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"Online Or Offline, What Do You Prefer?" Pre-Test of Measurement Scales for Empirical Analysis

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Abstract

In times of increasing globalization and the continuing growth of internet-based processes and services, it becomes necessary to study emerging phenomena such as user resistance from a novel theoretical perspective. In this paper, we develop measurement instruments to empirically analyze and test why different process participants use or do not use this process in a virtual environment, and why different types of people perceive a virtualized process as useful or usable. We are interested in why people reject or use virtual processes. In order to verify the rejection of virtual processes, we base our research on user resistance and we examine Process Virtualization Theory, service quality and user satisfaction and their impact on attitude towards user resistance. Therefore we conducted a pre-test in the form of an online-survey with 90 participants. The aim of this pretest is to validate our measurement instruments and to get an early understanding of construct validity.

Keywords: Virtual environment, Virtual process, Process Virtualization Theory, User resistance, Service quality, User satisfaction

Introduction

The growing world-wide globalization and the possibility to use new innovations of the digital economy leads to the fact that more and more processes and services are being virtualized. For companies, this is an important and cost-effective instrument to maintain high user service levels in case of increasing number of process participants (Lu et al. 2009). Through process virtualization, the classical form of physical interaction is shifted to a virtual process (Overby 2012). An example for this change is the transformation of the traditional shopping and buying processes into electronic commerce (e-commerce), where a direct, physical interaction between a consumer and a salesman is no longer necessary (Overby 2008). However, recent studies have shown that the rejection (acceptance) of a virtual process depends to a large degree on the individual process participant or user (Overby and Konsynski 2010). Research of the information technology (IT) and user resistance leads to different perspectives. Some studies investigated whether or not there are differences by gender when it comes to the adoption and usage of technology-based processes (Morris et al. 2005; Venkatesh and Morris 2000; Venkatesh et al. 2000). Some researchers investigated the usage behavior of individuals at post-adoptive stages and the perception of different processes (Sun and Zhang 2008). However there are only a few studies about the rejection of a virtual process. Oreg (2003) tried to explain this behavior with the introduction of "resistance to change". This type of resistance is more pronounced in some people than others. This factor is so important that it might prevent the introduction of new or revised technology. Other authors focus on user satisfaction which is achieved through the quality of the service and see it as a crucial factor for the success of products and services (Kettinger and Choong C. Lee 1994; Kim et al. 2009). Actually there is a large amount of studies that deal with the rejection of virtual processes, but haven't found a definitive explanation (Barth and Veit 2011). For this reason, it is important to find out and understand which factors play a role in these behaviors (Morris et al. 2005). Overby (2008; 2012) tries to give an explanation through his Process Virtualization Theory (PVT). Although PVT does not explain user resistance, it explains which processes are particularly suitable to be virtualized and which factors are most important (Overby 2008; Overby 2012). The PVT is deliberately structured so that it applies to as many transformation of physical to virtual processes as possible and can be easily modified. PVT should help to determine if at an early time of the introduction of certain information-technology it will face great resistance (Overby and Konsynski 2010). Due to this, it is important to understand which factors influence the rejection of a virtual process and whether gender differences matter when implementing new technologies. It is necessary to explain the reasons and implications of process resistance as well as whether gender differences matter when using technology-based processes (Al-Shafi 2009).

For this reason, we identified factors that have an influence on user resistance from the user's point of view as process participants. In this paper, we want to focus on the user resistance as our main dependent variable. Our research model is split in two major parts; (a) PVT and its influence on user resistance and (b) service quality (SQ) as well as user satisfaction and its influence upon user resistance. These two parts of our research will allow us to analyze the reason for the user resistance to conduct a process virtually from a personal process participant's point of view and from a quality and satisfaction perspective. This allows us to detect the reasons for rejection of a process, especially while comparing different virtual processes which all have to serve the same purpose; e.g., different forms of the airport check-in process. We will introduce several moderator constructs like loyalty, gender, age, propensity to trust people and propensity to trust IT which may or may not have an influence on the relations of PVT or service quality & user satisfaction upon user resistance.

We validate and test our measurement instruments using an empirical study in the form of an online-survey with 90 fully answered questionnaires. For researchers, our results will help to improve the understanding of the likelihood to conduct processes virtually and explain differences in usage. Additionally, it will help companies to improve their IT-strategy and to form their processes more efficient.

The remainder of the paper is structured as follows. In the next section, we provide an overview of user resistance and its core concepts as well as PVT, service quality and user satisfaction. Afterwards, we develop and present our research model based on the effects of PVT, SQ and user satisfaction on the user resistance. Then, we describe our research methodology and the data collection process as well as the measurement scales that we developed. We validate the collected data, present and discuss our results.

Related Work and Theoretical Background

User Resistance

The critical factor for the successful implementation of processes and systems in the information technology is "user resistance" (Barth and Veit 2011; Laumer and Eckhardt 2012). User resistance is defined as behaviors intended to prevent the implementation or use of a system or to prevent system designers from achieving their objectives (Markus 1983). In the IS-literature there are different definitions for resistance to explain the behavior of IT-users (Laumer and Eckhardt 2012). Similar to the definitions there are different explanation for the emergence of resistance. Oreg (2003) investigates the general resistance towards changes in individual behavior. In an empirical study he identifies four characteristics which result in a particular strong resistance. These characteristics are: routine seeking, emotional reaction, short-term focus, and cognitive rigidity. To determine the individual characteristics of a person he developed a "resistance to change scale" and recommends to apply this scale for the occupation of certain positions in companies as well as for the introduction of products. As a result it may be possible to determine the resistance of people to change their behavior.

Martinko et al. (1996) see both internal and external factors that lead to the reactions of individuals concerning the implementation. External factors are the work environment, properties of the introduced IT-system and the management support. Prior experience with IT systems, as well as the character of the individual (e.g. optimistic or pessimistic) are the internal factors. These factors combined in a model should be able to determine the height of the resistance or how it develops in the future (Martinko et al. 1996). Lapointe and Rivard (2005) developed a multi-level framework to explain the resistance to the implementation of information technologies. These arise from the interaction of the initial situation with the given object. The perceived threat is one of several determinants which have an influence on the expression of resistance. That happens on an individual as well as on a group level. The analysis of Lapointe and Rivard includes the change of resistance from the beginning of the introduction process up to later stages, as well as the influence of individual observations on the resistance of the group. At the beginning the individual attitudes towards information technology are separated but approach throughout the process. The distinction between these different levels also allows to make distinctions in the intensity of the effect. Therefore factors which are acting on an individual level are less influential than factors on the group level. Another strength of the model is the longevity. The authors argue that they can identify triggers that influence initial conditions and the object of resistance. These trigger can be aspects like consequences to use a system, behavior of other users or the reaction of the system advocates to deal with resistance. Based on this they infer that the best time for the reduction of user resistance is the time window directly after the implementation process. At this time triggers are most effective (Lapointe and Rivard 2005).

Every non-usage may be called resistance regardless of the reasons why it happen (Markus 1983). If a process has a low virtualizability it is not amenable for virtualization and users will resist using it. There are different approaches to explain why people resist using certain technologies. The approach of Lapointe and Rivard (2005) is based on a model where resistance behaviors are the result of interactions between initial conditions and a given object (Laumer and Eckhardt 2012). Another approach is to design virtualizability as the reverse side of acceptance which we use in our research model (Laumer and Eckhardt 2012). Leonardi states that people might have a high resistance to change in general and do not use new technology like a newly virtualized process (Leonardi 2009). To conclude, user resistance is the counterpart of process virtualizability and can be used to measure both PVT and the quality aspect of our research model.

Process Virtualization Theory

PVT is a theoretical starting point for the identification and measurement of factors which affect the virtualizability of a certain process from the user's perspective, as process participants. Overby (2008) defines a "process" as a set of steps to achieve an objective, which applies to activities engaged in by individuals, organizations, or society in general. The main difference between a "virtual process" and a "physical process" is the removal of all physical interactions between people and/or objects; "process virtualization” refers to the transition from a physical process to a virtual process (Overby 2008; Overby 2012). The key factor of the virtualization of a process is IT, but there are examples of processes like catalogue sales or mail-order which are not entirely based on IT.

The focus of this paper is on IT-enabled and internet-based processes because Overby defines process virtualization as “the transition from a physical process to a virtual process” (Overby 2008). This needs a virtual environment such as the Internet. In IS research, many traditional processes are virtualized, like the transition of education to distance learning environments, the transition of shopping to e-commerce websites, or the transition of interpersonal relationships to social networking communities (Overby et al. 2010). Overby’s PVT was intentionally designed and developed to predict and explain whether a physical process is amenable or resistant to virtual conduction. PVT describes how a process can be controlled and conducted online without physical interaction between people and objects or between people themselves (Overby 2008). PVT explains that some processes (e.g., shopping for laptops) are more amenable to virtualization than others (e.g., shopping for perishable goods such as fruits or meat). The main dependent variable in PVT is thus process virtualizability. The independent variables are split into two groups (a) characteristics of the virtualization mechanism and (b) process characteristics (Overby 2008).

Process Characteristics

PVT proposes four main characteristics which can be used to measure how suitable a specific process is for virtualization: sensory requirements (SR), relationship requirements (RR), synchronism requirements (SCR), and identification and control requirements (ICR) (Overby 2008; Overby 2012). Every single one of these four requirements is proposed to influence process virtualizability negatively. As each requirement increases, the process becomes less amendable for virtualization.

Sensory requirements describe the need of process participants to be able to enjoy a full sensory experience of the process, as well as of the other process participants and objects (Overby 2008). Such sensory experiences include hearing, seeing, tasting, smelling, and touching other process participants or objects, in addition the overall sensation that participants feel when engaging in a process, such as security, excitement or vulnerability (Overby 2008, p. 280).

Relationship requirements define the need for process participants to interact with one another (Overby 2008). These interactions can lead to friendship development, trust development and knowledge acquisition (Overby 2012). Such relationships are very relevant in the today’s world where traditional processes are partially replaced by virtual ones such as social networking sites, distance learning mechanisms or e-commerce.

Synchronism requirements relate to the degree to which the activities that make up a process need to occur quickly with minimal delay (Overby 2008). While some virtual processes may reduce the delay, others might take longer until the participants are satisfied (e.g., physical shopping has no delay, however shopping in an e-commerce environment takes time until the goods are delivered).

Identification and control requirements specify the degree to which the process requires unique authentication and identification of process participants and the ability to exert control over their behavior (Overby 2008).

Virtualization Mechanism Characteristics

PVT suggests three characteristics for IT-based virtualization: representation, reach and monitoring capability (Overby 2008; Overby 2012). These characteristics are described as virtualization mechanism characteristics by Overby (Overby 2008). Representation and reach are proposed to have a positive effect on process virtualizability, while the effect of monitoring capability is questionable and depends on the process under investigation (Overby 2008; Overby 2012). Additionally each of these three variables also moderators the relationship between process characteristics and process virtualizability (Overby 2008; Overby 2012).

Representation refers to the possibility of IT to present information relevant to the conducted process, including simulations of actors and objects, their properties and characteristics, and how the participant interacts with them (e.g. representation of sensory requirements such as sight and sound in IT-based virtual processes) (Overby 2012). High representation capabilities of IT have a positive effect on process virtualizability. They also moderate and facilitate the virtualization of processes with high sensory requirements and high relationship requirements (Overby 2008).

Reach is the capacity of IT to allow process participation across both space and time, allowing flexible participation in processes across the globe (Overby 2012). High reach capabilities have a positive effect on process virtualizability, however it also moderates the relationships between relationship requirements and process virtualizability as well as between synchronism requirements and process virtualizability (Overby 2008).

Monitoring capability is IT's capacity to authenticate and identify process participants and to track their activities (e.g., using process authentication systems such as username/password combinations) (Overby 2012). The effect of monitoring capability on process virtualizability depends on the empirical context. Some virtualized processes benefit from high monitoring capability, while others may be rejected because participants do not want their actions monitored (Overby 2012). In turn, this suggests that important factors influencing this effect are not only the specific process under scrutiny, but also the characteristics of the specific process participants. Monitoring capability plays a more important role in the theory as a moderator than as a main effect. It facilitates the virtualization of processes with high identification and control requirements (Overby 2008).

Service Quality

Service quality is an important concept in IS literature and the most researched area of services marketing (Cenfetelli et al. 2008; Chakrabarty et al. 2007; Delone and McLean 2003). From January 1992 to April 1994 nearly 1500 scientific papers were published (Buttle 1996). Service quality is important to be able to differentiate in a market with identical goods and to achieve a competitive advantage (Parasuraman et al. 1988). It is generally viewed as a driver of corporate marketing and financial performance (Buttle 1996). To understand this, first, the concept of service quality needs to be explained. It can be defined as a factor of how a service adapts towards customer's needs (Chakrabarty et al. 2007). Service quality describes the conformance to customer requirements in the delivery of a service (Chakrabarty et al. 2007) and it has been shown to result in significant benefits to researchers and to firms (Chakrabarty et al. 2007). The researchers use the service quality to analyze the user evaluations and the practitioners use the service quality to means of creating competitive advantages and user loyalty (Iacobucci et al. 1995).

Service quality has been shown to affect purchase intentions within different industries for instance the banking, pest control, dry cleaning, and fast food industries. With more than 1,600 citations to date is SERVQUAL the most widely applied service quality framework and consists of five parts: reliability, assurance, empathy, and responsiveness, tangibles (Cenfetelli et al. 2008; Parasuraman et al. 1988). It describes the customer perceptions of service quality in service and retailing organizations (Cenfetelli et al. 2008; Parasuraman et al. 1988).

Parasuraman (1988) recommends vendors or service providers to use SERVQUAL to find out how to increase service quality most effectively. The scale also provides the ability to measure which dimensions influence the most perceived perception (Parasuraman et al. 1988). The gap between the exceptions of customers / users and the service quality actually provided by the provider is measured through this attempt.

However, more factors need to be considered for service quality based on a virtual level. User acceptance and usage of new technologies strongly depend on the general attitude towards technology. It can have a strong influence on the perceived quality of process performance (Zeithaml 2000).

User Satisfaction

In addition to the service quality, the user satisfaction explains in the IS literature a crucial factor for the success of products and services (Bhattacherjee 2001b; Delone and McLean 2003; Kettinger and Choong C. Lee 1994; Kim et al. 2009). Besides the service quality, user satisfaction is very important for Information technology because it is a considered measure of customer value as well as a significant factor in measuring IS success and use (DeLone and McLean 1992; McKinney et al. 2002). Based on Cenfetelli et al. (2008), we define user satisfaction as the individual's affective reaction to the cognitive appraisal of service quality performance. Thus, the existing studies of user satisfaction provide a useful base for identifying and examining the individual's needs. Furthermore, it describes the satisfaction of an individual user among a virtual process and is strongly related to service quality (Cenfetelli et al. 2008; Kettinger and Choong C. Lee 1994).

Research Model

As described above, we use the PVT and service quality to measure user resistance. Items for this construct have been internally tested and validated and high construct validity has been achieved. The first part of our research model consists of the relation between PVT and user resistance and the second part of our research model consists of the relation between user resistance and service quality & user satisfaction. The goal of this pre-test was to test and validate items and constructs for the two main parts of our research model; (a) PVT-requirements and their influence upon user resistance, (b) the influence of service quality & user satisfaction upon user resistance. We evaluate item loadings, construct validity and Cronbach's alpha to validate item and construct validity.

PVT to User Resistance (Individual Effect)

The first part of our research model consists of the four process characteristics, which stem directly from PVT, describing how amenable a process is being conducted from the perspective of a process participant (Overby 2008). Normally, the PVT-requirements should negatively influence the process virtualizability, but they should have a positive effect upon user resistance. That is because user resistance is in contrast to the virtualizability of process and therefore the higher the perceived requirements are, the lower process virtualizability should be and the higher user resistance will be. This part of our research model outlines the individual effect the four process characteristics of PVT have on user resistance. However we believe, that the influence of the PVT-requirements upon user resistance will change when comparing different forms of the check-in process (online, mobile, ticket-machine or counter check-in).

Service Quality & User Satisfaction to User Resistance (Quality Effect)

The next major part of our research model introduces service quality and user satisfaction, which should also have an influence upon the user resistance. If the service quality of a virtual process is high, user resistance will be low (Chakrabarty et al. 2007). The same effect applies to user satisfaction; if a process participant is satisfied with the process, the construct will lower the overall user resistance to conduct the process virtually. Another important assumption is the relation between service quality and user satisfaction. Chakrabarty et. al. (2007) state that user satisfaction is positively influenced by service quality. If service quality is high, user satisfaction will be high as well (Cenfetelli et al. 2008).

Additional Moderators

After the development of the two main parts of our research model, we considered that several other IT-constructs should have an influence upon our constructs and their relations. Overby's PVT suggests the use of three virtualization mechanism characteristics as moderators, which influence the relation between the requirements and process virtualizability (Overby 2008). Because user resistance, as main dependent variable, is the exact opposite of process virtualizability, the moderators should possess a moderating effect, however a negative one.

Loyalty is another newly developed moderator-construct. Introduced by Teo and Lui in 2007, it describes to what extend consumers trust in specific e-commerce processes (Teo and Liu 2007). The items of the construct have been tested and validated before and we imply that if loyalty is high this will decrease the relations towards user resistance. If users are loyal in concern of a specific process execution, they will continue to use it, rather than change their behavior (Teo and Liu 2007). Therefore loyalty may have a moderating effect in our research model. Process participants who have trust in a certain process will most likely continue to use it, even in a virtualized form.

Our second introduced moderator is gender. Until now, only some studies of the IS literature examine the roll of gender in concerns of IT-usage (Morris et al. 2005; Venkatesh and Morris 2000; Venkatesh et al. 2000). However it is not clear how certain gender perceive virtual processes or why they use/reject them. Different research papers suggest that in some cases gender possesses an influence on the use/user resistance of virtualized processes (Jackson et al. 2001; Singer et al. 2012). It is not clear yet, if this is also the case for our research model so we included the construct as a moderator. The influence could be positive or negative.

The last three moderators are propensity to trust people, propensity to trust IT and social influence. We imply that these three constructs will have an influence, as moderators, upon the relation between user resistance and PVT-requirements and service quality/user satisfaction (Teo and Liu 2007). If people are trustworthy towards IT they will most likely use virtualized processes. The moderating effect should be negative towards user resistance. However if process participants have high trust in other people, they will most likely prefer the traditional, offline check-in process. The moderating-effect will be positive towards user resistance. Social influence measures the extent to what family members would suggest the use of a virtual process. If the recommendation is high, than user resistance will be lower.

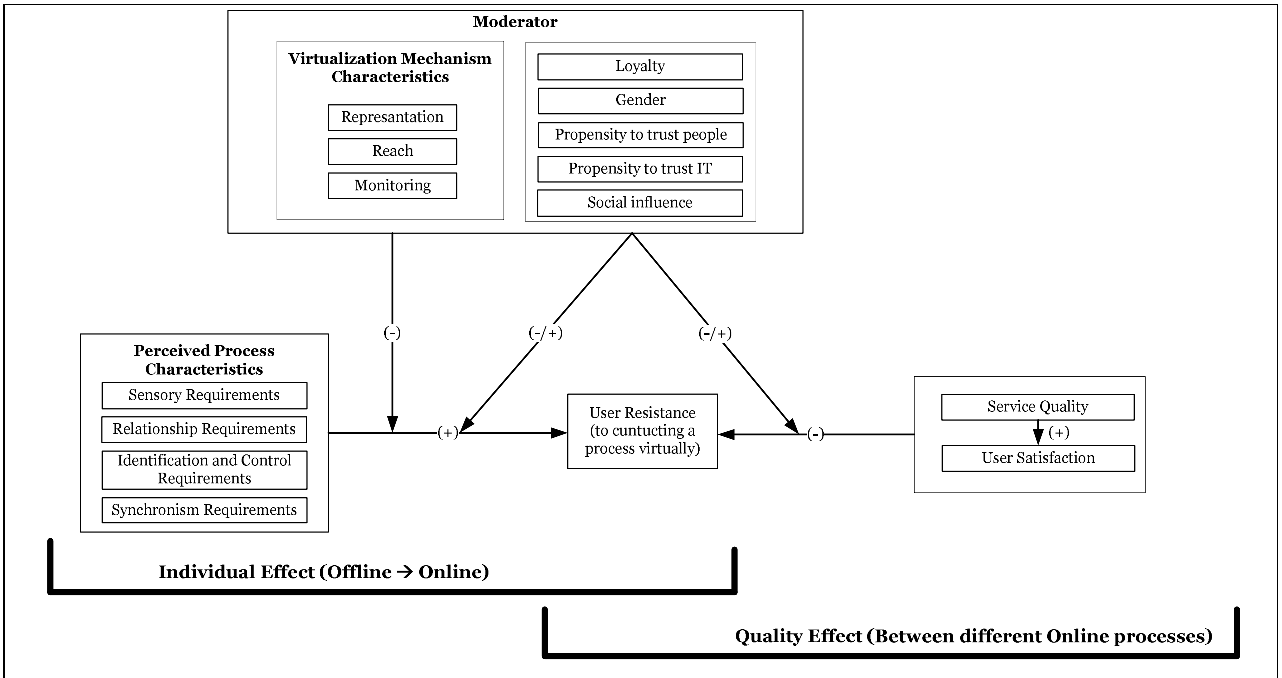

Figure 1. Complete research model

Research Methodology

Pre-test Design, Measurements and Data Collection

Empirical testing of PVT and user resistance are nascent and until today no primary standard measurement scales for PVT exist (Barth and Veit 2011; Overby 2012). Therefore our strategy was to extent the research model and conduct a first test to help build measurement scales for both the individual effect (PVT) and the quality effect (service quality/user satisfaction) upon user resistance towards the virtualized processes.

We focus on the "airport check-in" process, which exists in both physical and virtual versions and allowed us to analyze the process characteristics for different variants of the same process. When conducting the check-in process passengers receive their boarding pass in order to be able to proceeds to their airplane. Normally this process is conducted by the airline itself and exists in different variants. These variants are online check-in, mobile check-in, self-check-in using machines, and the check-in at the counter. Through the introduction of the different check-in options, the process has become heavily supported by and dependent on IT and it is used frequently by different groups of persons.

We tested our research model using an online questionnaire. Our primary goals were to evaluate the competency of the questionnaire, the validation of our measurement scales, and to estimate the length of the survey or time to take the survey. An invitation with the request to participate our survey was sent to a broad range of people of all ages. 90 out of 115 participants answered the questionnaire completely.

We used and adapted items from two existing studies that have already developed and tested initial items for every construct. We used established guidelines (Moore and Benbasat 1991) to adjust the wording of our measurement scales to our setting and to ensure content validity. For the process characteristics, we adopted and extended the items from previous research on PVT by Barth and Veit (Barth and Veit 2011) and Overby and Konsynski (2010). For virtualization mechanism characteristics, we adopted and expanded items from previous research by Overby and Konsynski (2010). The items for these constructs always needed to be adopted and tailored to the specific process in focus.

All items were operationalized on 7-point Likert scales, with answer choices ranging from "strongly disagree" (1) to "strongly agree" (7), with the exception of user satisfaction, which was measured by a 7-point semantic differential scale. We also included control variables such as age, IT-affinity, experience in the survey in order to control for additional factors which may influence user resistance. However, the relationship of these factors upon user resistance has to be tested through a larger data base. This conducted pre-test focuses only on the measurement scales, which are summarized in Table 1.

Table 1: Scales

Construct	Item		Factor Loadings	Source
Sensory Requirements	SR1	I need to touch and verify relevant documents before I go to the gate or leave my baggage at the counter.	0,78	(Barth and Veit 2011; Overby and Konsynski 2010)
	SR2	I feel more comfortable when I can hold my ticket in my hand.	0,79	
	SR3	I would like to conduct the check-in-process, without speaking or hearing airline employees.	0,80	
Relationship Requirements	RR1	Personal contact and information interchange with a responsible airline employee is important for myself.	0,92	(Barth and Veit 2011; Overby and Konsynski 2010)
	RR2	It is important for me that I will personally advised by a responsible airline employee.	0,95	
	RR3	I prefer a personal consultation while I am conducting the check-in-process.	0,93	
Synchronism Requirements	SCR1	I think that my preferred check-in-process (e.g. online or at the counter) is performed faster than other check-in processes.	0,79	(Barth and Veit 2011; Overby and Konsynski 2010)
	SCR2	It is important for me that I can use the check-in before the day of departure.	0,85	
	SCR3	When I book a flight on short notice, I also want to check-in immediately.	0,72	
Identification and Control Requirements	ICR1	The personal identification during online check-in is safe.	0,96	(Overby and Konsynski 2010)
	ICR2	My data is safe from unauthorized use.	0,72	
User Resistance	UR1	If I had the choice, I would prefer to conduct my check-in-process on-site at the check-in desk.	0,95	(Barth and Veit 2011; Oreg

	UR2	I prefer the personal care/treatment on site at the check-in desk, instead of online-check-in.	0,95	2003)
	UR3	I would not conduct my check-in-process online.	0,81	
	UR4	I can imagine to use online-check-in in the future.	0,76	
Assurance	ASR1	I am satisfied to have chosen the online-check-in.	0,93	(Cenfetelli et al. 2008; Parasuraman et al. 1988)
	ASR2	The online-check-in-process has answers to all of my questions.	0,95	
Empathy	EMP1	The online-check-in-process remembers me as a regular user. (After the first time)	0,90	(Cenfetelli et al. 2008; Parasuraman et al. 1988)
	EMP3	I am satisfied with the service selection (e.g. seat selection, upgrades) during the online-check-in-process.	0,82	
Reliability	RLB1	I believe that online check-in is reliable.	0,97	(Cenfetelli et al. 2008; Parasuraman et al. 1988)
	RLB2	I believe that I get all my required performance during online check-in.	0,97	
	RLB3	I think that the online check-in is done correctly.	0,97	
	RLB4	I trust the online check-in that I am checked-in in time.	0,93	
Responsiveness	RSP1	I think the online check-in meets my needs.	0,96	(Cenfetelli et al. 2008; Parasuraman et al. 1988)
	RSP2	I think that online check-in provides me with immediate assistance when something goes wrong.	0,94	
Tangibles	TNG1	I think online check-in is up to date.	0,90	(Cenfetelli et al. 2008; Parasuraman et al. 1988)
	TNG3	Online check-in is neat, concise and well structured.	0,93	
	TNG4	The online check-in corresponds to my expected performances.	0,91	
User Satisfaction	How do you feel while using the online-check-in process?			(Bhattacherjee 2001a; Cenfetelli et al. 2008)
	SAT1	dissatisfied/satisfied	0,82	
	SAT2	terrible/delighted	0,79	
	SAT3	frustrated/ lucky	0,86	
	SAT4	upset/happy	0,86	
Monitoring Capability	MON1	Online check-in allows me to check my data for input errors.	0,95	(Overby and Konsynski 2010)
	MON2	I can check by myself, whether my data is correctly entered.	0,92	
Reach	REA1	Through online-check-in I can check-in my flight from anywhere in the world.	0,93	(Overby and Konsynski 2010)
	REA2	Online check-in gives me the opportunity to check my flight details from everywhere.	0,92	
	REA3	Online check-in allows me to independently decide when and where I check-in.	0,92	
Representation	REP1	The needed check-in information is presented in a readable and understandable way.	0,93	(Overby and Konsynski 2010)
	REP2	The needed check-in information is visualized in a readable and understandable way.	0,94	
	REP3	My bookings are presented in an appropriate manner.	0,92	
Loyalty	LOY1	In the future I will stay loyal to my preferred check-in option.	0,79	(Yoo and Donthu 2001)
	LOY2	I will use my preferred check-in process again.	0,77	

	LOY3	My preferred check-in option will be my first choice in the future.	0,79	
	LOY4	I will recommend my preferred check-in option to others.	0,95	
Propensity to trust IT	PTI1	I think information technology is basically reliable.	0,93	(Teo and Liu 2007)
	PTI2	I think information technology can be trusted.	0,86	
	PTI3	I think information technology is basically trustworthy.	0,90	
	PTI4	I generally trust information technology until it gives me a reason not to do this.	0,87	
Propensity to trust people	PTP1	I think other people are basically reliable.	0,87	(Teo and Liu 2007)
	PTP2	I think other people can be trusted.	0,72	
	PTP3	I think other people are basically trustworthy.	0,98	
Social Influence	SI1	My social environment thinks that I should use the online-check-in process.	0,88	(Ajzen 1991)
	SI2	My social environment has recommended me to use the online-check-in process.	0,85	
	SI3	My relatives think I should use the online-check-in process.	0,90	
	SI4	My relatives have recommended me the use of the online-check-in process.	0,87	

Data Analysis and Results

In order to ensure construct validity and transfer our constructs from the theoretical to the empirical level, we use partial least squares (PLS) analysis for investigating the results. We choose PLS analysis because of our main goal to develop and provide a new theoretical model (Hair et al. 2011). For our analysis we used the software SmartPLS 2.0 M3 and SPSS 19 (Hair et al. 2011). We evaluated internal consistency and convergent validity by assessing item loadings, composite reliability, and average variance extracted (AVE).

Table 3 presented the loadings and cross-loadings for all items. The results show that all factor loadings are significant and lie above the recommended threshold of 0,7 (Hair et al. 2011). All of the items in our measurement model are considerably higher than the cross-loadings on other constructs (Straub et al. 2004). Thus, reliability and discriminant reliability are achieved with our measurement model (Gefen et al. 2000; Hair et al. 2011). To prove the discriminant validity we use the Fornell-Larcker criterion (Table 2). Discriminant validity is also achieved because the correlations between each pair of latent variables are less than the square root of AVE. Additionally Cronbach's alpha and composite reliability (CR) for all but two constructs are above 0,7 (Gefen et al. 2000; Hair et al. 2011; Straub et al. 2004), and each average variance extracted (AVE) is larger than 0,5 (Hair et al. 2011). This shows that the measurements are reliable and the latent construct can account for at least 50% of the variance in the items. We also tested our data set for common method bias. In order to check for common method bias, we conducted a Harman's One Factor Test (Podsakoff and Organ 1986). The results show that the largest covariance illustrated by one factor is only 29,5%. Also, the questionnaire was anonymous, which reduces the probability that method bias significantly has affected the study results (Podsakoff et al. 2003).

Table 2: Reliabilities and Correlation Matrix

uct	Cronbach's Alpha	Composite Reliability	AVE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ory ements	0,79	0,86	0,61	**0,78**																

tionship ements	0,92	0,95	0,87	0,67	**0,93**														
hronism ements	0,71	0,83	0,71	-0,27	-0,29	**0,84**													
cation ntrol ements	0,65	0,83	0,62	-0,11	-0,10	-0,09	**0,79**												
nce	0,89	0,93	0,76	0,57	0,68	-0,58	-0,06	**0,87**											
rance	0,87	0,94	0,88	-0,09	-0,06	0,13	-0,12	-0,09	**0,94**										
athy	0,66	0,85	0,74	-0,27	-0,29	0,39	-0,20	-0,40	0,65	**0,86**									
bility	0,97	0,98	0,92	-0,17	-0,22	0,14	-0,10	-0,21	0,85	0,68	**0,96**								
siveness	0,89	0,95	0,90	0,04	0,06	-0,09	-0,25	0,14	0,70	0,53	0,72	**0,95**							
gibles	0,90	0,94	0,84	-0,10	-0,18	0,25	-0,16	-0,24	0,76	0,66	0,84	0,65	**0,91**						
r ction	0,86	0,90	0,69	-0,18	-0,21	0,34	-0,11	-0,37	0,25	0,38	0,22	0,10	0,28	**0,83**					
nitoring lity	0,85	0,93	0,87	-0,27	-0,20	0,35	-0,06	-0,35	0,53	0,51	0,58	0,34	0,64	0,26	**0,93**				
ch	0,91	0,94	0,85	-0,21	-0,26	0,49	-0,07	-0,37	0,43	0,61	0,42	0,26	0,61	0,29	0,68	**0,92**			
re- on	0,92	0,95	0,87	-0,01	-0,11	0,21	-0,15	-0,18	0,77	0,66	0,81	0,66	0,93	0,35	0,59	0,57	**0,93**		
ralty	0,90	0,90	0,69	-0,09	-0,20	0,32	-0,01	-0,25	0,16	0,16	0,26	-0,01	0,26	0,27	0,27	0,30	0,27	**0,83**	
pensity IT	0,91	0,94	0,79	-0,28	-0,27	0,16	-0,47	-0,27	0,19	0,29	0,26	0,09	0,21	0,08	0,32	0,19	0,15	0,04	**0,89**
pensity people	0,92	0,90	0,75	-0,03	-0,04	-0,07	-0,34	0,10	0,10	0,19	0,15	0,16	0,10	-0,02	0,01	0,02	0,13	-0,11	0,54	**0,86**
ial ce	0,90	0,93	0,77	-0,14	-0,28	0,37	-0,20	-0,32	0,14	0,27	0,19	0,02	0,18	0,12	0,12	0,28	0,14	0,18	0,35	0,15

agonal elements represent the square root of the AVE. Off diagonal elements are the correlations among latent constructs.

Table 3: Item Loadings and Cross-Loadings

Construct	Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Sensory Requirements	SR1	**0,78**	0,55	0,02	-0,21	0,38	-0,01	-0,14	-0,15	0,05	-0,01	-0,06	-0,14	-0,08	0,03	0,05	-0,21	-0,13	-0,04
	SR2	**0,79**	0,47	-0,04	-0,15	0,32	-0,05	-0,15	-0,07	0,04	0,08	0,02	-0,15	-0,06	0,13	0,04	-0,15	0,03	-0,10
	SR3	**0,80**	0,55	-0,47	0,03	0,57	-0,13	-0,30	-0,16	0,02	-0,21	-0,29	-0,29	-0,27	-0,11	-0,22	-0,26	0,02	-0,17
2. Relationship Requirements	RR1	0,63	**0,92**	-	-	0,57	-	-	-	0,01	-	-	-	-	-	-	-	-	-

				0,24	0,11		0,08	0,29	0,24		0,13	0,15	0,17	0,21	0,07	0,16	0,25	0,08	0,28
	RR2	0,66	**0,95**	-0,28	-0,13	0,65	-0,05	-0,27	-0,20	0,06	-0,18	-0,25	-0,21	-0,24	-0,10	-0,19	-0,20	0,02	-0,20
	RR3	0,58	**0,93**	-0,29	-0,05	0,67	-0,05	-0,26	-0,17	0,09	-0,20	-0,20	-0,18	-0,27	-0,13	-0,20	-0,32	-0,06	-0,31
3. Synchronism Requirements	SCR1	-0,28	-0,32	**0,79**	-0,11	-0,52	0,17	0,34	0,22	-0,03	0,29	0,40	0,38	0,39	0,29	0,28	0,27	-0,02	0,23
	SCR2	-0,20	-0,26	**0,85**	-0,03	-0,49	0,10	0,35	0,09	-0,11	0,18	0,18	0,25	0,44	0,12	0,25	0,08	-0,07	0,44
	SCR3	-0,13	-0,03	**0,72**	-0,08	-0,30	0,00	0,19	-0,04	-0,10	0,07	0,20	0,13	0,28	0,03	0,22	-0,03	-0,12	0,19
4. Identification and Control Requirements	ICR1	-0,11	-0,10	-0,07	**0,96**	-0,07	-0,09	-0,17	-0,10	-0,22	-0,16	-0,05	-0,04	-0,05	-0,14	-0,04	-0,40	-0,28	-0,14
	ICR2	-0,05	-0,06	-0,11	**0,72**	-0,03	-0,13	-0,21	-0,07	-0,23	-0,10	-0,21	-0,07	-0,10	-0,11	0,06	-0,46	-0,36	-0,28
5. User Resistance	UR1	0,51	0,65	-0,53	-0,06	**0,95**	-0,08	-0,36	-0,17	0,16	-0,23	-0,32	-0,25	-0,30	-0,15	-0,24	-0,23	0,11	-0,33
	UR2	0,55	0,67	-0,55	-0,06	**0,95**	-0,02	-0,33	-0,16	0,16	-0,21	-0,31	-0,31	-0,34	-0,14	-0,26	-0,19	0,15	-0,25
	UR3	0,44	0,47	-0,43	-0,13	**0,81**	-0,09	-0,25	-0,14	0,10	-0,21	-0,29	-0,33	-0,31	-0,16	-0,22	-0,12	0,18	-0,10
	UR4	0,47	0,55	-0,48	0,02	**0,76**	-0,13	-0,44	-0,25	0,07	-0,20	-0,37	-0,34	-0,34	-0,19	-0,15	-0,38	-0,08	-0,41
6. Assurance	ASR1	-0,12	-0,06	0,16	-0,02	-0,06	**0,93**	0,61	0,79	0,59	0,72	0,21	0,54	0,47	0,71	0,21	0,14	0,05	0,11
	ASR2	-0,07	-0,06	0,09	-0,19	-0,11	**0,95**	0,61	0,81	0,71	0,72	0,24	0,46	0,35	0,73	0,11	0,21	0,13	0,15
7. Empathy	EMP1	-0,30	-0,26	0,43	-0,16	-0,42	0,46	**0,90**	0,46	0,35	0,54	0,33	0,50	0,60	0,54	0,14	0,26	0,17	0,20
	EMP2	-0,16	-0,24	0,22	-0,20	-0,25	0,70	**0,82**	0,75	0,61	0,62	0,32	0,36	0,43	0,63	0,14	0,24	0,15	0,28
8. Reliability	RLB1	-0,15	-0,22	0,14	-0,13	-0,17	0,83	0,64	**0,97**	0,69	0,83	0,21	0,56	0,41	0,79	0,23	0,24	0,16	0,16
	RLB2	-0,16	-0,23	0,18	-0,10	-0,24	0,83	0,70	**0,97**	0,71	0,83	0,22	0,59	0,46	0,81	0,25	0,27	0,13	0,16
	RLB3	-0,13	-0,19	0,11	-0,10	-0,21	0,80	0,65	**0,97**	0,67	0,80	0,25	0,56	0,38	0,78	0,32	0,26	0,19	0,23
	RLB4	-0,23	-0,18	0,10	-0,04	-0,17	0,81	0,60	**0,93**	0,68	0,74	0,11	0,51	0,34	0,70	0,17	0,21	0,10	0,18
9. Responsiveness	RSP1	0,06	0,10	-0,12	-0,31	0,17	0,66	0,50	0,68	**0,96**	0,60	0,06	0,28	0,24	0,62	-0,04	0,13	0,18	0,04
	RSP2	0,02	0,01	-0,05	-0,16	0,10	0,65	0,51	0,68	**0,94**	0,63	0,13	0,37	0,26	0,64	0,03	0,02	0,11	0,00
10. Tangibles	TNG1	-0,10	-0,17	0,35	-0,18	-0,24	0,63	0,63	0,66	0,54	**0,90**	0,31	0,58	0,68	0,80	0,25	0,25	0,11	0,25
	TNG2	-0,01	-0,12	0,14	-0,13	-0,19	0,73	0,58	0,80	0,63	**0,93**	0,24	0,57	0,47	0,91	0,17	0,15	0,06	0,12

	TNG3	-0,15	-0,21	0,16	-0,11	-0,22	0,75	0,60	0,87	0,62	**0,91**	0,20	0,60	0,49	0,84	0,28	0,16	0,09	0,08
11. User Satisfaction	SAT1	-0,16	-0,24	0,35	0,03	-0,48	0,23	0,36	0,22	0,03	0,27	**0,82**	0,28	0,27	0,33	0,37	0,08	-0,03	0,08
	SAT2	-0,20	-0,21	0,18	-0,24	-0,24	0,18	0,31	0,15	0,13	0,17	**0,79**	0,18	0,13	0,23	0,10	0,14	0,03	0,11
	SAT3	-0,11	-0,11	0,27	-0,19	-0,17	0,16	0,28	0,13	0,09	0,22	**0,86**	0,18	0,32	0,26	0,12	0,06	0,02	0,13
	SAT4	-0,12	-0,10	0,29	-0,06	-0,19	0,23	0,27	0,19	0,11	0,25	**0,86**	0,18	0,24	0,30	0,20	-0,03	-0,09	0,09
12. Monitoring Capability	MON1	-0,24	-0,21	0,32	-0,02	-0,36	0,48	0,49	0,52	0,30	0,58	0,27	**0,95**	0,61	0,55	0,25	0,30	-0,02	0,12
	MON2	-0,26	-0,16	0,33	-0,10	-0,29	0,52	0,47	0,57	0,35	0,62	0,20	**0,92**	0,67	0,56	0,25	0,30	0,03	0,11
13. Reach	REA1	-0,17	-0,22	0,39	-0,11	-0,27	0,38	0,55	0,40	0,26	0,57	0,18	0,59	**0,93**	0,50	0,31	0,21	0,02	0,25
	REA2	-0,22	-0,25	0,41	-0,06	-0,37	0,38	0,59	0,32	0,24	0,53	0,34	0,61	**0,92**	0,52	0,20	0,12	0,03	0,23
	REA3	-0,18	-0,24	0,53	-0,05	-0,36	0,42	0,54	0,45	0,23	0,59	0,27	0,68	**0,92**	0,55	0,32	0,21	0,01	0,31
14.Representation	REP1	0,00	-0,10	0,19	-0,11	-0,15	0,73	0,64	0,75	0,65	0,86	0,26	0,55	0,54	**0,93**	0,29	0,13	0,10	0,10
	REP2	-0,06	-0,14	0,25	-0,10	-0,20	0,74	0,66	0,78	0,60	0,86	0,39	0,58	0,57	**0,94**	0,25	0,15	0,13	0,22
	REP3	0,06	-0,06	0,14	-0,22	-0,14	0,66	0,53	0,71	0,59	0,87	0,30	0,50	0,46	**0,92**	0,22	0,12	0,14	0,04
15. Loyalty	LOY1	-0,03	-0,17	0,20	-0,10	-0,07	0,20	0,17	0,28	0,09	0,24	0,20	0,18	0,17	0,22	**0,79**	0,08	-0,02	0,25
	LOY2	-0,08	-0,21	0,08	0,07	-0,09	0,18	0,05	0,31	0,04	0,22	0,20	0,09	0,03	0,27	**0,77**	-0,01	0,02	0,06
	LOY3	0,01	-0,20	0,12	-0,03	-0,04	0,21	0,05	0,28	0,08	0,26	0,13	0,12	0,08	0,27	**0,79**	-0,02	-0,03	0,10
	LOY4	-0,10	-0,17	0,38	-0,01	-0,32	0,11	0,17	0,19	-0,05	0,22	0,27	0,31	0,37	0,24	**0,95**	0,05	-0,15	0,18
16. Propensity to trust IT	PTI1	-0,32	-0,32	0,21	-0,46	-0,28	0,17	0,29	0,25	0,10	0,19	0,09	0,31	0,21	0,15	0,04	**0,93**	0,55	0,36
	PTI2	-0,17	-0,23	0,02	-0,42	-0,20	0,28	0,35	0,36	0,18	0,33	0,04	0,29	0,23	0,29	0,00	**0,86**	0,54	0,29
	PTI3	-0,21	-0,17	0,06	-0,46	-0,20	0,09	0,22	0,16	0,09	0,10	0,04	0,18	0,10	0,04	0,02	**0,90**	0,49	0,25
	PTI4	-0,25	-0,24	0,23	-0,35	-0,25	0,12	0,19	0,17	-0,04	0,13	0,10	0,33	0,14	0,06	0,09	**0,87**	0,36	0,33
17. Propensity to trust people	PTP1	-0,08	-0,09	-0,01	-0,47	0,05	0,15	0,23	0,21	0,25	0,14	0,05	0,08	0,09	0,20	-0,03	0,64	**0,87**	0,21
	PTP2	-0,13	-0,19	0,02	-0,44	-0,03	0,07	0,21	0,11	0,22	0,12	0,03	0,05	0,10	0,13	0,01	0,63	**0,72**	0,21
	PTP3	-	-	-	-	0,09	0,07	0,17	0,12	0,13	0,08	-	-	0,01	0,10	-	0,52	**0,98**	0,13

		0,03	0,06	0,08	0,31							0,04	0,02			0,11			
18. Social Influence	SI1	-0,14	-0,22	0,42	-0,18	-0,35	0,23	0,30	0,25	0,04	0,20	0,17	0,16	0,32	0,18	0,28	0,26	0,06	**0,88**
	SI2	-0,15	-0,30	0,34	-0,18	-0,23	0,10	0,14	0,12	0,01	0,12	0,14	0,03	0,20	0,09	0,21	0,29	0,14	**0,85**
	SI3	-0,09	-0,22	0,28	-0,17	-0,27	0,09	0,26	0,15	0,00	0,18	0,08	0,16	0,28	0,15	0,09	0,36	0,17	**0,90**
	SI4	-0,12	-0,27	0,24	-0,19	-0,23	0,03	0,21	0,11	0,04	0,09	0,00	0,05	0,16	0,04	0,03	0,33	0,17	**0,87**

Discussion

PVT was first introduced in 2008 as a theoretical model to explain factors interfering with process virtualization. The goal of this paper was to extent the original PVT-model through the introduction of service quality & satisfaction, several moderators and to test item and construct validity. Our pre-test consisted of 90 completed questionnaires and was conducted to evaluate our measurement model. However, we had not enough items for every single processes. Due to this, we did not conduct a regression analysis of relationships among our developed constructs. The analysis of valid measurement scales for further research represents the main contribution of this paper.

Even though our research model could be split in two separate parts (PVT and service quality & user satisfaction), we tested and validated the measurement scales as a whole. Item and construct validity was achieved and there were no significant bias through cross-loadings.

In summary, our pre-test was successful. We achieved our main goal by verifying and validating the measurement scales we developed. Only ICR and Empathy failed to achieve a Cronbach's Alpha of 0,7. This is due the fact that we used only two items for each construct. In future studies, we will ask more and better items from the existing literature and we will combine this measurement model with a larger sample size, in a large-scale survey, which will be conducted through an online-survey and offline, paper based, at two German airports. Because of the small number of participants and the observation of four different check-in-processes, the relationships of the constructs are not shown in this research model. The analysis of the structural model showed that the relationships were not sufficiently significant. However all relationships have the right direction. This first framework can be used for any kind of business process and should help researchers and practitioners.

In addition, we suggest using several of our newly developed moderator constructs. They are most likely to have a strong influence on the relationship between the PVT–user resistance and system quality & user satisfaction – user resistance. In future research, it will be necessary to test the relationships among all the constructs through a regression analysis.

Conclusion

Finally, we would like to stress the fact that the pre-test is based on a relatively small sample size for each of the airport check-in processes. Due to this, we did not conduct a regression analysis of the relationships among the constructs. It was also not possible to differentiate the analysis under different processes, in spite of the impact this has for the topic of user resistance. The main contribution of this paper is the analysis of the measurement scales. There is definitely the need for a larger sample, a more suitable panel to establish construct validity as well as nomological validity. This pre-test establishes a measurement framework and achieves validity of our measurement instruments, which can be leveraged by other researchers on user resistance as well as on process virtualizability.

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