Current Software-as-a-Service Business Models: Evidence from Finland

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Abstract. This paper characterizes the business models of Software-as-a-Service (SaaS) firms based on their value proposition, customer segments, revenue streams, and customer relationship, and analyzes interconnections of these business model elements. The target set of 163 Finnish SaaS and ASP firms was first compared to other software firms and then clustered into four clusters based on indicator data of their business model elements. The comparison reveals that the SaaS and ASP firms have smaller customer and transaction sizes than software firms in general. The resulting classification reveals two different configurations, a pure-play SaaS model and an enterprise SaaS model, and the typical factors of these business models.

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

1 Introduction

The concept of *Cloud Computing* includes three types of services, in which the key component is either an application provided to the end-users, platform and development tools provided to the application developers, or processing and storage capacity shared among multiple applications using virtualization techniques [1]. In *Software-as-a-Service (SaaS)*, a software company provides a single version and instance of an application to several end-users, on top of a multi-tenant infrastructure and over the Internet [2].

The current academic and trade literature contain a rich variety of architectural descriptions, which define technical characteristics and details of different SaaS offerings, and numerous articles focus on the benefits and problems of adopting such SaaS offerings. However, to date relatively few papers have been published about the business model aspects of SaaS. We find this shortage engaging since technology *per se* has no essential value [3], and as a business model SaaS exhibits some major changes, compared to traditional software business models like professional services, software product business, and application hosting.

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We also found that the recent studies on perceptions of SaaS among customers [4] and on suitable governance structures [5] consider SaaS as a uniform offering. The recent studies consider product innovation as part of the offering insignificant. Also, the variety of software companies' means to operate and conduct marketing and sales has not been considered, while these may have a considerable effect on the adoption.

In addition to technological innovations, SaaS companies have also introduced various business models innovations. A *business model* generally refers to a conceptual description of how a company creates and captures value [6]. Business model concept has been used to design frameworks or classifications of companies and to describe business logics of individual companies [7] and, although a clear and commonly accepted definition of the concept does not yet exist, business model is becoming a relevant unit of analysis [6]. Either as a classification or an actualization of firms execution [8], business model implies holistic thinking on how a firm operates, communicates with its surroundings, and how it makes money. We therefore adopt the view that business model is a configuration of several different factors that jointly describe how the firm does business.

We chose the business model framework suggested by Osterwalder, et al. [7] as a basis for our study. This framework is a synthesis of a large number of prior business model studies considering individual elements and their connections. Therefore, this model compatible with our conceptualization of business model as a configuration of elements. It is also perhaps the most popular one when analyzing firms in the IT industry. The framework includes nine elements and their relationships: value proposition, customer segments, customer relationships, channels, revenue streams, activities, resources, partners, and cost structure.

While business models of software firms have been studied in numerous papers, studies attempting to classify and characterize SaaS companies are virtually non-existent. To fill this gap, we analyze SaaS companies from the business model perspective. The analysis uses survey data from the Finnish software industry and produces a new classification of these firms, enabling identification of factors and configurations that are typical for SaaS companies' business model, and highlighting the differences among these firms.

2 SaaS Business Model in the Previous Research

In this section, we present and discuss the relevant literature examining Software-as-a-Service from the business model perspective. The focus is on business models as configurations of many elements and on previous classifications thereof. After collecting applicable literature from research article databases, and screening them based on their abstracts, a total of twelve articles were chosen for closer examination[1].

[1] The digital libraries of IEEE and ACM, Springerlink, Ebscohost Academic Search Elite and Google Scholar were used. The examined publications include Armbrust, et al. [9], Benefield [10], Choudhary [11], Desai, et al. [12], Cusumano [13], Durkee [14], Jacobs [15], Liao [16], Dubey and Wagle [17], Sääksjärvi, et al. [18], SIIA [19] and Tyrväinen and Selin [20].

Value propositions of SaaS, denoting a description of SaaS firm's offering and its relative advantage, are well represented and recognized in all of the analyzed articles. In brief, the key property of SaaS seems to be a highly standardized offering with minimal value adding services, enabling low costs and prompt deployment. Accordingly, it has been suggested that SaaS firms should be "productizing" their services so these can be provided them more efficiently [13].

The offering includes either a traditional enterprise application delivered over the Internet, a web-native application, or a web service component [19]. Liao [16] moreover points out that there may be applications intended for individual consumers and for enterprise users. In addition to outsourced application development, SaaS business model also includes providing the IT infrastructure required for the online service [11][17][18]. Therefore, after attaining low-cost offering, SaaS vendors compete on functionalities, reliability and service availability [10].

Another business model element elaborated in many of the examined articles is the SaaS revenue streams, which is often considered together with the cost structure element. In this regards, the previous studies have compared SaaS to more traditional packaged software product business. Similarities of software product business and SaaS business have been found in high number of customers, small revenue per customer, higher up-front investments on software development and in high customer acquisition costs [18][19][20]. In addition to the low delivery cost of online provisioning, the main difference seems to be found in the on-demand licensing and pricing; in traditional product business model users buy a perpetual-use license, in contrast to paying a monthly or a usage-based subscription fee SaaS [11]. In general, SaaS business model economics are linked to one-to-many delivery model. By aggregating many users together, SaaS vendors may leverage economies of scale [15].

On this value capture side, SaaS business model has also been also characterized as a movement from "high-touch, high-margin, high-commitment" provisioning of professional software services to "low-touch, low-margin, low-commitment" self-service [9]. This means that the customer relationship, channels and customer segment elements of the SaaS business models are all about efficient marketing and sales model and about automated delivery of services in large volumes [19], enabling efficiently serving even small and medium-sized (SME) customers. Consequently, SaaS offering may appeal more to the SME customers, and SMEs and enterprise customers are likely to adopt applications at different rates [17].

On the value creation side, SaaS vendors are trying to minimize the cost per customer and therefore seek for new ways to produce services of high quality more efficiently than before [10]. This may be achieved through automated processes [14] and scalable IT resources, likely obtained from service provider with economies of scale in producing computing capacity [9].

Overall, we found that the majority of the current literature still remains at a conceptual level. While case studies have also been employed, we find room for further empirical examination of different business models. Also, the articles tend to concentrate on value propositions of SaaS offerings and value capture through alternative revenue logics. In addition to industry reports, only a few articles considered SaaS business model as configuration of elements.

Among the few, Cusumano [13] looked at business model as combinations of different customer segments, revenue models and delivery models. Tyrväinen and

Selin [20] focused on marketing and sales of SaaS and analyzed a combination of different aspects of customer segments (through customer lifecycle value, customer size, and buyer role), customer relationship and channels elements (including service model, sales channel, and marketing channel), and revenue logic through entry transaction size. We argue that more of this holistic business model thinking is needed to advance the literature on SaaS. Identifying feasible configuration for the business model would help software companies in aligning and balancing otherwise separate elements in order to perform and run successful business.

The examined articles analyze both SaaS and preceding application service provisioning (ASP) business models. The existing SaaS literature, examined through the business model framework and its elements, helped in identifying the primary characteristics of SaaS models, and also distinguishing the SaaS models from the ASP models. While the delivery model of ASP and SaaS over the Internet are similar, the business models for ASP and SaaS firms are fundamentally different. In the ASP model, a service provider hosts a customer-specific and integrated pieces of software. Since customization, integration and hosting services add value and distinctiveness through customer intimacy [13], they may be more profitable also with smaller volumes. In contrast, *scalability* of the entire business model aiming at ease of adoption on the client side seems to be the most important premise for the SaaS vendors [9], requiring efficiency in producing and delivering the services and in handling customer relationships.

To summarize the existing literature, we submit a definition of a SaaS business model as configuration of business model elements (using the elements suggested in [7]). Software-as-a-Service business model is essentially about:

- Standardized and simple offering with minimal services enabling low costs and prompt deployment over the Internet (value propositions),
- Automated processes and scalable IT resources, to achieve economies of scale (activities, resources, and partners),
- Efficient mode of sales that can be efficiently used to target small and medium-sized customers and buyers at all levels of an end-user organization (customer relationships, channels, and customer segments),
- Increased focus on customer acquisition and retention, but also automated delivery of the offering and support (activities, customer relationship),
- Usage-based pricing with 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 [12][19]. For both ASP and SaaS, the first wave of offering seem to 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 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 Method

The empirical part of our study aimed at classifying SaaS companies and examining their business model configurations. We used 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 Software Industry Survey [21], focusing on firms whose main activities are providing software as either products or services to their customers. The details of the survey can be found in the final report available online [21], 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 describe and 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. In particular, we developed measures for the value capture side of the business model framework [7]:

- Customer segments; customer size and buyer role
- Value proposition; online delivery, customer specificity and complexity
- Revenue streams; sales case size, usage-based pricing
- Channels and customer relationship; on-demand model, self-service purchasing

The survey questions that were used to measure the business model components are included as an appendix. The two multiple choice questions (customer size and transaction size) 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 [22]. Because the items were measured with different scales and have different distributional characteristics, correlation rather than the most commonly used Euclidean distance as the similarity measure. The mean and maximum similarity between each case and the rest were used to remove several firms that were far different from the rest as to be considered outliers leaving 163 firms for the final analysis.

The final analysis started with 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.

Although cluster analysis has been used in previous business model studies [23], the method has a key weakness that it will always provide a solution even if no structure existed in the data and does not have a test statistic that can be used to assess statistical significance [24]. Thus the goodness of the results rely solely on researcher judgment, which is the most significant weakness of our study.

4 Results

4.1 Comparing SaaS and ASP Firms and Other Software Firms

In the examined literature, authors [9][18][20] hypothesize that SaaS business model is distinguished by aiming at serving large segment of smaller customers and adjusting the revenue logic to match the segment's needs. Results of our empirical analysis are shown in Figure 1. They illustrate the customer segmentation and the revenue logic of the operating SaaS firms by showing correlation of increasing SaaS revenue with marketing and sales indicators. The analysis should be interpreted as follows.

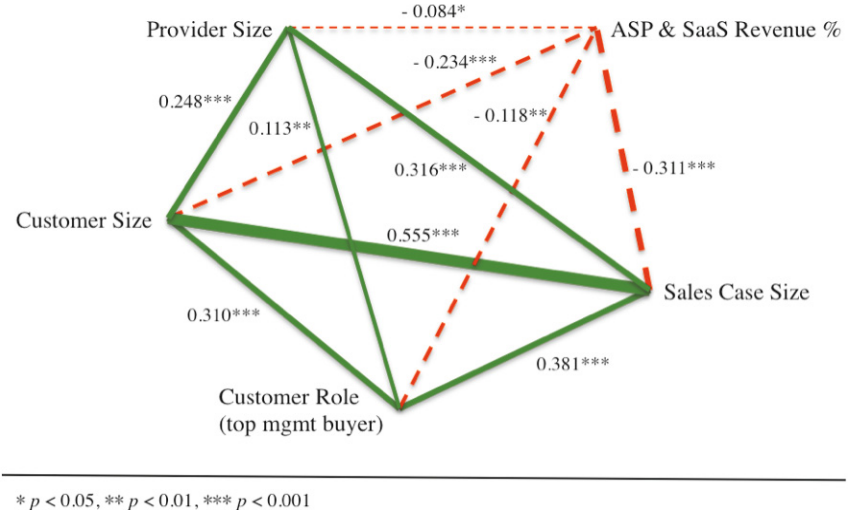

Fig. 1. Correlations of increasing ASP and SaaS revenue percentage and sales indicators among software firms. Dotted lines represent negative correlations, solid lines positive correlations. The strength of the line designate stronger association between indicators.

The solid lines represent positive correlation of the sales indicators. We find that as the customer size increases, also the value of sales case (transaction) increases. Accordingly, the large software vendors tend to sell to large customers, and the transaction size is higher when a large customer is acquiring or when a large software vendor is selling. In large organizations and large sales cases the decision maker is more often a top manager while end users and middle managers buy software in smaller transactions and in smaller firms.

The dotted lines indicate negative correlation. Accordingly, firms with higher share of revenue from ASP and SaaS are somewhat smaller than other software companies. The analysis indicates that these firms sell to smaller customers than other software companies. Also, their sales cases are typically smaller and their buyer is more often an end user or middle manager than the buyer of other software. The smaller transaction size is likely to be related to recurring revenue logic.

The relation of growing ASP and SaaS revenue with smaller customer size and smaller sales case size is not only due to smaller average size of the analyzed firms. This was verified with two regression analyses (see Table 1). In the first regression, low ASP and SaaS revenue share and high software provider size together explained large customer size. In the second, they explained large sales case size.

Table 1. Regression tests to verify the associations between ASP and SaaS revenue percentage and sales indicators; provider size, customer size and transaction size

	Customer size	Sales case (transaction) size
	(1)	(2)
ASP and SaaS	-0.773***	-1.090***
Provider size (personnel class)	0.250***	0.351***
Intercept	3.123***	3.227***
Observations	474	468
R^2	0.110	0.185
Adjusted R^2	0.106	0.182
F	29.119	52.846
p	0.000	0.000

† $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Linear regression

Thus, these results communicate that when comparing two software companies of the same size, the customers and transactions sizes of ASP and SaaS companies are smaller. The important implication in context of this study is that, for SaaS business model, a different mode of sales and sales channel is required than e.g. in selling larger software system deliveries.

These results are also in line with the SaaS business model characteristics reported in other sources [25]. That is, SaaS firms spend close to half of their budget to marketing and sales to gradually acquire a high number of customers, each of which is spending relatively small monthly or annual fees on the services. These add up to an increasing customer base, which generate growing recurring revenue ensuring predictability for business development and success of the SaaS firm.

4.2 Classification of SaaS and ASP Firms

We employed cluster analysis to find suitable classification of operating ASP and SaaS companies and to describe the properties of their business models. Table 2 shows the cluster profiles for the four identified clusters. We interpret the findings as follows.

In the first and second clusters we find companies with browser-based products, but with high customer specificity indicated by high marks in "Customer specific product" and "Product needs integration". Thus, we regard these clearly more ASP than SaaS companies. These two clusters are distinguished by their revenue logic ("Product sold with on-demand model" and "Product pricing is based on actual user") and by customer size. The companies in the second cluster are targeting smaller firms, include less professional services and have more on-demand elements in their business model. We chose to label these two clusters as "Enterprise ASP" and "Pure-play ASP".

The software companies appearing in clusters three and four do not evidently customize their products and services for each customer indicated by low medians in customer-specificity, need for integration and need for training. For this reason, we account them much closer to using a SaaS business 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"). Companies in the third cluster are not involved as much in online sales and focus on larger corporations, with some service elements included in their offering. The fourth cluster relies heavily on on-demand and online sales and focuses on smaller customers. We label these two SaaS clusters as "Enterprise SaaS" and "Pure-play SaaS" respectively.

Table 2. Cluster profiles revealing two types of ASP and two types of SaaS companies

	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 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.

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, service and customer base 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 of ASP and SaaS firms

	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

In this article, the characteristics of the Finnish software companies delivering Software-as-a-Service were examined. Compared to the current literature on SaaS business models, we were interested in gaining a holistic view of how these companies operate to create and appropriate value. We chose to describe the properties of SaaS business model against a widely adopted and comprehensive framework. 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. This study was therefore conducted to identify factors archetypal in this type of business model and to produce classification of the current SaaS business models.

Current literature on Software-as-a-Service is mostly written from software engineering viewpoint. By reviewing articles on the SaaS business model, we learned that classifications of operating SaaS companies did not yet exist, and that essential facet of the SaaS business model seems to be scalability of the entire business model. We find that this scalability of the business model is attributed to standardized application, which is easily sold and delivered to large volumes of customers, while

maintaining low marginal costs. In other words, scalability of the SaaS business model is based on avoiding customer specificity. Scalability is also the factor separating SaaS and ASP business models. ASP in our analysis is considered as hosting of customer-specific software.

In this paper, the properties operating SaaS firms were analyzed and described in various perspectives. The firms were found to target smaller customers as software firms on average and direct their marketing and sales also at end-user. This observation verifies some of the assumptions made in the previous studies [20] on SaaS firms' marketing and sales. Further, our cluster analysis enabled forming a classification of the operating SaaS firms. Two different types of SaaS business models were discovered: “Pure-Play SaaS” and “Enterprise-SaaS”.

Properties of “Pure-Play SaaS” business models have not been previously presented as configuration of multiple elements. To summarize and elaborate the business model according to the selected business model framework, we put forward a definition of representative “Pure-Play SaaS” business model:

- Value proposition includes a horizontal, standardized web-native application.
- Revenue streams are obtained through a small entry fee and a recurring fee.
- SaaS firms mainly target SMEs and sell to middle management and end-users.
- Sales channel is push-oriented and SaaS firms engage in inbound high-pressure sales. Less human contact in deployment in required than traditionally, owing to more simple applications.
- SaaS firms are required to have both domain expertise, to include the best practices to the application, and application development capabilities. They partner with IT-service providers for infrastructure and support services.
- Initial development costs may be high, but firms aim for minimal marginal costs.

The “Pure-Play SaaS” business model 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. It means that SaaS may turn out infeasible for certain types of applications or customer segments. Our classification reveals the "Enterprise SaaS" model 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. We suggest “Enterprise SaaS” business model to include:

- A mass-customized, but complex application requiring also support services.
- Vendors charge an entry fee, recurring fee and service fees.
- Target at larger enterprises and their IT-managers and top executives.
- Aim at high-touch, trust-enhancing customer relationships with tailored contracts.
- Perform personal sales to do consultative sales, and employ channel partners.
- Possess domain expertise and utilize an ecosystem of companies as a resource.

- Use partners to deliver value-adding applications and services.
- Have varying marginal costs, owing to the long sales cycles and required support.

These software companies, take Salesforce as an example, may benefit from more standardized offering and scale economics, but maintain the customer-specific features as part of their offering due to customer demand and additional revenues.

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. We propose characteristics of "Self-Service SaaS" to include:

- A very simple application, which is easy to adopt. Consider Dropbox.
- Use of freemium model, ad-based revenues or small recurring fees.
- Adopted first by end-users and individual consumers, then SMEs.
- Fully automated self-service, as little interaction between customer as possible.
- Outbound and viral marketing used to attract customers to vendors home page. Landing page critical in turning prospects into customers.
- Close to zero marginal costs.

The software firm's business model includes several factors, which may promote or hinder the adoption of SaaS offering in customer organizations. The results of the present study can therefore be utilized in future research to produce more accurate information on adoption of SaaS model. For instance, the perception of compatibility with existing practices in large customer organization may differ notably when faced with "Pure-Play SaaS" or "Enterprise-SaaS" offerings. The results also have practical significance. 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. The identified "Pure-Play SaaS" and "Enterprise-SaaS" models offer executives and software product manager a starting point for creating and assessing new ways to operate and make money.

The acknowledged weaknesses of our study mainly relate to the limitations of cluster analysis as the analysis method [24]. A cluster analysis will always produce a classification regardless of the existence of any structure in the data. Thus, the categories are always to some extent artificial and can present an oversimplification of the reality. While the same risk of our classification 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 alignment of value creation and value capture sides of SaaS business model is interesting topic for further research.

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References

1. Vaquero, L., Rodero-Merino, L., Caceres, J., Lindner, M.: A break in the clouds: towards a cloud definition. ACM SIGCOMM Computer Communication Review 39, 50–55 (2008)
2. Mell, P., Grance, T.: NIST Working Definition of Cloud Computing. National Institute of Standards and Technology, Information Technology Laboratory (2009)
3. Chesbrough, H.: Business model innovation: It's not just about technology anymore. Strategy and Leadership 35, 12–17 (2007)
4. Benlian, A., Hess, T.: Opportunities and risks of software-as-a-service: Findings from a survey of it executives. Decision Support Systems 52, 232–246 (2011)
5. Susarla, A., Barua, A., Whinston, A.: A Transaction Cost Perspective of the "Software as a Service" Business Model. Journal of Management Information Systems 26, 205–240 (2009)
6. Zott, C., Amit, R., Massa, L.: The Business Model:Theoretical Roots. Recent Developments, and Future Research (2010)
7. Osterwalder, A., Pigneur, Y., Tucci, C.L.: Clarifying Business Models: Origins, Present, and Future of the Concept. Communications of the Association for Information Systems 16, 1–25 (2005)
8. Magretta, J.: Why business models matter. Harvard Business Review 80, 3–8
9. Armbrust, M., Fox, A., Griffith, R., Joseph, A., Katz, R., Konswinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I., Zaharia, M.: A View of Cloud Computing. Communications of the ACM 53, 50–58 (2010)
10. Benefield, R.: Agile Deployment: Lean Service Management and Deployment Strategis for the SaaS Enterprise. Presented at the 42nd Hawaii International Conference on System Sciences (2009)
11. Choudhary, V.: Software as a Service: Implications for Investment in Software Development. Presented at the 40th Hawaii International Conference on System Sciences (2007)
12. Desai, B., Weerakkody, V., Currie, W., Tebboune, S.D., Khan, N.: Market Entry Strategies of Application Service Providers: Identifying Strategic Differentiation. Presented at the 36th Hawaii International Conference on System Sciences (2003)
13. Cusumano, M.: The Changing Software Business: Moving from Products to Services. IEEE Computer, 20–27 (January 2008)
14. Durkee, D.: Why Cloud Computing Will Never Be Free. Communications of the ACM 53, 62–69 (2010)
15. Jacobs, D.: Enterprise Software As Service: Online Services are Changing the Nature of Software. ACM Queue, 36–42 (July/August 2005)
16. Liao, H.: SaaS business model for software enterprise. Presented at the Information Management and Engineering, Chengdu, China (2010)
17. Dubey, A., Wagle, D.: Delivering Software as a Service (2007)
18. Sääksjärvi, M., Lassila, A., Nordström, H.: Evaluating the Software as a Service Business Model: From CPU Time-Sharing to Online Innovation Sharing. Presented at the IADIS International Conference e-Society, Qawra, Malta (2005)
19. Software & Information Industry Association: Software as a Service: Changing the Paradigm in the Software Industry. SIIA and TripleTree Industry Analysis Series (2004)
20. Tyrväinen, P., Selin, J.: How to Sell SaaS: A Model for Main Factors of Marketing and Selling Software-as-a-Service. In: Regnell, B., van de Weerd, I., De Troyer, O. (eds.) ICSOB 2011. LNBIP, vol. 80, pp. 2–16. Springer, Heidelberg (2011)

21. Rönkkö, M., Peltonen, J., Pärnänen, D.: Software Indusry Survey (2011), http://www.softwareindustrysurvey.fi/ReportFinland2011.pdf
22. Hair, J.F., Anderson, R., Tatham, R.L., Black, W.C.: Multivariate Data Analysis. Prentice Hall, Upper Saddle River (2006)
23. Bigliardi, B., Nosella, A., Verbano, C.: Business models in Italian biotechnology industry: a quantitative analysis. Technovation 22, 1299–1306 (2005)
24. Ketchen, D.J., Shook, C.L.: The Application of Cluster Analysis in Strategic Management Research: An Analysis and Critique. Strategic Manage. J. 17, 441–458 (1996)
25. Radizeski, P.: Top 3 Reasons its Hard to Sell SaaS (2009), http://blog.tmcnet.com/on-rads-radar/2009/03/top-3-reasons-its-hard-to-sell-saas.html

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:	Private persons ☐	Firms, under 50 employees ☐	Firms, 51-250 employees ☐	Firms, Over 250 employees ☐	Public sector ☐
Typical buyer of our product or service:	End user ☐	Technical personnel ☐	Business manage-ment ☐	Top manage-ment ☐	Reseller ☐