Success Factors and Value Propositions of Software as a Service Providers – A Literature Review and Classification

Sebastian Walther
Institute for Information Systems Management, University of Bayreuth, Bayreuth, Germany., s.walther@uni-bayreuth.de

Andreas Plank
University of Bayreuth, Bayreuth, Germany., andreas-plank@web.de

Torsten Eymann
University of Bayreuth, Bayreuth, Germany., torsten.eymann@uni-bayreuth.de

Niraj Singh
SAP AG, Walldorf, Germany., niraj.singh@sap.com

Gaurang Phadke
University of Bayreuth, Bayreuth, Germany., gaurang.phadke@uni-bayreuth.de

Success Factors and Value Propositions of Software as a Service Providers – A Literature Review and Classification

Sebastian Walther
University of Bayreuth
Chair of Information Systems Management
Bayreuth, Germany
s.walther@uni-bayreuth.de

Andreas Plank
University of Bayreuth
Bayreuth, Germany
andreas-plank@web.de

Torsten Eymann
University of Bayreuth
Chair of Information Systems Management
Bayreuth, Germany
torsten.eymann@uni-bayreuth.de

Niraj Singh
SAP AG
University Alliances Department
Walldorf, Germany
niraj.singh@uni-bayreuth.de

Gaurang Phadke
University of Bayreuth
Chair of Information Systems Management
Bayreuth, Germany
gaurang.phadke@uni-bayreuth.de

ABSTRACT

The contribution of the paper is twofold. First, an overview is given, which success factors and value propositions have been investigated in recent research in the context of software as a service. Subsequently an indicator of each factor's relevance is provided by counting the number of mentions in the IS literature. Second, it offers a categorization scheme of the extracted factors according to Delone and McLean's IS success categories. To identify the relevant factors a literature review is conducted including high-ranked journal articles and conference proceedings, which are then complemented by referred books. Performance is found to be the most important success factor, while cost saving is the major value driver of software as a service. Additionally, the results show that many value propositions of software as a service are realized on an organizational level, while the most success factors to "run" the service can be found in the system quality category.

Keywords

Literature Review, Software as a Service, SaaS, Value Proposition, Success Factor, DeLone and McLean.

INTRODUCTION

Software as a Service (SaaS) has been one of the most discussed topics among IT-managers in the last few years. This is mainly the case because SaaS offers new chances and revenue streams for software sellers like SAP and Oracle with the market potential estimated to be around 21 billion EURO in 2015 (Gartner, 2011). This practical relevance is complemented by a steadily growing body of research concerning on-demand systems. However, the concept is not completely new. Already at the end of the 1990s software was provided as an on-demand solution under the denomination of Application Service Providing (ASP) (Benlian, 2010). This is even more surprising when considering that this model, which had failed to gain a significant market share, today is seen as the IT-model of the future with the power to change paradigms in IT (Carr, 2009). This is supported by the fact that IT functions are consequently changing from core competency to context activity (Carr, 2003). Similar to the concept and subsequent realization of an electric power station, the trend is moving from the company-owned computing centers towards centralized "IT-factories" (Carr, 2009). Some IT-experts are more skeptical

about the impact of cloud computing. Especially, the practitioners have highlighted the complexity and challenges faced due to the adoption of SaaS (Dueck, 2009).

A wide variety of literature exists, examining single value and success drivers of SaaS. However, a coherent view summarizing these factors is still missing. Companies offering SaaS solutions highlight a broad variety of benefits which SaaS can offer without providing a rigorous and critical perspective of factors affecting the success of adopted information technology. Thus, this paper tries to close this gap by providing a holistic view on factors, which can be seen as value propositions (VP) of SaaS in comparison to on-premise solutions, as well as a more critical view on factors, which influence the success of SaaS as context activity in enterprises.

This paper is structured as follows. First, the theoretical background is explained including the concept of SaaS, as well as the definition of success factor (SF) and VP. Second, the applied methodology of the literature review according to Webster and Watson (2002) is explained. Third, a meta-analysis of the investigated journal and conference articles is given, including an overview according to the regional distribution of the investigated companies. Fourth, a list of SFs and VPs is iteratively created and the relevant journals are screened for these factors, resulting in a quantitative overview concerning the single factors. Finally, a classification is introduced in which SFs and VPs can be arranged according to different aspects.

Performance is found to be the most important SF, while cost saving is the major value driver of SaaS. Additionally, the results show that many VPs of SaaS are realized on an organizational level, while the most SFs to "run" the service can be found in the system quality category. According to Webster and Watson (2002) a good literature review should advance science and give insights into the structure of a topic. Hence the results of the analysis of the success and value factors are synthesized according to the framework of DeLone & McLean (D&M model) (2003) of IS success. The D&M model captures SFs, which are critical as backbone of companies, as well as value-creational considerations on organizational level as net benefits construct.

The results of this paper can be used in different ways. For instance, the classification can be used as operationalization of the D&M model in the context of SaaS. Another possible application is the usage of the different SFs in a SaaS specific adoption model. A third area of interest would be the empirical validation of the different constructs and factors with a "factor analysis".

THEORETICAL BACKGROUND

Definition of Software as a Service

In order to define SaaS, it is necessary to define the term cloud computing because SaaS is a specific form of cloud computing. However, there is a high confusion among practitioners concerning the term cloud computing. This is underlined by a study conducted by Forrester research, where only 58% of the surveyed managers were able to explain the cloud concept correctly (Forrester, 2010). However, it is necessary to have a widely accepted definition of cloud computing within the scientific community to discuss the topic on the same basis. A general definition of cloud computing is offered by the National Institute of Standards and Technology (NIST). According to this definition, cloud computing has to fulfill the following requirements: resources have to be provided in electronic form via internet. In the case of SaaS the resources are software applications. The service is provided on-demand. The resources have to be scalable, this means that the use of single customers is measurable and can be controlled (Benlian, 2010). Cloud computing offers four different iterations: private cloud, public cloud, community cloud and hybrid cloud (Mell and Grace, 2009).

According to Mell and Grace (2009), cloud computing can be subdivided into three different service models: platform as a service (PaaS), infrastructure as a service (IaaS) and software as a service (SaaS). The three service models have interrelated components, however only SaaS will be explicitly explained.

SaaS as specific form of cloud computing is defined as follows: "The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g. web-based email). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings".

Success Factor

Generally, SFs are a limited amount of areas, in which the results can guarantee a successful positioning of the company. Success in this context means that the success of the company rises (Esteves and Pastor, 2009). Success of the company is then dependent on the company itself and can include, but must not, profit maximization or shareholder value maximization. This argumentation can be transferred into a smaller area of relevance, where a success has to be specifically defined. Success is always dependent on the task the information system has to fulfill. IS success is a widely discussed topic, therefore it has to be clearly defined in the context of SaaS, what success really means. In the context of SaaS, success means that the IT infrastructure supports the core business in a rigorous, non-failing manner to be successfully adopted or used. It has to be mentioned that IT is a supporting function; therefore success is always defined indirectly via the degree to which the software supports the company's goals. Accordingly, we understand SFs in the context of SaaS as follows: *SFs are certain areas, which are critical to a successful adoption and usage from either vendor or customer side.*

Value Proposition

The term VP has been widely discussed in marketing literature. It is often stated as the key requirement of a good business model. We will not discuss the connection between business models and VPs, or whether specific VPs are better than others. The considerations which lead to our definition of VP are as follows. In order to create a sales appeal, the customer has to expect added value from the SaaS solution. VPs are aspects of a product or service that convince customers choosing one specific solution over another (Anderson and Carpenter, 2011). In this context we define VPs as *benefits, which create added value compared to on-premise software*. These VPs can (or cannot) be offered by software vendors. We use this simplified definition of VP to guide our search on the question, how SaaS creates value for customers in comparison to on-premise software.

Distinguishing between Success Factor and Value Proposition

SFs always involve potential risk components. Especially areas with minimum requirements, like security and availability, are critical for achieving company goals. Therefore these IT-capabilities have to be controlled constantly. On the other hand VPs focus on aspects, which can produce added value compared to on-premise. So VPs deal with benefits of SaaS. SFs can be VPs of software vendors, if managed well. For instance a high availability can be a unique VP compared to other software vendors. However, it can still be critical to provide a minimum availability. Hence, a SF just shows the potential for risk, not compulsory a disadvantage. Equally, VPs are benefits, which can (but do not compulsory have to) produce added value. Although added value is essential for creating a competitive advantage, it must not be critical if single VPs don't create added value.

DeLone & McLean Model of IS Success

DeLone & McLean's IS success models (2003) is the most widely used framework to structure IS success in the international IS community (Urbach, Smolnik and Riempp, 2009). The updated D&M IS Success model was empirically tested in various domains, including e-Commerce, ASP, portals, etc. Several debates have enlightened the problems and benefits, which are connected to this framework. The D&M IS Success model is not discussed here in detail. However the constructs related to IS success are closely conceptualized according to the initial IS Success model.

The six interdependent core components are information, system and service quality, system use, user satisfaction and net benefits (see figure 1). In the following the categories will be explained (Petter and McLean, 2008):

- System quality - the "desirable characteristics of an information system". For instance: ease of use, system flexibility and system reliability.
- Information quality - the "desirable characteristics of the system outputs". For instance: relevance, understandability and accuracy.
- Service quality – quality of IT support. For instance: accuracy, responsiveness and reliability.
- System use – the degree to which users utilize the capabilities of an IS. For instance: amount of use and frequency of use.
- User satisfaction – users' level of satisfaction with reports and websites.

- Net benefits – degree to which IS contributes to the success of the stakeholders. For instance: productivity improvements, market efficiency and cost reductions.

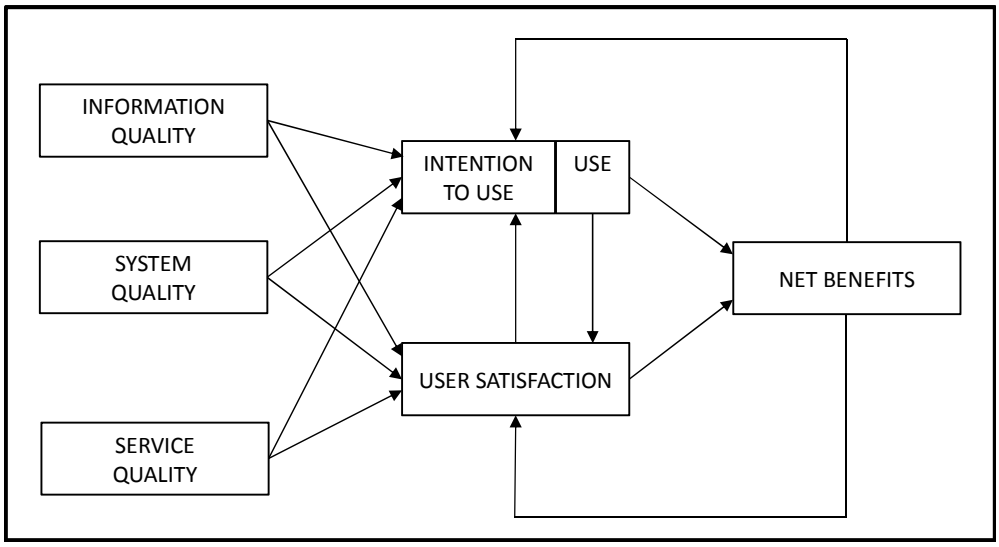

Figure 1. D&M Success Model

LITERATURE REVIEW

Methodology

To ensure high transparency concerning the selection process of the included sources, this review is based on the approach of Webster and Watson (2002). The approach is built on two principles.

First the findings should include all relevant literature. Different tools and searching logics should be used to include a wide variety of journals, conferences and regions. Second, reproducibility is required. This is necessary so that the study can be verified by third parties. To ensure reproducibility the literature review has to be conducted systematically.

The following databases were selected to support the research process: EbscoHost (including Business Source Premier- and EconLit), ACM Digital Library, Emerald Fulltext Archive Database, IEEE Computer Society Digital Library, Oxford Journals Full Collection, Elsevier (including Science Direct), SpringerLink and Wiley Online Library (AISel). Additional to journal articles, conference papers were added via AIS Electronic Library (AISel), IEEE Computer and Society Digital Library. All in all 22 of the 23 journals, which got an A-ranking in the "WI-Journalliste 2008" were accessed. The "WI-Journalliste 2008" is a journal and conference ranking created by the German IS community to provide a basis for cumulative dissertation evaluation criteria. Further relevant sources were detected by scanning the back-matter of the journal articles. Because of missing licenses the articles of the journals Decision Support Systems (DSS), Information and Organization (I&O), Information & Management (I&M), Information Systems (ISYS) and Journal of Strategic Systems (JSIS) were just available when published before 2005. Additionally there was no access authorization for the European Journal of Information Systems (EJIS).

The search was conducted by a search string. Thereby all contributions to the SaaS topic were considered relevant in the first step. The search string was: ("SaaS" OR "software as a service"). It was applied on title, keywords and abstract. The quotation marks around SaaS are set in order to avoid that the second "S" is treated as a plural "S". Because hyphens are ignored by search machines there is no need to include the German writing "software-as-a-service" into the search string. Most of the search engines have a list of so called stop words. These are common words like "as" or "a", which are ignored when integrated into a search string. Accordingly many search engines just search for the words "software" and "service". Consequently the number of findings differs from the number of articles related to the topic. The number of words between "software" and "service" can be defined as two; nevertheless there remains a certain amount of non-topic results. So the number of results of the first step of the searching process is not listed here.

Meta-Analysis of the Selected Literature

Fig. 2 shows in which time period the articles were published. Most of the articles were written in the last four years. Just one contribution was written before 2006. Hence, SaaS is a quite new model.

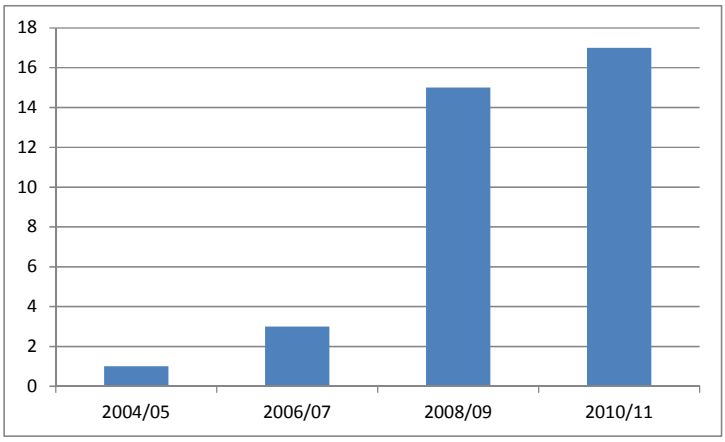

Figure 2. Number of Sources per Year

The selected literature was composed of 50% journal articles and 39% conference proceedings. "Others" stands for contributions in reference books. 88% of the articles and proceedings are "A" and 12% "B" ranked. The majority of the selected sources were found in IEEE Software, Wirtschaftsinformatik and the ECIS proceedings.

The majority of the contributions are written from authors engaged in research (26). Five articles were written by practitioners. In four articles scientists and practitioners worked together. The literature review covers several regions with Europe as core region of the empirical studies (53% of the empirical studies). Moreover, North American, Japanese and Balkan-related companies were investigated (see fig. 3).

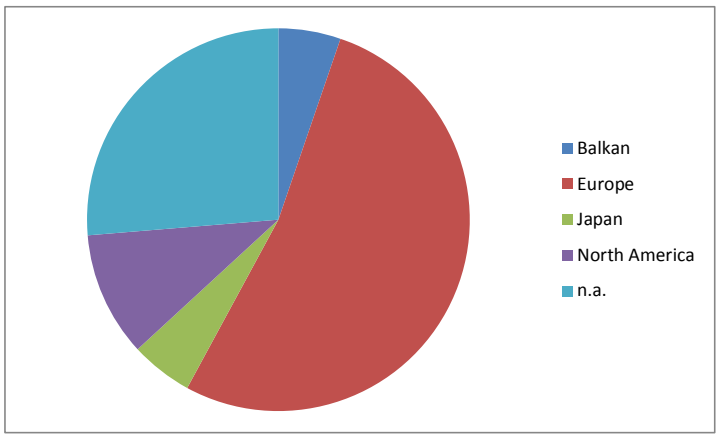

Figure 3. Geographical Distribution of Empirically Investigated Companies

RESULTS

In the following paragraph the extracted success factors, the quantitative distribution of each factor and its operational definition are given. It has to be mentioned that the operational definition is not drawn from a single paper, but represents an abstraction of several papers.

Critical Success Factors

The SFs were aggregated into 13 different factors: performance, security, individualization, privacy, availability, compliance, flexibility, interoperability, ease of implementation, legal policies, charging, alternative costs of in-house IT systems and social aspects. These SFs were counted by the number of articles they were mentioned in. No definite conclusions are drawn from the number of citations of a certain SF. However, a first impression should be given, which SFs are highly discussed and which factors are not. Table 1 shows the quantitative distribution of the SFs.

Critical Success Factors/References	Armbrust et al. (2010)	Benefield (2009)	Benlian (2009)	Benlian et al. (2010)	Benlian und Buxmann (2009)	Benlian und Hess (2009)	Benlian und Hess (2010a)	Benlian und Hess (2010b) (ECIS)	Bibi et al. (2011)	Biggeleben et al. (2009)	Braß und Zimmermann (2010)	Buxmann und Hess (2008)	Campbell-Kelly (2009)	Choudhary (2007)	Cusumano (2010)	David und Mann (2007)	Dueck (2009)	Eckhardt (2009)	Enderlein et al. (2009)	Erdogmus (2009)	Gold et al. (2004)	Huang und Wang (2009)	Jansen (2011)	Janssen und Joha (2011)	Klein et al. (2010)	Lassila (2006)	Lehmann und Buxmann (2009)	Limam und Boutaba (2010)	Matros et al. (2010)	Narasimhan und Nichols (2011)	Ojala und Tyrväinen (2011)	Pendyala und Shim (2009)	Terplan und Voigt (2011)	Xin und Levina (2008)	Zencke und Eichin (2008)	Zhang et al. (2010)	Sum
Performance	x	x	x	x	x		x	x	x		x			x	x					x	x		x	x		x		x		x		x	x		x	x	21
Security	x				x			x	x			x	x		x	x	x	x	x	x		x	x	x				x		x	x	x			x	20
Individualisation					x			x	x		x	x		x	x		x	x	x			x		x	x							x		x	x	18
Privacy			x	x	x		x	x	x	x	x	x										x	x	x	x				x			x	x			x	18
Availability		x	x	x	x		x		x	x	x						x	x		x			x	x		x							x	x			16
Compliance			x				x	x	x				x					x		x	x		x	x	x			x	x				x			x	15
Flexibility									x		x			x	x	x	x	x						x			x		x				x	x	x		14
Interoperability					x		x		x			x		x		x	x	x			x			x		x							x			x	13
Ease of Implementation					x	x						x				x	x							x	x					x	x	x				x	11
Legal Privacy Policy									x											x				x	x				x					x			6
Charging							x		x												x						x				x			x			6
Alternative Costs of Inhouse IT systems													x					x																			2
Social Aspects																																					0
	2	2	4	3	7	1	6	5	10	2	5	6	3	3	5	3	6	7	3	6	4	3	5	10	5	3	2	3	4	3	5	7	8	3	3	5	

Table 1. Quantitative Distribution of Success Factors

The most important aspect was performance. The lowest concerns were connected to social aspects, where a survey-based exploratory method was used asking customers, if they expect social risks combined with SaaS solutions (e.g. employee resistance). This was falsified. Table 2 shows the investigated SFs and their operational definition on which the SFs were assigned.

Success Factor	Description
Performance	*Describes the workload which can be processed by the software within a certain amount of time in relation to a specific amount of resources. Includes assurance of performance while scaling resources rapidly and virtualizing on a large scale.*
Security	*Deals with technical security apsects. Includes issues like the potential risks of data loss or manipulation by internal employees, from the service provider's side or external players. Captures denial-of-service attacks or similar problems.Also includes architectural issues like vulnerability of hypervisor structures.*
Individualization	*SaaS provides standard software for a high variety of different branches, user types and company sizes. Individual needs of single customers may therefore not be met. This is a problem not only of SaaS, but of standard software in general which might be more evident in SaaS-related contexts.*
Privacy	*Deals with the risk to reveal private data like home addresses of employees which may then be seen by unauthorized users. Security and privacy are built on one another, however are different concepts. For instance, an internet environment can be secure, however still be completely unprivate. Hence these concepts are distinguished.*
Availability	*Up-time of the SaaS service. Availability is critical, as complete production processes can be disrupted if availability is restricted, resulting in a high financial loss for the affected company.*
Compliance	*Defines that the provider acts according to the service agreement. This includes clear service-level-agreements and the skill to accomplish the service in a satisfactory way. Accountability, resposibility and other legal aspects have to be clear prior to usage. Includes data-recovery processes and audit activities.*
Flexibility	*Focuses on provider's flexibility to provide the right amount of resources that can be used by the customers when needed. Provider must possess excess resources to provide scalability and virtualization in order to assure flexibility to the customer.*
Interoperability	*Describes to which extent the software can be integrated into the company-owned IT-system. High Interoperability is usually provided by a SOA system architectures which is often the technical foundation of on-demand enterprise systems.*
Implementation	*Deals with the realization of technical specificatns into user-friendly software components. Includes adaption of company specific paramaters into branche-neutral reference models*
Legal Aspects	*Legal data-security aspects differ among different countries. The data center therefore has to fulfill the legislative regulations of the target countries and cannot solely focus on regulations imposed by the country the data center is placed at.*
Charging	*Describes the pricing mechanisms. Can be critical if the definition of the assessment base is too complex and therefore expensive, fault-prone or intransparent.*
Oportunity Costs of Inhouse IT Systems	*The decision for a SaaS solution is one against the own IT infrastructure. Therefore the attractiveness of SaaS sinks with decreasing infrastructure costs, i.e. by lower prices for servers.*
Social Aspects	*Characterize the risk of resistance of employees against outsourcing decisions.*

Table 2. Identified Success Factors

Value Propositions

The VPs were aggregated into 19 different propositions: cost savings, financing, concentration on core competencies, functionality, cost flexibility, installation, planning, strategic flexibility, innovation ability, helpdesk quality, ease of use, availability, mobility, data security, higher investment security, replacement of old infrastructure, energy savings and accounting benefits. The quantitative distribution is shown in Table 3.

Value Propositions/References	Armbrust et al. (2010)	Benefield (2009)	Benlian (2009)	Benlian et al. (2010)	Benlian und Buxmann (2009)	Benlian und Hess (2009)	Benlian und Hess (2010a)	Benlian und Hess (2010b) (ECIS)	Bibi et al. (2011)	Biggeleben et al. (2009)	Brab und Zimmermann (2010)	Buxmann und Hess (2008)	Campbell-Kelly (2009)	Choudhary (2007)	Cusumano (2010)	David und Mann (2007)	Dueck (2009)	Eckhardt (2009)	Enderlein et al. (2009)	Erdogmus (2009)	Gold et al. (2004)	Huang und Wang (2009)	Jansen (2011)	Janssen und Joha (2011)	Klein et al. (2010)	Lassila (2006)	Lehmann und Buxmann (2009)	Limam und Boutaba (2010)	Matros et al. (2010)	Narasimhan und Nichols (2011)	Ojala und Tyrväinen (2011)	Pendyala und Shim (2009)	Terplan und Voigt (2011)	Xin und Levina (2008)	Zencke und Eichin (2008)	Zhang et al. (2010)	Sum
Cost Savings		x			x	x	x		x	x	x	x		x	x	x	x		x		x	x	x	x	x	x			x	x	x	x	x	x	x	27
Financing	x				x	x	x		x		x	x				x		x	x			x		x						x	x	x	x		x	x	18
Concentration on Core Competencies			x		x	x	x		x	x		x	x			x				x		x		x	x	x						x	x			x	17
Functionality		x		x			x		x		x	x		x		x					x			x					x	x	x			x	x		15
Cost Flexibility	x					x	x		x		x	x					x	x					x		x				x		x			x	x		14
Installation		x			x				x			x	x	x				x				x		x				x			x	x			x		13
Planning	x		x	x					x							x		x		x				x		x			x		x		x	x			12
Strategic Flexibility							x		x		x	x		x	x						x				x		x	x		x			x				12
Actuality						x					x	x	x	x		x						x		x		x						x	x		x			12
Innovation Ability			x						x		x			x				x				x		x					x	x	x		x				11
Helpdesk Quality		x		x			x			x		x			x			x		x				x						x							10
Ease of Use						x						x						x		x				x	x					x	x				x	x	10
Availability		x										x				x		x					x						x	x		x	x	x			9
Mobility									x	x	x		x			x		x								x						x				x	9
Data Security		x					x											x		x									x	x		x	x				8
Higher Investment Security		x							x					x										x				x	x		x						7
Replacement of Old Infrastructure													x									x		x													3
Energy Savings									x								x	x																			3
Accounting Benefits																		x																			1
	3	7	3	3	4	6	8	0	11	4	8	11	5	7	3	8	3	11	2	5	3	7	3	12	5	5	1	3	8	9	9	8	9	5	7	5	

Table 3. Quantitative Distribution of Value Propositions

The most important VP of SaaS is cost saving. This is congruent with the understanding of a context activity, where the highest benefits for the company concerning a context activity can be gained by reducing costs. The VP "concentration on core competencies" further highlights the role of SaaS as a context activity. In Table 4 the different VPs are explained.

Value Proposition	Definition
Cost Savings	*Describes the potential to save costs by introducing SaaS based on a "Make-or-Buy-or-Rent" decision. Cost savings are realized through economies of scale and scope on vendor's side and can lead to overall cost reductions within an IT-ecosystem.*
Financing	*Describes the reduction of initial investments when introducing a SaaS solution compared to on-premise. This is driven by the fact that high initial investments are transofmred to running operational costs impacting cash-flow and therefore the net present value.*
Concentration on Core Competencies	*SaaS represents a possibility to outsource the IT infrastructure as context activity. Hence, SaaS-customers can concentrate on their core competencies.*
Functionality	*Industry-specific knowledge of the provider can be built on top of existing software solutions, where customers can choose an industry and company size specific solution. Additionally applications for special domains can be rent (e.g. SAP App-Store) and integrated into the software system.*
Cost Flexibility	*As payments in SaaS are based on rental fees, initial payments drop reducing the lock-in effect and sunk costs problem. Hence cost flexibility, a strategic benefit, increases.*
Installation	*SaaS transfers the installation and attendence to the provider. This has two effects. First the customer can reduce IT persone. Second, overall costs of the IT-ecosystem can decrease, as the installation process is accomplished by one central institution realizing scale effects.*
Planning	*Continous payments enable the SaaS customer to better plan their cash-flows compared to a highly unlinear temporal cost distribution.*
Strategic Flexibility	*Lower sunk costs and a lower lock-in effect can enhance flexibility in business decisions. Regular up-date-activities by the provider ensure working with the actual version of the software.*
Actuality	*Describes the possibility of SaaS to always offer the latest software.*
Innovation Ability	*SaaS can enhance innovation ability by immediately integrating new functions for instance in the form of apps.*
Helpdesk Quality	*SaaS providers often have to provide higher helpdesk quality, as lower lock-in effects boost the competition between SaaS providers.*
Ease of Use	*SaaS applications are often developed for users with a wide variety of different backgrounds. So at application development stage, there is explicitly looked after ease of deployment, which generates a higher usability for customers.*
Availability	*Represents the time a service is usable divided by the time the service could be used without any breakdowns. Generally the provider runs more professional IT-systems which causes less breakdowns.This can lead to a higher availability than of in-house-systems.*
Mobility	*Describes the ubiquity aspect of SaaS where it is possible to use software from different locations..*
Data Security	*Can be a reason to decline the use of SaaS, it can also lead to higher protection against attacks and data loss than compared to inhouse-systems. The reason for this is, that the software vendor usually has a higher know-how concerning IT-infrastructure and security issues.*
Higher Investment Security	*Describes the limitation of risk which is associated with the spending of high amounts for qualitative poor services.*
Replacement of Old Infrastructure	*Describes the phenomenon that the customer doesn't have to invest in modernizing the companies infrastructure, but can just replace old infrastructure.*
Energy Savings	*Overall energy savings can be achieved as the vendor doesn't need the same amount of resources (in sum) as the single user would have to. Therefore, energy can be saved, which is also an ecological effect.*
Accounting Benefits	*Describes the reduction of the temporal profit (as initial costs are transformed into operational costs) and therefore the decrease of tax load.*

Table 4. Identified Value Propositions

A CLASSIFICATION OF SUCCESS FACTORS AND VALUE PROPOSITIONS AS NEW SOFTWARE AS A SERVICE SUCCESS MEASURES

IS success is a widely discussed topic where no overarching consensus exists, which factors can be taken to measure IS success on a general basis. However, the D&M model of IS success has proposed several categories, which have been widely tested in several IS contexts. The classification is based on the comparison of the operational definition with the previously introduced D&M success categories. Additional support is provided by a proposed operationalization scheme from DeLone

and McLean (2004), which is taken as underlying pattern. User satisfaction and system use are not included, as none of the factors can be attributed according to these categories. Many of the factors are variables which can also be found as traditional MIS success measures, where others cannot be attributed to any category. Some factors are SaaS-specific. The extracted SFs and VPs are categorized as follows, however some cannot be attributed without intersection, hence have to be considered carefully when used as operationalization:

- *System Quality* is the "desirable characteristics of an information system". According to this definition, the following SFs and VPs of software as a service are attributed to system quality: Performance, Availability, Flexibility, Ease of Implementation, Interoperability, Functionality, Installation, Actuality, Ease of Use.
- *Information Quality* is the "desirable quality of system outputs". The following SFs and VPs are attributed to information quality: Security, Privacy, Compliance,
- *Service Quality* is the quality of the IT support. These are: Helpdesk Quality.
- *Net benefits* are the degree to which IS contributes to the success of the stakeholders. According to this definition, the relevant factors are as follows: Cost savings, Financing, Concentration on Core Competencies, Cost Flexibility, Planning, Strategic Flexibility, Innovation Ability, Mobility, Higher Investment Security, Accounting Benefits.

The results are summarized in table 5.

Software as a Service Success Metrics

System Quality
- Performance
- Availability
- Flexibility
- Ease of Implementation
- Interoperability
- Functionality
- Installation
- Actuality
- Ease of Use

Information Quality
- Security
- Privacy
- Compliance

Service Quality
- Helpdesk Quality

Net Benefits
- Cost Savings
- Financing
- Concentration on Core Competencies
- Cost Flexibility
- Planning
- Strategic Flexibility
- Innovation Ability
- Mobility
- Higher Investment Security
- Accounting Benefits

Table 5. Software as a Service Success Metrics

CONCLUSION

The paper explored the recent literature adjacent to SaaS SFs and VPs. This was done by reviewing high quality journals, conferences and books to extract an indicator of relevance by counting the number of times mentioned in the relevant literature. Subsequently these SFs and VPs were categorized according to D&M's categories of IS success.

The study conducted three major results.

First, it gave a broad overview of SFs and VPs in the SaaS domain. This is especially important, as no literature review on these factors exists. Thus this paper helps to advance research in the domain of on-demand applications.

Second, cost reduction has been shown to be the most important VP of SaaS. This is consistent with the comprehension of context activities and can further enrich research in this direction. However, the inclusion of cost reductions as benefit of SaaS is often derived of a theoretical viewpoint and has to be empirically validated to be a major value driver for the customer.

Third, most VPs of SaaS can be found on an organizational level – the net benefits construct. This is not surprising, however the net benefits construct and its importance for the value-added in a SaaS context has not been empirically validated in the adoption phase. Hence a possibility to research in this direction arises.

The study has some shortcomings and limitations. First, the usage of the frequency of mentions as indicator for relevance has not been built on a solid statistical basis. The reason for this is that this study should only give a broad overview concerning which factors are investigated in research and to roughly estimate its relevance. Further research could apply advanced statistical methods to extract the most important factors to include them in an operationalized model. Second, the chosen articles are limited to high class journals. However, SaaS is a relatively new topic, which could be enriched by insights of work in progress articles from less highly rated conferences. Especially when investigating SaaS success, innovative success measures could be of relevance. Hence, the literature review could be extended by additional conferences. Third, the categorization of the factors according to the D&M model has some problems with the separation accuracy. This means that some factors couldn't be clearly attributed to one category. When operationalizing, this can lead to the problem of content validity. All in all, the paper gives researcher investigating SaaS success a first impression which SFs and VPs are discussed in research and ideas for success-related research models.

REFERENCES

1. All, A. (2000) Gartner: SAAS growth shows no sign of slowing. http://www.itbusinessedge.com/cm/blogs/all/gartner-saas-growth-shows-no-signs-of-slowing/?cs=48600.
2. Anderson, J., Carpenter, G. (2011) A Framework for Creating Value Propositions. In: Peterson, R.; Kerin, R.: Wiley International Encyclopedia of Marketing – Marketing Strategy, Wiley: Texas.
3. Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I., Zaharia, M. (2010) A View of Cloud Computing. In: Communications of the ACM, 4, 53, 50-58.
4. Arrow, K. (1969) The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Non-Market Allocation. In: The Analysis and Evaluation of Public Expenditure: The PBB System. U.S. Government Printing Office: Washington, DC, 39-73.
5. Barney, J. (1997) Gaining and sustaining competitive advantage. Addison-Wesley: Reading, Massachusetts.
6. Barney, J. (1991) Firm Resources and Sustained Competitive Advantage. In: Journal of Management, 1, 17, 99-120.
7. Benefield, R. (2009) Agile Deployment: Lean Service Management and Deployment Strategies for the SaaS Enterprise. In: Proceedings of the 42nd HICSS.
8. Benlian, A. (2009) A transaction cost theoretical analysis of software-as-a-service (SAAS) – based sourcing in SMBs and enterprises. In: ECIS 2009 Proceedings.
9. Benlian, A., Buxmann, P. (2009) Treiber der Adoption SaaS-basierter Anwendungen – Eine empirische Untersuchung auf Basis verschiedener Applikationstypen. In: Wirtschaftsinformatik, 5, 51, 414-428.
10. Benlian, A., Hess, T. (2009) Welche Treiber lassen SaaS auch in Grossunternehmen zum Erfolg werden? Eine empirische Analyse der SaaS-Adoption auf Basis der Transaktionskostentheorie. In: Wirtschaftsinformatik Proceedings 2009, 53.
11. Benlian, A., Koufaris, M., Hess, T. (2010) The Role of SaaS Service Quality for continued SaaS Use: Empirical Insights from SaaS using Firms. In: ICIS 2010 Proceedings, 26.

12. Benlian, A., Hess, T. (2010) The Risks of Sourcing Software as a Service – An empirical Analysis of Adopters and Non-Adopters. In: ECIS 2010 Proceedings, 142.
13. Benlian, A. (2010) Chancen und Risiken des Einsatzes von SaaS – Die Sicht der Anwender. In: Benlian, A. (Hrsg): Software-as-a-Service. Gabler: Wiesbaden.
14. Buxmann, P., Diefenbach, H., Hess, T. (2008) Die Softwareindustrie: Ökonomische Prinzipien, Strategien, Perspektiven. Springer: Heidelberg.
15. Buxmann, P., Heiner, D., Hess, T. (2011) Software as a Service: Die Anwendungsebene des Cloud Computing. Springer: Heidelberg.
16. Bibi, S., Katsaros, D., Panayiotis, B. (2011) Business application acquisition: On-premise or SaaS-based solutions? In: IEEE Software, http://doi.ieeecomputersociety.org/10.1109/MS.2011.119, Loaded on: 01.09.2011.
17. Biggeleben, M., Kolbe, H., Schäfermeyer, M., Vranesic, H. (2009) Prüfkriterien für Geschäftsmodelle im Kontext von Software as a Service. In: Wirtschaftsinformatik Proceedings 2009, 52.
18. Brodkin, J. (2011) Loss of customer data spurs closure of online storage service ""The Linkup"". In: Network World, http://www.itbusinessedge.com/cm/blogs/all/gartner-saas-growth-shows-no-signs-of-slowing/?cs=48600linkupfailure.html?page=1, Loaded on: 31.10.2011.
19. Braß, D., Zimmermann, R. (2010) Software as a Service – am Beispiel einer Business-Intelligence-Lösung in der Logistik. In: HMD – Praxis der Wirtschaftsinformatik, 43-51.
20. Buxmann, P., Hess, T. (2008) Software as a Service. In: Wirtschaftsinformatik, 6, 50, 500-503.
21. Campbell-Kelly, M. (2009) Historical Reflections – The Rise, Fall, and Resurrection of Software as a Service. In: Communications of the ACM, 5, 52, 28-30.
22. Carr, N. (2003) "IT doesn't matter". In: Harvard Business Review, 5, 81, 41-49.
23. Carr, N. (2009) The big Switch - Rewiring the World, From Edison to Google. W.W. Norton: New York.
24. Choudhary, V. (2007) Software as a Service: Implications for Investment in Software Development. In: Proceedings of the 40th HICSS.
25. Clemons, E., Row, M. (1991) Sustaining IT advantage: The role of structural differences. In: MIS Quarterly, 3, 15, 275-292.
26. Coase, R. (1937) The Nature of the Firm. In: Economica, 4, 16, 486-405.
27. Choi, S., Stahl, D., Whinston, A. (1997) The Economics of Electronic Commerce: The Essential of Doing Business in the Electronic Marketplace. Macmillan: Indianapolis.
28. Cusumano, M. (2010) Technology Strategy and Management - Cloud Computing and SaaS as New Computing Platforms. In: Communications of the ACM. 4, 53, 27-29.
29. David, J., Mann, A. (2007) The Emergence of On-Demand Software Aggregators: Implications for Developers, Customers, and Software Companies. In: AMCIS 2007 Proceedings, 194.
30. Delone, W. H. and McLean, E. (2003) The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. Journal of Management Information Systems, 19, 4: 9–30.
31. Delone, W.H. and Mclean, E. (2004) Measuring e-Commerce Success: Applying the DeLone & McLean Information Systems Success Model. Int. J. Electron. Commerce 9 (2004) (October): 31–47.
32. Demirkan, H., Kenneth, H. (2008) The risk and information sharing of application services supply chain. European Journal of Operational Research, 3, 187, 765-784.
33. Dibbern, J. (2004) Sourcing of application software services. Empirical evidence of cultural, industry and functional differences. Physica: Heidelberg.
34. Eckhardt, J. (2009) Software as a Service – Rechtliche Rahmenbedingungen. In: Köhler-Schute, C. (Hrsg.): Software as a Service. KS-Energy: Berlin, 114-138.
35. Enderlein, S., Helmich, M., Mueller, J., Krueger, J., Borovskiy, V. (2009) Service Objects: Adaptable, Metadata-Based Services for Multi-Tenant On-Demand Enterprise Applications. In: AMCIS 2009 Proceedings, 807.
36. Erdogmus, H. (2009) Cloud Computing: Does Nirvana Hide behind the Nebula? In: IEEE Software, 2, 26, 4-6.

37. Esteves, J., Pastor, J. (2009) Analysis of Critical Success Factors Relevance along SAP Implementation Phases. In: 7th ACIS, 1119-1125.
38. Forrester Research, Inc. (2010) Decoding Cloud Computing: How Enterprises Should Segment Cloud Computing Oppoertunities. (Hrsg): Forrester Research, Inc.
39. Garfinkel, T., Rosenblum, M. (2005) When virtual is harder than Real. HotOS'05: Santa Fe.
40. Gold, N., Mohan, A., Knight, C., Munro, M. (2004) Unterstanding Service-Oriented Software. In: IEEE Software, 2, 21, 71-77.
41. Gartner (2011) Gartner Says Worldwide Software as a Service Revenue ist Forecast to Grow 21 Percent in 2001. http://www.gartner.com/it/page.jsp?id=1739214, 2011-07-07. Abruf am 2011-12-03.
42. Greschler, D., Mangan, T. (2002) Networking lessons in delivering software as a service - Part I. In: International journal of network management, 5, 12.
43. Gunten, A. (2007) Mit Software als Service zum Erfolg. In: InfoWeek.ch, 2, 1, 35-38.
44. Herrmann, W. (2011) "Cloud und SaaS werden zum Mainstream". http://www.computerwoche.de/management/cloud-computing/1938638/, Loaded on: 2011-10-31.
45. Heinzl, A., Schoder, D., Frank, U. (2010) WI-Orientierungslisten. In: Wirtschaftsinformatik, 2, 50, 155-163.
46. Huang K.-W. and Wang, M. (2009) Firm-level productivity analysis for software as a service companies. In ICIS 2009 Proceedings, 21.
47. Jacobs, D. (2005) Enterprise Software as Service. Online services are changing the nature of software. In: ACM Queue 3, 6, 36-42.
48. Janssen, M., Joha, A. (2011) Challenges for adopting Cloud-based Software as a Service (SaaS) in the Public Sector. In: ECIS 2011 Proceedings, 80.
49. Jansen, W. (2011) Cloud Hooks: Security and Privacy Issues in Cloud Computing. In: Proceedings of the 44th HICSS.
50. Klein, M., Pilarski, B., Bitzer, S., Schumann, M. (2010) SaaS für HR-Anwendungssysteme – Kriterien, Eignung und Implikationen. In: HMD – Praxis der Wirtschaftsinformatik, 25-51.
51. Lacity, M. and Hirschheim, R. (1995) Beyond the information systems outsourcing bandwagon: the insourcing response. Wiley: Chichester.
52. Lambrecht, A., Skiera, B. (2006) Paying too much and being happy about it: existence, causes, and consequences of tariff-choice biases. In: Journal of Marketing Research 5, 43, 212-223.
53. Lassila, A. (2006) Offering software as a service: Case study of system integrators. In ECIS 2006 Proceedings, 97.
54. Lehmann, S. and Buxmann, P. (2009) Preisstrategien von Softwareanbietern. In: Wirtschaftsinformatik, 6, 51, 519-529.
55. Limam, N. and Boutaba, R. (2010) Assessing Software Service Quality and Trustworthiness at Selection Time. In: IEEE Transactions on Software Engineering, 4, 36, 559-574.
56. McDonald, M. (2010) What we're watching in… Cloud Computing. In: Harvard Business Review, 6, 88, 24-30.
57. Matros, R., Rietze, C., Eymann, T. (2010) SaaS und Unternehmenserfolg: Erfolgsfaktoren für die Praxis. Benlian, A. (Hrsg.): Software-as-a-Service. Gabler: Wiesbaden.
58. Mell, P. and Grace, T. (2009) The NIST Definition of Cloud Computing. (Hrsg.): National Institute of Standards and Technology, 7, 15.
59. Narasimhan, B. and Nichols, R. (2011) State of Cloud Applications and Platforms: The Cloud Adopters' View. In: IEEE Computer, 3, 44, 24-28.
60. Ojala, A. and Tyrväinen, P. (2011) Developing Cloud Business Models: A Case Study on Cloud Gaming. In: IEEE Software, 4, 28, 42-47.
61. Penrose, E. (1959) The theory of the growth of the firm. Blackwell: New York.
62. Pemmaraju, K. and Rangaswami, M. (2010) Leaders in the cloud: Identifying the business value of cloud computing for customers and vendors. Sand Hill Group.
63. Pendyala, V. and Shim, S. (2009) The Web as the Ubiquitous Computer. In: IEEE Computer, 9, 42, 90-92.

64. Peteraf, M. (1993) The Cornerstones of competitive advantage: A resource-based view. In: Strategic management journal, 3, 14, 179-191.
65. Petter, S. and McLean, E. (2008) A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level. In: Information & Management, 46, 3, 159-166.
66. Porter, M. (1980) Competitive Strategy: techniques for analyzing industries and competitors. Free Press: New York.
67. Reflex security (2011) Security within a virtualized environment: A new layer in layered security. http://www.vmware.com/files/pdf/partners/security/security-virtualized-whitepaper.pdf, loaded on: 2011-10-30.
68. Schuller, S. (2008) Demystifying The Cloud: Where Do SaaS, PaaS and Other Acronyms Fit In? http://www.saasblogs.com/saas/demystifying-the-cloud-where-do-saas-paas-and-other-acronyms-fit-in/, loaded on 2011-10-31.
69. Slaviero, M. (2011) BlackHat presentation demo vids: Amazon, Part 4. In: AmiBomb, http://www.sensepost.com/blog/3797.html, Loaded on: 31.10.2011.
70. SIIA; Macrovision; SoftSummit; SVPMA; CELLUG (2009) Key trends in software pricing and licensing: A survey of software industry executives and their enterprise customers. http://www.siia.net/software/pubs/SW_Pricing_Licensing_Report.pdf, Loaded on: 2009-03-09.
71. Salipante, P., Notz, W., Bigelow, J. (1982) A Matrix Approach to Literature Reviews. In: B. Staw; L. Cummings: Research in Organizational Behavior. JAI Press: Greenwich, 321-348.
72. Turner, M., Budgen, D., Brereton, P. (2003) Turning Software into a service. IEEE Computer, 10, 36, 38-44.
73. Terplan, K. and Voigt, C. (2011) Cloud Computing. Mitp: Heidelberg.
74. Urbach, N., Smolnik, S. and Riempp, G. (2009) An empirical investigation of employee portal success. The Journal of Strategic Information Systems, 19, 184-206.
75. Vieira, A. and Schulter, C. (2009) Westphall: Intrusion Detection Techniques in Grid and Cloud Computing Environment. In: IT Professional, 1, 99, 1-1.
76. Williamson, O. (1985) The economic institutions of capitalism: firms, markets, relational contracting. The Free Press: New York.
77. Williamson O. (1991) Comparative economic organization: The analysis of discrete structural alternatives. In: Administrative science quarterly, 2, 36, 269-296.
78. Wolfinbarger, M. and Gilly, M. (2003) "Etailq: Dimensionalizing, Measuring, and Predicting Etail Quality". In: Journal of Retailing, 3, 79, 187-198.
79. Xin, M. and Levina, N. (2008) Software-as-a ServiceModel: Elaborating Client-Side Adoption Factors. In: ICIS 2008 Proceedings, 86.
80. Zencke, P. and Eichin, R. (2008) SAP Business ByDesign - Die neue Mittelstandslösung der SAP. In: Wirtschaftsinformatik, 1, 50, 47-51.
81. Zhang, Y., Su, G. and Zheng, W. (2010) Converting Legacy Desktop Applications into On-Demand Personalized Software. In: IEEE Transactions on Services Computing, 4, 3, 306-321.