

Towards a Model for Research Portal Acceptance and Usage

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Towards a Model for Research Portal Acceptance and Usage

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ABSTRACT

Research portals have been suggested as both a knowledge management tool and a collaboration technology for research communities. This paper proposes a research model designed to understand the acceptance and usage of such portals. The model is based on UTAUT which we augment to include research portal-specific technology, individual and situational characteristics. Our model incorporates theories originating from the fields of knowledge management and collaboration technology. This paper thus answers the call for developing more technology-specific acceptance theories. It contributes to both research and practice, because it represents a first step towards developing research portals that are more widely used than they currently are.

Keywords

Research Portal, Knowledge Management, Collaboration Technology, UTAUT.

INTRODUCTION

Contemporary research problems are often characterized by two different aspects. First, they are worked on by many different academic disciplines each providing a unique perspective to its overall solution (Metzger and Zare, 1999). This fact requires researchers of these disciplines to collaborate and define a common ground upon which to communicate with each other. Secondly, research can be considered a cumulative effort, in which new knowledge is created by analyzing and combining existing knowledge (vom Brocke, Niehaves, Riemer, Plattfaut and Cleven, 2009). The overall amount of publications that may contain relevant knowledge to solve a given research problem may very well rank in the thousands. This calls for effective knowledge management support for research communities (Piccoli, Ahmad and Ives, 2000).

Against this backdrop of both an increasing need for collaboration and knowledge management support for research communities, so-called research portals have been suggested to provide a means for structuring, presenting, and sharing scientific findings (Becker, Knackstedt, Lis and Stein, 2010). Research portals are Internet-based knowledge management and collaboration instruments, which present research activities by answering questions like “who is doing research with whom?”, “what is being researched?”, and “what results have been achieved?”. Thus, research portals foster the creation of virtual communities of practice (Lavoué, George and Prévôt, 2011) in research settings. They support internal communication in the community (Yu, Lang and Kumar, 2010), but also have a strong focus on reaching external stakeholders and fostering the knowledge transfer between practitioners and academics (Rynes, Bartunek and Daft, 2001). Current research, however, indicates that these portals often do not live up to their potential: an empirical evaluation of 813 research portals suggests that while some portals fulfill their purpose as knowledge management and collaboration instruments the majority of them provides only basic functionality regarding publication management and almost no collaboration features whatsoever (Becker, Delfmann, Knackstedt and Lis, 2011). Thus, research portals are in most cases far from an accepted and frequently used technology.

This paper seeks to gain a theoretical understanding as to why this is so. More specifically, the main focus of the paper is to propose a research model that answers the following question: *why do scientists choose to use a research portal?* Our model combines the unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis and Davis, 2003) with other theories known from the research areas of knowledge management and collaboration technology. It augments UTAUT to include research portal-specific technology, individual, and situational characteristics designed to provide strong guidelines for the successful design and implementation of research portals. Focusing on conceptual theory development, the paper represents a first step towards a theory of research portal acceptance and use.

The remainder of the paper is structured as follows. In Section 2, we briefly introduce UTAUT, discuss the research portal-specific technology, individual, and situational characteristics that augment UTAUT, and theorize as to how they influence UTAUT constructs. We continue by discussing limitations of our work as well as contributions for research and practice. The paper concludes with an outlook to future research.

THEORETICAL DEVELOPMENT

We base our research model (Cf. Figure 1) on UTAUT, which states that there are four key predictors of intention to use a technology: performance expectancy, effort expectancy, social influence, and facilitating conditions. Intention to use a technology in turn predicts actual technology use (Venkatesh et al., 2003). In addition, UTAUT states that the various relationships between these constructs are “moderated by a combination of gender, age, experience, and voluntariness” (Brown, Dennis, and Venkatesh, 2010, p. 13). As research portals are a technology that is mostly used voluntarily by its target audience, we exclude the last construct from our research model. Furthermore, we concretize technology experience to research portal experience. Brown et al. (2010) argue that while UTAUT has been empirically proven to measure factors influencing the intention to use technology in general, the theory lacks constructs that help understanding the adoption of a *particular* technology in the *concrete situational context* in which it is used. In this paper, we propose a research model that aims at explaining factors influencing the acceptance of research portals. We argue that such portals are both a knowledge management instrument as well as a collaboration technology for research communities. In order to understand what influences the four indicators of UTAUT affecting (intention to) use, we therefore must turn to theories of knowledge management and collaboration technology. We follow the argument of Brown et al. (2010) in stating that factors originating from these theories must consequently be antecedents of UTAUT, because they are supposed to explain what exactly influences, e.g., performance expectancy in the context of research portals. UTAUT therefore acts as a mediator between the characteristics of a given use situation and the eventual acceptance and use of a research portal. We argue that *technology characteristics* inherent in a research portal influence both performance and effort expectancies of such a portal (Brown et al., 2010 who argue identically for collaboration technology). Furthermore, *particular characteristics of the individual* user working with a research portal will affect performance and effort expectancies (Fjermestad and Hiltz, 1998). In addition, we differentiate two kinds of situational contexts: the *research community* and the *environment* in which the research portal is used. The research community contains all constructs describing the perceived social relationships among a group of researchers using the portal. The environment refers to the organizational and technical support of a research portal. In the following, we focus on theorizing about factors belonging to the four research portal-specific main characteristics described above and how they interrelate to UTAUT constructs. All UTAUT inherent hypotheses were adapted for our research model as well (Venkatesh et al., 2003), but are omitted for reasons of brevity.

Technology Characteristics

We consider a research portal to be both a knowledge management system as well as a collaboration technology for research communities. As such it can be described in terms of its physical characteristics like the functionality it offers. Dennis, Fuller and Valacich (2008) argue, however, that a collaboration technology can also be defined by its socially derived characteristics providing a subjective perception of its features. Empirical findings suggest that various socially derived characteristics influence the performance and effort expectancies of a collaboration technology (Dennis, Wixom and Vandenberg, 2001; Desanctis and Gallupe, 1987) and are thus antecedents of UTAUT. More specifically, we consider the immediacy of communication originally coming from media richness theory (Trevino, Lengel and Daft, 1987) to comprise a socially derived collaboration characteristic. Furthermore, empirical evidence suggests that system and information quality greatly influence the user’s intention to use information technology (Cenfetelli and Schwarz, 2011). In our research model, we theorize that these factors belong to socially derived technology characteristics and are thus antecedents of performance and effort expectancies. These three characteristics are described in more detail below.

Immediacy of Communication

Immediacy of communication describes the ability of a collaboration technology to enable users to quickly communicate with each other (Straub and Burton-Jones, 2007). This characteristic “depends on capabilities inherent in the technology (it must be capable of immediacy) and also on the way it is used” (Brown et al., 2010, p. 20). Although a text message is delivered within a few milliseconds (characteristic that is inherent in the technology), the receiver may choose to take days to answer it. Straub and Karahanna (1998) report that immediacy of communication is an important factor in the choice of a collaboration technology. It influences the way users perceive the effectiveness and efficiency of the technology and thereby performance and effort expectancies. We thus follow the argument of Brown et al. (2010) in hypothesizing:

Hypothesis 1a: Immediacy of communication will positively influence performance expectancy of a research portal.

Hypothesis 1b: Immediacy of communication will positively influence effort expectancy of a research portal.

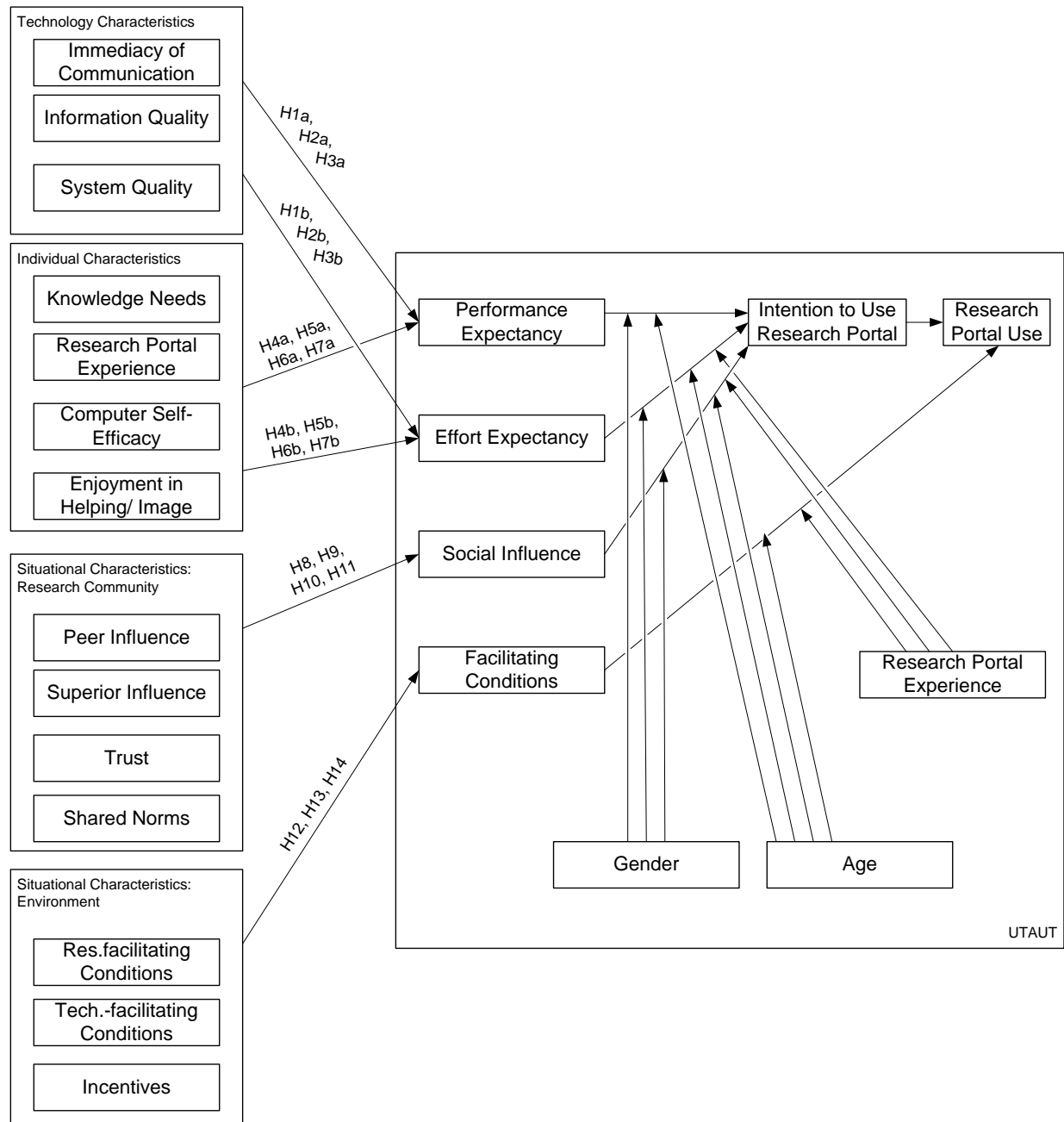


Figure 1: Research Model

Information Quality

Cenfetelli and Schwarz (2011) define information quality to be “a user’s evaluation of the system’s conveyance of semantic meaning and/or communication of knowledge” (p. 810). It signifies a user’s “object-based belief” (Cenfetelli and Schwarz 2011, p. 810) which Wixom and Todd (2005) define to be the user’s beliefs regarding the capabilities of a system itself. We theorize that the greater the user perceives the quality of the information presented on a research portal to be, the more he expects his overall work performance to improve. Furthermore, we theorize that the higher the quality of information a research portal provides the easier usage will be perceived. Thus, we hypothesize:

Hypothesis 2a: Information quality will positively influence performance expectancy of a research portal.

Hypothesis 2b: Information quality will positively influence effort expectancy of a research portal.

System Quality

Confetelli and Schwarz (2011) define system quality to be “a user’s evaluation of the technical capabilities of the system and its usability” (p.810). Similar to information quality it is also an object-based user belief (Wixom and Todd 2005). We theorize that the better the user’s perceived quality of a research portal, the more it will improve his overall work performance and the easier it will be to use for him. Thus, we hypothesize:

Hypothesis 3a: System quality will positively influence performance expectancy of a research portal.

Hypothesis 3b: System quality will positively influence effort expectancy of a research portal.

Individual Characteristics

Individual characteristics are also important to understand the acceptance and usage of knowledge management systems (Kankanhalli, Tan, & Wei, 2005) and collaboration technology (Dennis, Wixom and Vandenberg 2001) in general and thus of research portals in particular. We consider two factors that have been researched in the area of knowledge management (*knowledge needs* and *enjoyment in helping others*) and two factors originating from the field of collaboration technology (*technology experience*, which we adapted to research portal experience, and *computer self-efficacy*).

Research portal experience

Research portal experience denotes an individual’s ability to use a research portal. Technology experience is reported to greatly influence the choice and use of a technology (Carlson & Zmud, 1999; Daft & Lengel, 1986). We therefore adapted this construct to research portals. Empirical evidence suggests that an individual’s experience using a given technology will increase as time goes by thus increasing performance and easing use (Dennis & Garfield, 2003). Thus, we hypothesize:

Hypothesis 4a: Research portal experience will positively influence performance expectancy of a research portal.

Hypothesis 4b: Research portal experience will positively influence effort expectancy of a research portal.

Computer Self-Efficacy

Computer self-efficacy describes an individual’s belief in his ability to use a particular technology to accomplish a task (Brown et al., 2010). There is empirical evidence suggesting that the more able a person feels to use a technology the easier is its perceived use (Venkatesh, 2000). The same effect could be substantiated for performance: Compeau and Higgins (1995) study the influence of computer self-efficacy on outcome expectations which is a construct similar to performance expectancy (Brown et al. 2010). We theorize that these effects will also hold true in the application domain of research portals. Thus, we hypothesize:

Hypothesis 5a: Computer self-efficacy will positively influence performance expectancy of a research portal.

Hypothesis 5b: Computer self-efficacy will positively influence effort expectancy of a research portal.

Knowledge Needs

The knowledge management literature describes how a misfit between knowledge management systems (KMS) and the user’s knowledge needs are the primary reason for KMS failures (e.g. Lam & Chua, 2005). We theorize that the individual user’s particular knowledge needs will also influence performance and effort expectancies, because the more a user needs to know about the specific topic of the research portal the greater is his expected performance and the easier he perceives usage of the system to be. Thus, we hypothesize:

Hypothesis 6a: Greater knowledge needs of an individual will positively influence performance expectancy of a research portal.

Hypothesis 6b: Greater knowledge needs of an individual will positively influence effort expectancy of a research portal.

Enjoyment in helping others

Kankanhalli, Tan and Wei (2005) define enjoyment in helping others as the perception of pleasure derived from helping others by contributing knowledge to an electronic knowledge repository. They were able to show that enjoyment in helping others greatly influences the use of such systems. Research portals can be considered a kind of electronic knowledge repository. We therefore argue that enjoyment in helping others influences performance expectancy, because the more a user enjoys helping others, the greater will be the perceived performance. Furthermore, we theorize that enjoyment in helping others influences effort expectancy, because the more an individual is willing to help others the easier the perceived use of a research portal. Thus, we hypothesize:

Hypothesis 7a: The enjoyment in helping others will positively influence performance expectancy of a research portal.

Hypothesis 7b: The enjoyment in helping others will positively influence effort expectancy of a research portal.

Situational Characteristics: Research Community

The situational characteristics of the research community describe the social environment and relationships of the user. It has been proven that social relationships significantly influence the individuals' attitude towards knowledge sharing (Bock, Zmud, Kim, & Lee, 2005; He & Wei, 2006). In the users social environment peers and superiors are expected to be key influences in system usage (Brown et al., 2010). We therefore divide these social characteristics in peer influence, superior influence, trust, and shared norms.

Peer Influence

Peer influence is the direct influence of research colleagues or other peers by communicating their attitude towards the research portal. Peers strongly affect social influence that in turn influences a user's intention to use a technology (Taylor and Todd 1995). If the peers have an aversion to the system the user is more likely to also neglect the system. If the attitude mainly of positive nature the user's intention to use the system will rise (Brown et al., 2010). Although this effect has only been empirically proven for collaboration technology in general, we argue that it will also hold true for research portals in particular. Thus, we hypothesize:

Hypothesis 8: Peer influence will positively influence the perception of social influence.

Superior Influence

Superiors also greatly affect social influence (Taylor & Todd, 1995). Superior influence is the direct influence of authorities in the own organization or in the research community. Superiors can promote and encourage their staff to use research portals. They can communicate the underlying strategy, goals and intentions to use a technology. Furthermore, it is possible for superiors to order the use of technology. Brown et al. (2010) empirically demonstrated the positive influence of superiors on social influence. We therefore expect this effect to hold true for research portals as well. Thus, we hypothesize:

Hypothesis 9: Superior influence will positively influence the perception of social influence.

Trust

A certain level of trust is crucial for participating in knowledge management activities and thus for contributing to research portals. As knowledge is often seen as a competitive resource, people try to empower their standing in communities with the help of knowledge (Orlikowski, 1993) and have the tendency to hoard their knowledge (Davenport & Prusak, 1998). Trust enables social relations, fosters knowledge sharing (McEvily, Perrone, & Zaheer, 2003) and is defined by the believe in the reliability of others, their competence and good intent (Nooteboom, 2001). Hence, trust within the research community is an important construct for participating in knowledge sharing in research portals and has been validated as a significant contextual factor for knowledge contribution (Kankanhalli et al., 2005). As new knowledge is often created by building on existing knowledge (vom Brocke et al., 2009), trust can be considered a prerequisite for knowledge sharing within a research community. Thus, we hypothesize:

Hypothesis 10: Trust within the research community will positively influence the perception of social influence.

Shared Norms

Communities develop specific sets of norms that govern the way members think and behave. These norms are reflecting the similarities of the group members and are coordinating their actions (He & Wei, 2006). Shared norms affect the employee's behavior and influence conditions for knowledge contribution (Nahapiet & Ghoshal, 1998). In the context of research portals especially the culture of sharing, which can be seen as a shared norm, is an important factor affecting social influence which in turn influences the intention to use a research portal. Communities with a distinct culture of sharing are characterized by low levels of competition within the group and have a pro learning attitude, which was shown by several studies (Alavi, Kayworth, & Leidner, 2005; Gold, Malhotra, & Segars, 2001). Thus, we hypothesize:

Hypothesis 11: Shared norms within the research community positively influence the perception of social influence.

Situational Characteristics: Environment

The environment a research portal is used in refers to all factors influencing facilitating conditions that in turn affect actual portal use. Respective characteristics include resource-facilitating conditions, technology-facilitating conditions and incentives.

Resource-facilitating Conditions

Resource-facilitating conditions are the organizational resources to support use of the research portal (Brown et al., 2010). As defined by Ajzen (1991) as well as Taylor and Todd (1995) these conditions are representing the availability of time and money for research portal usage. The component time can be further distinguished in time available and time made available by the organization for using the technology (Bourdon & Hollet-Haudebert, 2009). Taylor and Todd (1995) empirically demonstrate that the perception of facilitating conditions increases with the perception of the available resources. We argue that this effect can also be measured for research portals. Thus, we hypothesize:

Hypothesis 12: Resource-facilitating conditions will positively influence the perception of facilitating conditions of research portals.

Technology-facilitating Conditions

Similar to resource-facilitating conditions, technology facilitation conditions are the technological resources available to support use of research portals. These conditions include the availability of the system, system support and technology compatibility issues that may influence usage (Taylor & Todd, 1995). Taylor and Todd (1995) assume that the lack of technology-facilitating conditions will hinder the intention to use a technology. The availability of these resources may in turn support, but will not per se encourage usage (Taylor & Todd, 1995). Again, we theorize that this effect will hold true for research portals as well. Thus, we hypothesize:

Hypothesis 13: Technology-facilitating conditions will positively influence the perception of facilitating conditions of research portals.

Incentives

Incentives are seen as crucial for sharing knowledge (Ba, Stallaert, & Whinston, 2001). The effect of incentives for knowledge contribution is subject to debate (Bock et al., 2005), because studies have even shown negative effects for monetary incentives (Huber, 2001; Ruggles, 1998). However, most studies agree that the goals of information system and organization design have to be aligned to user incentives (Ba et al., 2001; He & Wei, 2006). Other studies show that employees rewarded for technology use are likely to behave differently than employees in organizations with few incentives (Brown et al., 2010). According to Kelley and Thibaut (1978) knowledge sharing is most likely to occur when the user perceives the rewards to exceed the costs for knowledge sharing. Thus, we hypothesize:

Hypothesis 14: Incentives will positively influence the perception of facilitating conditions of research portals.

LIMITATIONS

This paper presents a research model designed to understand why scientists choose to use a research portal to document their research results and collaborate with their peers. To that end, the model extends UTAUT to include research portal-specific characteristics. It was created analyzing literature from the research domains of knowledge management and collaboration technology. Constructs found in respective theories were argumentatively transferred to the domain of research portals. However, the model lacks empirical evaluation so far. Future research consequently will focus on testing the hypotheses presented above. Furthermore, the acceptance and usage of research portals might be influenced by constructs we did not consider in this initial model. This might be due to the fact that research portals serve purposes in addition to managing knowledge in research communities and facilitating collaboration among scientists. Moreover, the presented model is limited to understanding the acceptance and use of research portals. It is therefore not concerned with understanding research portal success. Empirical findings in the area of knowledge management suggest that usage of a knowledge management system is a poor measure for knowledge management success (Jennex, Smolnik, & Croasdell, 2007). The same argument can be extended to research portals.

CONTRIBUTIONS

Contributions to research

This paper answers the call for theories that are more focused and technology-specific (Orlikowski & Iacono, 2001) thus augmenting theories like TAM or UTAUT that broadly apply to entire classes of technologies. The model presented in this paper is a first step toward understanding a particular technology, in this case research portals. It builds on UTAUT by exploring research portal-specific antecedents of UTAUT's four key indicators influencing the intention to use a technology. We follow the argument of Venkatesh and Bala (2008) in stressing that such technology-specific theories are more explanatory than general models of acceptance and usage. Consequently, they are more helpful in designing and implementing better IT artifacts.

Contributions to practice

The paper addresses researchers who are interested in implementing or using a research portal and practitioners who are interested in getting a fast, yet comprehensive insight into a particular research topic. The presented model is a first step towards defining concrete design and implementation guidelines that help to set up research portals that will be frequently used by its intended target audience. In addition, the constructs of the presented model can be translated to a research portal maturity model providing a more detailed look at the capabilities of a particular portal and suggesting concrete measures to advance the offered functionality.

OUTLOOK

Short-term research will focus on empirically validating the presented research model. We will conduct a survey among the research staff of the third largest university in Germany. It has recently set up a research portal to document all research activities of the university. The long term purpose of the portal is to facilitate the collaboration of university staff and promote interdisciplinary research projects. The portal's target audience provides an ideal survey population to empirically test the hypothesis presented in this paper, as the university staff has been working with the portal for quite some time. Mid-to long-term research will focus on exploring other application scenarios of research portals to extend our model.

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