SYSTEM CHARACTERISTIC OR USER PURPOSE? – A MULTI-GROUP ANALYSIS OF ONLINE SHOPPING BY MOBILITY IMPAIRED AND UNIMPAIRED USERS

Complete Research

Kroenung, Julia, University of Mannheim, Mannheim, Germany, kroenung@bwl.uni-mannheim.de

Jaeger, Lennart, Goethe University Frankfurt, Frankfurt, Germany, lennartjaeger@gmail.com

Kupetz, Arne, Goethe University Frankfurt, Frankfurt, Germany, arne.kupetz@gmail.com

Abstract

Since van der Heijden (2004) it is widely accepted that hedonic and utilitarian information systems underlie different adoption mechanisms. Within this research, we compare two homogenous user groups and their adoption behaviors with respect to e-commerce websites. The groups thereby differ only in the fact that one of them consists of individuals suffering from mobility impairment. Consistent with theory in psychology and medical rehabilitation that suggests that disablement leads to an adapted evaluation of surroundings (including ICT) in terms of needs and purposes, we show by means of a multi-group structural equation analysis that concerning adoption determinants of a system, not only the mere system characteristics (utilitarian vs. hedonic) matter, but also the value that is attached to the system by the user in terms of his personal needs. The results indicate that although e-commerce websites are predominantly classified as hedonic system, the adoption of them by the mobility-impaired group is predominantly determined by perceived usefulness. This leads to the discussion if user characteristics in terms of physical capabilities and the needs they imply should be attached more importance to in IS adoption research.

Keywords: Disability, Utilitarian Value, Hedonic Value, Online-Shopping.

1   Introduction

Physical mobility refers to the ability to move one's body within or between environments (e.g. indoor and outdoor movements) whereby the pursuit of activities and participation is enabled (Cowan et al. 2012). However, the presence of impaired body functions or structures may compromise one's ability to pursue objectives that require being mobile. Outdoor movements, for instance, require the coordination of various capabilities (e.g. physical, mental, and social), as well as adequate accessibility or transportation (Cowan et al. 2012; WHO 2001). Accessibility problems may occur, when an individual, who uses a wheelchair, is confronted with an inaccessible building due to a lack of ramps and elevators or inadequate transportation to the place of interest. These obstacles may preclude or discourage people with mobility impairments from participating in daily life (e.g. mainstream social, cultural, economic and political activities) and may lead to social exclusion (Burchardt 2000).

In this respect, the potential of information systems (IS) for social inclusion is immense, since many activities can be performed online and are thus decoupled from physical mobility. Social networking

sites (SNS), virtual worlds, and e-commerce represent only a few examples of how social interaction and commercial activities are transferred to virtual channels (Dewan and Ramaprasad, 2014; Webster, 2014). However, whereas for unimpaired people these possibilities represent only an additional option to interact with people, purchase products or engage in the pleasures of virtual worlds, for mobility-impaired people, they are often the only option to do so (Childers and Kaufman-Scarborough 2009, Stendal, Molka-Danielsen, Munkvold, and Balandin, 2012).

From a logical standpoint, this dependence on the electronic channel due to mobility impairments should lead to a different evaluation of these technologies with respect to their utilitarian and hedonic value for the mobility-impaired user compared to unimpaired users who depend on these technologies to a much smaller extent. This argument is supported by research in psychological and medical sciences (Livneh, 1980; Verbrugge and Balaban, 1989). Keany and Glueckauf, (1993) for instance, inspired by the work of Dembo et al. (1956), describe how a disability leads to a change in values that are attributed to certain things. They argue that due to the fact that a disability limits functionalities of the body and sometimes values associated with them (e.g. perfection, beauty), the psychological coping mechanisms of the human mind lead to devaluation of values associated with physique and in turn induce an increased appreciation of alternatives values (e.g. friendship, joy) (Dembo et al., 1956; Keany and Glueckauf, 1993). Further support for the argument of adapted evaluation patterns comes from rehabilitation science research on assistive technologies. For example, a study conducted by Samuelsson and Wressle (2008) showed that mobility-impaired people evaluate technologies predominantly with respect to their attributed utilitarian value regarding the enhancement of mobility.

Transferred to research on IS adoption, basing on motivational theory and consumer research van der Heijden (2004) introduced the classification between hedonic and utilitarian systems and confirmed the hypothesis that the adoption of utilitarian systems, due to their emphasis on functionality and instrumental value for the user, is predominantly driven by cognitive constructs (e.g. perceived usefulness). As to hedonic information systems, van der Heijden (2004) claimed that due to their emphasis on pleasure and fun their adoption would predominantly be based on affective constructs (e.g. perceived enjoyment), which he confirmed by his study. Thus, the essence of van der Heijden (2004)'s argument is, that the system's functional focus or characteristic (utilitarian vs. hedonic) determines its main adoption determinant (perceived usefulness vs. perceived enjoyment) beforehand. Regarding adoption decisions by physically disabled users however, we challenge van der Heijden, (2004)'s emphasis on system characteristics and argue that the user's individual value that he/she attributes to a system determines whether its adoption is predominantly cognitively or affectively driven, and advocate for a user centred rather than a system centred view on adoption. Combined with the research emphasis on the adoption by mobility-impaired users, our research objective can be formulated as follows: In what manners do the adoption patterns of a hedonic system (e.g. online shopping) by mobility-impaired users differ from those by demographically homogenous unimpaired users?

2   Theoretical Background

2.1   Hedonic and utilitarian system value – system vs. user centricity

Basing on motivational theory (Deci, 1975) and consumer research (e.g. Babin, Darden, and Griffin, 1994; Childers, Carr, Peck, and Carson, 2002), Van der Heijden (2004) classified information systems into hedonic and utilitarian. He thereby defined utilitarian systems as systems „ (...) which aim to provide instrumental value to the user" (Van der Heijden 2004, p. 696). Hedonic systems representing the natural contrast were defined as systems that „(...) aim to provide self-fulfilling value to the user" (van der Heijden 2004, p. 696). Supported by consumer research, van der Heijden argued, that due to the different set of values that these systems provide to the user, their adoption should be determined by either perceived usefulness, a construct that by definition pays credit to instrumentality (Davis, 1989;

Davis, Bagozzi, and Warshaw, 1989), if the system is utilitarian, or perceived enjoyment if the system can be characterized as hedonic.

This classification provided by van der Heijden (2004) has been widely accepted in IS research and represented the basis for many other successful publications (e.g. Benbasat and Barki, 2007; Venkatesh and Bala, 2008; Venkatesh, Thong, and Xu, 2012). However, in his publication and motivational theory, two perspectives are inherent, among which only one – mainly due to van der Heijden's publication - is widely accepted in IS research. We label these perspectives, which we will comment on in the following: *system centricity* and *user centricity*.

The perspective of *system centricity*, following van der Heijden's classification into hedonic and utilitarian systems, implies that the aim of a system and thus its main characteristic (utilitarian or hedonic) determines how the adoption patterns of the users of the system are shaped. For instance, Microsoft Outlook as a utilitarian system is predominantly adopted on the basis of cognitive beliefs (e.g perceived usefulness), whereas a hedonic system (e.g. an online game platform) is predominantly adopted because of the users' perceived enjoyment regarding the system. Thus, system-centricity focuses on the systems original purpose and functional focus defined by its designers. It assumes that the user anticipates this purpose and that his/her adoption patterns respond accordingly. An example for the system-centric perspective is the following statement: Due to its utilitarian value, the adoption of MS outlook is predominantly driven by perceived usefulness. This system-centricity seems natural given the fact that most IS were designed to fulfill a certain purpose, that in the late 80's and early 90's was still mainly functional (see Davis, 1989; DeLone, 1988; Johnston and Vitale, 1988; Leifer, 1988), and the main reason for Davis (1989)'s focus on perceived usefulness in the TAM (Davis, 1989; Davis et al., 1989), and performance expectancy in the UTAUT four years later (Venkatesh, Morris, Davis, and Davis, 2003). However, due to the development of the personal computer, and the emergence of e-business and social media (Brown and Venkatesh, 2005; Venkatesh and Brown, 2001; Webster, 2014), the emphasis on system functionality decreased and the hedonic aspect of systems gained importance. Still, although the term of hedonic system and the associated construct perceived enjoyment was introduced by van der Heijden in the year 2004, it does not imply user-centricity with respect to adoption patterns, since with respect to adoption, the argument persisted that the characteristics of the system determine the adoption patterns of the user.

The perspective of *user centricity* by contrast, represents a different conceptual perspective with regards to adoption patterns in relation to the system. This perspective implies that the focus on perceived usefulness or perceived enjoyment is not determined by the systems characteristics (utilitarian vs. hedonic) but by the users type of value that is attributed to it. Implicitly inherent in the definition of hedonic and utilitarian system provided by van der Heijden (2004), user centricity in terms of adoption patterns means that the user attributes the type of value (hedonic vs. utilitarian) to the system that he/she feels provided by the system. In other words, it is the user who defines the type of value that the system provides for him, and by this value his/her adoption patterns are coined. Thus, the classification into utilitarian and hedonic values and their linkages to perceived usefulness or perceived enjoyment derived by van der Heijden (2004) remain in force in the user-centered perspective. However, the essential difference is that the user decides upon the type of value (utilitarian vs. hedonic) that the system provides and the value type is not a predefined system characteristic. Consumer research on shopping value supports this user centered view (Babin et al., 1994; Childers et al., 2002; To, Liao, and Lin, 2007). Zeithaml (1988) for instance, conducts a literature review on value definitions and derives a conceptual definition of shopping value that stresses that the consumer's subjective experience defines whether shopping is perceived to be utilitarian or hedonic. Further, Babin et al. (1994) develop a scale to measure shopping value that is explicitly designed to recognize both value types in consumers.

Transferred to IS adoption and comparing system- with user centricity, we state that in many – maybe most - cases both will lead to the same shapes of adoption patterns. However, there are two scenarios where both perspectives conceptually diverge: The first are systems with both hedonic and utilitarian

characteristics as most social media for instance (Gerow, Ayyagari, Thatcher, and Roth, 2012; O'Brien, 2010), and the second are individual differences with respect to system requirements or purposes within users (Agarwal and Prasad, 2007; Allen, 2000; Lederer and Smith, 1988; Schepers and Wetzels, 2007; Zmud, 1979). As to the first, especially the emergence of social media has challenged the classification into utilitarian and hedonic systems (Mikalef, Giannakos, and Pateli, 2012; C. Xu, Ryan, Prybutok, and Wen, 2012). For instance, whereas some users attribute a utilitarian value to Facebook especially if they use it for professional purposes or for accomplishing certain things (e.g. organizing group events), others attribute a purely hedonic value to the same system and consequently show different adoption patterns. Thus, these systems are no longer distinctively classifiable into utilitarian or hedonic.

In addition to this, individual differences in user purposes and value attributions to systems further challenge the classification into hedonic and utilitarian. Taking a group of severely disabled people using the virtual network Second Life as example, for those who suffer from a devalued identity (Steele, 1998), the opportunity to become someone else and communicate through an avatar without being stereotyped (Goff, Steele, and Davies, 2008) also holds a utilitarian aspect (Stendal et al., 2012), whereas it is almost exclusively associated with joy by most unimpaired users. Within this research, we argument for the user-centered perspective on IS adoption implying that the users' value attribution to the system (utilitarian vs. hedonic) determines whether its adoption is predominantly affectively (e.g. perceived enjoyment) or cognitively (e.g. perceived usefulness) driven. We further state that this user-centered perspective is conceptually superior when adoption decisions by a group with special needs (e.g. mobility-impaired users) are investigated. Within the next subsection we will briefly summarize literature from the psychological and medical sciences explaining how an impairment induces a shift in value attributions, followed by research model and hypotheses.

2.2   Impairment-induced value change

Within the psychological and medical sciences, a whole bunch of literature, mostly assigned to a stream labelled 'rehabilitation science', has investigated the impact of disability and impairment on individuals' perceptions, values and behavioral responses (Dembo et al., 1956; Li and Moore, 1998; Linkowski, 1971; Livneh, 1980; 2012). The understanding of psychological coping mechanisms and effective counselling as objective, this research aims to understand the adaptive psychological responses of individuals that are induced by a disability. Dembo et al. (1956) emphasised the perception of a disability as "value loss", and concluded that non-acceptance of a disability leads to underestimation of existing abilities and even self-devaluation. In contrast to this, acceptance of a disability represents an adjustment of a person's value system in the sense that perceived losses from disability do not negatively affect existing values (Dembo et al., 1956; Keany and Glueckauf, 1993; Wright, 1983).

With respect to an impairment induced value change that leads to significant differences in adoption patterns, the following two interconnected arguments are essential: The influence of the disability on individuals' values (Dembo et al. 1956, Keany and Glueckauf 1993, Li and Moore 1998, Linkowski and Dunn 1974), and disability-induced special needs that result in a change of emphasis with respect to values and beliefs (e.g. Burnett 2006, Li and Moore 1998). As mentioned before, the first argument originated from a sub discipline of social psychology that deals with coping and rehabilitation behaviors and has many intersections with the medical sciences. Although research within this stream primarily focused on people who according to a tragic incident face the consequences of a disability and slowly adapt to this circumstance during a coping period of unpredictable length (Dembo et al. 1956, Livneh 1980), it has also been documented that a difference in the evaluative structure of individuals with physical disabilities also includes people disabled from birth, for whom this psychological adaptation takes place earlier in life (see e.g. Linkowski and Dunn 1974). Thereby, the change in self-concept and values is manifested by means of a subordination of the physique relative to other values (Keany and Glueckauf 1993). As society puts an emphasis on physical perfection, beauty and ability, psychological defence mechanisms induce that the perception of irreversible disadvantages in these

categories by an individual cause an expansion of his/her value scope. Consequently, the relative emphasis on physique decreases and the importance of other values such as friendship, intelligence or creativity increases (Keany and Glueckauf 1993). This change is manifested in different self-perceptions (Linkowski and Dunn 1974) as well as affective or cognitive responses compared to non-disabled people (Burnett 2006). Thus, in terms of value hedonic and utilitarian values differ with a disability and dependent on the disability. In simple terms, the disability moderates what an individual evaluates as pleasant and/or useful. Thereby, the change of utilitarian value (i.e. the perception of usefulness of a stimulus) also relates to the differing needs and requirements depending on the disability. Thus due to a disability/impairment, object evaluation mechanisms adapt and requirements change (Keany and Glueckauf, 1993).

Because of these well-documented changes in value attributions by people with impairments, we argue that holding a user-centered perspective on adoption, differences in adoption patterns between impaired and non-impaired users should be significant with respect to utilitarian and hedonic value expressions. In order to avoid a blending of effects, we selected online shopping websites as exemplary system, since recent research predominantly classified them as hedonic systems (Arnold and Reynolds, 2003; Childers et al., 2002; Wang and Scheepers, 2012). Another argument for this choice was that with respect to online shopping some research on disabled consumers exists, whereas no research on disabled users could be found with respect to other systems that are typically investigated. We further restricted our focus only on mobility impairments, since many types of different disabilities/impairments are not comparable with respect to requirements (Marks, 2009). Within the following section, we base on extant literature on online shopping and disabled (mobility-impaired) consumers in order to derive our hypotheses.

2.3 Research model and hypotheses

Few studies have tried to explain what motivates people with mobility impairments to shop online and provide some evidence that difference due to the presence or absence of mobility impairments might exist. For instance, Burnett (2006) classified disabled participants into "low-disabled", "moderate-disabled" and "high-disabled" in his study and found that the higher the disability status, the more the Internet was perceived as a "*convenient and reliable source of product and service information*" and was used as a connector to the outside world, such as for online shopping. Thus, he concluded that people with disabilities more likely use the online environment to carry out activities of their daily life and are less likely to use it for its novelty benefits.

In another study, Childers and Kaufman-Scarborough (2009) suggested that consumers with mobility impairments that have trouble dealing with the physical geography of bricks and mortar stores may have developed a dependence on online shopping. As such, convenience was not viewed in terms of saving times, but rather in being dependent on access to shopping. On the other hand, non-disabled consumers experienced convenience in its traditional definition (e.g. to save time or trouble of shopping in a physical retail store). Furthermore, Kouroupetroglou and Mitsopoulos (2000) stated that online shopping is even more important to people with disabilities, since it would be a matter of access and hence necessity, rather than only of convenience. Empirical evidence on consumers with a disability and their perception of enjoyment is scarce and Childers and Kaufman-Scarborough (2009) noted that solely being empowered and independent to achieve one's shopping goals was perceived as a source of enjoyment and that the Internet itself was not a source of entertainment. In contrast, individuals without a disability use the Internet more frequently for getting information about entertainment and downloading or playing games (Burnett 2006). Consequently, the utilitarian value of online shopping for people with mobility impairment should be higher compared to unimpaired users. This leads to the following hypotheses:

Hypothesis 1: For individuals with mobility impairments, utilitarian value (operationalized as perceived usefulness) is a stronger predictor of actual use of online shopping than for individuals without mobility impairments.

Hypothesis 2: For individuals with mobility impairments, hedonic value (operationalized as perceived enjoyment) is a weaker predictor of actual use of online shopping than for individuals without mobility impairments.

If systems are easy to use, less effort by the user is required, which increases the likelihood of their use (Davis et al. 1989). In the context of online shopping, perceived ease of use should influence actual use directly, because when consumers feel its use is easy, they will more likely shop online. Whether a shopping website is easy to use, may be especially important for people with mobility impairments, because their ability to manipulate objects (e.g. using a mouse or keyboard) may be limited. For instance, there may be difficulties with mouse-based navigation, which leads to the requirement of assistive devices that interact correctly with the website (Childers and Kaufman-Scarborough 2009). In the event of missing accessibility features on websites, individuals with mobility impairments may perceive the website too difficult to use and refrain from using it. However, perceived ease of use should be a secondary concern for people without mobility impairments, because website tools are exceptionally easy to use (Childers 2001). If a website is perceived to be easy to use, people with mobility impairments may value the use of an accessible website more than people without mobility impairments. Thus:

Hypothesis 3: For individuals with mobility impairments, perceived ease of use is a stronger predictor of actual use of online shopping than for individuals without mobility impairments.

In addition to a direct effect, perceived ease of use may influence online shopping use indirectly via perceived usefulness, because if an online shopping website is too difficult to use it is less likely to be perceived as useful, which results in a decreased likelihood of its use. Studies on technology acceptance and use of online shopping websites have verified that perceived ease of use has a strong impact on perceived usefulness (Gefen et al. 2003). The use of assistive devices, as well as various accessibility barriers due to the website design may make searching for product information or purchasing processes time consuming and exhausting (Ritchie and Blanck 2003). As such, the use of an online shopping website may be perceived to be ineffective or inefficient by people with mobility impairments. If a website is perceived to be easy to use, people with mobility impairments, may value the affordance of effectiveness and efficiency more and perceive its use to be more useful than people without mobility impairments. Thus:

Hypothesis 4: For individuals with mobility impairments, perceived ease of use is a stronger predictor of utilitarian value (operationalized as perceived usefulness) than for individuals without mobility impairments.

A similar reasoning may be true for the effect of perceived ease of use on perceived enjoyment, because if the use of online shopping websites is too difficult, it may be less likely perceived as enjoyable, which in turn leads to decreased use. Some researchers provided evidence that an IS that is easy to use, is more likely to be perceived enjoyable (Davis et al. 1992; Igbaria et al. 1995; Teo et al. 1999; van der Heijden 2004). Research indicates that assistive devices for people with mobility impairments also can create fatigue through complex manoeuvres and cognitive processing load (Childers and Kaufman-Scarborough 2009). If a website is perceived to be easy to use, people with mobility impairments may value the lack of complex manoeuvres and cognitive processing load higher and perceive its use to be more enjoyable than people without mobility impairments. Thus:

Hypothesis 5: For individuals with mobility impairments, perceived ease of use is a stronger predictor of hedonic value (operationalized as perceived enjoyment) than for individuals without mobility impairments.

The following Figure 1 contains the research model and hypotheses. The symbol β_1 thereby stands for the group with mobility impairments, whereas the symbol β_2 represents the group without mobility impairments.
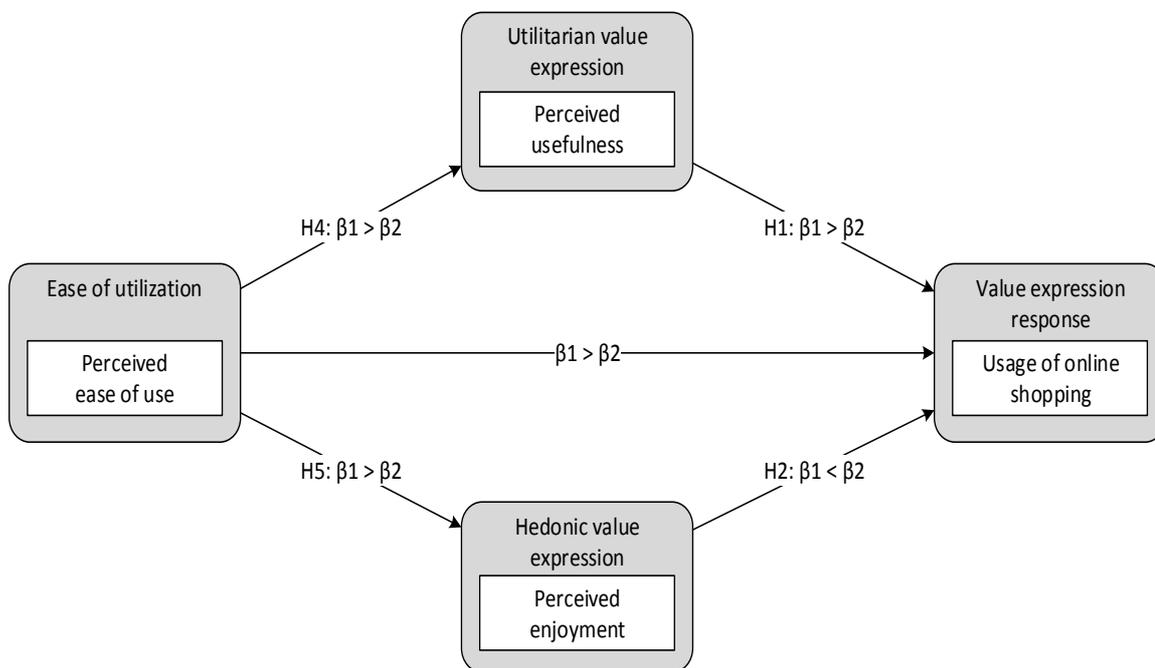

Figure 1.   Research model and hypotheses

3   Research Methodology

In order to empirically test the hypotheses set out in the research model, an online survey was conducted, as this method is seen to be best for obtaining personal and social facts, beliefs and attitudes, and enhancing the generalizability of results (Kerlinger, 1973). Especially, the latter is useful for the identification of causal factors and obtaining insights on a broader basis. Moreover, respondents might be more willing to share information about their disability in an anonymous survey without an interviewer present. However, survey methods have the limitation that the scope of information often is obtained at the cost of depth (Kerlinger 1986). With this limitation in mind, the questionnaire for this survey was structured with a variety of questions that broach the main topics of this work.

3.1   Measures

A self-developed questionnaire, which among other things consisted of the items measuring the variables of the research model, was used to collect the data. The items used to measure perceived usefulness, perceived enjoyment, and perceived ease of use were adapted and modified from prior research in order to enhance the quality and validity of the construct measures (e.g. Davis et al. 1989, Van der Heijden 2004). For each item, respondents assessed the extent of their agreement/disagreement using a five-point Likert-type scale, ranging from strongly disagree (1) to strongly agree (5). The items measuring online shopping use, were self-developed (e.g. the frequency of visiting online shopping websites or performing purchases online).

3.2 Data collection

The online survey platform 'EFS Survey' was used to collect the data and the corresponding link for the survey questionnaire was distributed to special interest group websites such as news portals and forums, as well as to personal contacts to disabled rights organizations and sport clubs in Germany. For the unimpaired participants, Facebook was the predominant distribution channel. At the beginning a cluster variable sorted the participants into mobility-impaired and unimpaired participants who with respect to the demographic part obtained different set of questions. Participation was entirely voluntary and anonymous. Prior research highlighted the need for more data concerning the disability status, since different disabilities entail different types of limitations and barriers towards access to ICT (see Vicente and López, 2010). This study responded to this calling and accurate distinctions between the degree and type of disability of each participant were achieved by i.e. implementing a matrix, within disabled participants could mark different body areas to distinguish handicapped from regular functioning body parts. Furthermore, the opportunity to state the degree of handicap recorded in the German handicap passport, as well as the level of care category of the public German nursing care insurance was given in order to measure the daily effort that is needed for home care. We focused on mobility-impaired participants relying on mobility devices (e.g. canes, rollators, wheelchairs) to facilitate the ability to walk and excluded other forms of disabilities (e.g. intellectual, sensory or learning) from the sample. The following Table 1 contains the demographic information of all participants.

Characteristic: Mobility Impairment		Yes (n=100)	No (n=100)	Total
Measure	Item	Frequency	Frequency	Frequency
Gender	Female	48	44	92
	Male	52	56	108
Age	Under 18	6	4	10
	18-24	11	11	22
	25-39	31	49	80
	40-59	50	34	84
	60 or older	2	2	4
Educational level	Without educational level	17	22	39
	Finished Apprenticeship	37	32	69
	Professional school degree	18	14	32
	College	11	12	23
	University degree	11	20	31
	Doctorate	6	0	6
Income (in €)	No regular income	12	13	25
	400-1200	36	29	65
	1201-3000	44	44	88
	3001-5000	6	12	18
	> 5000	2	2	4

Table 1.   Demographic information of the impaired and unimpaired sample group

3.3   Data analysis technique

In order to assess the research model and test the proposed hypotheses with the collected empirical data, a structural equation modeling technique was used, namely Partial Least Squares analysis (PLS) (Chin 1998). PLS is a least squares regression based technique that provides the necessary outputs to estimate the measurement model (i.e. the relationship between the latent variable with its respective manifest variables) and the structural model (i.e. the relationship between the latent variables) (Henseler et al. 2009). Furthermore, PLS is able to provide solid results for small sample sizes and can be used to test and validate exploratory models (Henseler et al. 2009). Due to these characteristics, PLS has been used by scholars from various disciplines, as for instance International Marketing Research (see Henseler et al. 2009 for review). In order to test the mobility impairment's hypothesized moderating effect on the relationships between the constructs in the model, two distinct PLS path models for the two groups of individuals with mobility impairments and individuals without mobility impairments were estimated. Differences in the path coefficients are assessed by means of a bootstrap-based PLS multigroup analysis (Henseler 2012). The software SmartPLS version 2.0.M3 was used for PLS path modeling (Ringle et al. 2005). As there is no overall goodness-of-fit criterion for the quality of PLS path models, measurement model and structural model, were evaluated independently (Hair et al. 2012; Henseler et al. 2009). First, the reliability and validity of the measurement model were assessed and second the structural model for hypotheses testing was examined (Henseler et al. 2009).

4   Results

4.1   Measurement model

For an assessment and evaluation of the reflective measurement model, several criteria need to be tested (see Henseler et al. 2009). Construct reliability was assessed by applying the test for composite reliability (CR), which is an indicator for internal consistency between measurements of a latent variable and values higher than 0.7 indicate that all items in each latent variable form a single latent construct (see Hair et al. 2006). This test can be seen as more precise than the traditional criterion for internal consistency (i.e. Cronbach's Alpha), as the latter assumes that all indicators are equally weighted and thus underestimates the internal consistency reliability of latent variables (Chin 1998).

Items		Mobility Impairment / No Mobility Impairment						
		Loadings	CR	AVE	Latent Variable Correlations			
					Use	PU	PEOU	PE
Use of Online Shopping	U-1	0.971/0.896	0.8899/	0.8017/	**0.8954/**			
	U-2	0.873/0.874	0.8785	0.7833	**0.8850**			
Perceived usefulness	PU-1	0.920/0.906	0.8862/	0.7231/	0.4314/	**0.8504/**		
	PU-2	0.765/0.842	0.8769	0.7047	0.4112	**0.8395**		
	PU-3	0.859/0.764						
Perceived ease of use	PEOU-1	0.907/0.940	0.9492/	0.8616/	0.412/	0.3953/	**0.9282/**	
	PEOU-2	0.933/0.899	0.9516	0.8677	0.2969	0.4459	**0.9315**	
	PEOU-3	0.945/0.955						
Perceived enjoyment	PE-1	0.940/0.927	0.9233/	0.8008/	0.3794/	0.5451/	0.6009/	**0.8949/**
	PE-2	0.874/0.904	0.9377	0.8337	0.4522	0.5737	0.6076	**0.9131**
	PE-3	0.869/0.910						

Table 2.   Results of the measurement model analysis

As shown in Table 2, the CR-values range from 0.87 to 0.95, which exceeds the recommended threshold 0.7 (Hair et al. 2006). Indicator reliability was assessed by checking factor loadings (Johnson et al. 2006). As shown in Table 2, all items have loadings above 0.7, which indicates that the indicators are reliable. Construct validity, which measures whether the indicators actually explain their respective latent variables, can be assessed through convergent validity and discriminant validity (Henseler et al. 2009). For the assessment of convergent validity we used the average variance extracted (AVE) (Fornell and Larcker 1981). As shown in Table 2, the AVE of each latent variable ranges from 0.7 to 0.87, which is above the recommended threshold of 0.5 (Fornell and Larcker 1981). For the assessment of discriminant validity, we referred to the Fornell-Larcker criterion (Fornell and Larcker 1981; Hair et al. 2006). This criterion is evaluated by means of a comparison of the square root of the AVE of every latent variable with the correlation coefficients among the latent variables, where the former should be higher than the latter (Fornell and Larcker 1981; Hulland 1999). As shown in Table 2, this is the case for all variables. Furthermore, the bootstrapping procedure for assessing measurement invariance across the group-specific PLS path models was used (Rigdon et al. 2010). As shown in Table 3, the results of the composite reliabilities and AVEs do not differ significantly in the presence or absence of mobility impairments. Thereby, measurement model invariance is established (Sarstedt et al. 2011).

Latent Variable	Quality Criterion	Mobility Impairment/No Mobility Impairment		|Diff| means	t-Value	p-Value
		Original Sample	Standard Error			
Use of Online Shopping	AVE	0.8017/0.7833	0.0322/0.0387	0.0184	0.367	0.7140
	CR	0.8899/0.8785	0.0329/0.0402	0.0114	0.032	0.9745
Perceived usefulness	AVE	0.7231 /0.7047	0.0573/0.0604	0.0184	0.222	0.8245
	CR	0.8862/0.8769	0.0184/0.0093	0.0093	0.0467	0.9628
Perceived ease of use	AVE	0.8616/0.8677	0.0255/0.029	0.0061	0.1586	0.8742
	CR	0.9492/0.9516	0.0061/0.0024	0.0024	0.0154	0.9877
Perceived enjoyment	AVE	0.8008/0.8337	0.0333/0.0267	0.0329	0.7749	0.4394
	CR	0.9233/0.9377	0.0329/0.0144	0.0144	0.019	0.9849

Table 3.   Test for measurement invariance

4.2   Structural model

For an assessment of the structural model several criteria needed to be tested. These included coefficient of determination (R^2); estimates for path coefficients; effect size (f^2) (see Chin 1998; Henseler et al. 2009). The first essential criterion to evaluate is the coefficient of determination (R^2 value), which represents the variance of the latent endogenous variable explained by the antecedent exogenous variables (Chin 1998; Hulland 1999, p). R^2 values of 0.67 for endogenous latent variables can be described as "substantial", whereas values of 0.33 and 0.19 are rated as "moderate" and "weak", respectively (Chin 1998). The R^2 value of the endogenous variable USE amounts to 26% for the group of people with mobility impairments and 24% for the group of people without mobility impairments, and indicates a weak explanatory power of the exogenous variables (Chin 1998).

In order to test the hypotheses, a non-parametric procedure, named PLS-MGA (multi-group analysis), was adopted (Henseler 2012). First, the PLS structural model for each subsample was estimated. The second and third columns of Table 4 show the path coefficients and their significant levels for both groups. Second, each subgroup was subjected to a bootstrap analysis with 500 bootstrap samples. Each path coefficient estimate of the group of people with mobility impairments (β_1) was compared with the corresponding estimate of the group of people without mobility impairments (β_2). The number of posi-

tive and zero differences divided by the total number of comparisons (i.e. 25000) indicates the probability that β_1 is greater than β_2 (Henseler 2012). As shown in the second column of Table 4, the influence of perceived usefulness on online shopping use is stronger for people with mobility impairments (β_1=0.295, p<0.01) than for people without mobility impairments (β_2=0.226, p<0.05). But, as shown in the last column of Table 4, the path coefficients do not differ significantly between the two models (Prob. (β_1>β_2)=72.18%). Thus, H1 is not supported. However, the influence of perceived enjoyment on online shopping use is considerably weaker for people with mobility impairments (β_1=0.064, n.s.) than for people without mobility impairments (β_2=0.322, p<0.01). As shown in the last column of Table 4, the path coefficients PE $\rightarrow$ USE differ significantly (Prob. (β_1>β_2)=3.33% or Prob. ($\beta_1 \leq \beta_2$=96.7%), respectively). Thus, H2 is supported. Furthermore, the influence of perceived ease of use on online shopping use is considerably stronger for people with mobility impairments (β_1=0.257, p<0.05) than for people without mobility impairments (β_2=0.003, n.s.). As shown in the last column of Table 4, the path coefficients PEOU $\rightarrow$ USE differ significantly (Prob. (β_1>β_2)=95.34%). Thus, H3 is supported. Additionally, the path coefficients PEOU $\rightarrow$ PU and PEOU $\rightarrow$ PE are weaker for people with mobility impairments than for people without mobility impairments, but do not differ significantly (Prob. (β_1>β_2)=37.36%, and Prob. (β_1>β_2)=46.63%, respectively). Thus, H4 and H5 are not supported.

Path	Coefficients		Hypotheses	PLS-MGA:
	Impaired (β_1)	Unimpaired (β_2)		Prob. (β_1>β_2)
PU→USE	0.295***	0.226**	H1: β_1 > β_2	72.18%
PE→USE	0.064 n.s.	0.322***	H2: β_1 < β_2	**3.33%**
PEOU→USE	0.257**	0.003 n.s.	H3: β_1 > β_2	**95.34%**
PEOU→PU	0.395***	0.446***	H4: β_1 > β_2	37.36%
PEOU→PE	0.601***	0.608***	H5: β_1 > β_2	46.63%
Note: *** p < 0.01 , ** p < 0.05 , * p < 0.1 , n.s. = not significant, PU = perceived usefulness, USE = use of online shopping, PE = perceived enjoyment, PEOU = perceived ease of use				

Table 4.   Multi-group comparison test results

Based on the results of the t-statistics, which highlighted that perceived ease of use failed to predict online shopping use for people without mobility impairments in the presence of perceived usefulness and perceived enjoyment, an analysis into a potential mediation effect through perceived usefulness and perceived enjoyment was conducted (Baron and Kenny 1986). Additionally, a Sobel test to assess the significance of the mediation effect (i.e. whether the indirect effect of the exogenous variable on the endogenous variable through the mediator variable is significant) was conducted (Sobel 1982). As shown in Table 5, the results demonstrate that for people with mobility impairments, perceived usefulness partially mediates the relationship between perceived ease of use and online shopping use, whereas there is no significant mediation effect by perceived enjoyment. In contrast, for people without mobility impairments, perceived enjoyment and perceived usefulness fully mediate the relationship between perceived ease of use and online shopping use.

Mobility Impairment (β_1)							
Hypothesis	(1) IV→DP	(2) IV→MED	(3) IV→DP	IV→MED	MED→DP	Sobel-Test	Mediation type observed
PEOU→PU→USE	ß=0.414 (p<0.01)	ß=0.4 (p<0.01)	ß=0.288 (p<0.01)	ß=0.359 (p<0.01)	ß=0.317 (p<0.01)	Z=2.568 (P<0.01)	Partial

PEOU→PE→USE	ß=0.414 (p<0.01)	ß=0.601 (p<0.01)	ß=0.288 (p<0.01)	ß=0.601 (p<0.01)	ß=0.206 (n.s.)	Z=1.887 (n.s.)	No media-tion
No Mobility Impairment (ß$_2$)							
PEOU→PU→USE	ß=0.299 (p<0.01)	ß=0.45 (p<0.01)	ß=0.138 (n.s.)	ß=0.447 (p<0.01)	ß=0.35 (p<0.01)	Z=2.876 (P<0.01)	Full
PEOU→PE→USE	ß=0.299 (p<0.01)	ß=0.613 (p<0.01)	ß=0.034 (n.s.)	ß=0.612 (p<0.01)	ß=0.432 (p<0.01)	Z=4.914 (P<0.01)	Full

Table 5.   Mediation effect

The last criterion for assessing the structural model is the effect size, which measures the effect of an exogenous latent variable on an endogenous latent variable and can be obtained by Cohen's f^2 (Chin 1998; Cohen 1988). The change in the R^2 of the endogenous latent variable is calculated by estimating the structural model twice for when an exogenous variable is used and when it is not used. Values of 0.02 indicate that the predictor variable has a "weak" effect size on the endogenous variable, whereas values of 0.15 and 0.35 indicate a "moderate" and "large" effect size, respectively (Chin 1998; Cohen 1988). As shown in Table 6, the effect sizes of perceived usefulness on the endogenous variable use are weak, whereas perceived ease of use has a weak effect for people with mobility impairments and no effect for people without mobility impairments. The effect sizes of perceived enjoyment on use vary between groups, as there is no effect for people with mobility impairments and a weak effect for people without mobility impairments.

Construct	f^2 - Effect Size		Effect	
	Impaired	Unimpaired	Impaired	Unimpaired
Perceived usefulness → Use	0.0808	0,0434	Weak	Weak
Perceived ease of use → Use	0,0471	0.0171	Weak	None
Perceived enjoyment → Use	0.0013	0.071	None	Weak

Table 6.   Effect sizes

5   Discussion

With respect to our research objective in what manners the adoption patterns of a hedonic system (e.g. online shopping) by mobility-impaired users differ from those by demographically homogenous un-impaired users, this study aimed at quantifying the influence of hedonic and utilitarian value expressions that determine use of online shopping and analysed differences in structural relations between mobility impaired and unimpaired users. We proposed utilitarian value expression (operationalized as perceived usefulness), hedonic value expression (operationalized as perceived enjoyment), and perceived ease of use as critical predictors of online shopping use and tested whether the impact of these concepts differ depending on the presence or absence of mobility impairments. In order to avoid noises with respect to our effects, we created two demographically homogenous samples. The multi-group comparison results suggest that differences with respect to adoption patterns and inherent system evaluations (utilitarian vs. hedonic) do exist in the presence of mobility impairments.

With respect to IS adoption research, our study showed that regarding special requirements of a user group the user-centred perspective seems to be more applicable compared to the system-centred perspective. This research provided indication, that although online shopping would be clearly classified into the hedonic category of systems introduced by van der Heijden (2004) and thus trigger predominantly hedonic value expressions in terms of perceived enjoyment, this turned out to be true only for the unimpaired user group. The mobility-impaired user group by contrast, did not attribute any hedon-

ic value to online shopping, clearly indicated by the non-significant relationship between perceived enjoyment and online shopping use. This finding is consistent to prior research in psychological and medical sciences (see e.g. Keany et al. 1993). We thus derive the following implications: The first is that on the basis of consumer research (e.g. Babin et al. 1994), research in rehabilitation science (e.g. Dembo et al. 1956, Keany et al. 1993, Li et al. 1998) and our results we argue for the user-centred perspective on adoption patterns rather than the system-centred perspective. Although this conceptual difference does not have any impact in general, with regards to the adoption by people with special requirements due to a disability it is conceptually essential, since it puts emphasis on individual and his/her personal needs rather than on the system's characteristics. It makes a difference if the ratio between usefulness and enjoyment as prior adoption determinants is theorized on the basis of system characteristics or value attributions according do individual user needs, especially regarding the societal impact of IS research. The second is, that the aspect of physical disability should find its way as individual difference into research in IS adoption, which we hope to initiate by means of this research. And third, our study can be seen as a complement of van der Heijden (2004)' s work, since online shopping my serve as either substitute or complement of regular shopping, since visiting stores is often not easily possible for mobility-impaired people.

5.1   Limitations and future research

However, some limitations should also be considered. First, this study is limited due to self-reported usage, as this study did not measure actual online shopping usage. Additionally, the results might change in the events of the fast-moving development of website design and the aspect of time must also be considered. Furthermore, users may shift their purposes over time (see Burleson et al. 2014) and this study might be limited due to its non-longitudinal setting. As such, this research might be limited due to its non-longitudinal setting. Further, as this study has its scope on online shopping websites, which limits generalizability of the results to other types of Information Systems (IS). We did not restrict online shopping to a particular site, which is a limitation with respect to specificity of the IT artefact, however, with reference to O'cass and Fenech (2003) and Klopping and McKinney (2004), we expect our results as not to limited in this respect. For future approaches we therefore suggest preliminary focus group research in order to extract specific sites of interest for the mobility-impaired group and construct the survey around these specific service. As the degree of immobility is categorical without any gradation in this study, future research could test another structural model that puts the level of handicap of the mobility impairment as control variable to examine how far the degree of immobility affects the relationship among the variables under investigation.

With respect to future research instead of suggestions we would like to call for research in the area of IS adoption by people with physical disabilities. According to Pope and Tarlov (1991) one out of every seven people in the US was disabled, with an increasing tendency regarding the fast demographic change. From a societal standpoint it is thus absolutely necessary to gain insights on how these people with special needs due to disablement adopt and use technologies, in order to understand how IS can be designed to positively impact their lives. The insights gained in this research represent a starting point for a user-driven design of systems under the integration of the particular target group. Further study may also examine, for example, an online system when it is the online choice (i.e. substitute) for both groups of respondents. Another possibility to gain new insights is to connect this study to the notion of affordances (i.e. action possibilities) offered by an online system to its potential users (Pozzi et al. 2014).

Moreover, it is important to link the findings from this research to the work by (Hartson 2003) on cognitive, physical, sensory and functional affordances. These important and user-centered approachest already build important complements to Van der Heijden (2004)'s work, and hold the potential to be conceptually linked or merged with system and user centricity. Especially the sensory affordances could be an interesting complement for this research in the future.

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