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The Bipartite Influence of Information Overload on User Resistance to Knowledge Management Systems

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ABSTRACT

This research centers on the relationship between information overload as an aspect of information quality on the one side, and, on the other side, user resistance to knowledge management systems as an aspect of an individual's decision process. While discussing this relationship theoretically we propose a bipartite influence of information overload as on the one hand it fosters acceptance of these system, but on the other hand also causes user resistance. By analyzing information overload in pre- and post-implementation phases of knowledge management systems we argue that information overload has an ambivalent causal effect as it can act both positively and negatively in relation to the point of time overload occurs or is expected. Therefore, based on existing literature we propose a research model and illustrate the relationships through results of a case study.

Keywords

Information overload, resistance, perceived threat, status-quo-bias, knowledge management system.

INTRODUCTION

The management of knowledge and information is an essential part of a firm's competitive advantage (Alavi and Leidner, 2001). Due to continuous technological progress and growing number of sources of information, knowledge workers receive more and more information per day (The Economist, 2010; Yang *et al.*, 2000). They have to cope with all the information by distinguishing between relevant and irrelevant aspects, processing as many messages as possible at the same time, deal with varying quality and making efficient decisions. For managing this process, empowering knowledge distribution among the workforce and support knowledge creation as well as sharing firms can take advantage of knowledge management systems (KMS) (Alavi and Leidner, 1999). However, many obstacles have to be overcome to achieve a successful implementation of KMS. Previous research has discovered that end users often refrain from using new systems and show antagonism (Kim and Kankanhalli, 2009). And even if they do not resist, it can still be questionable if the implementation becomes successful as it is necessary to use the system appropriately (DeLone and McLean, 2003) and to integrate it fully with the firm's processes. Systems which are not properly integrated cannot help to generate the productivity surplus aimed for (Davenport *et al.*, 1998).

In this context, several studies have already identified a number of factors which positively impact the acceptance of information systems in general (Davis *et al.*, 1989; Bhattacharjee, 2001; Venkatesh *et al.*, 2003; Venkatesh and Bala, 2008). Nonetheless, negative influence factors have long been ignored (Lapointe and Rivard, 2005) although they not only favor resistance but also compensate interference of positive factors (Cenfetelli, 2004).

One example of a negative perception in relation to KMS is information overload which can be understood as the overburdening of the capability of processing information (Eppler and Mengis, 2004). No one would disagree, that information overload before the implementation of a KMS is an enabler of KMS usage as employees might expect that the KMS addresses the perceived information overload and consequently might use the new system. However, one might wonder that the implementation of a new KMS might lead to an increased information overload although the system is capable of dealing with it. As a result, the follow question arises:

How does information overload influence user resistance to a newly implemented KMS?

With the answer to this question we want to bring light into the darkness of the relationship of information overload and user resistance to KMS. By regarding two points of time, we can examine user behavior before the implementation and with an existing information overload and thereafter with another scale of overload and can find out its role concerning the change process. This will help to better understand why users might resist adopting newly implemented KMS. Additionally, it will help to identify supportive measures for system implementation processes within organizations.

For reaching this goal the paper is structured as followed. First we will give an overview of the used theories and models in which we explain how we understand resistance and information overload and the mediating factors. Based on this foundation we define our research model and refer to a small case study which gives a direction for our research model. Finally, we give a look-out over the next steps which are necessary in order to empirically test our model.

RESEARCH BACKGROUND

User Resistance Research

For explaining the existence and magnitude of IT adoption, several research models propose and evaluate factors which exert influence on IT adoption (Williams *et al.*, 2009). The factors can be classified as either enablers or inhibitors. Enablers are more obvious because they are more present in recent research papers (Williams, *et al.*, 2009). If enablers exist they affect the influenced component positively: The stronger the enabler, the stronger is the magnitude of the influenced component. For instance, if a user thinks that the new system is remarkably useful (e.g. it accelerates a process) the perceived usefulness will increase the probability of adopting and using the technology (Venkatesh *et al.*, 2003). But if perceived usefulness is not very strong there will likely be no or only a minor chance of adoption.

In contrast to enablers, inhibitors have only negative influence. If they are perceived in terms of an IT-innovation they raise resistance and compensate positive effects of enablers. In absence, inhibitors have no influence at all. Enablers, however, have no compensating effect on inhibitors. Cenfetelli (2004) calls this phenomenon “asymmetry of inhibitors”. This characteristic and the fact that such determinants are perceptions of the potential user complicate the discovery of inhibitors and the quantification of their strength (Cenfetelli, 2004). Resistance to change is such an inhibitor (Bhattacharjee and Hikmet, 2007).

Keen (1981) calls resistance to change simply as social inertia which impedes organizational change within an organization. People want to keep constancy which is defined as an equilibrium between forces favoring and opposing change. This can be seen as a status quo that wants to be maintained (Lewin, 1947; Kim and Kankanhalli, 2009). Its antecedents (Bhattacharjee and Hikmet, 2007) and characteristics (Lapointe and Rivard, 2005; Laumer and Eckhardt, 2010) as well as its direct and mediated influences have been examined in different studies (e.g. Sanford and Oh, 2010). As Bhattacharjee and Hikmet (2007) we see resistance to a KMS as a “generalized opposition” caused by the expected adverse consequences of the KMS-induced changes. It is influenced by status-quo-bias and perceived threats (Kim and Kankanhalli, 2009). Furthermore, resistance to change or resistance to a KMS is not comparable to acceptance as a behavior; it is more a cognitive and affective attitude (Lewin, 1947; Piderit, 2000) preventing potential usage behavior (Bhattacharjee and Hikmet, 2007) and causing user resistance behavior (Kim and Kankanhalli, 2009). For simplicity reasons, we use the term “user resistance” during the rest of the paper.

Perceived Threat

Resistance depends on other influential factors. The most important factor which accumulates many indicators of inhibitors is perceived threat (Lapointe and Rivard, 2005). Perceived threat evolves from different, often situation-dependent impacts like uncertainty and risk and expresses itself in the fear of loss of power, loss of equity, and stress (Dent and Goldberg, 1999).

Status-Quo-Bias

Another aspect which influences resistance is status-quo-bias (Kim and Kankanhalli, 2009). Human beings seek balance or comfort concerning their state of mind. Unless there is a disturbance, humans want to keep up balance and do not want to change. In the event of disturbance they look for possible actions to abolish the imbalance and return to the comfort zone (see „Cognitive Dissonance Theory“ in Festinger (1955, c1957)).

The implementation of a new IS can represent such a disturbance which is externally imposed. From the user's perspective the IS is a tool for doing the same work as before. Without a detailed explanation of the necessity of the system the user will not see any value in the IS and turn to resistance to keep up his status quo. Another perspective on status quo theory concentrates on a disturbance that causes enduring imbalance. When he is out of balance the user starts looking for measures to get back to balance again. A disturbance, for example, can be the sudden rise in productivity of a competitive firm. Then a new technology that promises to induce a productivity increase in the own company poses a proper means to resolve imbalance and a user who understands this will more likely accept the new system.

Besides evaluating just the usefulness of a new system a user compares its own effort for the implementation with the system's value added. Regarding this context, Kim (2011) studies the concept of switching costs. In their paper they name four kinds of costs (uncertainty, transition, sunk and loss costs), and examines their impact on perceived value and user's resistance to change (Kim, 2011). As a control variable Kim (2011) adds switching benefits to the model to represent compensation on the costs which impact perceived value together. Statistical analyses state a direct positive influence by uncertainty costs and an indirect positive influence by sunk costs via perceived value on resistance. In other words, resistance tends to increase if perceived costs excel or at least compensate the perceived value of the IS to be implemented.

Information Overload

Information overload has many different meanings depending on the context of research. But all of them have a common basis: the knowledge management process. Knowledge is created by human beings who internalize information and process it with their minds (Edmunds and Morris, 2000). Processing means categorizing new information and assigning it to existing knowledge. In addition, the new amount of knowledge is completely or partly rearranged.

The first understanding of information overload simply means signal overload. Especially in marketing research signal overload depicts an important topic where it refers to the attention that an advertisement is able to attract. In terms of KMS this understanding becomes more concrete: Eppler and Mengis (2004) define information overload as crossing a line at which perceived information has accumulated to more than a human's information processing capacity can handle. Information that is perceived beyond this point will not be included in the actual decision making (Eppler and Mengis, 2004).

There are three main reasons why information overload represents a problem. (1) Information overload leads to confusion, stress, tension and anxiety. (2) That why people who experience information overload try to protect themselves from the consequences by avoiding further information. That means they avoid consulting certain information channels or stop searching before they have gathered all relevant information (MacDonald *et al.*, 2011). (3) As a result, information can be missed and bad decisions can be made. These causes lead to productivity reduction, decrease in job satisfaction and technologies are rejected (Gee-Woo Bock *et al.*, 2010).

The search for information is also a process that includes decision making (Ye Diana Wang and Forgionne, 2008) and moreover, it is the task that KMS should assist. Therefore doing research on the influence of information overload exhibits important clues for understanding technology adoption.

Evaluating the relevance of information is another part of information processing. Due to the increasing number of information channels and possibilities to manipulate published information, even for amateurs, the quality of information especially on the internet is not evident. Consequently, information overload grows even more as besides data interpretation a more precise evaluation pro or contra further processing is required (Lu *et al.*, 2010).

Knowledge Management and Knowledge Management Systems

"Knowledge management [...] refers to a systemic and organizationally specified process for acquiring, organizing and communicating both tacit and explicit knowledge of employees so that other employees may make use of it to be more effective and productive in their work." (Alavi and Leidner 1999, p. 6). It has the task of managing the flow of information and knowledge within a company which support the conduction of core processes. This knowledge management process can be supported by KMS. Therefore, *"[KMS] refer to a class of IS applied to managing organizational knowledge. That is, they are IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application."* (Alavi and Leidner 2001, p. 114). KMS can consist of individual systems or combinations of different kinds of IT-based systems like groupware, wikis, communication tools, and intranet systems. They are often introduced to cope with the ever increasing amount of information in our society and within organizations (MacDonald *et al.*, 2011). As the amount of information is a predictor for information overload KMS suit for reducing the amount of information overload (Eppler and Mengis, 2004). A counter side of the implementation and use of a KMS is that

additional information about the KMS is needed to use such a system (Bock et al. 2010). Especially when operating newly introduced systems more information is needed to use them.

DEVELOPMENT OF THE RESEARCH MODEL

Within this section, we will propose a research model for explaining the bipartite influence of information overload on user resistance to KMS. Therefore, we will first discuss the influence on user resistance mediated by perceived threats and afterwards a mediation effect of status-quo-bias. Thus, we assume a direct effect of perceived threats and status-quo-bias on user resistance to KMUS as follows:

Hypothesis H3: The higher the perceived threat through a planned implementation of an IS, the higher is the resulting resistance to change.

Hypothesis H4: The higher the status-quo-bias of the current situation before a planned implementation of an IS, the higher is the resistance to change.

Information Overload - Perceived Threat – User Resistance to KMS

KMS are in charge of „[...] getting the right information for the right person at the right time“, (Malhotra, 2004, p. 90). Therefore, they contain portals to different data bases and also search engines and filter applications which offer the user a range of possibilities for research. The process of information gathering equalizes a decision making process (Ye Diana Wang and Forgionne, 2008) that determines which information sources are being used when and for how long. The decision making takes place iteratively and repetitively during a KMS session and will be discussed in the next paragraph. Further, the decision for or against the technology use under the influence of information overload will be explained.

We already know that information overload can restrict proper decision making. To protect themselves from information overload knowledge workers limit the amount of information sources they consult. This is possible through avoiding certain channels or discontinuation of the search before having enough information (Gee-Woo Bock *et al.*, 2010) which can provoke oversight of relevant information. Transferring this onto the tools available to a knowledge worker he will refrain from accepting the KMS if it represents just another information channel.

A second menace can be the suboptimal decision making. In case the user has the impression, that the KMS increases information overload and thus complicates the foundation of decisions he will reject it because he will still be responsible for his decisions. A similar situation occurs if the KMS assumes user's tasks like filtering of information. This way the user loses control over this part of the task and cannot evaluate the quality of the search result anymore (Thatcher *et al.*, 2011).

It needs to be differentiated between Pre-Adoption- and Post-Adoption-Phase. Sometimes users do not recognize any negative influence of a system on their everyday work until they have decided for using it. Both, the work of Gee-Woo Bock *et al.* (2010) and Thatcher *et al.* (2011) examine the Post-Adoption-Phase and confirm that there can be a change in attitude towards a KMS over time even though the implementation process has been well organized and realized.

As already mentioned, the implementation process of the KMS can impose information overload on the users, too. While doing their usual work, employees have to absorb a lot of information about the new system, the implementation process itself and also have to learn about the system usage in trainings. The user tries to combine all this information to find an answer to the question whether the system is really going to improve his work. If information overload occurs, uncertainty may appear and increase resistance following the principle “rather staying where I am now than change for something uncertain”.

Information Overload - Status-Quo-Bias – User Resistance to KMS

Assuming, that future users of the KMS are already exposed to information overload, then it can also be an enabler for technology acceptance (Gee-Woo Bock *et al.*, 2010). In this case information overload takes over the role of the disturbance which effects imbalance in the employees before the implementation of the system. As a consequence, the employees see a resolution of their imbalance in accepting the KMS. At least, the KMS must be understood as a tool which helps to arrange information.

The phenomenon of status-quo-bias is connected to perceived uncertainty and perceived usefulness. If a human is uncertain about future developments he will naturally remain in his actual state if this represents equilibrium. This fact is being enforced when losses are possible consequences of the uncertain developments. Even if losses are small they are perceived more strongly than gains (Kahneman and Tversky, 1979; Kim and Kankanhalli, 2009). Furthermore, the user tries to figure out how “good“ the results of his work have been until now and how “good“ they will be after the implementation of the

system. If the results from before the implementation seem to be (more than) sufficient, it will be hard to persuade the user to adopt the system. Anyway, if the user needs to put more effort in the implementation than improvement is expected, the effort will not be worth it and resistance increases.

Bipartite Influence of Information Overload

Based on the discussion above, we will propose the bipartite influence of information overload on user resistance to KMS in this section. An important aspect is the vicious circle which is initiated by information overload. On the one hand, when information overload exists *before* the use or change of a KMS it can necessitate the system's implementation and further enhance its acceptance. Information overload creates a feeling of inequity and discomfort at the recipient of the information. No matter whether a bad functioning or no KMS takes influence on the amount a quality of information the user tries to change this state and is willing to go through the change process if she expects improvement (Kim and Kankanhalli, 2009). As specific KMS are capable of reducing information overload and therefore have a reducing impact on perceived threats and on status-quo-bias, users are likely to be less resistant and accept the new KMS. Thus, we assume

Hypothesis H1b: Information overload has a diminishing effect on perceived threat if it exists already before the implementation of a new KMS.

Hypothesis H2b: Information overload has a diminishing effect on status-quo-bias if it exists already before the implementation of a new KMS.

On the other hand, information overload can emerge from the use of a successfully implemented KMS or be extended through the implementation (Gee-Woo Bock *et al.*, 2010). Users need additional knowledge and information to operate the system itself. Additionally, the system is new to the users and it takes time to get used to the system and the structure of its content. This further enhances the effects of information overload and heightens the fear of losing power and getting affected by stress. Through increased expected information overload the users might resist the change and restrain from using the new system. Thus, we assume,

Hypothesis H1a: Information overload has a positive effect on perceived threat if it is expected as a consequence of the use of a new KMS.

Hypothesis H2a: Information overload has a positive effect on status-quo-bias if it is expected as a consequence of the use of a new KMS.

Figure 1 illustrated the resulting research model illustrating the bipartite influence of information overload on user resistance mediated by perceived threats and status-quo-bias.

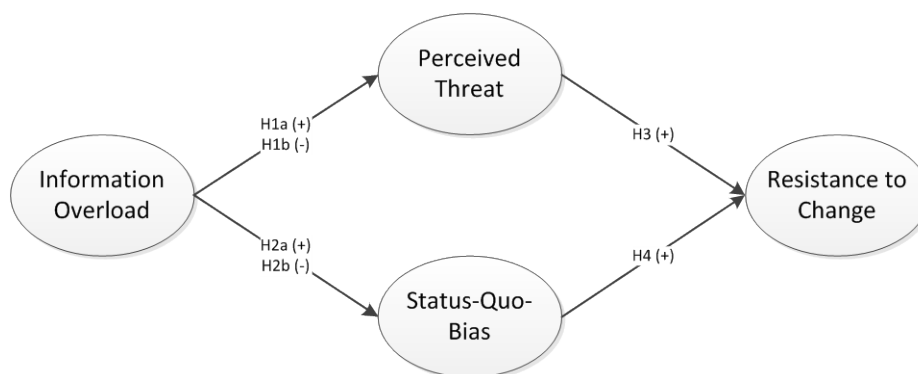


Figure 1: Research Model

Based on the proposed hypothesis it is not useful to combine both of these aspects in one model as contradictory relations will have to be examined. Two different points of time are needed to conduct the data collection. The first one has to be before the implementation of a (new) KMS. The second one has to be right after the implementation of the KMS. Table 1

shows the expected outcomes depending on the level of information overload and the data collection time. The collection at the first point of time supplies data about the case in which there is information overload before the implementation and use of a KMS (hypothesis 1b and 2b) and at the second point of time a high information overload represents the consequence of the additional information needed to use the KMS (hypothesis H1a and H2a).

	Low information overload before change	High information overload before change	Related hypothesis
Low expected information overload caused by the new system	Depending on switching costs and expected outcome	Low user resistance	H1b, H2b
High expected information overload caused by the new system	High user resistance	Depending on switching costs and expected outcome	H1a, H2a

Table 1: Relationship between status of implementation of a KMS and information overload

In order to provide first empirical evidence for the derived hypothesis and the bipartite influence of information overload on user resistance the following section illustrates first case study results.

SUPPORTING FINDINGS FROM A CASE STUDY

A single case study (Yin, 2009) was conducted in order to evaluate the proposed hypothesis before the implemented change. The observed financial service provider is currently in a situation where a bad allocation of information leads to information overload and thus to a high dissatisfaction of the employees toward the current KMS. This allows us to investigate the relationships between the constructs of our model before the change and the expected consequences of the KMS implementation. First results were generated out of 30 semi-structured interviews with employees through all hierarchical levels and different kinds of employees from clerks to the sales. The interviews were tape recorded, subsequently analyzed, and finally translated into English. Table 2 gives an overview of striking statements from the interviews which show a relationship to the hypothesis H1b and H2b. Regarding perceived threats, they give an impression of the users' point of view and show that due to a high information overload they have no anxiety to change to the new system and believe that it will better support their daily work. Feelings of losing power or taking additional risks have not arisen.

According to the status-quo-bias, the interviewed persons feel a high inequity and are not satisfied with the current situation, and want it to be improved somehow. As the implementation of the new KMS is one possibility to realize that, the employees positively await the implementation. They definitely perceive the switching costs lower than the benefits of the new system (Kim, 2011). Additionally, the current handling with information leads to information overload that conveys a feeling of imbalance and discomfort which again leads to a desire to change the current state.

We also see hypotheses H3 and H4 supported. As the interviewees are threatened by the current information overload, are eager to change the situation, and expect an improvement through the new KMS they tend to accept the new system what shows a rather low resistance to it (Cenfetelli and Schwarz, 2011).

As the change has not been implemented and the current system is in use for over 12 years we cannot draw conclusions related to hypothesis H1a and H2a. Additional interviews are necessary during and after the implementation in order to investigate the relationships of these hypotheses through a case study as well as using a survey as it will be explained in the following concluding section.

	Statement of sales staff	Statement of clerks	Statement of managers
H1b	<i>“Currently, I do not always find the needed information on time and therefore have problems advising my customers. I want the new system to better support my work and help me to better advise my customers.”</i>	<i>“The current situation concerning the amount of information is problematic and causes risks for the firm. I think the new system will only benefit us. I think work will be done more easily.”</i>	<i>“I don't use that system very much and my assistants retrieve the information I need, but I can imagine using it, when it becomes more handy, intuitive, and faster to use. Information has to be steered into paths that support the employees”</i>
	<i>(expressed by 94% of the sales staff)</i>	<i>(expressed by 90% of the clerks)</i>	<i>(expressed by 100% of the managers)</i>

H2b	"I'm awaiting the new system and I hope that it deals with the information flood."	"Concerning the information allocation, the situation can only get better. We are all waiting for the system change."	"We are all waiting for the new system and expect that the situation is getting better."
	(expressed by 100% of the sales staff)	(expressed by 90% of the clerks)	(expressed by 90% of the managers)

Table 2: Interview Statements Supporting the Relationships of the Constructs

DISCUSSION AND CONCLUSION

Based on existing theories and literature, we have developed a model that shows the causal relationships between information overload, perceived threats, status-quo-bias, and user resistance. Thus, this research centers on the relationship between information overload as an aspect of information quality on the one side, and, on the other side, user resistance to KMS as an aspect of an individual's decision process. Additionally, we point out the ambivalence of information overload through the failure and the implementation of a KMS and illustrate that information overload can have both positive and negative effects on perceived threats and status-quo-bias which both influence resistance to the acceptance of such a system. This scenario is interesting because the opposing and mediated influence of information overload on the resistance of users. Other aspects like stress or the expectation/confirmation theory proposed by Bhattacharjee (2001) would also be interesting to take into consideration but would be beyond the scope of this article. Results of the presented case study support parts of the newly developed model. The goal of the case study results is to illustrate and show the practical relevance of the developed model.

Limitations can be seen in the definition of resistance which is diversely discussed in the literature. Depending on that definition the model holds or falls. Additionally, the case study could have been designed in the way that it better suits demands of the development of the research model.

The development of the research model is the first part of the project. In order to validate the model and test the posed hypotheses, additional research needs to be done. Therefore, surveys at different points of time are planned in the financial service industry where the current, badly designed KMS will be replaced by a new one which better suits the requirements. The first survey will be before the replacement when the employees still have to work with the old system. The second survey will be shortly after the implementation, when the benefits of the new system become obvious but the employees still need to get used to the system and learn how to use it properly.

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