b}$ ) (Joshi, 2005).

The result of all these inputs for the user is the definition of their attitude regarding the new IS ( $A_7$ ) (Marakas & Hornik, 1996; Markus, 1983; Beaudry & Pinsonneault, 2005; Vinhais & Joia, 2014; Zorn, 2002). However, because humans are gregarious beings, their attitude toward behavior is not part of an individual and rational system of decision-making, but rather of a complex system of social relations (Elster, 1989). Therefore, the attitude of an individual to the IS will also depend on how this same system is perceived by their peers ( $A_8$ ) (Bartos, Butler, & Crowley, 2011; Lapointe & Rivard, 2007). Thus, an individual who is positive toward a given IS may change his or her attitude owing to the negative force of the collective consciousness, or vice versa (Bartos et al., 2011; Lapointe & Rivard, 2007). Once a group’s positive perception of the system has been aroused, the resistance to the IS will be low or non-existent ( $A_9$ ), leading to the appropriate use of the system ( $A_{10}$ ) (Bartos et al., 2011). On the other hand, if there is a negative group perception of the system, the formation of what Lapointe and Rivard (2007) call group resistance ( $A_{11}$ ) occurs. Thus, when a group perceives that as a whole it will lose out in the redistribution of power from the new IS, its components organize themselves to resist it ( $A_{12}$ ) (Lapointe & Rivard, 2007).

Once the user’s resistance to the IS has been verified ( $A_{12}$ ), the role of the system implementer becomes relevant. He



or she has the possibility to identify and characterize the ISR (Lapointe & Rivard, 2006), and to work to mitigate it (Markus, 1983) by identifying powerful stakeholders and involving them in the process of using the system (Lapointe & Rivard, 2007). In this case (A13), coping with the resistance to the IS involves the recognition and acceptance of the problem (A13a), the rectification of the system (A13b), or the dissuasion of the users (A13c) (Rivard & Lapointe, 2012). The action of the implementer can significantly impact the attitude of the user (A7) and the group (A8) to the IS. By obtaining a positive perception of the IS, the level of resistance can decrease or disappear completely, thereby mitigating the resistance (A9). However, despite the performance of the implementer, the individual and the group may maintain a negative perception and a continued resistance to the IS (A12). In this situation, the implementer may once again choose to try to identify and mitigate the ISR, following a flow similar to the one presented here, or opt to no longer interfere with the IS. Once the implementer has decided on the latter option, the ISR remains at a medium (A14) or high (A16) level, which will move the process forward even with resistance.

Once the user develops a medium resistance to the IS, an apparent acceptance and use of the system is identified. That is, the user claims to be in agreement with the system, while developing a veiled resistance to it (Ferneley & Sobreprez, 2006). This hidden resistance usually translates into a workaround behavior, understood as inappropriate use (disguised as proper use) of the IS (A14) (Alter, 2004; Ferneley & Sobreprez, 2006). In this case, the implementation of the IS achieves lower results than initially anticipated (A15).

Finally, when a high level of resistance to the information system develops, what Marakas and Hornik (1996), Baudery and Pinsonneault (2005) and Lapointe and Rivard (2005) describe as destructive behavior (A16) can occur. This behavior is expressed by incorrect data entry, data destruction, uninstallation of the system, and all types of sabotage that could invalidate the IS, making its continued use in the organization impossible (Marakas & Hornik, 1996; Beaudry & Pinsonneault, 2005). In this case, the IS deployment is a failure, and the system is uninstalled (A17).

After these three outputs associated with the implementation of the IS (A10, A15, A17), the process comes to an end (A18).

Figure 2 consolidates the above discussion through a procedural modeling, showing how the ISR phenomenon develops over time among the various actors involved.

Finally, in Exhibit 3, the activities (Ai) listed in the procedural modeling proposed in Figure 2 are related to the presented theoretical reference.

In this manner, the objective of the work is achieved, leaving only the presentation of the final conclusions of this research.

## CONCLUSION

The present article aimed to develop a procedural model of the ISR phenomenon over time, considering both work that preceded and justified the birth of the concept and the most recent discussions on the subject.

Figure 1 visually depicts the extent to which the ISR concept has evolved, leading to a yearly increase in the number of scientific publications on this topic. In addition, the analysis of these articles identified an approach primarily focused on the actors and antecedents of ISR. The fact that the majority of the analyzed articles address ISR as the final product, rather than as a process (see Exhibit 2), justified the construction of a procedural modeling that explained the antecedents, paths, and interactions associated with the ISR phenomenon, as well as its interaction with other actors such as groups and the team responsible for implementing the system.

Thus, this article generates the following academic and organizational implications.

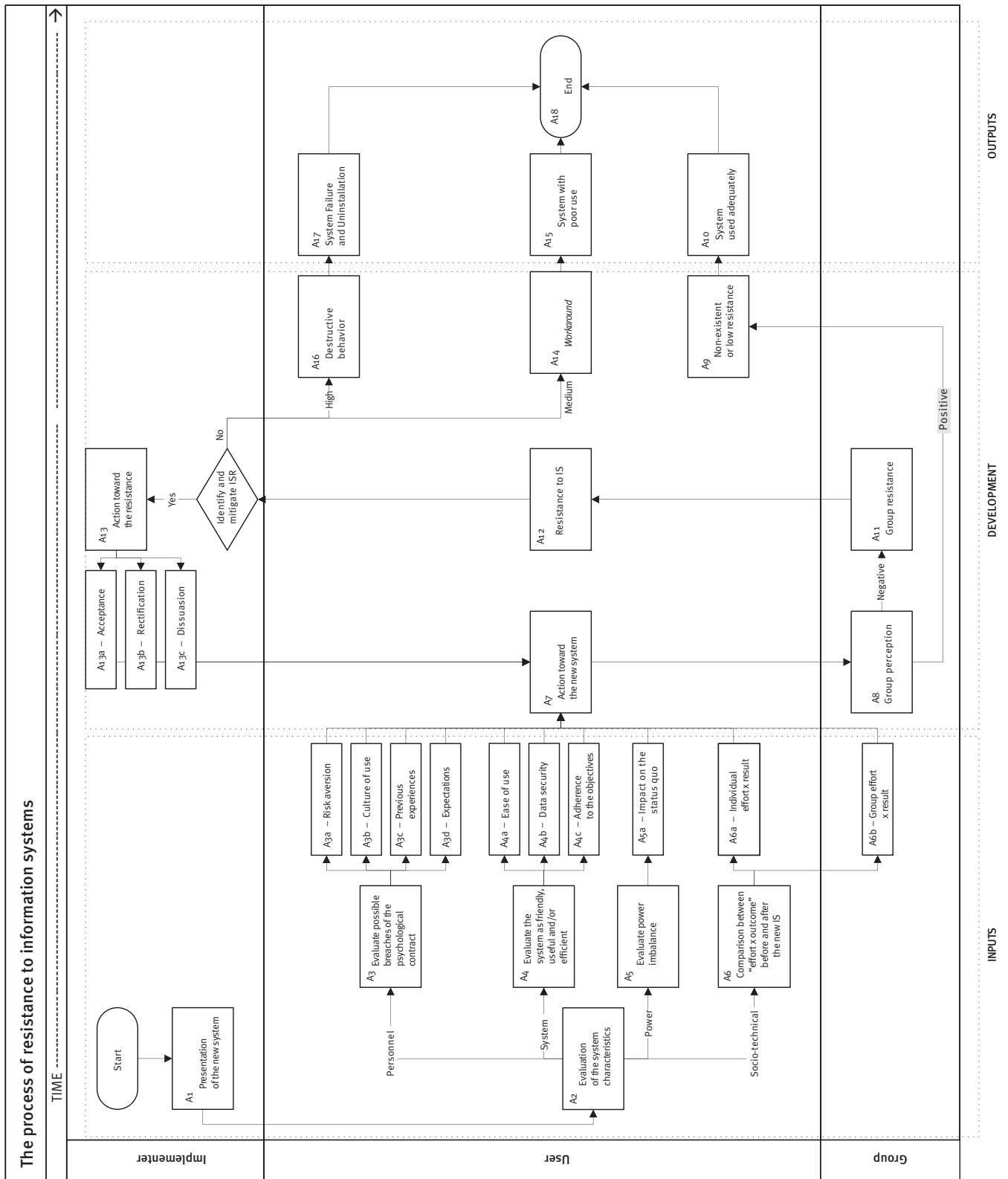
From an academic point of view, this paper strives to advance scientific knowledge in the ISR field by presenting a procedural approach that can be expanded, applied, discussed, and tested.

From a managerial perspective, the present paper provides insights for managers and practitioners, provoking them to reflect on the implementation process and their role, as well as that of the user, in this enterprise, whether as client, agent, or object of organizational change resulting from the IS deployment.

However, this work presents various limitations, as explained below. Although we have exhaustively searched for the principal articles on ISR, involuntary omissions may have occurred. In addition, although the articles have gone through a process of categorization according to the phases of the resistance process, as well as the triangulation of their approaches, the development of the procedural modeling follows an inductive logic, indicating that this exploratory modeling must be validated *vis-à-vis* concrete ISR examples.

An exact understanding of the ISR phenomenon continues to challenge both academics and practitioners, especially in a society increasingly dependent on ICT. However, we believe that this work has succeeded in introducing new theoretical perspectives to the complex process of the formation of resistance to information systems in organizations.

Figure 2. Process modeling of the resistance to information systems



## Exhibit 3. Activities and theoretical bases

Code	Activity	Theoretical base
A1	System presentation	Hirschheim and Newman (1988); Joshi (1997, 2005); Pinsonneault and Beaudry (2005); Shang (2012)
A2	Evaluation of system characteristics	Markus, 1983; Klaus and Blanton, 2010; Macêdo et al., 2014
A3	Evaluates possible breaches of the psychological contract	Hirschheim and Newman (1988); Zorn (2002); Joia (2007); Joia and Magalhães (2009b); Kim and Kankanhalli (2009); Macêdo et al. (2014)
A4	Evaluates the system as friendly, useful and / or efficient	Hirschheim and Newman, (1988); Joia (2007); Joia and Magalhães (2009b); Joia (2007); Pinsonneault and Beaudry (2005); Shang (2012); Magalhães (2009); Kim and Kankanhalli (2009); Esteves and Alves (2013); Bagayogo et al. (2013)
A5	Evaluates power imbalance	Markus (1983)
A6	Comparison between “effort x result” before and after the new IS	Joshi (1997, 2005)
A7	Attitude in relation to the new IS	Markus (1983); Marakas and Hornik (1996); Zorn (2002); Pinsonneault and Beaudry (2005); Vinhais and Joia (2014)
A8	Group perception	Bartos et al. (2011); Lapointe and Rivard (2007)
A9	Non-existent or low resistance	Bartos et al. (2011)
A10	System used adequately	Bartos et al. (2011)
A11	Group resistance	Lapointe and Rivard (2007)
A12	Resistance to IS	Markus (1983); Lapointe and Rivard (2007)
A13	Attitude in relation to the resistance	Lapointe and Rivard (2006); Markus (1983)
A14	Workaround	Ferneley and Sobreperéz (2006)
A15	System with poor use	Ferneley and Sobreperéz (2006)
A16	Destructive behavior	Marakas and Hornik (1996); Pinsonneault and Baudery (2005); Lapointe and Rivard (2005)
A17	System Failure and Uninstallation	Marakas and Hornik (1996); Pinsonneault and Beaudry (2005)
A18	End	Markus (1983); Lapointe and Rivard (2007); Ferneley and Sobreperéz (2006); Marakas and Hornik (1996); Pinsonneault and Baudery (2005)

## REFERÊNCIAS

- Alter, S. (2004). Theory of workarounds. *Communications of the Association for Information Systems*, 34(55), 1041. Retrieved from <http://aisel.aisnet.org>
- Ash, J. S., Berg, M., & Coiera, E. (2004). Some unintended consequences of information technology in health care: The nature of patient care information system-related errors. *Journal of the American Medical Informatics Association: JAMIA*, 11(2), 104-112.
- Associação Brasileira das Empresas de Software. (2015). *Mercado brasileiro de software: Panorama e tendências*. São Paulo, SP: ABES – Associação Brasileira das Empresas de Software.
- Azad, B., & King, N. (2008). Enacting computer workaround practices within a medication dispensing system. *European Journal of Information Systems*, 17(3), 264-278. doi:10.1057/ejis.2008.14
- Azad, B., & King, N. (2012). Institutionalized computer workaround practices in a Mediterranean country: An examination of two organizations. *European Journal of Information Systems*, 21(4), 358-372. doi:10.1057/ejis.2011.48
- Bagayogo, F., Beaudry, A., & Lapointe, L. (2013). Impacts of IT acceptance and resistance behaviors: A novel framework. *ICIS proceedings*, Milan, Spain. Retrieved from <http://aisel.aisnet.org/icis/>
- Bariff, M. L., & Galbraith, J. R. (1978). Intraorganizational power considerations for designing information systems. *Accounting, Organizations and Society*, 3(1), 15-27. doi:10.1016/0361-3682(78)90004-1
- Bartos, C. E., Butler, B. S., & Crowley, R. S. (2011). Ranked levels of influence model: Selecting influence techniques to minimize IT resistance. *Journal of Biomedical Informatics*, 44(3), 497-504. doi:10.1016/j.jbi.2010.02.007
- Beaudry, A., & Pinsonneault, A. (2005). Understanding user responses to information technology: A coping model of user adaptation. *MIS Quarterly*, 29(3), 493-524. doi:10.2307/25148693
- Beaudry, A., & Pinsonneault, A. (2010). The other side of acceptance: Studying the direct and indirect effects of emotions on information technology use. *MIS Quarterly*, 34(4), 689-710. doi:10.2307/25750701
- Bloom, N., Garicano, L., Sadun, R., & Reenen, J. Van. (2014). The distinct effects of information technology and communication technology on firm organization. *Management Science*, 60(12), 2859-2885. doi:10.1287/mnsc.2014.2013
- Bostrom, R. P., & Heinen, J. S. (1977). MIS problems and failures: A socio-technical perspective part II: The application of theory. *MIS Quarterly*, 1(4), 11-28. doi:10.2307/249019
- Boudreau, M., & Robey, D. (2005). Enacting integrated information technology: A human agency perspective. *Organization Science*, 16(1), 3-18. doi:10.1287/orsc.1040.0103
- Bruque, S., Moyano, J., & Eisenberg, J. (2009). Individual adaptation to IT-induced change: The role of social networks. *Journal of Management Information Systems*, 25(3), 177-206. doi:10.2753/MIS0742-1222250305
- Burton-Jones, A., & Straub, D. W. (2006). Reconceptualizing system usage: An approach and empirical test. *Information Systems Research*, 17(3), 228-246. doi:10.1287/isre.1060.0096
- Cenfetelli, R. T. (2014). Inhibitors and enablers as dual factor concepts in technology usage. *Journal of the Association for Information Systems*, 5(11/12), 472-492.
- Coetsee, L. (1999). From resistance to commitment. *Public Administration Quarterly*, 23(2), 204-222.
- Computer History Museum. (2016). Timeline of computer history: Software & languages entries. Retrieved from <http://www.computerhistory.org/timeline/?category=sl>
- Davenport, T. H. (2013). *Process innovation: Reengineering work through information technology*. Boston, USA: Harvard Business Press.
- Davidson, E. J., & Chismar, W. G. (2007). The interaction of institutionally triggered and technology-triggered social structure change: An investigation of computerized physician order entry. *MIS Quarterly*, 31(4), 739-758.
- Desmet, K., & Parente, S. L. (2014). Resistance to technology adoption: The rise and decline of guilds. *Review of Economic Dynamics*, 17(3), 437-458. doi:10.1016/j.red.2013.09.005
- Dubin, R. (1978). *Theory building*. London, UK: Free Press.
- Elster, J. (1989). *Nuts and bolts for the social sciences* (pp. 32-33). Cambridge, USA: Cambridge University Press.
- Engelbert, R., & Graeml, A. R. (2013). Use of information technology in mandatory settings: A proposal for an objective view of appropriation. *AIMCIS proceedings*, Chicago, Illinois. Retrieved from <http://aisel.aisnet.org/amcis/>
- Ericsson, K. A., & Simon, H. A. (1980). Verbal reports as data. *Psychological Review*, 87(3), 215-251. doi:10.1037/0033-295X.87.3.215
- Esteves, R., & Alves, P. (2013). Implementation of an information technology infrastructure library process: The resistance to change. *Procedia Technology*, 9, 505-510. doi:10.1016/j.protcy.2013.12.056
- Fernandes, C., Joia, L. A., & Andrade, A. (2012). Resistência à implementação de sistemas de folha de pagamento na administração pública: Um estudo multicase. *Organizações & Sociedade*, 19(60), 145-164.
- Ferneley, E., & Sobreperez, P. (2006). Resist, comply or workaround? An examination of different facets of user engagement with information systems. *European Journal of Information Systems*, 15(4), 345-356.
- Fetzner, M. A., & Freitas, H. M. R. (2012). Repensando questões sobre mudança, afeto e resistência na implementação de SI. *Revista Eletrônica de Administração*, 18(1), 1-26.
- Fortune, J., & Peters, G. (2005). *Information systems: Achieving success by avoiding failure*. New York, USA: John Wiley & Sons, Ltd.
- Gale, J. R. (1968). Why management information systems fail. *Management Review*, 57(11), 1.
- Gambôa, F., Caputo, M., & Bresciani, E., Filho. (2004). Método para gestão de riscos em implementações de sistemas ERP baseado em fatores críticos de sucesso. *Revista de Gestão da Tecnologia e Sistemas de Informação*, 1(1), 45-62. doi:10.1590/S1807-17752004000100004
- Hirschheim, R., & Newman, M. (1988). Information systems and user resistance: Theory and practice. *The Computer Journal*, 31(5), 398-408. doi:10.1093/comjnl/31.5.398

- Huber, G., & Veen, A. Van de. (1995). *Longitudinal field research methods*. Thousand Oaks, USA: Sage Publications.
- Im, K. S., Dow, K. E., & Grover, V. (2001). Research report: A reexamination of IT investment and the market value of the firm – An event study methodology. *Information Systems Research*, 12(1), 103-117. doi:10.1287/isre.12.1.103.9718
- Joia, L. A. (2007). Sources of resistance to G2G endeavors: Evidence from a case study in the Brazilian context. *Information Technology for Development*, 13(3), 233-251. doi:10.1002/itdj.20072
- Joia, L. A., & Costa, M. F. C. (2007). Fatores-chave de sucesso no treinamento corporativo a distância via web. *RAP-Revista de Administração Pública*, 41(4), 607-637. doi:10.1590/S0034-76122007000400002
- Joia, L. A., & Magalhães, C. (2009a). Evidências empíricas da resistência à implantação de prescrição eletrônica: Uma análise explano-exploratória. *RAC-Eletrônica*, 3(1), 81-104.
- Joia, L. A., & Magalhães, C. (2009b). Implementation of an electronic prescription system in a Brazilian general hospital: Understanding sources of resistance. *Electronic Journal of Information Systems in Developing Countries*, 39(2), 1-18.
- Joshi, K. (1997). A model of users' perspective on change: The case of information systems technology implementation. *MIS Quarterly*, 15(2), 229-242. doi:10.2307/249384
- Joshi, K. (2005). Understanding user resistance and acceptance during the implementation of an order management system: A case study using the equity implementation model. *Journal of Information Technology Case & Application Research*, 7(1), 6-20. doi:10.1080/15228053.2005.10856057
- Kane, G. C., & Labianca, G. (2011). IS avoidance in health-care groups: A multilevel investigation. *Information Systems Research*, 22(3), 504-522. doi:10.1287/isre.1100.0314
- Karr-Wisniewski, P., & Lu, Y. (2010). When more is too much: Operationalizing technology overload and exploring its impact on knowledge worker productivity. *Computers in Human Behavior*, 26(5), 1061-1072. doi:10.1016/j.chb.2010.03.008
- Kim, H., & Kankanhalli, A. (2009). Investigating user resistance to implementation: A status quo bias perspective. *MIS Quarterly*, 33(3), 567-582. doi:10.2307/20650309
- Klaus, T., & Blanton, J. E. (2010). User resistance determinants and the psychological contract in enterprise system implementations. *European Journal of Information Systems*, 19(6), 625-636. doi:10.1057/ejis.2010.39
- Kling, R. (1980). Social analyses of computing: Theoretical perspectives in recent empirical research. *ACM Computing Surveys*, 12(1), 61-110.
- Kling, R. (1999). What is social informatics and why does it matter? *D-Lib Magazine*, 5(1), 1-30.
- Lapointe, L., & Rivard, S. (2005). A multilevel model of resistance to information technology implementation. *MIS Quarterly*, 29(3), 461-491. doi:10.2307/25148692
- Lapointe, L., & Rivard, S. (2006). Getting physicians to accept new information technology: Insights from case studies. *CMAJ: Canadian Medical Association Journal/Journal de l'Association Médicale Canadienne*, 174(11), 1573-1578. doi:10.1503/cmaj.050281
- Lapointe, L., & Rivard, S. (2007). A triple take on information system implementation. *Organization Science*, 18(1), 89-107. doi:10.1287/orsc.1060.0225
- Laumer, S. (2011). Why do people reject technologies: A literature-based discussion of the phenomena "resistance to change" in information systems and managerial psychology research. *ECIS proceedings*. Retrieved from <http://aisel.aisnet.org/ecis2011/60/>
- Levy, Y., & Ellis, T. J. (2006). A systems approach to conduct an effective literature review in support of information systems research. *Informing Science Journal*, 9, 181-212. doi:10.28945/479
- Lin, T. C. (1994). An integrated model for user resistance to information system: The Taiwan case. *Journal of Information Technology Management*, 5(3), 47-58.
- Macêdo, D. G., Gaete, L., & Joia, L. A. (2014). Antecedentes à resistência a sistemas empresariais: A perspectiva de gestores brasileiros. *RAC-Revista de Administração Contemporânea*, 18(2), 139-160. doi:10.1590/S1415-65552014000200003
- Marakas, G. M., & Hornik, S. (1996). Passive resistance misuse: Overt support and covert recalcitrance in IS implementation. *European Journal of Information Systems*, 5(3), 208-219. doi:10.1057/ejis.1996.26
- Markus, M. L. (1983). Power, politics, and MIS implementation. *Communications of the ACM*, 26(6), 430-444.
- Markus, M. L., & Benjamin, R. I. (1996). Change agency: The next IS frontier. *MIS Quarterly*, 20(4), 385-407. doi:10.2307/249561
- Markus, M. L., & Keil, M. (1994). If we build it, they will come: Designing information systems that people want to use. *Sloan Management Review*, 35(4), 11. Retrieved from <https://sloanreview.mit.edu>
- Markus, M. L., & Robey, D. (1998). Information technology and organizational change: Causal structure in theory and research. *Management Science*, 34(5), 583-598. doi:10.1287/mnsc.34.5.583
- Markus, M. L., & Tanis, C. (2000). The enterprise system experience: From adoption to success. R. W. Zmud (Ed.), *Framing the domains of IT management: Projecting the future through the past* (pp. 173-207). Cincinnati, OH: Pinnaflex Educational Resources.
- Martinko, M. J., Zmud, R. W., & Henry, J. W. (1996). An attributional explanation of individual resistance to the introduction of information technologies in the workplace. *Behaviour & Information Technology*, 15(5), 313-330. doi:10.1080/014492996120085a
- Patton, M. Q. (2002). *Qualitative research and evaluation methods*. London, UK: Sage Publications.
- Prasad, P., & Prasad, A. (2000). Stretching the iron cage: The constitution and implications of routine workplace resistance. *Organization Science*, 11(4), 387-403. doi:10.1287/orsc.11.4.387.14597
- Rivard, S., & Lapointe, L. (2012). Information technology implementers' responses to user resistance: Nature and effects. *MIS Quarterly*, 36(3), 897-920.
- Robey, D., Ross, J. W., & Boudreau, M. C. (2002). Learning to implement enterprise systems: An exploratory study of the dialectics of change. *Journal of Management Information Systems*, 19(1), 17-46. doi:10.1080/07421222.2002.11045713

- Scandura, T. A., & Williams, E. A. (2000). Research methodology in management: Current practices, trends, and implications for future research. *Academy of Management journal*, 43(6), 1248-1264.
- Shang, S. C. (2012). Dual strategy for managing user resistance with business integration systems. *Behaviour & Information Technology*, 31(9), 909-925. doi:10.1080/0144929X.2011.553744
- Tambe, P., & Hitt, L. M. (2012). The productivity of information technology investments: New evidence from IT labor data. *Information Systems Research*, 23(3), 599-617. doi:10.1287/isre.1110.0398
- Van Veenstra, A. F., Klievink, B., & Janssen, M. (2009). Avoiding management' of resistances during IT pre-implementation phase: A longitudinal research in a high tech corporation. *17th European Conference on Information Systems*. Retrieved from <http://aisel.aisnet.org/ecis2009/48>
- Vinhais, J. C., Joia, L. A. (2014). Trajetória de migração de software proprietário para livre: evidências empíricas associadas ao open office. *Organizações & Sociedade*, 21(71), 615-642. doi:10.1590/S1984-92302014217100005.
- Vergara, S. C. (2004). *Projetos e relatórios de pesquisa em administração*. São Paulo, SP: Editora Atlas.
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *Management Information Systems Quarterly*, 26(2), 13-23.
- Yin, R. K. (2005). *Estudo de caso: Planejamento e métodos*. Porto Alegre, RS: Bookman.
- Zorn, T. E. (2002). The emotionality of information and communication technology implementation. *Journal of Communication Management*, 7(2), 160-171. doi:10.1108/13632540310807296