The Role of Confirmation on IS Continuance Intention in the Context of On-Demand Enterprise Systems in the Post-Acceptance Phase

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ABSTRACT

The research project examines expectations as well as organizational and technological cognitive beliefs influencing a company's intention to continue using on-demand enterprise systems in the post-acceptance phase. Expectation-confirmation theory from behavior literature is integrated with Delone & McLean's model of IS success to theorize a model of IS continuance on company level. The decision making process to continue using an information system in small and middle enterprises as main target customer group of cloud-based enterprise systems is modeled by re-introducing the attitude construct from adoption literature. Additionally, post-purchase expectations are included as influence factor of attitude and intention in the continuance context. To prevent cloud-washing, attention is drawn to the substantive differences between service and application quality of on-demand enterprise systems.

Keywords

Software as a Service, SaaS, Cloud-Computing, Expectancy-Confirmation Theory, IS Continuance, Delone and McLean

INTRODUCTION

A vast body of research on enterprise system (ES) success exists (Gable, Sarshana and Shan, 2003) and the last five years have seen an exponentially growing body of research on software as a service (SaaS). Especially success factors and the adoption of SaaS have been investigated thoroughly. In contrast, little empirical research has been done concerning the continuation inertia of SaaS including psychological variables like expectations and confirmation (Benlian, Koufaris and Hess, 2010; Wang, 2011). This work tries to close this research gap by answering the research question: "Which role plays confirmation in the continuation of an on-demand enterprise system in the post-acceptance phase"? Confirmation, which is defined as the degree to which expectations were met by the actual performance, has been empirically shown to be important in the continuance and satisfaction context in several branches. The theoretical reason for this is that cognitive perceptions are significantly influenced by confirmation (Anderson and Sullivan, 1993; Bhattacherjee, 2001; Oliver, 1980). Especially in the context of SaaS, it is likely that users are strongly influenced in their perceptions through confirmation, as most of them have usually worked with on-premise systems prior to using on-demand solutions (influencing pre-purchase expectations (Anderson, Fornell and Rust, 1997) which impact confirmation directly). This is possibly not only true for the pre-purchase expectation-related confirmation and satisfaction constructs, but also for post-purchase expectations as conceptualized in referred work as perceived usefulness (Bhattacherjee, 2001). Additional evidence for the importance of the confirmation construct is provided by the exploratory interviews, where the managers were only able to highlight the cloud benefits by comparing them to their on-premise solutions. Beneath answering the research question, the work makes additional SaaS- and ES-specific contributions.

First, to specify the model in the context of on-demand applications, a literature review and exploratory interview were conducted. In this exploratory phase a list of on-demand success factors was extracted and categorized according to the DeLone and McLean (D&M) (Delone and McLean, 2003) IS success dimensions: organizational (net benefits) and technical (information, system and service quality). Organizational components induce advantages on company level, like cost savings and flexibility in business decisions and are important benefits of ES. Technical components are technical characteristics, which impact individual users throughout the company, like availability, reliability and usability. The organizational value construct has not been empirically validated in the context of SaaS continuance and has been partly tested in an infrastructure as a service scenario (Heinle and Strebel, 2010). Hence, this work will empirically test this relationship.

Second, it is necessary to clearly distinguish between on-demand specific benefits and product-specific benefits to identify SaaS specific success drivers and to avoid "cloud washing". "Cloud washing" is a term used when benefits of an on-demand solution are misleadingly attributed to the categorization as cloud product, however are not technically cloud-specific. For instance, SAP ByDesign is complimented by users for its intuitive interface. However, technically seen, its interface could also be implemented into an on-premise solution. The results will help to understand whether customer satisfaction is mostly based on cloud-specific benefits or software characteristics, which are falsely attributed as cloud benefit.

Table 1 summarizes literature in and adjacent to the field of SaaS adoption, continuance, expectations and success and highlights the filled gaps.

The paper is built as follows: First, the theoretical background is given on the theories of IS continuance and the D&M model. Second, the research model of IS continuance of on-demand enterprise systems is presented. Methodology is not discussed, as the focus of the paper lies within the research model. However, the data analysis will be analyzed quantitative-empirically.

Authors/Paper	Summary	Research Area
Xin and Levina 2008	Adoption of SaaS in the enterprise software context is investigated. Several hypotheses connected to classical outsourcing are proposed.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [ ]Success Factors
Benlian 2009	Transaction cost theory based factors (application specificity, environmental uncertainty and usage frequency) contributing to the adoption of SaaS are empirically tested.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [ ]Success Factors
Benlian et al. 2009	Different factors affecting adoption of SaaS solutions are investigated empirically on different application types. Different application types have different adoption requirements.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Kim et al. 2009	Adoption issues for cloud computing are qualitatively discussed like performance, security and integration.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Susarla et al. 2009	Transaction cost theory is applied to test a model of SaaS adoption with implications for user and provider firms concerning contracts.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Armbrust et al. 2010	Benefits, threads and opportunities of cloud computing on computational and technological level are discussed.	[ ]Expectations / [ ]Adoption/ [ ] Continuation / [X]Success Factors
Benlian and Hess 2010	Perceptions on SaaS chances and risks from the perspective of adopters versus non-adopters. Security risks are found to be the dominant factor of overall risk perceptions.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Benlian et al. 2010	A SaaS-QUAL scale is developed and validated in an IS continuance context based on two empirical surveys.	[X]Expectations / [X] Adoption/ [X] Continuation / [X]Success Factors
Heart 2010	Effects of Trust and Perceived Risk on Saas Adoption Intentions are investigated.	[ ]Expectations / [X]Adoption/ [X] Continuation / [X]Success Factors
Heinle and Strebel 2010	Organizational drivers of IaaS adoption are empirically tested with theoretical foundation in innovation diffusion, agency and IT governance theory.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Limam and Boutaba 2010	The authors present a framework to assess service quality (uptime and response time) and trustworthiness based on the ECT.	[ ]Expectations / [ ]Adoption/ [ ] Continuation / [X]Success Factors
Matros et al. 2010	Key Performance Indicators are proposed in the categories: costs, innovation, flexibility, performance and risk	[ ]Expectations / [ ]Adoption/ [ ] Continuation / [X]Success Factors
Yao et al. 2010	Factors influencing the adoption decision are discussed.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Janssen and Joha 2011	Benefits and challenges are explored for adopting SaaS from the government perspective. Four categories of SaaS benefits, disadvantages and risks are identified: strategic and organizational, politcal and legislative, technical and conomic.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Martens and Toitenberg 2011	Risks and Costs are investigated in the context of decision-making.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Misra and Mondal 2011	Several characteristics of businesses are analyzed to help companies to decide companies wether cloud computing is beneficial from a ROI perspective.	[ ]Expectations / [X]Adoption/ [ ] Continuation / [X]Success Factors
Wang 2011	Privacy and security compliance are investigated in the information systems continuance context.	[X]Expectations / [X] Adoption/ [X] Continuation / [X]Success Factors

Table 1. Related Literature and Research Gaps

THEORETICAL BACKGROUND

Distinguishing between Technology Adoption and IS Continuance

Continuation intention has often been investigated in the phase of technology adoption. However, it is not limited to it. For instance continuation has been used to evaluate the post-adoption phase (Benlian et al., 2010), success of web-technology based business models (Wang, 2008) or at the end of the lifecycle (Furneaux and Wade, 2011). From marketing perspective continuation is an indicator for customer loyalty. Loyalty is a central concept in marketing and essential for profit maximization (Heskett 1997; Zeithaml, Berry and Parasuraman, 1996). Hence, continuation is a concept relevant throughout all stages of the lifecycle.

The technology acceptance model (TAM) is an instrument to investigate continuance in the adoption of individuals. Theoretical foundation of TAM is the theory of reasoned action (Ajzen and Fishbein, 1980), which postulates that intention is a strong predictor of actual behavior. The relationship between behavioral intention and actual use has been validated in IS and reference disciplines (Ajzen, 1991; Taylor and Todd, 1995). Intention itself is influenced by attitude, a construct that in psychology represents the degree of emotional satisfaction for an object. Antecedents of attitude are cognitive beliefs. TAM represents the belief-attitude-intention chain in the context of technology adoption, where the constructs perceived usefulness and perceived ease of use are introduced as salient cognitive beliefs.

Complementary research has investigated the adoption from institutional perspective by introducing external pressures and benefits influencing adoption intentions (Chau and Tam, 2000; Furneaux and Wade, 2011; Teo, Wei and Benbasat, 2003). Both models focus on macro-factors and blank out individual attitudes like satisfaction. In contrast, interviewed subjects are often senior executives with decent power to continue or dismiss the investigated information systems. This measurement approach implies that the decision process of continuation is highly dependent on individual judgment and perceptions.

An Expectancy-Confirmation Theory of IS Continuance

The concept of continuation has been introduced in the previous chapter. The ECT of IS continuance includes this concept coherent to TAM and unifies it with the ECT.

ECT has been used in marketing and information systems research to study consumer satisfaction and repurchase intentions. It has been validated in a variety of product and service continuance contexts (Patterson, Johnson and Spreng, 1997; Spreng, MacKenzie and Olshavsky, 1996). The process by which consumers manifest repurchase intensions is as follows (Oliver, 1980). Consumers have (pre-purchase) expectations prior to consuming the product or service. These expectations are shaped by several factors like company image, word of mouth and past experience (Anderson et al. 1997). Temporarily staggered, there is an initial consumption, where a perception of the performance is formed. This performance is then evaluated towards original expectations (confirmation). Based on their degree of confirmation, customers form a satisfaction which then influences repurchase intentions.

ECT ignores potential changes in expectations, which are shaped while consuming the service. This is critical, as the process of service delivery influences the expectations interactively while the service is consumed. Hence, post-consumption expectations (modified) replace pre-consumption expectations, often providing a stronger antecedent of user satisfaction. However, the problem of including pre-purchase expectations into the model is not only of theoretical nature. Data gathering of pre-consumption variables is problematic for two reasons: 1) asking for pre-purchase expectations while consuming the service would lead to biased results as the cognitive processes of memory would be influenced by the perception of the service process, 2) to overcome this problem, participants would have to be surveyed prior to using the on-demand system, which is usually not possible when cooperating with a software vendor to gather survey data.

The ECT model of IS Continuance (Bhattacherjee, 2001) focuses on post-acceptance variables (but is not limited to it). It modifies the framework in two dimensions. First, pre-purchase expectations are excluded. This is the case as satisfaction and confirmation capture all influences of pre-acceptance variables. Furthermore confirmation is directly defined by and therefore incorporating pre-purchase expectations. Second, perceived usefulness is included to represent post-purchase expectations. This is consistent with ECT's expectation construct, which is defined as belief or sum of beliefs. Perceived usefulness has been demonstrated to consistently influence user intention throughout the process of IS usage.
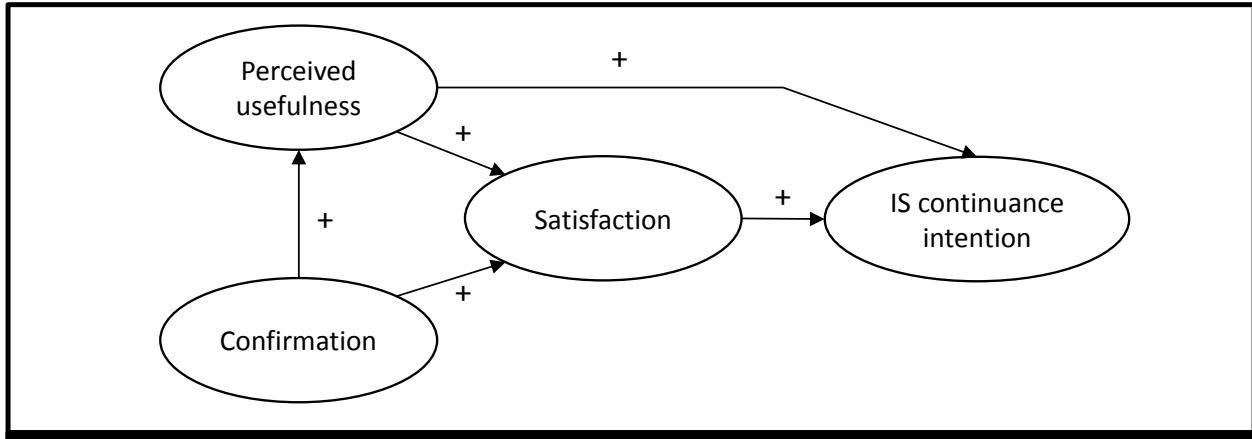
Figure 1. A Post-Acceptance Model of IS Continuance

Delone and McLean Model of IS Success

D&M IS success model (DeLone and McLean, 1992; Delone and McLean, 2003) is the most frequently used framework to structure IS success in the IS discipline (Urbach, Smolnik and Riempp, 2009). The D&M model is a process model, which explains IS success starting from technical delivery to concepts focusing on individual and organizational benefits. It includes no overarching measure of success. Instead it provides a set of success categories and interdependencies between each.

The six core components are information, system and service quality, intention to use, user satisfaction and net benefits (see Figure 2). In the following the relevant will be shortly introduced (Petter, DeLone and McLean, 2008). *System quality* is the "desirable characteristics of an information system" like ease of use, system flexibility and system reliability. Information quality is the "desirable characteristics of the system outputs" like relevance, understandability and accuracy. *Service quality* is the helpdesk quality. *Net benefits* is the degree to which IS contributes to the success of the stakeholders like cost savings and productivity improvements.

Continuation is not included into the D&M model. The reason for this is the conceptual gap which can be found in the subsequent differentiation between IS success from a customer's and vendor's perspective. While the D&M model of IS success focuses on the customer perspective on individual and organizational level, IS continuance is of importance from a vendor's perspective.
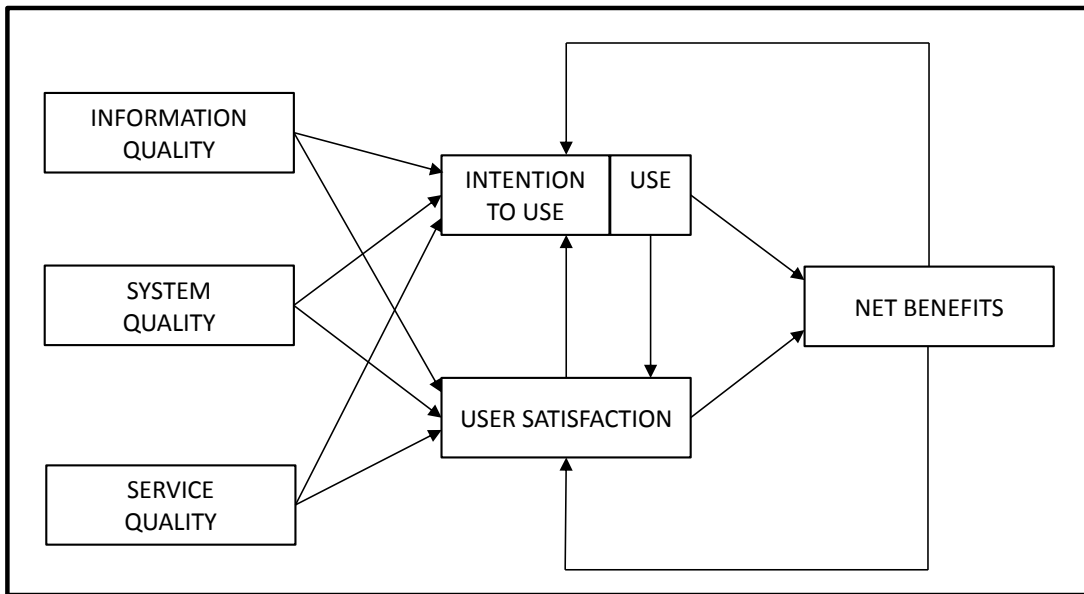

Figure 2. Updated D&M IS Success Model

A CONTINUANCE MODEL FOR ON-DEMAND ENTERPRISE SYSTEMS

The research question imposed was as follows: "Which role plays confirmation in the continuation of an on-demand enterprise system in the post-acceptance phase"? According to the requirements of an on-demand specific continuation framework, which were sketched in the motivational chapter, the post-acceptance model of IS continuance (Bhattacherjee, 2001) was selected as fitting best. However, several modifications have to be conducted.

Beneath the "model fit" the selected model offers additional benefits. First, it captures initial expectations indirectly; therefore a temporarily divided surveying process is obsolete. Secondly, it introduces cognitive beliefs and therefore integrates TAM and ECT. Third, the satisfaction construct captures1 the unique decision making process in small and middle enterprises (SME) (Haddara and Zach, 2011). SME can be seen as the primary customer group of on-demand enterprise applications. In the case of SME usually a small number of executives decide to continue or discontinue the use of an enterprise application. This leads to a decision making process which is more dependent on the individual.

As previously stated, a continuance model for SaaS has to capture several on-demand specific considerations which are not captured by the initial framework:

First, exploratory interviews with senior executives from software vendor SAP and a literature review on on-demand application success showed that the success factors of on-demand applications could be categorized according to the D&M success dimensions system, information and service quality, as well as net benefits. Hence these constructs are introduced and modified. The net benefits construct is re-named to organizational benefits to highlight the importance on company level. Additionally, the system, information and service quality are subsumed in a higher-order construct "technological quality". In TAM, technological quality (analogous output quality) can be seen as a cognitive belief-influencing attitude and perceived usefulness (Venkatesh and Davis, 2000).

Second, the shift from on-premise to on-demand has often been called a transformation from product to service. Therefore the term service quality in the D&M model is misleading, as it might be interpreted as the service delivery process of on-demand applications. Accordingly the service quality from the D&M model is renamed to helpdesk quality. Discussion revealed a major confusion about on-demand specific technical benefits. For instance intuitive user interface was categorized as benefit of on-demand applications. However, from a technical viewpoint, the user interface can also be implemented identically in an on-premise solution. To distinguish this clearly, the technological quality is split into service and application quality. Service quality includes all dimensions of the application delivery process, like availability. Contrary, application quality captures factors, which are not cloud-specific. This includes SOA-paradigm based system characteristics like extensibility, which cannot particularly be seen as technical benefit of the on-demand paradigm. Service and application quality are subdivided into the D&M success categories according to the previous point.

Third, perceived usefulness is replaced by organizational benefits. Perceived usefulness was defined as cognitive belief salient to IS use. In TAM, perceived usefulness is defined as the belief of the individual user how useful a system is (Davis, 1989). For instance: enhancing productivity, improving managing skills and performance. Applied on the organizational context organizational benefit is defined as the belief to which degree the information system supports the organizational goals. This is consistent with the definition of the net benefits on organizational level (Petter et al., 2008).

Fourth, the organizational benefits-satisfaction relationship has been empirically tested to be insignificant (Sabherwal, Jeyaraj and Chowa, 2006; Venkatesh and Davis, 2000; Venkatesh, Morris and Davis, 2003) and is therefore removed from the model.

Finally, the constructs system investment and technical integration are included as additional continuation inertia (Furneaux and Wade, 2011). Technical integration has been empirically shown to influence continuation. System investment had only little influence in the late-adoption phase. However, it might be important in the early adoption phase, as it is more difficult to argument for discontinuation in an early adoption phase if investments were high.

Confirmation is defined as the user's perception of the congruence between expectation and its actual performance (Spreng et

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[1] Organizational continuance research usually doesn't include the attitude construct as the decision making process is more complex than in SME.

al., 1996). We define technological quality as perceived technological performance, which means the different evaluations on the same stimulus (Spreng, 1999). As confirmation is defined as degree to which (pre-purchase) expectations are met by actual performance, a higher performance should result in a smaller gap between expectations and performance, followed by a higher confirmation. This leads to the first proposition:

> *P1. Executives' perceived technological quality is positively associated with their extent of confirmation.*

Empirical evidence has shown that cognitive beliefs like confirmation and perceived usefulness (Bhattacherjee, 2001) can be related similarly to ease of use and perceived usefulness (Davis, Bagozzi, and Warshaw, 1989). Theoretical support can be found in cognitive dissonance theory (Festinger, 1957) where cognitive dissonance arises, when pre-acceptance usefulness perceptions are disconfirmed. Users might then try to minimize this dissonance by modifying their usefulness perceptions towards reality. Hence, a high confirmation will elevate users' perceptions of organizational benefits and vice versa:

> *P2. Executives' extent of confirmation is positively associated with their beliefs about the organizational benefits.*

There is moderate empirical evidence that the dimensions of technological quality are positively related to the organizational benefits construct (Petter et al., 2008). Explanation for this relationship can be found in the D&M success model (Delone and McLean, 2003), which describes IS success as process where the technological quality represents the foundation on which organizational value can be realized. This leads to following proposition:

> *P3. Executives' perceived technological quality is positively associated with their beliefs about the organizational benefits.*

Satisfaction is defined as an affective state that is emotional reaction to a product or service experience (Oliver, 1980; Spreng et al., 1996). Per ECT, confirmation is an antecedent of satisfaction. From a pre-purchase perspective high confirmation is associated with the realization of benefits, which were expected. Contrary, the lack of confirmation is associated with failure of the consumed service or product. The confirmation-satisfaction has been empirically validated in IS and other industries. Hence:

> *P4. Executives' extent of confirmation is positively associated with their satisfaction.*

Continuance intention is defined as the intention to continue using the enterprise application (Bhattacherjee 2001; Mathieson 1991). Per TAM (Davis et al., 1989) beliefs are direct and indirect predictors of intentions as enhanced organizational performance is coupled to several extrinsic and intrinsic rewards for the responsible IS executive like promotions, monetary gains and reputations (Vroom, 1995). Therefore, IS being an instrument to support these goals high organizational benefits are likely to strengthen continuation intention. The organizational benefits-continuation context has been empirically validated in IS showing a significant correlation (Sabherwal et al. 2006). Hence:

> *P5. Executives' beliefs about the organizational benefits are positively associated with their continuation intentions.*

Satisfaction is an emotional state, which is related to a perceived product or service quality. Therefore a better technological quality is likely to raise satisfaction. There is strong empirical support for following proposition (Petter et al., 2008):

> *P6. Executives' perceived technological quality is positively associated with their satisfaction.*

Per ECT, users' primary predictor of continuation intention is satisfaction. Satisfaction is an affect, which is captured as positive or negative feeling. According to the theory of reasoned action, a positive affect leads to continuation intention while dissatisfaction is followed by discontinuation (Ajzen, 1991). This leads to the seventh proposition:

> *P7. Executives' satisfaction is positively associated with their continuation intentions.*

System investment is defined as "the financial and other resources committed to the acquisition, implementation and use of an information system" (Furneaux and Wade, 2011). System investment is especially important, as the discontinuance of an existing system in an adoption phase would signal a "loss" of sunk costs. This effect is based on the effect of sunk costs, where executives continue making resource commitments even though discontinuance would make sense from a rational viewpoint (Arkes and Blumer, 1985). While system investment might have negative impact on discontinuance intention, the theory of sunk costs is also applicable vice versa:

> *P8. Organizations' system investment is positively associated with their continuation intentions.*

System Embeddedness is defined as technical integration or "the extent to which an information system relies on sophisticated linkages among component elements to deliver needed capabilities". Substantial integration of information systems into the organization increases the probability of difficulties when switching an information system. This relationship

has been empirically validated to have negative influence on discontinuance of information systems (Furneaux and Wade, 2011). Hence:

> *P9. Higher levels of technical integration are positively associated with executives' continuance intentions.*

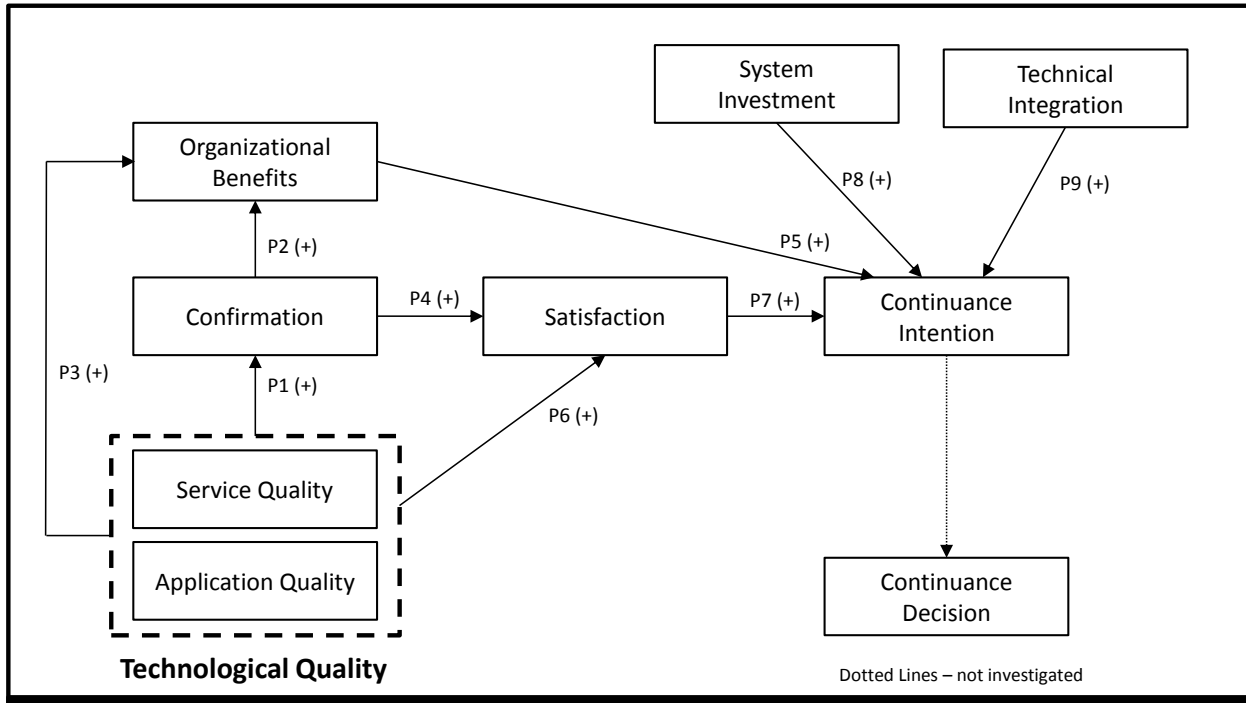Figure 3 summarizes the constructs and hypotheses.

Figure 3. A Continuance Model for On-Demand Enterprise Systems

CONCLUSION

The paper summarized the authors' state of work. This was done in three steps. First, the research question and its relevance to the IS discipline were explained. Therefore, literature in the field of SaaS adoption, continuance, expectations and success was illustrated. Based on the relevant literature, research gaps were highlighted. Second, relevant theories to study the concept of confirmation were introduced. Third, the research model with its hypotheses and constructs was sketched. This was done by linking SaaS-specific considerations with general theory to balance external and internal validity.

Next steps in the research project will include operationalization of the relevant constructs and creation of the survey. During the surveying process, customers of SAP By Design will be contacted. According to the gained sample size, the data analysis method eventually has to be modified and small sample strategies have to be applied, including simulation methods.

The study has several flaws which are mainly of theoretical nature. The theoretical problems arise when introducing the belief-attitude-intention chain into the organizational decision processes. In big companies, the decision process is highly structured with many cost calculations and strategic considerations. Especially the attitude then recesses as it is formalized in TAM2 and TAM3 (Venkatesh and Davis, 2000; Venkatesh et al., 2003). The more a cognitive decision process is made consciously, like information-based decisions, the less it is based on attitude. However, as the decision process is made in a SME, it is likely, that attitude might be a significant influence factor of continuation intention. Theory has used both perspectives on decision making, however, data will show if it holds true in the special case of SaaS in the context of SME. In this point it still has to be discussed, if an exploratory-empirical approach would be more adequate. Another theory-driven problem is the conceptualization and operationalization of the perceived usefulness construct which is lifted into an organizational concept in the proposed model. Literature doesn't provide any hints on the perceived usefulness construct on organizational level. This is an essential problem, as it can lead to wrong implications if continuation is investigated in an organizational context but operationalized from an individual perspective.

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