SOFTWARE-AS-A-SERVICE BUSINESS MODELS

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Abstract

Software-as-a-Service (SaaS) offering is beneficial to both SMEs and larger corporations, who wish to outsource software-related activities and use simple and low-cost software systems. The expected pros and cons of SaaS offering and technological details are well represented in the contemporary academic and trade literature. However, comprehensive understanding of SaaS as a business model seems to be missing. By synthesizing existing literature and using survey data collected from Finnish software industry, this article reveals two different configurations and the typical factors of SaaS business models. The resulting classification contributes to understanding how software companies need to align and balance otherwise separate business model elements in order to run successful business.

Keywords: Software-as-a-Service, Business model, Classification, Cluster analysis, Software Industry

1 Introduction

Software-as-a-Service (SaaS) refers to a type of software provisioning model where a service provider offers access to a software application over the Internet to several customers [1] [2][3]. SaaS differs from Application Service Provisioning (ASP) and other more traditional software hosting models by the degree of standardization: SaaS software do not generally require customer specific installation or configuration work and typically multiple customers can be served by the same software instance. From the business perspective, SaaS is thus a model [4]:

- to organize software development, deployment and operating in efficient manner,
- for customers to outsource operating, maintenance, and other software-related activities,
- for producing and delivering browser-based, standardized software,
- often characterized by high volumes, high scalability, and on-demand pricing.

Literature on SaaS is mostly focused on technical aspects of SaaS, although this is only an evolutionary development from the preceding ASP model [3][5]. Yet, significant changes have also taken place in the business models of software companies. A business model explains the business logic of a firm, i.e. how the value is created and how it is appropriated [6][7]. Business models are often presented as configurations of several elements [6], typically presented as classifications. While business models of software firms have been studied in numerous papers, studies attempting to classify and characterize SaaS companies are virtually non-existent. In this paper we use data from the Finnish software industry to analyze SaaS companies from the business model perspective and form a new classification of these firms. The classification enables identifying factors and configurations that are typical for SaaS companies' business model and highlighting the differences to the ASP models.

2 Existing Literature on SaaS Business Models

Business model can be defined as a general description of how a firm operates and how it makes money. While the concept of business model has frequently appeared in academic literature, to present frameworks, classifications and business logic of individual companies [7], there is still no agreed definition on the business model concept [8]. Some academics also argue that the concept is redundant with existing well-defined concepts such as the value chain [9]. However, the business model concept, while probably redundant for explanatory theories, has value in that it can be used to communicate research findings or can be used as a control variable capturing a large number of other concepts [10].

The aim of our literature review was to examine how SaaS business model elements had been considered in the prior studies, to establish a definition of SaaS business model as a configuration of elements, and to learn from previous SaaS business model classifications. To facilitate our review, we used the business model framework suggested by Osterwalder [7]. This framework is a synthesis of previous business model studies and it is perhaps the most popular one when analyzing firms in the IT industry. The framework includes nine elements: value proposition, customer segments, customer relationships, channels, revenue streams, activities, resources, partners, and cost structure.

After choosing an analysis framework, we continued by collecting a number of articles with keywords "Software-as-a-Service" and "business model" from several research article databases[1]. Because most existing papers on SaaS are written from the engineering or systems adoption viewpoint, we screened the articles based on their abstracts. After this screening, 14 articles remained for further analysis.

Table 1 presents the details of the analyzed articles. We noted two research gaps. First, the majority of the articles remained at a conceptual level and were not linked with any data providing evidence for the validity or usefulness of the presented business model analysis. In such cases, it becomes difficult to assess the quality or applicability of the results. Second, compared against the elements of the selected framework, the articles tend to concentrate on value propositions of SaaS offerings and value capture through alternative revenue logics. Industry reports provided the most comprehensive business model analyses, but only few articles [11][12] considered SaaS business model as configuration of elements. We argue that identifying feasible configurations is particularly relevant as software companies need to align and balance otherwise separate elements in order to perform and run successful business.

Despite the lacking coverage of some of the business model elements, the existing SaaS literature provides us certain remarks and viewpoints that help identifying the essential characteristics of SaaS models and particularly distinguish it from the ASP models. While the delivery model of ASP and SaaS models as an application over the Internet means that the software can be technically similar, the business models for ASP and SaaS firms are fundamentally different: In ASP model, a provider operates a single customer-specific, tailored, and integrated instance that is typically developed or configured and then deployed according to the needs of each customer. Since these services add value and distinctiveness [11] through customer intimacy they may be more profitable also with smaller volumes.

[1] The digital libraries of IEEE and ACM, Ebscohost Academic Search Elite and Google Scholar were used.

Table 1 Existing research on SaaS business models

Ref / Type	Elements considered	Remarks on SaaS
Armbrust, et al. [1], conceptual	Value proposition, Revenue streams	"A shift from “high-touch, high-margin, high-commitment” provisioning of service “low-touch, low-margin, low-commitment” self-service." [p.6]
Benefield [13], conceptual	Value proposition, Activities	"[..] to look new ways to produce high quality services more efficiently and more rapidly than ever before." [p.5]
Choudhary [14], analytical	Customer relationship, Revenue streams	“[..] the firm will always invest more in software development under the SaaS model relative to perpetual licensing model.” [p.9]
Currie [15], conceptual	Value proposition, ASP business model typology	“There are different types of ASP models that have emerged in the market: [..] Pure Play, ASP enablers, Vertical, Enterprise, Horizontal.” [p.3]
Cusumano [11], statistical	Value proposition, Revenue streams, Channels, Customer Segments	“Managers need to [..] create service offerings that add value and distinctiveness to their products. Managers need to think about how to “productize” their services so they can deliver them more efficiently.” [p.26]
Durkee [16], conceptual	Value proposition, Customer relationship	"[..] to obtain high quality and minimize costs the value-based cloud must rely on a high degree of automation." [p.69]
Gold, et al. [17], conceptual	Value proposition, Revenue streams, Channels	“SaaS envisages a composition of fine-grained services as opposed to the larger-grained applications of the ASP approach.” [p.3]
Jacobs [2], conceptual	Value proposition, Cost structure	"Since online service model aggregates many users together, it can leverage economies of scale to reduce costs." [p.40]
Liao [18], conceptual	Value proposition, Revenue streams	"[..] SaaS service is usually divided into two categories: Enterprise-oriented services, Consumer-oriented services" [p.2]
Ma [19], analytical	Value proposition, Cost structure	“Exiting costs play two opposite roles in the competition. On one hand, they increase the SaaS vendors’ lock-in power and allow the vendor to extract more surplus from existing users; on the other hand, they reduce the attractiveness of the SaaS.” [p.2]
Dubey and Wagle [20], industrial report, cases	Value prop., Activities, Costs, Revenue Streams, Customer segments	“Some applications will migrate to the new delivery model faster than others. [..] Enterprise customers and those in small and midsize businesses are likely to adopt applications at different rates.” [p.2, p.7]
Sääksjärvi, et al. [5], conceptual	Value proposition, Customer relationship	"Among these risks are the price competition [..], the importance of product customization to achieve the required lock-in of customers [..], and extensive marketing costs needed [..] in order to benefit from economies of scale." [p.178]
SIIA [21], industrial report, cases	Value prop., Revenue streams, Customer rel., Channels, Costs, SaaS model typology	"Above all else, SaaS firms must maintain their focus on building their customer base and scaling to profitability, since payment streams are considerably smaller at the outset when compared to the traditional licensing model." [p.28]
Tyrväinen and Selin [12], cases	Value prop., Revenue streams, Channels, Customer relationship, Customer segments	“The most important performance indicator for marketing and sales was customer acquisitions cost. Customer lifetime value and churn were the KPIs for customer relationship management” [p.14]

In contrast, scalability and sales volume on the vendor side and ease of adoption on the client side seem to be important properties of the SaaS [13][22] requiring efficiency in producing and delivering the services and in handling customer relationships. As a configuration of business model elements, and explained through the elements suggested in [7], SaaS therefore is about:

- standardized offering with minimal value adding services enabling low costs and prompt deployment (value propositions),
- automated processes and scalable IT resources, likely obtained from service provider with economies of scale in producing computing capacity (activities, resources, and partners),
- efficient marketing and sales model and automated delivery to large volumes, that can be efficiently used even for small and medium-sized customers (customer relationships, channels, and customer segments),
- increased focus on customer acquisition and retention (activities, customer relationship),
- small transactions and minimal costs per customer, but higher up-front investments on software development and customer acquisition (revenue streams and cost structure).

The analyzed literature also suggests some ASP and SaaS business model classifications, based on types of the offering and customer segmentation [15][21]. For both ASP and SaaS, the first wave of offering seem include the characteristics of traditional software project business aimed at enterprise customers with complex software product elements and service elements for integration and training. Only afterwards, pure-play firms enter with more focused and scalable business models targeted to more broader customer market. In the following analysis, our classification is based on combination of business model elements and on thinking where a continuum of different business models is in between ideally scalable SaaS model and customer-specific ASP model. Accordingly, we position the derived definition of SaaS business model at the other extreme of the continuum and anticipate that the market consists of these pure-play SaaS firms and enterprise SaaS firms.

3 Data and analysis methods

The empirical part of our study aimed at classifying SaaS companies and examining their business model configurations. We used the data from the annual Finnish Software Industry Survey targeting all software companies in Finland. The definition of software company and thus the framing of the study followed the tradition of the annual National Software Industry Survey [23], focusing on firms whose main activities are providing software as either products or services to their customers. The details of the survey are available in the final report available online [23], so we will provide only a short overview of the sample and survey procedures. The mailing list of the survey contained 5469 companies. However, this number contains many non-software firms because the industry code to which most of the software companies fall into contains also a substantial amount of companies that provide IT related services but that are not software companies. The data collection started in April and ended in May 2011 resulting in 506 complete and 168 partial responses.

The survey form contained question that asked the informants to indicate how their revenue was divided between ten different sources. Asking for SaaS revenue directly is problematic because some ASP and software product companies market their offering as SaaS and would be likely to give erroneous responses. Instead, we used the item “Providing an application as a service used over the Internet” as a qualifier for identifying companies that might be using a SaaS business model. While this is a necessary condition for a company being a SaaS firm, it is not a sufficient condition because this item also captures ASP companies.

To classify SaaS firms, we decided to focus on the characteristics of the product and the transactions with the customers since they were central in the chosen business model framework. The survey questions that were used to measure the business model components are included as an appendix. The two multiple choice questions were converted to single

measures by giving the options scores from one to five and using the largest chosen item as the measure.

We used cluster analysis to develop a classification for the firms. Cluster analysis is a family of methods that group cases based on their similarity [24]. Because the items were measured with different scales and have different distributional characteristics, we used cosine between vectors describing the cases in a nine-dimensional space formed by the questions as a similarity measure. The mean and maximum similarity between each case and the rest were used to remove several firms that were so different from the rest as to be considered outliers leaving 172 firms for the final analysis.

The final analysis started with the hierarchical average linkage clustering to determine the number of clusters that best describe the data. We analyzed the results by inspecting the resulting dendrogram, which suggested that four clusters were sufficient to describe the data. To arrive to the final results, we used these four clusters as seeds for confirmatory k-means cluster analysis. After the cluster memberships were established, we profiled the clusters by inspecting descriptive statistics of each cluster.

4 Results

Table 2 shows the cluster profiles for the four clusters. The first and second clusters were companies with high customer specificity (higher values in "Customer specific product" and "Product needs integration") and thus had clearly more ASP than SaaS companies. The differentiating factors between these two were that the second cluster was targeting smaller firms, had more on-demand elements and slightly less professional service elements ("Product needs integration" and "Product requires training"). Thus we label these two clusters as "Enterprise ASP" and "Pure-play ASP". The clusters three and four do not generally tailor their product for each customer and are thus much closer to using a SaaS model than the companies in clusters one and two. The latter two clusters are differentiated by the sales model and customer size ("Product sold with on-demand model" and "Customer size"): The fourth cluster relies heavily on on-demand and online sales and focuses on smaller customers, whereas the third cluster does not involve as much online sales and focuses on larger corporations, with some service elements included. Thus decided to label these two SaaS clusters as "Enterprise SaaS" and "Pure-play SaaS".

The interrelations of business model elements in the found clusters makes possible to discover the following SaaS business model configurations. The "Pure-play SaaS" model reveals a combination, where simple and non-customized software may be delivered without the need to instruct the users or integrate it and, thus, provide the software as-a-service with lower fees that appeal to SME customer segment (low values in "Sales case size" and "Customer Size"). The "Pure-play SaaS" model is also associated with online channels for marketing, sales and delivery ("Product purchased online") that, in turn, entail high level of automation to these activities. Such low-touch customer relationship can be established either through push-oriented high-pressure sales or as pull-oriented self-service. In both cases, the production and channel costs per customer needs to be minimized to enable attractive pricing.

Table 2 Cluster profiles

	SaaS business model							
	Enterprise ASP		Pure-play ASP		Enterprise SaaS		Pure-play SaaS	
	Mean	Med	Mean	Med	Mean	Med	Mean	Med
Browser based product	4.4	5.0	4.6	5.0	4.7	5.0	4.4	5.0
Customer specific product	3.5***	4.0*	4.0***	4.0***	2.7*	2.0	2.1***	2.0***
Product needs integration	4.1***	4.0***	3.3	4.0	2.5***	3.0***	2.0***	2.0***
Product sold with on-demand model	1.9***	2.0***	4.0***	4.0***	2.4**	2.0**	4.0***	4.0***
Product purchased online	1.8***	2.0***	2.1	2.0	2.1*	2.0	4.2***	4.0***
Product requires training	4.1***	4.0***	3.8*	4.0	2.8**	3.0**	2.2***	2.0***
Product pricing is based on use	2.4***	2.0***	3.5	4.0	3.9***	4.0***	3.7**	4.0*
Sales case (transaction) size	3.6***	4.0**	2.9	3.0	3.6**	4.0*	2.4***	2.0***
Customer size	3.3*	4.0	2.6**	2.0**	3.7***	4.0***	2.3***	2.0***
N		56		25		41		41

Mann-Whitney U tests between one group and the rest. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The “Enterprise SaaS” cluster indicates a combination where software is more complex, although standardized for all customers, or perhaps supports more comprehensive process and therefore requires supporting service like training and integration to existing systems. This increases the deployment costs and demands for more effort in nurturing customer relationship (low value in “Product purchased online”). Thus marketing and sales is based on personal business relations and delivery includes customer-specific, even on-site work. For this reason, the pricing for “Enterprise SaaS” may be higher compared to “Pure-play SaaS”.

Table 3 shows three sets of descriptive statistics for the firms. The first basic statistics show that the “Pure-play SaaS” companies are both younger and smaller than the other companies. This would be in line with the analyzed literature with regards to evolution of ASP and SaaS business models, in which “Pure-play SaaS” firms emerge after “Enterprise SaaS” firms closer to traditional software business models. The first set of statistics further indicates that “Pure-play SaaS” firms are less profitable. This could be explained by their revenue logic where the software vendor needs to invest on product and service development up-front and recurring revenue logic delays the return to these investments.

The second set of descriptive statistics describes how these companies accumulate their revenues. These statistics show clear differences between the clusters. First, the SaaS clusters create approximately twice as large share of their revenue from sales of software as a service over the internet than the ASP firms. This highlights the fact that whereas a firm can be classified as an ASP firm just based on the delivery model, certain elements need to be changed in the business model level as well for a firm to be considered as a SaaS firm.

The third set of descriptive statistics shows how the firms view themselves on a multiple choice question asking which of the given five firm types describes them best. The software product firm and software project contractor were the most commonly chosen options and the SaaS firm viewed themselves more often as product firms than the ASP firms.

Table 3 Descriptive statistics for clusters

	SaaS business model							
	Enterprise ASP		Pure-play ASP		Enterprise SaaS		Pure-play SaaS	
	Mean	Med	Mean	Med	Mean	Med	Mean	Med
Basic statistics								
Age	10	8	8	6	10	10	6**	3*
Revenue (M€)	1.50**	0.57	4.32	0.25	0.87	0.42	0.61**	0.13**
Total personnel	17*	8	40	4	11	6	5*	3*
Profitability	0.09**	0.09**	0.02	0.02	0.00	0.04	-0.03	0.00*
Productivity (k€)	85.4	74.8	106.8	60.0	81.9	76.3	73.7*	40.0
Sources of revenue								
3rd party sw. licenses	3.7**	0.0**	1.7	0.0	1.7	0.0	1.6*	0.0*
ASP and SaaS	24.6***	10.0**	27.3	15.0	40.6	30.0	52.2**	50.0**
Content and ads	0.8	0.0	0.8	0.0	0.7	0.0	6.4	0.0
Deployment project	11.0***	7.5***	6.2	0.0	6.1	3.0	4.6***	0.0***
Development project	21.9	10.0	32.9*	25.0	12.6	5.0	16.0*	0.0*
Hardware	1.4	0.0	1.6	0.0	3.2	0.0	0.1	0.0
Maintenance	11.8**	5.0**	10.0	0.0	10.4	0.0	1.6***	0.0***
Not software related	9.9	0.0	4.6	0.0	7.9	0.0	3.2*	0.0*
Other software related	3.9	0.0	9.5	0.0	5.6	0.0	3.2	0.0
Own software licenses	11.1*	5.0**	5.4	0.0	11.1	0.0	11.1	0.0*
Firm type								
Software product firm	.446*	0	.48	0	.634	1	.732*	1
Device manufacturer	0	0	.04	0	.024	0	0	0
Software project contractor	.375	0	.36	0	.22	0	.171	0
Consulting firm	.161	0	.12	0	.122	0	.098	0
Reseller	.018	0	0	0	0	0	0	0
N		56		25		41		41

Mann-Whitney U tests between one group and the rest. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5 Discussion and conclusions

This article focused on identifying factors archetypal in Software-as-a-Service business models. The examination was made against a widely adopted business model framework, which helped in thinking SaaS as configuration of multiple elements. Performed literature review facilitated identifying characteristics of a "Pure-play SaaS" model. Looking this model as a balanced configuration, the essential facet turned out to be scalability of the entire business model. We find that scalability of business model is associated with standardized product that is easily sold to large volumes, and that scalability offer software companies a possibility for economic growth. It is also the factor, which enables us to explain the difference between ASP and SaaS business models: ASP in our analysis is considered as hosting of customer-specific software.

We find “Pure-play SaaS” as very challenging business model. Our results also show that the firms pursuing this model are less profitable, which indicate that parts of the configuration are misaligned, or certain competence is missing. The results of reviewing existing literature and empirically examining software firms indicate that the “Pure-play SaaS” business model requires competence on both

- software product development, where firms are focused on intellectual property assets and R&D capabilities, to provide appealing but standardized products matching customer needs and,
- service provisioning, where firms strive for economies of scale through automation of functions and efficiency in infrastructure management, and
- customer relationship management, where firms need to cover the high marketing costs of customer acquisition to quickly achieve critical mass while simultaneously keeping an eye on churn rate.

Despite the high requirements, we consider “Pure-play SaaS” as promising model for software vendors for several reasons. In case scalability of the business model is achieved, SaaS companies have good potential for economic growth and the offering can be more easily deployed in foreign markets. SaaS business model also brings accessible new smaller underserved customer segment, where small software companies are more credible than in traditional software business. Finally, SaaS represents an attractive model for investors; SaaS requires relatively low initial investment with opportunity to deploy more capital over life, and rapid development cycle allow determining quickly whether the business model works in the markets.

Majority of the analyzed companies, despite delivering software over the internet, do not employ the scalable SaaS business model. At first, it means SaaS should not be considered only as a model of delivering software. Moreover, it denotes that SaaS may turn out infeasible for certain types of applications or customer segments. The cluster analysis based on survey data enabled empirically confirming the assumed SaaS business model characteristics, and gave means to find another, different SaaS business model. Specifically, an "Enterprise SaaS" model was found that can be seen as possibility to those software firms who do not want the radically change their business model or wish to focus on larger customers. These software companies may benefit from more standardized offering and scale economics, but maintain as part of their offering the customer-specific features due to customer demand and additional revenues

The research results on SaaS adoption already demonstrate that customers are willing to deploy generic and horizontal software (e.g. office applications or CRM applications) in SaaS mode, whereas more specific and vertical industry software is deployed as bespoke software [4][25][26]. These studies however consider adoption only through one type of offering, resembling the “Pure-play SaaS”. In this study, we identified alternative “Enterprise SaaS” business model for software companies. We are also aware of another alternative business model referred as “Self-Service SaaS”, which exhibits software offering simplified and standardized to the extent that customers can themselves find, evaluate and deploy the software, i.e. the channel is pull-oriented. Consequently, we envision that there shall be a multitude of innovative SaaS offerings and business models and, therefore, also the future scientific studies would benefit from examining SaaS adoption through different types of business models and offerings.

The key limitations of our study relate to the general idea of business model as a classification and the limitations of cluster analysis [27] as the analysis method. While it is convenient to classify firms into categories based on what they do, these are always to some extent artificial categories and can present an oversimplification of the reality. For instance, the present classification focuses on business-to-business type of SaaS and, thus, the consideration leaves out services intended for individual consumers, including for example online games. This

issue is related to the fact that cluster analysis will always produce a classification regardless of the existence of any structure in the data. While the risk of our classification being just a statistical artefact in the data remains, we believe that this risk is small considering the feasibility of our classification. In further studies, we also need to consider that the measures for the examination of SaaS model did not include all the elements suggested by the business model framework. For instance, the role of partners in SaaS business model is interesting topic for further research.

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Appendix: Survey questions

How well do the following statements describe your firm's main product or service?	Strongly disagree	Disagree	Do not agree or disagree	Agree	Strongly agree
Our product or service is used through a web browser	1	2	3	4	5
Our product or service is tailor-made for each customer	1	2	3	4	5
The pricing of our product or service is based on its actual usage	1	2	3	4	5
Our product or service requires customer-specific integration or installation work	1	2	3	4	5
Our product or service requires customer-specific user training	1	2	3	4	5
Our product or is purchased online through an automated system	1	2	3	4	5
We sell our product with on-demand model without the need for longer commitment by the customer	1	2	3	4	5

Please estimate the following about your typical customer and sales case.

The typical total value of one sales case:	Under 10€	10-1,000€	1,000€-10,000€	10,000€ -100,000€	Over 100,000€
The typical customers:	Privatepersons	Firms, under 50 employees	Firms, 51-250 employees	Firms, over 250 employees	Public sector