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Adoption of E-Health Services from the User's Perspective: Identification of the relevant Determinants of Adoption to benefit from the Promises

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Abstract

The purpose of this paper is to construct a conceptual framework for the adoption decision of potential users in the field of electronic health services including the relevant determinants, sources of information aimed at reducing uncertainty about the innovation and the barriers that inhibit the adoption. So far, adoption research has widely ignored the healthcare sector. Consequently, no comprehensive studies on adoption decision processes yet exist. Using a semi-structured field manual, we interviewed 15 experts from the business, academic and public health sector. In addition to its comprehensiveness, our study specially highlights the particularities of this process that are associated with health services, the involvement of multiple decision-makers, and the ambivalent role presented by the attending physician (where present).

Keywords: electronic health services, adoption process, determinants of adoption, barriers of adoption

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The Relevance of Industrialization

In his seminal article, Levitt was one of the first scientists to discuss the industrialization of services (Levitt, 1976). He hypothesized that the use of technology would contribute to a company's economic success through radial improvements in the quality and efficiency of its goods and services. In reality, the achievements of industrialized services testify to Levitt's thesis. Nevertheless, the economic benefits of industrialized services are only realized if these services are accepted and frequently used by the target group. Therefore, an array of studies in the area of adoption research investigates the relevant determinants of adoption, especially for services that have been industrialized by means of information and communication technologies (for a study on self-scanning technology in a retail setting, see Weijters *et al.*, 2007; for online investment trading, see van Beuningen *et al.*, 2009; for online-banking, see Featherman, Miyazaki and Sprott, 2010). Up to now, research on the adoption of e-health services has been neglected (Lanseng and Andreassen, 2007), and all the more so now in view of the enormous financial problems facing the public health sector. On the one hand, per capita health spending is constantly growing (OECD, 2009). On the other hand, several studies prove that the use of e-health services effect cost reductions (Verhoeven *et al.*, 2007; Seto, 2008). In one study about nursing care for example, the average visit costs were 48.27 USD for face-to-face home visits compared to 22.11USD for average virtual visits (Finkelstein, Speedie and Potthoff, 2006). Moreover, e-health services potentially offer additional advantages by improving access to healthcare providers for people living in areas with weak infrastructures, health-impaired individuals or working people who have little time (Simmons, 2000; Jung and Berthon, 2009).

In view of the social and academic need to develop e-health services, we have identified three major research gaps. First, the specific characteristics that differentiate them from other services need to be investigated (Berry and Bendapudi, 2007). Second, adoption research rarely focuses on an investigation of e-health services (Lanseng and Andreassen, 2007). Third, the few studies that do exist completely neglect to considerate the whole adoption decision-making process and setting. They mainly concentrate on investigating of the technology acceptance model (TAM) (Davis, 1989) or modifications of it. Klein (2007) and Lanseng and Andreassen (2007) for example extend the TAM by trust beliefs investigating the patient's

acceptance for internet-based patient-physician electronic communication applications as well as for an online self-diagnosis tool. Based on the methodical analysis using structural equation modelling, a comprehensive identification of the relevant determinants is not possible. Furthermore, this restricts the consideration of additional factors like characteristics of the potential user and factors referring to the provider or the environment. Our study contributes to these three research gaps. Based on a qualitative empirical study we construct a conceptual framework tending to develop new insights into the area of e-health services through a holistic perspective (Yadav, 2010). We highlight the relevant determinants for the adoption on e-health services concerning the service, the potential user, the provider and the environment. We examine the different decision-makers in the public health sector and give an overview of possible barriers during the adoption process.

Literature Synthesis

The topic of adoption processes has a rich heritage in the social and behavioural sciences (Gatignon & Robertson, 1991), and deals with different areas, that focus on the adoption and diffusion of innovations (e.g., industrial firms Mansfield, 1961; complex organisations Zaltman, Duncan and Holbek 1973; Kimberly and Evanisko, 1981 and educational institutions Stern *et al.*, 1976). The present research concentrates on the consumer domain (Robertson, 1971). Gatignon and Robertson (1985) propose various elements to depict the consumer diffusion paradigm. As the current research question is concerned with the individual adoption rather than with innovation diffusion in a social system, the following major elements are relevant: the innovation and its characteristics, the social system where the individual adoption (and the later diffusion process) takes place, the adoption process at the individual level, the personal influence that is transmitted as well as personal characteristics of innovators and other adopters. The marketing strategy for the innovation and the competitive activities within the product category – also belonging to the diffusion research paradigm – are not pursued as health policy often restricts marketing activities. Nevertheless, we will discuss the information policy of the service provider as actual sources of information and used communication channels play a crucial role in the adoption process. In the following, we present empirically supported adoption factors. As studies about the adoption of e-health services are scarce, we also consult results of studies investigating the adoption of e-services.

The Innovation and its Characteristics

The characteristics of an innovation are an essential aspect of the adoption. First, the scheme proposed by Rogers (1962) dominates research in this area (Gatignon and Robertson, 1991). Although his five characteristics (relative advantage, compatibility, complexity, trialability and observability) (Rogers, 2003) might not be appropriate for understanding all adoption decisions (Gatignon and Robertson, 1991), they consistently demonstrate a significant effect on attitude or directly on intention to use e-services (e.g., Kleijnen, de Ruyter and Wetzels, 2004; Meuter *et al.*, 2005). Second, studies frequently investigate perceived ease of use as a determinant of adoption showing a positive and highly significant effect on perceived usefulness of the service (e.g., Nysveen, Pedersen and Thorbjørnsen, 2005; Premkumar and Bhattacherjee, 2008). Third, perceived usefulness itself has a consistently significant effect on attitude and on intention to use (e.g., King and He, 2006). Fourth, perceived efforts and costs of usage have a significant negative influence on perceived usefulness and on attitude (e.g. Venkatesh *et al.*, 2003; Wu and Wang, 2005; Kim, Chan and Gupta, 2007). Finally, studies consider the negative influence of perceived risk. This determinant plays an important role as health services are characterized to be high in credence properties (Darby and Karni, 1973). This reflects the fact that it is often not possible for the user to make an accurate evaluation of the service quality (Berry and Bendapudi, 2007). Furthermore, personalized services are particularly prone to consumer risk perception (Newell and Newell-Lemon, 2001).

The Social System

A social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. Although this social structure particularly affects the innovation's diffusion, it also has a significant effect on the adoption decision (Rogers, 2003). First, social influence (integrated in studies on different aspects) as an individual's perception that important others believe that one should use the e-service has a significant effect on perceived usefulness and intention to use (e.g., Dabholkar and Bagozzi, 2002; Yoh *et al.*, 2003; Nysveen, Pedersen and Thorbjørnsen, 2005; Schepers and Wetzels, 2007). Second, the adoption of interactive services in particular relies on the number of users who have already adopted the innovation, in turn influencing the degree of usefulness of this service (Mahler and Rogers, 1999). Third, the values and norms of the social system have a major effect on the adoption decision (Gatignon and Robertson, 1991). Especially in the public health system, the health policy plays an important role as health insurances often dictate services, medicines and therapies for financial reasons.

The (personal) Influence that is transmitted

In essence, the adoption process is the information exchange by which one individual communicates a new idea to one or several other individuals. Generally, mass media channels, interpersonal channels and interactive electronic communication are relevant sources of information that reduce uncertainty of potential adopters (Rogers, 2003). In this context, the following factors condition the impact of the information's influence (Gatignon and Robertson, 1991): (1) The origin of the information: personal information possesses a greater persuasiveness than impersonal mass media information. (2) The direction of the information: information screening by the less informed party (Stiglitz, 1975) or information signalling by the better informed party (Spence, 1974).

Personal Characteristics of Adopters

Existing research on personal characteristics identifies some variables which appear to discriminate innovators from later adopters or non-adopters (e.g., higher income, higher educational level, younger age, greater social mobility, more positive attitude towards risk or higher degree of opinion leadership), (Robertson, Zielinski and Ward, 1984). But further variables become relevant depending on the specific product or service category. Concerning e-services, the general technology readiness of the potential adopter plays a crucial role (Parasuraman, 2000). Besides, technology anxiety resulting from technology-based uncertainty has a negative effect on use (Meuter *et al.*, 2005). In the specific context, the individual adopter's demand for a the health service reflects the level of user involvement as the subjective psychological state referring to the importance and relevance of the specific service and plays an important role in the potential adopter's decision process (Barki and Hartwick, 1994; Venkatesh and Bala, 2008). Furthermore, trust in the service-provider has a significant effect on intention to use e-services (e.g., Gefen and Straub, 2003) and especially e-health services (Klein, 2007; Lanseng and Andreassen, 2007). The need for interaction also plays a relevant role as a high level of need for personal interaction reduces the desire to try an e-service (Meuter *et al.*, 2000; 2005). Finally, experience with comparable e-services has a significant effect on the intention to use (e.g., King and He, 2006).

We use the factors identified above as a basis for designing the field manual for our qualitative study and integrate them in the conceptual framework for the adoption of e-health services depending on their verification within the qualitative study.

Methodology

The aim of this research was to construct a conceptual framework for the adoption process of potential users of e-health services. Therefore, we used qualitative semi-structured interviews as they provide a smooth interviewing process that targets identifying the relevant determinants, information sources that eliminate existing uncertainty about the advantages and disadvantages of e-health services, persons or institutions that influence the decision process and potential barriers that threaten to abort of the process. Furthermore, this procedure is used in order to allow new viewpoints to emerge freely. To focus on the adoption of e-health services the problem-centred interview was applied as the interview methodology. As a guide for the interviews, we wrote up a loose field manual applying the findings from the literature review. The interviews themselves consisted of the following two parts: after the explorative investigation of all aspects with an influence on the adoption decision we also conducted a confirmatory validation of the conceptual framework that was adapted from the research literature. In total, we interviewed 15 experts of e-health services working in the areas of business practice, academic research and public health system institutions to construct the conceptual framework. The conducted interviews took between 60 and 75 minutes. Griffin and Hauser (1993) propose 15 personal interviews of one hour as being sufficient to highlight 80 percent of the relevant aspects of the research questions. Zaltman and Higie (1993) recommend between seven and 15 interviews of 90 to 120 minutes and write that a sample of 15 experts is adequate for drawing a complete picture of the adoption decision. For this, we tape recorded all interviews and transcribed them verbatim. Then, we entered the transcripts into QSR NVIVO 8. To analyse the transcripts, we developed a scheme of conceptual codes which we deduced from the literature research. After that, we identified sub-categories and themes and coded them using thematic analysis and constant comparison of the data. The main researcher, also conducting the interviews, coded all the data. Another expert checked and discussed the analysis of the study data.

Results and Discussion

Based on a comprehensive review of the literature and the results of the qualitative interviews we constructed the following conceptual framework for the adoption decision of potential users in the field of e-health services (see Figure 1).

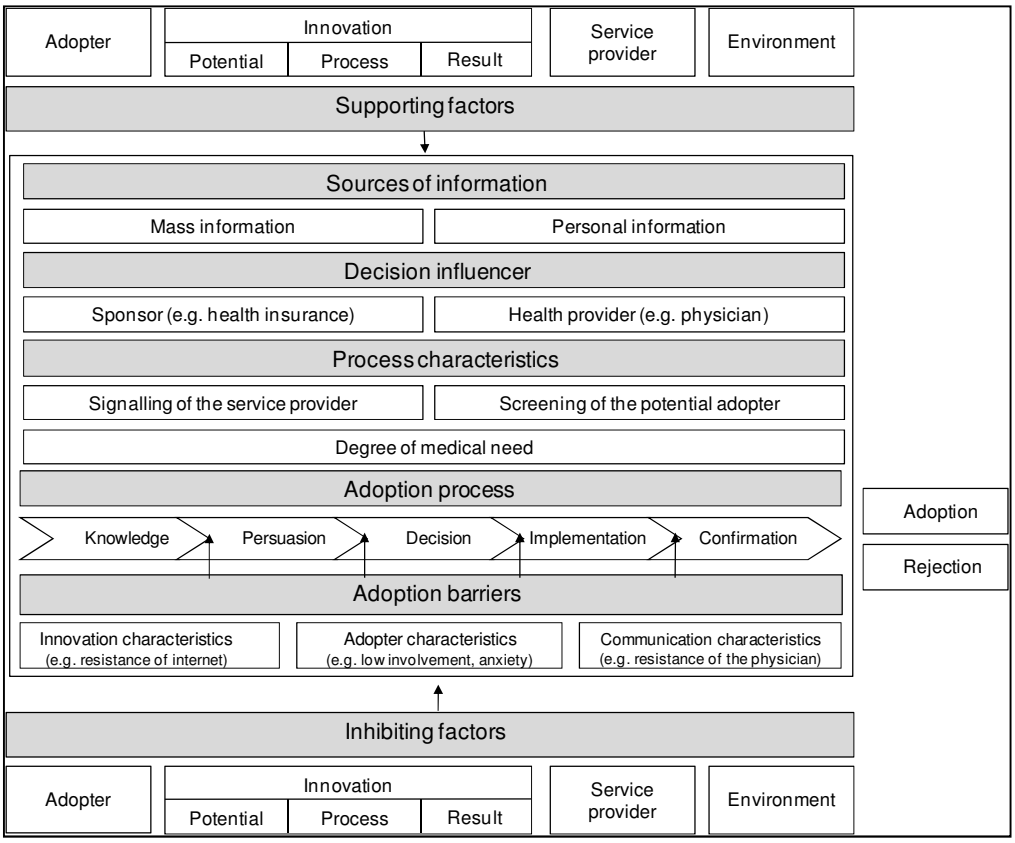

Figure 1: Conceptual framework for the adoption decision of potential users in the field of e-health services.

Besides the confirmation of the literature-based findings, the qualitative interviews identified the following additional factors which have not yet been considered in adoption research of e-health services. Concerning the factors influencing the adoption decision, four main sections are established as relevant: namely, the potential adopter, the innovation, the service provider and the environment. Regarding the innovation, the content analysis concludes that a three-part structure comprehensively reflects all the relevant factors: based on the characteristics of services, the categories refer to the required production potential of the provider (e.g., access to the e-health service), the process of the production (e.g., the perceived ease of use) and the outcome (e.g., perceived usefulness of the e-health service) (Lovelock and Wirtz, 2011). Where these factors bear a negative sign, a slowdown of the adoption process is indicated. Signalling activities of the service provider and screening activities of the adopter characterize the adoption process. However, in practice, service providers often omit to give sufficient information. Furthermore, the objectivity of the information is criticized and the information channels used (e.g., homepage or newsletters) do not attract enough attention. Concerning the sources of information, the official information provided by health sector institutions (e.g., health insurance), the personal environment of the potential adopter and health providers (e.g.,

hospitals, physicians and pharmacies) are relevant. In the case of e-health services, it has to be considered that the information about a new service usually differs from the demand for that service initially (e.g., illness). Furthermore, the decision to adopt or reject often depends not only on the potential adopter but also on the sponsor (e.g., health insurance) and especially on the health provider (e.g., the physician) – a process that can be compared with a buying centre in the business-to-business sector. In this constellation, the physician possesses the most influential position as the patient will trust the physician and is dependent on his or her opinion. In this context, the qualitative interviews highlight that health providers have considerable reservations regarding e-health services because they fear such things as loss of control, too much transparency about their diagnosis and treatment, data abuse or insufficient billing for their efforts. Relating to possible barriers that inhibit the intention to adopt the innovation, we also identified three categories: innovation, adopter and communication characteristics. Concerning the first category, the use of internet-based services particularly leads to a high drop-out rate, especially for the segment of older potential users, whereas the experts surprisingly judge that the application of technology is uncritical with regard to the elderly. Considering the adopter characteristics, a lack of intrinsic motivation and low involvement constitute particular barriers, as an intensive discussion of the advantages and disadvantages of the innovation does not take place. Furthermore, a fear of facing serious health problems will ward off the potential user. Finally, in the communication context, a sceptical attitude of physicians (as the source of information) towards e-health services is seen to present the most critical barrier. In general, with regard to inhibiting factors and barriers, transitions are fluent and the classification depends on the perceived intensity of a factor.

Regarding the discussion about the advantages of e-health services, our findings contribute to a comprehensive understanding of the adoption decision. Insights into the relevant supporting and inhibiting factors as well as the possible barriers are extremely helpful for service providers in support of the process of adoption on an individual basis. Furthermore, the identification of the influential role of the physicians and their predominantly sceptical attitude towards e-health services implies a need to take them into particular consideration during the development and implementation of new services. This conceptual framework should be validated by conducting qualitative interviews with adopters and non-adopters for different e-health services. Based on these findings, hypotheses have to be deduced so that generally accepted findings for different categories of adopters and e-health services can be established. It is time to systematically take advantage of the benefits that e-health services offer.

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