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Eetu Luoma

Examining Business Models of Software-as-a-Service Companies

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Editors
Seppo Puuronen
Department of Computer Science and Information Systems, University of Jyväskylä
Pekka Olsbo
Publishing Unit, University Library of Jyväskylä

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ABSTRACT

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Software-as-a-Service (SaaS) refers to the means of supplying functionalities of a software application to end-users over the Internet. The concept may also incorporate the use of cloud computing technologies as part of the service offered to the end-user. This dissertation investigates the business models of software firms providing Software-as-a-Service through examination of their value propositions, activities, structural aspects and revenue logic. In particular, this dissertation focuses on the characteristics of different business models for Software-as-a-Service firms and to the changes in software firms' business models induced by the adoption cloud computing technologies and service provisioning over the Internet. Moreover, this dissertation considers the effects of competitive forces to the business models of Software-as-a-Service firms. Findings from the quantitative and qualitative studies in this dissertation demonstrate that both software product firms embracing cost efficiency approach and the software services firms focusing on customer intimacy are adopting cloud computing technologies and unifying what they essentially offer, to transform into Software-as-a-Service companies. As a result, the new Software-as-a-Service firms inherit several characteristics of the software product companies or software services companies. Findings from comparative case study and analysis of 500 survey responses indicate that both types of the Software-as-a-Service firm are changing their value proposition to include a uniform set of software functionalities across different end-users and changing their activities and structure to support more direct customer relationship. However, the changes in the revenue logic of Software-as-a-Service firms are dependent on whether the firm decides to follow the cost efficiency of the customer intimacy approach. These findings provide practical insights into how the software companies are changing their business model and consequently how the market of software products and services is evolving. These conclusions also provide means of conceptualizing Software-as-a-Service for the studies in the adoption of information systems, and outsourcing of information technology.

Keywords: Software-as-a-Service, SaaS, cloud computing, software companies, software business, business models, IT outsourcing

Author's address

Eetu Luoma
University of Jyväskylä
Dept. of Computer Science and Information Systems
P.O.Box 35 (Agora)
FI-40014 University of Jyväskylä, Finland
eetu.luoma@jyu.fi

Supervisors

Professor Pasi Tyrväinen
Dept. of Computer Science and Information Systems
University of Jyväskylä

Senior Researcher Lauri Frank
Dept. of Computer Science and Information Systems
University of Jyväskylä

Reviewers

Professor Bala Iyer
Technology, Operations, and Information Management Division
Babson College, U.S.A

Professor Veikko Seppänen
Dept. of Information Processing Science
University of Oulu, Finland

Opponents

Professor Samuli Pekkola
Institute of Business Information Management
Tampere University of Technology

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FIGURE

TABLE

LIST OF INCLUDED ARTICLES

1. Luoma, E., Helander, N., & Frank, L. (2011). Adoption of Open Source Software and Software-as-a-Service Models in the Telecommunication Industry. In B. Regnell, I. van de Weerd, & O. De Troyer (Eds.), *Lecture Notes in Business Information Processing, Vol. 80, Proceedings of the Second International Conference on Software Business (ICSOB 2011),* (pp. 70–84). Berlin Heidelberg: Springer.

2. Luoma, E., & Nyberg, T. (2011). Four Scenarios for Adoption of Cloud Computing in China. In V. Tuunainen, M. Rossi, & J. Nandhakumar (Eds.), *Proceedings of the 19th European Conference on Information Systems (ECIS 2011). Paper 123.* Helsinki, Finland.

3. Luoma, E., Rönkkö, M., & Tyrväinen, P. (2012). Current Software-as-a-Service Business Models: Evidence from Finland. In M. Cusumano, B. Iyer, & N. Venkatraman (Eds.), *Lecture Notes in Business Information Processing, Vol. 114, Proceedings of the Third International Conference on Software Business (ICSOB 2012),* (pp. 181-194). Berlin Heidelberg: Springer.

4. Luoma, E. (2013). Examining Business Models of Software-as-a-Service Firms. In J. Altmann, K. Vanmechelen & R. Omer (Eds.), *Lecture Notes in Computer Science, Vol. 8193, Proceedings of the 10th International Conference on Economics of Grids, Clouds, Systems and Services (GECON 2013),* (pp. 1-15). Berlin Heidelberg: Springer.

5. Luoma, E. (2010). Utilizing Ecommerce Framework to Analyze the Changes in Software Business. In Z. Lin & X. Luo (Eds.), Proceedings of Joint Conference on eServices and Business Intelligence, Chengdu, China: eBEREA.

6. Luoma, E., Laatikainen, G., & Mazhelis, O. (2013). Exploring Business Model Changes of the Software-as-a-Service Firms. Submitted to the 22nd European Conference on Information Systems (ECIS 2014), 24.11.2013.

CONTENTS

1 INTRODUCTION

Software product business has traditionally implied that the majority of a software product firm's revenues are attained through sales of standard software application, that is, similar software is provided to each customer (Cusumano, 2004, p. 25). Traditionally, the business involves spending heavily on marketing and support, due to there being a potentially large customer base. On the other hand, software services business customarily involves creating a bespoke software application, either in one-off software project or in a customer relationship that lasts for a longer period of time (Rajala & Westerlund, 2007). In both cases, the software services business involves labor-intensive work from the software services firm to create a customer-specific software application for each customer (Cusumano, 2004, p. 26). Accordingly, a software services firm receives it revenues based on 'time and materials' consumed.

While this differentiation between product and service firms offers a starting point for viewing the whole software business, it is still understandably an oversimplification of its complexity. For instance, a software product firm may receive 20 percent of its revenues from license sales and actually 80 percent from customer-specific services. In addition, the typical value network for software applications includes activities for designing, implementing, deploying, operating and use of the application (Messerschmitt & Szyperski, 2003, p. 122-125):

- Consulting companies design the application.
- Software product and software service firms implement the applications, either as general products or as customer-specific implementations.
- A system integrator installs the application in the IT infrastructure, and may also provide integration services.
- Service providers operate the installed application.

Software-as-a-Service (SaaS) generally refers to the new means of supplying the functionalities of a software application to end-users over the Internet (Currie, Desai, & Khan, 2004; Kern, Kreijger, & Willcocks, 2002). The system infrastructure for deploying these is standardized, and the infrastructure often makes use of the cloud computing technologies, such as virtualization and multitenancy (Armbrust et al., 2010; Mell & Grance, 2011). The way these functionalities are delivered is therefore quite different from the methods used earlier in software business (Benlian & Hess, 2011; Kern et al., 2002; Schwarz, Jayatilaka, Hirschheim, & Goles, 2009).

Software-as-a-Service is seen as more beneficial than other options for outsourcing software, in a number of respects. The acclaimed benefits to end-users include lower costs and increased flexibility, and SaaS also tends to alleviate some of the problems associated with more traditional IT outsourcing (Benlian & Hess, 2011; Greschler & Mangan, 2002; Kern et al., 2002). Given these promises, the Software-as-a-Service phenomenon is said to radically change a large part of IT industry by breaking down the positions of big proprietary software companies (Andriole, 2012; Armbrust et al., 2010).

Since Software-as-a-Service is thus emerging as a beneficial outsourcing option for customers, it is currently enjoying some deserved popularity in research studies. However, there are still many unresolved matters related to the phenomenon. There have been calls for more studies to be made on the business aspects of the phenomenon (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011; Yang & Tate, 2012). Also, a need for increasing the understanding of the complex phenomenon has been identified in the previous literature (Kern et al., 2002; Schwarz et al., 2009). This author's examination of the contemporary literature on the topic resulted in finding studies related to a number of aspects of the SaaS business: (i) on its advantages and problems as an outsourcing option (Benlian & Hess, 2011; Choudhary, 2007; Greschler & Mangan, 2002); (ii) on client side adoption and acceptance of SaaS (Benlian, Hess, & Buxmann, 2009; Benlian, Koufaris, & Hess, 2011; Currie et al., 2004; Huyskens & Loebbecke, 2006; Susarla, Barua, & Whinston, 2003); and (iii) on the defining attributes of the SaaS firm's business (Choudhary, 2007; Currie & Seltsikas, 2001; Dubey & Wagle, 2007; Schwarz et al., 2009).

In spite of this background literature, there still seemed to be a dearth of studies taking a broader perspective on business models of the Software-as-a-Service firms. By adopting this term, I am firstly referring to an interpretation of what company offers, how it operates, organizes itself and of how it makes money (Baden-Fuller & Morgan, 2010; Magretta, 2002; Osterwalder, Pigneur, & Tucci, 2005) Secondly, it implies a holistic approach for representing the interconnected and feasible configurations of business parameters (Casadesus-Masanell & Ricart, 2010; Demil & Lecocq, 2010; Zott & Amit, 2010). Taking a broad and holistic perspective also takes into account how software applications are outsourced in general. Another aspect that seems to be currently missing from literature on the subject, is how SaaS business models differ from each other.

For these reasons, this dissertation aims to increase understanding on the different kinds of business models of Software-as-a-Service firms that currently exist, as well as the kinds of changes in the business models of different types of software firms. The dissertation therefore begins with highlighting the gaps that currently exist in contemporary research on SaaS phenomenon, and introducing the research questions. Next, I build upon a theoretical background from the existing business model literature to develop a novel conceptual research framework that will address the questions. Following the methodological considerations, I present and discuss the main results.

Finally, the dissertation concludes that both software product firms and software service firms are adopting cloud computing technologies, and unifying their value proposition across their client base to transform themselves into SaaS companies. As a result, there are two types of SaaS firm, which both create and capture value through business models which have characteristics that greatly resemble software product companies. These findings have theoretical implications not only for defining more clearly SaaS as a form of outsourcing, but also taxonomically in terms of the different kinds that exist; and there are also practical implications: the findings help to understand how the whole software industry is transforming itself to embrace the opportunities of cloud computing.

2 SOFTWARE-AS-A-SERVICE

This section covers the definition of Software-as-a-Service as well as the studies of the demand-side and supply-side of SaaS. The section concludes in establishing the research gaps and the research questions.

2.1 Definition of Software-as-a-Service

The term Software-as-a-Service (SaaS) has four main connotations. First, it implies an altered licensing model (Choudhary, 2007). In this regard, SaaS does not require acquiring a perpetual use license or investing on datacenter capacity. Instead, the customer organization and the software firm agree on a subscription and the software firm develops, deploys and operates the software application in its datacenter of choice (Choudhary, 2007; Greschler & Mangan, 2002). This can been interpreted as separating the ownership of software from its use (Laplante, Zhang, & Voas, 2008; Turner, Budgen, & Brereton, 2003), hence software is provided and consumed as a service rather than as a product.

Second, in SaaS software applications are deployed as a hosted service and delivered over the Internet (Armbrust et al., 2009; Campbell-Kelly, 2009; Chong & Carraro, 2006). This definition designates that the technological characteristics of SaaS are increased use of network connection, increased use of browsers as the interface and increased use of server-side processing (Hayes, 2008; Kern et al., 2002). Following this definition, the mode of delivery is the differentiating factor between Software-as-a-Service and the preceding modes of software business (Kern et al., 2002; Laplante et al., 2008; Tebboune, 2010). In SaaS, the end-user has location independent access to the capabilities of the software (Sääksjärvi, Lassila, & Nordström, 2005). Meanwhile, the vendors have full control over the applications as they reside in their datacenter (Garrison, Kim, & Wakefield, 2012).

The delivery mode also captures the essence of *application service provisioning (ASP),* which was the formerly dominant term used to describe the practice

of providing software applications as a service. ASP refers to offering multiple users access to a centrally managed application over the Internet (Currie et al., 2004; Huyskens & Loebbecke, 2006; Kern et al., 2002). The difference between the ASP and SaaS is defined through the way they are offered; the ASP model is concerned with deploying and operating *any* web-enabled software application in the provider's datacenter (Desai & Currie, 2003; Software & Information Industry Association, 2004; Walsh, 2003). The application can be either a software product or a customer-specific application, and a new instance of the software is installed for each client (Mäkilä, Järvi, Rönkkö, & Nissilä, 2010).

Also, the key participants of the ASP value network still include a customer, a service provider and a software firm as separate actors (Ekanayaka, Currie, & Seltsikas, 2003; Fulford, 2003; Software & Information Industry Association, 2004) and the customer is therefore required to both acquire a perpetual license for the application and pay a subscription-based fee for the service.

The third main connotation is that in SaaS the functionalities of the software application delivered over the Internet are standard, that is, the same for all customer organizations (Mäkilä et al., 2010; Sääksjärvi et al., 2005; Software & Information Industry Association, 2004). Standardizing the functionalities of the software application is a similarity with the traditional approach to software products (Ojala & Tyrväinen, 2011). However, in the traditional approach software applications are deployed as on-premise installation (Stuckenberg, Fielt, & Loser, 2011). Standardizing the functionalities is also the main difference between modern SaaS model and the ASP model. The functionalities are either business-oriented or customer-oriented (Chong & Carraro, 2006), that is, the software application either supports business processes of SMEs and large enterprises or they serve as tools for personal productivity and entertainment for the general public.

Fourthly, SaaS is seen by many to be a model that specifically uses cloud computing technologies (Chong & Carraro, 2006; Erdogmus, 2009; Vaquero, Rodero-Merino, Caceres, & Lindner, 2009), namely virtualization, multitenancy and the Internet (Marston et al., 2011). The concept of *cloud computing* includes three types of services that represent layers, and if cloud computing technologies are used to develop SaaS, the software application is dependent on the services provided by the lower layers called Platform-as-a-Service (PaaS) and Infrastructure-as-a-Service (IaaS). The cloud computing service layers are:

- *'The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure.'*(Mell & Grance, 2011, p. 2). This means that SaaS is provisioning software applications over the Internet to several end-users, on top of a multi-tenant infrastructure.
- *'The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider.'* (Mell & Grance, 2011, p. 2). This means that PaaS provisions the hardware platform, development tools and infrastructure software stack as a service, often consuming a virtualized infrastructure. Developers may use PaaS to implement and integrate their applications for the cloud (Beimborn, Miletzki, & Wenzel, 2011).

- *'The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications.'* (Mell & Grance, 2011, p. 3). This means IaaS delivers a hardware infrastructure for running the development tools and infrastructure software, providing both virtualized computational resources and data storage. This capacity can be on either a private cloud (hardware is used exclusively by one organisation), on a public cloud (accessible for general public), or on hybrids of both.

SaaS consists of two components, namely the software application itself and the IT infrastructure on which it runs (Campbell-Kelly, 2009). This means that cloud computing technologies could be employed for developing both customer-specific and standard software applications. However, in cloud computing it is the IT infrastructure – which includes both hardware and software – that is standardized across their client base according to the of principles multitenant architecture (Chong & Carraro, 2006; Novelli, 2012; Vaezi, 2012).

In the empirical studies on adoption and acceptance of SaaS, the term is often conceptualized and put into practice without considering its different connotations. Since the researchers studying the subject and respondents to qualitative or quantitative inquiries may have varying notions of the term, there seems to be a need to pay attention on how to distinguish between ASP as the means of delivering any software application over the Internet and SaaS with a more standardized offering.

For the purpose of this dissertation, I have buildt upon the definition by Sääksjärvi et al. (Sääksjärvi et al., 2005) to define the Software-as-a-Service concept as follows: *Software-as-a-Service* refers to providing an online access to a remotely managed software application, that permits simultaneous use of the same application installation by a large number of independent end-users (customers) on a subscription basis.

2.2 Adoption and acceptance of Software-as-a-Service

The concept of adoption is used loosely in the literature on SaaS to refer both to taking into use a software application provisioned as SaaS and to outsourcing software-related functions. Mainly these studies consider the reasons behind adopting SaaS. Recent literature generally agrees on three factors that have caused an increase in the uptake of SaaS. First, and perhaps most obvious given the characteristics of SaaS, is the potential cost reductions for acquiring software application and related services (Bibi, Katsaros, & Bozanis, 2012; Greschler & Mangan, 2002; Jacobs, 2005). As the SaaS provider is in charge of building and maintaining the infrastructure needed, with access to increased economies of scale, both capital and operational expenditures associated with software application should decrease for the customers (Benlian & Hess, 2011; Greschler & Mangan, 2002).

The second incentive is the potential flexibility gained from outsourcing the software-related functions to the software firm. It enables the customer organization to focus on its competences and to change direction without losing major IT investments (Benlian & Hess, 2011; Currie et al., 2004; Greschler & Mangan, 2002).

The third incentive seems to be related to previous problems encountered with more traditional forms of IT outsourcing. Greshler and Mangan (2002) argue that SaaS vendors may reduce the need for time-consuming and costly onsite upgrades. Benlian and Hess (2011), Choudhary (2007) and Currie et al. (2004) all consider Software-as-a-Service to have potential for improving quality of the service. Armbrust et al. (2010) add that the customers do not need to worry about overprovisioning or underprovisioning of IT services, because of the scalability of SaaS services. Finally, Bibi et al. (2012) suggest that SaaS may in effect be more simple way of adopting and managing software applications. . In addition, these same incentives may also account for a more general acceptance of SaaS by the firm and for its continued use on a longer term basis.

Possible impediments for the adoption and continued use of SaaS include risks related to data security and performance of the SaaS service, series of economic and strategic risks related to the relationship with the software firm and negative experiences related to SaaS adoption and usage (Benlian & Hess, 2011). One important issue concerning SaaS adoption is that the customer may not actually find a suitable solution to their needs (Desai & Currie, 2003). In such a case, the customer organization may instead turn to adopt a customer-specific software application. Indeed, Jacobs (2005) also finds that the benefits of Software-as-a-Service (as well as the risks) depend very much on the client and their specific needs. Conceptual and empirical articles that analyze the adoption and acceptance of SaaS are summarized in Table 1. In addition to the objectives and results, I made two more observations on the content of the studies.

Firstly, only a few of the empirical studies on adoption consider the potential different conceptualizations of SaaS in terms of a service, i.e., what exactly is adopted and what the software firm is actually offering compared to other forms of provision. While Software-as-a-Service can be offered by the software firm in either ASP, or a more strictly defined SaaS fashion, with a range of adjacent services and/or varying pricing schemes, it seems that most of the studies on adoption have so far failed to pay proper attention to how these different versions of the same thing may affect results. Currie et al. (2004), for example, find that vendors on the ASP end of the spectrum need to understand specific rather than general business and technology needs of customers, whereas the researchers studying the other more strictly defined SaaS end of the spectrum don't seem to need to even consider this issue.

Among the few studies that do consider these different versions however, is one by Altaf and Schuff (2010), which reveals that the lack of flexibility in terms of what is offered is a significant factor affecting the adoption. Indeed, Benlian et al. (2009) suggest that the type of application is one of the most important criteria in deciding to adopt SaaS or not. In short, less specific and less

strategically important applications are to a higher degree adopted as SaaS, than more complex, specific or strategically significant applications. And, Bibi et al. (2012) suggest that the decision to adopt SaaS also very much depends on the different billing models and service-level agreements offered with it.

Secondly, and in contrast to studies on how SaaS is adopted, those focusing on its acceptance and continued use do consider a variety of definitions. These are based on the quality of software and performance of the software firm. For instance, Benlian et al. (2011) define six factors in the software firm that affect the quality of service provided: (i) features offered, (ii) security, (iii) reliability, (iv) assurance, (v) responsiveness, and (vi) flexibility of the software firm. Their conclusion after testing these six factors, was that overall SaaS quality is not only attributable to the application's features or security aspects, but also to the ongoing practical relationship with the provider. Similar results on the importance of the software firm's management of customer relations have also been reported by Garrison et al. (2012).

TABLE 1 Summary of studies on adoption or acceptance of SaaS.

Author	**Target/Results**	**Study type**
Altaf & Schuff (2010)	Builds a research model based on notion of flexibility. Finds flexibility to be a significant factor in affecting the SaaS adoption among SMEs.	Adoption
Benlian et al. (2009)	Empirically tests several factors (derived from transaction cost economics, resource-based view and theory of reasoned action) affecting SaaS adoption. Finds that different application types have different adoption requirements. Firm size does not matter in SaaS adoption.	Adoption, Acceptance
Benlian et al. (2011)	Develop and validate a SaaS-Qual instrument for analyzing continuance of SaaS use. Find that confirmation of SaaS service quality has greater effect on satisfaction than perceived usefulness. Overall SaaS service quality is attributable not only on the features of the application or security aspects, but also rapport with the provider.	Adoption, Acceptance
Benlian & Hess (2011)	Examine the different opportunities and risks associated with SaaS adoption and their effect on intention to adopt SaaS. Find that cost advantages dominate the perceived opportunities and that the security risks are the main concern.	Adoption
Bibi et al. (2012)	Discuss differences between on-premise and on-demand models. Suggest that the decision to adopt SaaS requires consideration of different billing models and service-level agreements (SLAs).	Adoption
Chou & Chiang (2013)	Aims at increasing understanding about how SaaS customers' satisfaction is formed in context of post-adoption behavior. Find that the quality of the SaaS service affects trust on competences and openness of the provider.	Acceptance
Du, Lu, Wu, Li, & Li (2013)	Investigate user acceptance of SaaS services. Find that perceived usefulness is a key factor that has an impact on a customer's decision to use SaaS.	Acceptance
Fuller & McLaren (2010)	Compare the SMEs options to adopt either an integrated ERP or similar SaaS offering. Argue that ERP systems are better aligned with SME that are seeking for enterprise solutions.	Adoption

Continued in the next page

TABLE 1 Continued

Author	Target/Results	Study type
Garrison et al. (2012)	Examine the association of relational, technical and managerial capabilities of the client organization to cloud deployment success. Find that trust between client and cloud vendor can contribute to success in deployment.	Acceptance
Gupta et al. (2013)	Investigate the usage of cloud computing services by SMEs. Find the ease of use and convenience as main factors for adopting cloud acceptance.	Acceptance
Heart (2010)	Provides an analysis on the effects of trust and perceived risk on SaaS adoption. Finds that threats imposed by the Internet on organizational IT are perceived as significant.	Adoption
Iyer & Henderson (2010)	Discuss the necessary cloud computing capabilities. Finds seven key capabilities for formulating a cloud strategy.	Acceptance
Janssen & Joha (2011)	Analyze the benefits and challenges of adopting SaaS. Identify categories of benefits and disadvantages.	Adoption, Acceptance
Lee, Chae, & Cho (2013)	Analyze the incentives and the deterrents for SaaS adoption in a geographical context. Conclude that the economic benefits such as reduced costs and rapid deployment serve as the strongest incetives of SaaS adoption. Also find that main incentives for SaaS in Korea are not due to governmental or environmental market conditions, but rather customer-related factors.	Adoption
Obal (2013)	Studies how pre-existing trust in the vendor impacts on the perceptions of SaaS. Finds trust as an important factor for adopting disruptive technologies like SaaS.	Adoption
Walther et al. (2012)	Develops a continuance model for on-demand enterprise systems. Proposes a set of hypotheses concerning intentions to continue using SaaS.	Acceptance
Xin & Levina (2008)	Investigates the factors affecting SaaS adoption. Proposes several hypotheses of connected to literature on outsourcing.	Adoption

2.3 Supply-side of Software-as-a-Service

Compared to studies on the demand for SaaS, the studies that focus on its supply appear to investigate a wider variety of topics. These topics include examining the benefits of delivering over the Internet for software firms (Chong & Carraro, 2006; Greschler & Mangan, 2002); comparing the behavior of Software-as-a-Service businesses against the traditional software businesses (D'souza, Kabbedijk, Seo, Jansen, & Brinkkemper, 2012; Lassila, 2006; Schwarz et al., 2009; Yao, 2002); and variety of idiosyncratic aspects pertinent to the way SaaS firms conduct business.

From the perspective of supply, SaaS firms differ notably from more traditional set-ups, in that ownership of the software has moved from the customer organization to the software firm, as has management of the IT infrastructure (Chong & Carraro, 2006). Acclaimed benefits from these changes include an increase in economies of both scope and scale (Chong & Carraro, 2006; Kern et al., 2002; Tebboune, 2003); a more predictable subscription-based revenue (Choudhary, 2007; Greschler & Mangan, 2002); the possibility to target the 'long

tail' of smaller businesses (Chong & Carraro, 2006; Kern et al., 2002); rapid updates and online support (Choudhary, 2007; Greschler & Mangan, 2002); and avoiding the risks of large IT projects (Choudhary, 2007; Dhar & Varshney, 2011). These benefits also allow SaaS firms to match the needs and trends of the current marketplace relatively quickly, i.e., the requirements for increased IT efficiency and business agility (Marston et al., 2011). From the perspective of SaaS demand, this is perhaps the most important reason why both SME and larger enterprise clients are asking for such services (Armbrust et al., 2010; Greschler & Mangan, 2002).

According to recent studies, the way SaaS firms conduct business seems to be along similar lines to conventional methods for selling software products. In other words, a standardized set of functionalities is provided for all customers, with only limited possibilities for customer-specific alterations, so that vendors can more easily achieve economies of scale (Benlian & Hess, 2011; D'souza et al., 2012). Software product business and SaaS business have been found to also be similar in having a large volume of customers, small revenue per customer, and higher up-front investments on software development (Sääksjärvi et al., 2005; Software & Information Industry Association, 2004).

On the other hand, delivering software functionalities over the Internet (i.e., outsourcing deployment and operations to the service provider) changes the essential business and finance practices of a software firm, in that there is: (i) a different kind of license agreement which entails a more direct and continuous customer relationship (D'souza et al., 2012; Stuckenberg et al., 2011); (ii) a subscription-based pricing logic (Choudhary, 2007); (iii) the cost of operating the IT infrastructure to consider (D'souza et al., 2012); and (iv) the need to combine both software development and hosting as key activities and required capabilities (Stuckenberg et al., 2011).

The business of Software-as-a-Service has also been compared to business of supplying customer-specific applications and IT solutions. Schwarz et al. (2009) finds that the Software-as-a-Service firms target smaller customer segments with standard, non-critical applications, as opposed to targeting large firms with customer-specific items for critical applications in the traditional software services business. The authors also see a difference between provisioning short-term and standard contracts of application service provisioning and long-term and complex outsourcing contracts (Schwarz et al., 2009; Yao, 2002). Furthermore, Yao (2002) describes service providers as being smaller, relatively unknown, and focusing on regional market. In contrast, the providers of traditional outsourcing contracts are labeled as large corporations with well-known brands and a global reach.

Several investigations into the SaaS business model have been conducted to find out more about the nature of the business, and these also contribute to a better general understanding of how software firms organize their activities in the market today. The main changes are due to the introduction of cloud computing technologies, which has resulted in changing the structure of the IT market somewhat (Iyer & Henderson, 2010; Leimeister, Böhm, Riedl, & Krcmar,

2010; Weinhardt, Anandasivam, Blau, & Stoer, 2009). Whereas in traditional IT outsourcing, the software firm reached its customers through intermediaries like system integrators, now they are in direct continuous relationship with them, and details of the IT infrastructure remain hidden from the customer.

To illustrate the wide range of application service providers' scale and scope, Currie and Seltsikas (2001) came up with a taxonomy of ASP firms. They divided ASPs into firms providing industry-specific applications, horizontal applications, complex enterprise applications, simple web-enabled applications or applications enabling provisioning of a service. The providers of simple web-enabled applications could be labeled as SaaS firms. However, there has so far been no further taxonomies of SaaS firms in the literature.

A similar taxonomy of the industry players suggests that Software-as-a-Service firms would emerge from traditional software product and software services firms, traditional hosting providers or new start-up companies (Software & Information Industry Association, 2004). Lassila (2006) adds that also system integrators are also moving from project-based business to providing software services. The integrators would benefit from this by being able to leverage their domain-area expertise and from providing customizations, integrations and operating services (Lassila, 2006). One could easily see that integrators are likely to offer a platforms-as-a-service type of offering. Giessmann and Stanoevska-Slabeva (2012) divide the current PaaS providers into three classes according to the type of PaaS offered: development-focused platforms, application-based forms of integration, and distribution channels.

To further describe the range of SaaS firms on offer,, Gold et al. (2004) argue that SaaS offers a composition of fine-grained services, which also implies that SaaS is often composed of a set of simple software applications (Ojala & Tyrväinen, 2011). Dubey and Wagle (2007) suggest that some applications would appear in the market faster than others, referring to the potential issues of turning a complex ERP system into a SaaS offering. However, there is currently little in the literature that treats just how exactly providers do convert to supplying SaaS. A couple of exceptions to this are the studies by Ojala and Tyrväinen (2011) and Novelli (2012). While their findings are based on rare cases, they both seem indicate a trend towards offering more standardized products and also include structural changes in the focal firm's value network.

To study the activities of the SaaS firm, Choudhary (2007) examined the effects of a subscription-based revenue logic on the development activities of software firms. He found that the SaaS licensing scheme would typically lead to investing more in the software development activities in order to improve the quality of the SaaS on offer. In a similar vein, Cusumano (2008) argues that SaaS firms need to invest in the service they offer, which adds distinctiveness to their products and efficiency to their operations. To achieve a high standard of quality and minimize the operating costs, the software firms should increase the level of automation in their operations (Durkee, 2010).

To describe how SaaS firms aim to capture value, Armbrust et al. (2009) suggest they represent a shift in marketing activities towards a 'low-touch, low-

margin, low-commitment' customer-relationships. This would stand for a shift towards providing minimal adjacent services, using online channels and increasing customer self-service to benefit from low marginal costs. However, the SaaS firms would still have to spend extensively on marketing their service to achieve a large client base and to properly benefit from the economies of scale (Sääksjärvi et al., 2005; Software & Information Industry Association, 2004).

Tyrväinen and Selin (2011), on the other hand, find that SaaS firms may also provide integration, tailoring and consultancy and the use personal sales activities to reach their customers. Likewise, Cusumano (2008) argues that on the whole, software companies have expanded their approach in terms of customer segments, delivery models and revenue models. For instance, the current business model of software firms is largely based on subscriptions, advertisements or different kinds of 'freemium' models and target either small businesses or enterprises.

2.4 Conclusions and research questions

This review of the literature on Software-as-a-Service focused on the definition, on adoption factors and on the current knowledge about the business models of SaaS firms. It did not focus on the technological details, or the implementations of SaaS for a specific domain, on which there is already a substantial amount of research. In current literature, business aspects of SaaS are examined less thoroughly. Therefore, scholars have called for more studies on the business aspects of Software-as-a-Service (Marston et al., 2011; Yang & Tate, 2012)

To summarize, the extant literature seems to generally share in the opinion that SaaS represents a specific model for delivering the functionalities of software applications over the Internet; and that the licensing model is different from that used in traditional IT outsourcing. However, there are also variations in the connotations that software provided as a service has, such as a service which offers either a standardized software application, or one that is tailored to the client. Equally it can be either simple or complex in nature, and there are a number of ways it is priced and charged to the customer. With this in mind, it was important to settle on a definition of SaaS that includes online delivery, use of the same application installation and a subscription-based revenue.

From this definition, it is clear that SaaS is a novel form of IT outsourcing. When SaaS is adopted by a customer organization, it basically outsources online delivery of a software product. This means that all the software-related functions are also outsourced to the software company, such as design, implementation, deployment and operating. SaaS is consequently different from preceding customer-specific software services, software product and application service provisioning approaches. In this sense, SaaS is a turnkey solution for software applications (Yang & Tate, 2012).

The literature suggests that cloud computing technologies are not actually a prerequisite for offering SaaS, so they do not come into the definition. How-

ever, adopting cloud technologies may affect the means for performing software-related activities and result in new products and services.

Many articles in the literature argue that one of the most important benefits that SaaS offers over internally sourced software, is the cost efficiency of providing software applications from the Internet. However, this is not the only factor in its success, as for it to be accepted also depends very much on the quality of the software offered, how the IT is outsourced, and how the software firm handles its customer relationships. Furthermore, there is evidence that different end-user organizations need their SaaS to offer different things specific to each of them. There is perhaps a need therefore, to elaborate more clearly what value propositions individual SaaS firms can offer (i.e. what precisely is outsourced).

What is needed perhaps, is therefore a definition for a SaaS firm. This refers to a software company responsible for developing a software application and delivering it to the customers via the SaaS concept. Furthermore, the software firm is now held accountable for the quality of the service, and has to change from a licensing-based form of revenue for the software application towards a subscription-based form of revenue. In other words, the software firm needs to change its operations and revenue logic to match the altered conditions, and so the software firm has to change its business model.

The conceptual and empirical studies on the SaaS firms' value propositions, activities, revenue logic and costs generally paint a picture of a uniform business model configuration for all SaaS firms. To synthesize the studies looking at the properties of SaaS firms, this author finds that the Software-as-a-Service business model is essentially about:

- Standardized and simple offering (Mäkilä et al., 2010; Ojala & Tyrväinen, 2006) with minimal adjacent services enabling low costs and prompt deployment over the Internet (Armbrust et al., 2009; Benlian & Hess, 2011),
- Providing to the customers an inexpensive, scalable and carefree service delivery (Benlian & Hess, 2011; Greschler & Mangan, 2002; Stuckenberg et al., 2011),
- Targeting smaller customers (Chong & Carraro, 2006; Kern et al., 2002; Schwarz et al., 2009),
- Efficiency in operations and scalable IT resources (Cusumano, 2008; Durkee, 2010), to achieve economies of scale in targeting large volume of smaller customers (Sääksjärvi et al., 2005),
- Continuous customer-relationship with increased focus on customer acquisition and retention (Stuckenberg et al., 2011; Tyrväinen & Selin, 2011),
- Subscription-based revenue logic with shorter contracts, small transactions and minimal marginal costs per customer (Armbrust et al., 2009; Choudhary, 2007; Schwarz et al., 2009), and
- High up-front investments on software development and customer acquisition (Sääksjärvi et al., 2005; Software & Information Industry Association, 2004).

This relative uniformity among in considerations of SaaS firms operations and revenue logic is somewhat surprising, as there is coinciding findings of different types of offerings provided by software firms with varying backgrounds in either software product or software services business. Additionally, there are indications that SaaS firms would have different approaches when it comes to the specifics of managing customer relationships and pricing. I find that the existing literature fails to address this variation in the business models of SaaS firms. Consequently, there is a lack of understanding how current SaaS firms create, deliver and appropriate value to address the different needs of different customer segments. The identified research gap led to the formulation of the first research question:

RQ1: What are the different business models of Software-as-a-Service firms?

The existing literature also shows that there has been little examination of how the SaaS business model has been evolving, only descriptions of its basic characteristics, when in fact this is not a static phenomenon. The introduction of cloud computing, for example, has had an immense effect on the structure of the software market and it is therefore surprising that the academic literature has not yet caught up in terms of addressing how it has affected software firms' business models.

To address the issue would involve examining the strategic aims of the software firms in question, and to analyze exactly not only what internal pressures are forcing them to change their way of operating, but also the external competitive and technological forces. I believe one way to do this is to look more closely at the differences between SaaS firms, rather than simply what they have in common, and extend this investigation to a larger population of software firms. These notions have led to the second research question:

RQ2: What are the changes in the business models of software firms induced by internal and external influences of the firm?

3 THEORETICAL BACKGROUND

The theoretical background for the dissertation is drawn from the extant literature on business models. The section focuses on the business model concept, its key elements as well as its effectiveness as a tool in describing how companies change the way they do business. The section concludes with a conceptual framework for the dissertation.

3.1 The business model concept in its uses

For outside observers, like researchers, a *business model* is a description of how company operates, organizes itself and of how it makes money (Baden-Fuller & Morgan, 2010; Magretta, 2002; Osterwalder et al., 2005). In other words, a business model expresses an abstraction of business logic and provides evidence of how a company both creates and delivers value to its customers, as well as captures value for itself (Al-Debei & Avison, 2010; Teece, 2010; Zott, Amit, & Massa, 2011). The concept implies the property or behavior of a focal firm and draws attention to the means by which the focal firm creates and appropriates value. This means the business model is more of a conceptual model of business than a financial one (Teece, 2010), and also implies that a multitude of aspects are incorporated into a single business model concept.

Current notions of the business model concept use a number of existing organizational constructs to depict business in a comprehensive way (Al-Debei & Avison, 2010; Kindström, 2010). These constructs can be in terms of industrial organization, strategic networks, innovation, resources, and transaction cost economics (Amit & Zott, 2001; Hacklin & Wallnöfer, 2012; Hedman & Kalling, 2003). Proponents of the term argue for a holistic approach so as to represent the resource, transactive, and value structures in coherent and viable configurations (Casadesus-Masanell & Ricart, 2010; Demil & Lecocq, 2010; George & Bock, 2011; Zott & Amit, 2010). As a consequence, business models have a given set of interconnected elements, and being distinct from the product, industry, net-

work, or any of the isolated elements, a business model can thus be taken as a original unit of analysis (Zott & Amit, 2010).

However, those studies that have adopted this view have been criticized for not clearly distinguishing a business model from prevailing notions of strategy (George & Bock, 2011; Porter, 2001). Indeed, the concept of strategy also 'defines how all the elements of what company does fit together' (Porter, 2001, p.71). In answer, the advocates of business models have argued that their concept differs in that it does not include competition or originate from positioning oneself against competitors (Magretta, 2002; McGrath, 2010; Seddon, Lewis, Freeman, & Shanks, 2004), but instead from value creation for the customer (Mäkinen & Seppänen, 2007; Teece, 2010) and from the activities within the company (Seddon et al., 2004). Excluding competition in this way thereby rules out those aspects which are also in the definition of a strategy, such as 'being different', 'making tradeoffs in competing', 'creation of unique and valuable position' and 'continuity of direction' that belong to the Porter's (2001; 1996) definition of a strategy. Thus, strategy is more concerned with the scope and aims of focal firm's business (i.e. where and why to compete), whereas business model is concerned with how the firm operates to the create and appropriate value in compliance with the aims. In this way, the strategy can also be seen as choosing the right business model through which the firm will compete (Casadesus-Masanell & Ricart, 2010).

Although the business model concept (particularly in IT) has been studied from a number of perspectives, one could argue that it is perhaps more a topic for those studying strategic management. However, I would argue that the concept is important in the study of IT outsourcing. This is because the activities related to buying and selling software applications and associated services takes place in a dyadic relationship between an end-user organization and a software company that provides the products or services. In this setting, the end-user may provide a software company with some or all of the functions related to the development, operation and maintenance of the software application (Cheon, Grover, & Teng, 1995; Nelson, Richmond, & Seidmann, 1996). Conceptually, the outsourcing decision of a rational end-user has its counterpart in the business model of a software company. A rational end-user shall outsource the software-related activities in the case where there is a demand for such activities, where the end-user does not have the resources themselves to do so, and where the costs of outsourcing are lower than insourced activities. The software company responds to the demand with its value proposition, resources and revenue logic. The demand and the value proposition response not only describe what and how the end-user is outsourcing, but also what and how the software company executes its business model. The resources, cost, and appealing revenue logic of the software company are examples of why the end-user opts for this outsourcing solution. Following this line of reasoning and the general increase in IT outsourcing by the vertical industry firms, the software company through its value creation logic consequently has a strong influence on the adoption and diffusion of IT technologies in organizations.

Business model provides for both researchers and practitioners means for understanding, analyzing and communicating aspects pertinent to the design and operation of businesses. The concept is also used to understand the role of variation and innovation within the organizations (Al-Debei & Avison, 2010; Baden-Fuller & Morgan, 2010). The business model concept can also be used to study an individual company's unique characteristics (Osterwalder et al., 2005), as well as to show how these characteristics contribute to the focal firm's success or failure in the market (Morris, Schindehutte, & Allen, 2005; Ordanini, Micelli, & Di Maria, 2004; Zott & Amit, 2007). Similarly, a practitioner may use the business model concept to study exemplar role models. Or, the researcher may treat an individual company as a representative for a class of companies (Baden-Fuller & Morgan, 2010; Seddon et al., 2004) and create taxonomies that help in understanding the differences and similarities of firms' behavior (Zott et al., 2011). The taxonomies further enable deducing causal relationships leading to certain kind of operations or performance for the whole class of companies (George & Bock, 2011). For instance, the researcher may be interested in how the companies commercialize new ideas and technologies through their business models. For managers, the execution and management of a business model requires rendering it as concrete elements, such as a structure (e.g. units, human resources), activities and resources (Osterwalder et al., 2005). For studying causal relationships, a researcher similarly needs to subdivide the business model into manageable elements. This is to say, one cannot observe or measure a business model directly, but only through its constituents and interrelations between the elements.

Being a description, the business model acts as a conceptual tool, which narrates either the state of current business or planned future business (Al-Debei & Avison, 2010; Demil & Lecocq, 2010). The business model concept can be used to analyze a static 'blueprint' of the firm's operations and revenue logic, to see how coherent the core business model elements are (Demil & Lecocq, 2010), and this static viewpoint also includes examination of the elements that contribute to understanding of business models (Osterwalder et al., 2005). However, being static snapshots, these kinds of business models are consequently provisional and so likely to change. An alternative viewpoint is to use a business model more specifically as a means for studying and applying changes to an organization (Demil & Lecocq, 2010; McGrath, 2010). In the latter application of the business model, the abstraction of the firm's future business is considered as a narrative device or a tool to put into effect changes and innovation in the organization (Cavalcante, Kesting, & Ulhøi, 2011; Demil & Lecocq, 2010; Doganova & Eyquem-Renault, 2009). Because of these two uses of the concept, a business model can therefore be used both to analyze the firm at any moment in time, and also to analyze changes in the firms' behavior.

3.2 Key elements of a business model

A business model's design is generally considered in the existing literature to be a balanced configuration of the key elements of a given business. Zott and Amit (2010) emphasize the reflection of system-level design, as opposed to partial optimization. In comparison, Al-Debei and Avison (2010) describe business models as granular, hence perceive the concept as a hierarchy of first-level and second-level constructs. This is perhaps the reason why the academic literature on the topic suffers from inconsistent definitions and construct boundaries (George & Bock, 2011). The all-embracing nature of the business model concept means that researchers need to therefore specify these key elements to match their purpose.

While the inconsistency has created some confusion among researchers about the theoretical underpinnings of the concept, it seems there is a general consensus on the key elements of a business model, namely: (i) a value proposition incorporating both the customer segment and product/service portfolio; (ii) activities performed by the focal firm to create and appropriate value; (iii) an internal structure and the focal firm's position in the value network; (iv) a revenue logic that refers to the structure of income. Table 2 summarizes this exploration of the common elements.

As a general term, value refers to the importance, monetary worth or usefulness of products and services. The *value proposition* needs to articulate the users to whom the technology and activities are useful and the purpose the technology and activities serve (Chesbrough & Rosenbloom, 2002). This is to say, value proposition identifies a customer segment and a set of products and services offered to that segment. Applied to the IT domain, the product component is a combination of the functionalities of the software application and the IT infrastructure to run it, and the service component includes the deployment and delivery of the software functionalities to the end-users (Campbell-Kelly, 2009). The value proposition is the element that perhaps has the biggest impact on changes within a business model (Johnson, Christensen, & Kagermann, 2008) and it is usually the starting point for creating a new business model design. This is because producing products and associated services requires an effective configuration and execution of activities and an organizational structure, which further requires tangible and human resources (Hedman & Kalling, 2003). Performing these activities and employing resources incur costs affecting the revenues.

Zott and Amit (2010) introduce the possibility of a firm commercializing new technology in several ways: by licensing the technology to third parties, by becoming original equipment manufacturers themselves, by producing the services to install and maintain the technology or by becoming producers of the 'whole product'. The authors stress that each of these choices involves a different set of activities as well as resources and capabilities, and the activities may be performed within the firm or in cooperation with suppliers and partners.

The configuration of activities is therefore a vital element of the business model. An *activity,* in this context, serves the specific purpose of fulfilling an overall objective and it includes the engagement of human, physical and capital resources (Zott & Amit, 2010). The definition of a business model at large implies that the activities are related to creating, delivering and appropriating value. To put it simply, the activities are associated with 'making something' and 'selling something' (Magretta, 2002, p. 4). Applied to the activities of software firms, making something involves designing, implementing, provisioning as well as operating the software application (Messerschmitt & Szyperski, 2003, p.122-125), whereas selling something involves creating and maintaining the customer relationship.

TABLE 2 Key elements of a business model.

Element	**Appears as a business model element in:**
Value proposition	Al-Debei and Avison (2010); Alt and Zimmermann (2001); Amit and Zott (2001); Ballon (2007); Chesbrough and Rosenbloom (2002); Demil and Lecocq (2010); Dubosson-Torbay, Osterwalder, and Pigneur (2002); Gordjin and Akkermans (2001); Grigoryan (2006); Hacklin and Wallnöfer (2012); Hedman and Kalling (2003); Johnson et al. (2008); Kallio, Tinnilä, and Tseng (2006); Kindström (2010); Magretta (2002); Morris et al. (2005); Osterwalder et al. (2005); Rajala and Westerlund (2007); Shafer, Smith, and Linder (2005); Timmers (1998); Weill and Woerner (2013); Yip, 2004; Zott et al. (2011)
Activities	Alt and Zimmermann (2001); Demil and Lecocq (2010); Dubosson-Torbay et al. (2002); Gordjin and Akkermans (2001); Hedman and Kalling (2003); Johnson et al. (2008); Magretta (2002); Osterwalder et al. (2005); Shafer et al. (2005); Yip (2004); Zott and Amit (2010)
Organizational structure	Al-Debei and Avison (2010); Alt and Zimmermann (2001); Amit and Zott (2001); Ballon (2007); Chesbrough and Rosenbloom (2002); Demil and Lecocq (2010; Dubosson-Torbay et al. (2002); George and Bock (2011); Gordjin and Akkermans (2001); Grigoryan (2006); Hacklin and Wallnöfer (2012); Hedman and Kalling (2003); Kallio et al. (2006); Kindström (2010); Osterwalder et al. (2005); Rajala and Westerlund (2007); Shafer et al. (2005); Timmers (1998); Yip (2004); Zott et al. (2011)
Revenue logic	Al-Debei and Avison (2010); Alt and Zimmermann (2001); Ballon (2007); Chesbrough and Rosenbloom (2002); Dubosson-Torbay et al. (2002); Grigoryan (2006); Hacklin and Wallnöfer (2012); Hedman and Kalling (2003); Johnson et al. (2008); Kindström (2010); Magretta (2002); Morris et al. (2005); Osterwalder et al. (2005); Rajala and Westerlund (2007); Shafer et al. (2005); Timmers (1998); Zott et al. (2011)
Other suggested elements	*Resources* (Casadesus-Masanell & Ricart, 2010; Demil & Lecocq, 2010; Dubosson-Torbay et al., 2002; George & Bock, 2011; Hacklin & Wallnöfer, 2012; Hedman & Kalling, 2003; Johnson et al., 2008; Morris et al., 2005; Osterwalder et al., 2005; Shafer et al., 2005), *Strategic aims* (Alt & Zimmermann, 2001), *Scope* (Yip, 2004), *Competitive advantage and positioning* (Chesbrough & Rosenbloom, 2002; Morris et al., 2005), *Transactions* (Casadesus-Masanell & Ricart, 2010; George & Bock, 2011), *Distribution channel* (Grigoryan, 2006; Osterwalder et al., 2005; Weill & Woerner, 2013), and *Customer relationship* (Morris et al., 2005; Osterwalder et al., 2005; Weill & Woerner, 2013).

Zott and Amit (2010) go on to define activity system as one in which the activities can be defined in terms of who performed them, and in what sequence. The systemic aspect of the definition can be further interpreted to designate a value architecture (Al-Debei & Avison, 2010) or organized behavior of a firm. This is, in turn, linked to the *organizational structure* which describes the allocation of activities within the firm and between the firm's value network, the distribution (and the ownership) of resources as well as competence between the focal firm and its key external stakeholders – suppliers, partners and customers (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Demil & Lecocq, 2010). Consequently, the allocation of activities and distribution of resources affect the volume and structure of costs (Demil & Lecocq, 2010). In the context of a business model, the structural aspects therefore include arrangement of activities and resources between those involved, cooperative agreements with other companies, and the links a company establishes with its customers (Osterwalder et al., 2005).

A business model also describes how a company appropriates value, i.e. how it makes money by serving its customers (Magretta, 2002). For instance, a firm may choose to commercialize its products either by selling subscriptions to customers, by attaining advertising revenues from other firms, by commissioning other services that are provided, by sharing revenues with other firms, or by selling the product's outright to a third party (Dubosson-Torbay et al., 2002). This is what the *revenue logic* covers, it describes the structure of revenues (Demil & Lecocq, 2010) rather than the volume of revenues (which may be only transitory). Revenue logic thus reflects the choices between different pricing structures, temporal rights (e.g., perpetual licenses, subscriptions, pays-per-use), and the party who is paying for the product.

3.3 Business model taxonomies

There is not be a single business model that could apply to all organizations (Alt & Zimmermann, 2001), for if this was so it would be so general as to be devoid of any specifics. Nevertheless business models can be grouped together through their so called design themes, which describe the common attributes between firms (Zott & Amit, 2008). Identifying the design themes requires creating a model, that is, determining the elements, their subdivided parameters and connections between the elements. After that, similarities and differences between the parameters can be measured and analyzed to find emergent principles (called dimensions or design themes) for dividing the firms into taxa. The resulting taxonomy, where the firms are classified based on their design themes, must be both exhaustive and mutually exclusive in order to ensure the homogeneity of firms within the group. This means the model needs to be constructed to ensure that no business models remain unclassified and that a firm must belong to one taxon and one taxon only (Mäkinen & Seppänen, 2007).

Classifications of business models facilitate their comparison. Creating taxonomies and classifications are dominant activities in studying business models and they are used for exploring and developing business models as well as explaining and predicting changes in business model parameters (Baden-Fuller & Morgan, 2010). Complete business models are often too complex for representation and development (Al-Debei & Avison, 2010; Casadesus-Masanell & Ricart, 2010) and constructing a taxonomy enables reducing this complexity. Simplification can be achieved by aggregating together choices and consequences into larger constructs or by decomposing the business model to identify details influential to the configuration (Casadesus-Masanell & Ricart, 2010). As already indicated, for researchers the taxonomies serve a twofold function of codifying phenomena and of predicting relationships between phenomena (Grigoryan, 2006).

In the domain of e-business, taxonomies are employed to compare internet applications and websites (Clemons, 2009; Wirtz, Schilke, & Ullrich, 2010), firms engaging in mobile commerce (Leem, Suh, & Kim, 2004), location-based services (Dhar & Varshney, 2011), as well as internet retailers and bricks-and-mortar retailers (Enders & Jelassi, 2000; Palmer, Kallio, Saarinen, Tinnilä, & Tuunainen, 2000; Porra, 2000). These studies mostly differ in their notions of value proposition, structure and revenue logic as the basis for the classification, but there are other factors in the model too, such as the scope of operations (Palmer et al., 2000), company size (Porra, 2000) and the degree of innovation (Timmers, 1998) appear as part of the model.

Studies of business models of software firms use a variety of business model elements for classification and inference. For instance, Rajala et al. (2003) identify different characteristics of software firms according to their product strategy, revenue logic, cost structure/pricing strategy and distribution model. This model and the identified design themes were later used by Ojala and Tyrväinen (2006) to study market entry choices. On the other hand, Giessmann and Stanoevska-Slabeva, (2012) adopt the elements of the popular Business Model Canvas (Osterwalder & Pigneur, 2010) to facilitate identification of design themes in their study on business models of Platform-as-a-Service providers. In these three studies, as well as in several e-business studies, the authors do not present taxonomy of firms, which would conform to the qualities of being exhaustive and mutually exclusive. This seems to be associated with the selection of multiple elements and parameters to assess. Choosing four elements with at least two themes would lead to too many taxa and decrease the practical value of making a taxonomy at all.

Studies of software firms' business models also appear to consist of different levels of granularity. The German software industry survey (Pussep et al., 2013) uses a highly detailed classification scheme with five first-order constructs and 25 second-order constructs as parameters developed by Schief and Buxmann (2012). By contrast, Cusumano (2003) uses two broad categories based on firms' value proposition and their source of revenue, namely software product firms and software services firms. Through these categories, he observes a

gradual shift in software firms' business models towards increasing service offering and revenues. This is partly attributable to competitive pressures, but also to an individual firm's age and lagging sales (Cusumano, 2003, 2008). Both kinds of model have their functions: the detailed model is suitable for acquiring an overall description of the software industry, while the simpler model seems better suited to studying causal relationships.

Rajala and Westerlund (2007) present a classification scheme of software firms, which can be used to understand the types of software firms that existed before the cloud computing technologies received acceptance and momentum. Drawing their classification scheme mainly from transaction cost economics and industrial-network and interaction approaches, they find two dimensions as a basis for the classification: the level of homogeneity (i.e. the level of standardization) and the level of involvement in customer relationships. Accordingly, Rajala and Westerlund divide software firms into four taxa and describe their properties with a model that includes the nature of provision, customer-relationships and core competencies. The various types of software firms and their characteristics are summarized in Table 3 below. Software firms are classified in terms of offering a software product or software service and of the subgroups therein, which each have a core value proposition. This classification results in two types of software service company (to the left) and two kinds of software product company (to the right).

TABLE 3 Classification of software firms in 2007.

The degree of involvement in customer relationships			
	High	Type: Software tailoring Characteristics: *'A high degree of involvement in customer relationships and a low level of homogeneity of offerings characterize the businesses in this category. Typical offerings embody tailored software solutions designed to meet customer-specific needs.'* (Rajala and Westerlund, 2007, p.119)	Type: Applied formats Characteristics: *'A high degree of involvement in customer relationships and a high level of homogeneity of offerings. The total offerings are typically based on a uniform core solution, but are modified for customers by adding modular components. In these cases, the modification is sometimes carried out by value-adding resellers (VAR) acting as software integrators of the system solutions.'* (Rajala and Westerlund, 2007, p.120)
	Low	Type: Resource provisioning Characteristics: *'Characterized by a fairly low degree of involvement in customer relationships and a low level of homogeneity of offering. The needs are typically met with solutions that are conducted through one-off production in customer- specific projects.'* (Rajala and Westerlund, 2007, p.120)	Type: Standard offerings Characteristics: *'Businesses that seek large numbers of customers and economies of scale through a high level of homogeneity of offerings. A common characteristic of businesses in this category is that the offering is composed of a uniform core product, a modular product family or standardized online service.'* (Rajala and Westerlund, 2007, p.120)
		Low	High
		The level of homogeneity of offering	

3.4 Business model changes

Teece (2010) argues that business models are provisional and likely to be changed. Such a change can be due to a number of different factors such as new commercial opportunities, or ineffectiveness of the current business model with regards to competition and customer demand (Cavalcante et al., 2011). Changes occur as companies create new business models (in the case of start-ups), extend their business model by adding activities, value propositions or partners, revise their business model by modifying or replacing these elements, or terminate an existing business model (Cavalcante et al., 2011; Kindström, 2010). Giesen, Berman, Bell and Blitz (2007) identify three types of business model innovation which may lead to success, namely, creating a value proposition for a new customer segment; reconfiguring the value proposition and revenue logic; and reorganizing supply chains. An outward sign of business model change is a substantial change in the structure of revenue sources (Demil & Lecocq, 2010), which reflects overall changes in both the value proposition, activities, structures and the revenue logic.

Existing literature on the subject suggests that business models may change in response to both external and internal influences, and widely agrees on two external factors for these changes: (i) advances in contemporary technology (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Casadesus-Masanell & Ricart, 2010; Chesbrough & Rosenbloom, 2002; Jetter, Satzger, & Neus, 2009; Kamoun, 2008; Kraemer, Dedrick, & Yamashiro, 2000; Kuk & Jansen, 2013; Lee, 2001; Rappa, 2004; Timmers, 1998; Wirtz et al., 2010) and (ii) competitive forces (Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Cusumano, 2008; Demil & Lecocq, 2010; Feller, Finnegan, & Hayes, 2008; C.-S. Lee, 2001; Ojala & Tyrväinen, 2006; Rappa, 2004). In addition, macroeconomic forces, such as government policies (Deodhar, Saxena, Gupta, & Ruohonen, 2012) and regulatory alterations (Tankhiwale, 2009), have been demonstrated to have an impact on business model designs. These external forces have the power to change the value of the firm's product/service portfolio, structure of the value network, and the costs of performing activities and acquiring resources (Demil & Lecocq, 2010), as well as reshape customer demand.

In the domain of software business, Cusumano (2008) investigated the lifecycle dynamics of the market. He found that software product firms have tended to generate most of their revenues from product licensing fees at first, but over time shift to a mixture of products and services, and eventually, to mostly services. The reason for such a change is due to technological advances and competitive forces, with regard to both the company itself and its customers. In the early phases of the market, after introducing new technology, software firms focus on product innovation and design to address the new opportunities. In the later phases of the market, when there is a lack of features to distinguish the software products, and when a dominant design emerges, software

firms are forced to lower their prices. Consequently, software firms shift their emphasis to the process innovation and services.

The business model changes also originate from within the company. A business model design, i.e., the practical means to create and appropriate value, are for the company's managers and employees to choose, interpreting the changes in the environment and making decisions accordingly with regard to changing the business model (Aspara, Lamberg, Laukia, & Tikkanen, 2011; Cavalcante et al., 2011; Chesbrough & Rosenbloom, 2002; Demil & Lecocq, 2010; Shafer et al., 2005; Zott & Amit, 2007). As underscored above, elements of the business model are interrelated. Consequently, the extensions and revisions to one element are likely to cause successive determined and emergent changes (Demil & Lecocq, 2010). This is why business models are changed through experimentation (McGrath, 2010), through a process characterized by trials-and-errors and adaptations (Chesbrough, 2010).

Business models most certainly play a central role in explaining a firm's performance (Koo, Koh, & Nam, 2004; Ordanini et al., 2004; Zott et al., 2011; Zott & Amit, 2008). In relation to the outcomes, Chesbrough and Rosenbloom (Chesbrough & Rosenbloom, 2002) contend that the financial performance of a given firm *is* associated with developments in the firm's environment, but *only* through changes in the firm's business model. Thus, adoption of innovative technology does not directly improve or worsen the financial performance of a firm, but the business model extensions and revisions are the mechanism by which to achieve such gains. Finally, adopting new technologies may also result in business model changes of different magnitudes. Berman et al. (2012, p. 32) analyze the effect of cloud computing on business models and reveal three types of changes that will reveal the extent to which an organization uses cloud computing. 'Optimizers' use technology to enhance their value proposition and efficiency, whereas 'innovators' create new streams of revenue or change their role in the value network. Meanwhile 'disruptors' may generate totally new customer needs and therefore segments.

3.5 Conclusions and framework development

This dissertation uses a business model as the unit of analysis. By combining widely used definitions, I am thus defining a *business model* as an interpretation of what a company offers, how it operates, organizes itself and of how it makes money. This definition has been created specifically to study how SaaS firms work, and aspects included of it are interrelated and should be observed as a whole. In this context, I would argue that the concept of strategy is complementary to a business model–the strategic aims of a firm will correspondingly affect decisions about its business model. I consider a business model to be a valid unit of analysis for studies within information systems, and suggest that closer examination of business models may improve understanding on IT outsourcing decisions.

Consequently, this dissertation is positioned both in the business model literature and also in the IT outsourcing literature. With regards to the latter, Software-as-a-Service is mainly considered here as a means of outsourcing IT functions related to designing, implementing, deploying and operating software applications. With regards to the former, when considered in terms of potential value propositions, activities, structures and revenue logic of a software firm, business models help understand what IT functions are outsourced, why an end-user organization chooses to outsource certain IT functions and how the outsourcing relationship end-user organization and software firm is organized and managed. By addressing this dissertation to IT outsourcing in general, the author also limits the considerations to software applications and IT infrastructures that serve businesses and other end-user organizations. This rules out investigations of the software applications and services specifically targeted for individual consumers.

Considering the different theoretical perspectives available in the IT outsourcing literature, I have chosen to compare the notions of the transaction cost theory (Coase, 1937; Williamson, 1975, 1991) with the resource-based view for analyzing business strategy (Barney, 1991; Penrose, 1959; Wernerfelt, 1984). Both have already been embedded in to the business model literature. Amit and Zott (2001) describes a value proposition as the content of transactions. On the other hand, Demil and Lecocq (2010) adopt the Penrosian view of the firm as a bundle of resources, highlighting instead the point that available resources impact viable value propositions.

In addition, the author also finds that the concepts of asset specificity and resource inimitability – central to the transaction cost theory and the resource-based view respectively – encapsulate the essence of Software-as-a-Service. The resource-based view asserts that the sources of competitive advantage are associated with the resources that are unique to the organization. That is, the only real way an organization can differentiate itself from competitors is by having valuable, rare, inimitable, or non-substitutable resources (Barney, 1991). Following on from this thinking, SaaS could be seen as a form of outsourcing that exhibits a low level of inimitability–the simple and standardized software application running on top of a standard IT infrastructure is thus unlikely to provide a strategic advantage to the SaaS firm. Asset specificity is defined as the extent to which the investments made to support a particular transaction can be redeployed for other purposes (Williamson, 1975, 1991). Williamson argued that transaction-specific physical assets and human assets are non-redeployable and particularly unique to a single activity. Accordingly, SaaS is a form of outsourcing that exhibits a low specificity of assets – investments in physical IT infrastructure as well as people for developing, deploying and operating software applications are serving multiple end-users.

These two perspectives seem to be embedded into the concept of business model. Specificity and inimitability are particularly seen as qualities of a software firm's value proposition and activities. However, for the purposes of this study I will be adopting the term specificity (or customer-specificity) as the key

concept describing the qualities of a software firm's business model elements. This is due to the focus of transaction cost theory on the commercial activity between customer and provider, which I believe matches the customer-oriented thinking of business models. In comparison, the resource-based view focuses more on competitive advantage and so is therefore closer to the notion of strategy. Fully taking into consideration competitive pressures – especially in the context of lifecycle dynamics – should nevertheless adequately cover the pertinent aspects of a resource-based perspective.

A proper conceptual framework for empirical studies should include definitions of the concepts that will be used and how those concepts relate to each other, as pointed out in the existing literature. However, since there is already an excessive amount of partly overlapping, partly contradictory model definitions and frameworks, this thesis does not aim to present yet another totally new conceptualization or framework. Instead, it seems more fruitful to base it on a synthesis of previous described business models. It thus aims to be as comprehensive as possible, in order to allow different theoretical perspectives to be applied. The main aim is to analyze the business models of SaaS firms in particular, and the additional aim is to examine the consequent changes in software firms' business models in general.

Business models serve the purpose of allowing researchers to analyze the firms' characteristics as they currently manifest. This dissertation considers the four business model elements mentioned earlier: value proposition, activities, organizational structure and revenue logic. This being an interpretation, the researcher is selecting the appropriate level of detail for each element of this analysis. Consequently, this dissertation uses second-level constructs as business model parameters to analyze and classify the SaaS firms.

The business model concept is also used in this dissertation to analyze the changes in SaaS firms' behavior. This study then focuses on analyzing the impact of both internal and external influences on the defined business model's parameters. In line with the extant literature, it is argued that the internal causes for change originate from the SaaS firms' choices of strategic aims and scope. As previous studies have also found, I argue that new technology and competitive forces are potential triggers for changing a business model. These forces take effect through the manager, and hence through the strategic aims and scope of the company. In the case of SaaS firms, new technology in effect refers to cloud computing. Competitive forces, in this context, are specifically the actions of competitors, of changes in customer demands, and of changes in lifecycle dynamics on the business model.

This research is best described as explorative-descriptive in nature due to the novelty and complexity of both SaaS and the business model concept. This research, in turn, will neither test nor validate a general theory, but aims to develop an understanding of the issues that are relevant to what Software-as-a-Service firms offer, how they operate and how they make money. Therefore, the framework development results in conceptual framework that guides the author to capture the details of SaaS firms' business models. The framework is

illustrated in figure 1 below. It captures the business model elements that are connected – in line with the holistic thinking about business models and the theoretical considerations above – through the levels of specificity. In other words, it seems reasonable to assert that if one of the business model elements of a SaaS firm is specific, it should be reflected in the other elements as well. This framework also shows the potential internal and external forces that affect the choice of business model.

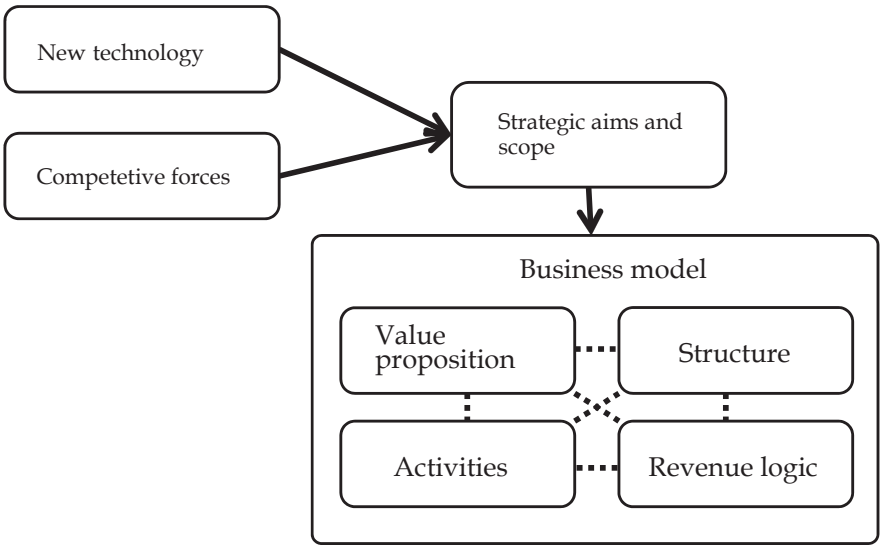


FIGURE 1 Conceptual framework for this dissertation.

A multifaceted business model is thus constructed. Firstly, the value proposition combines a software firm's choice of customer segment with choices concerning the product/service offered (Chesbrough & Rosenbloom, 2002; Hedman & Kalling, 2003; Johnson et al., 2008). Secondly, activities performed by the software firm are divided into software-related activities, such as development, deployment and maintenance (Messerschmitt & Szyperski, 2003, p.122-125), as well as those associated with creating and maintaining the customer relationship. Thirdly, organizational structure is conceptualized as the allocation of a firm's employees internally; into customer-facing unit performing customer-specific work, and into the back-end unit producing products and services that will be on offer (Davies, Brady, & Hobday, 2006; Galbraith, 2002). Organizational structure also refers to the allocation of activities and resources between a focal firm, its suppliers, and its channel partners. Finally, revenue logic deals with the temporal rights and pricing model (Lehmann & Buxmann, 2009).

4 RESEARCH METHODOLOGY

The methodology for this research follows the sequential mixed methods approach (Creswell, 2002, p. 15), and facilitates validation of the results by means of data, investigator, and methodological triangulation. The following subsections introduce how the included articles contribute to the specific research objectives, introduce the scope of the research and introduce the details of research methods used in this dissertation and in the included articles.

4.1 The specific research objectives

The main objectives of this dissertation are to study the differences in business models for different SaaS firms and also to examine the way these models might change for them.

In order for different SaaS firms to appear, there needs to be divergent needs among the client base. In light of the findings by Benlian et al. (2009), this study first investigates (in Article I) how SaaS is adopted, particularly with regard to how the customer organization's needs and requirements may affect the software firms' activities and value propositions. In Article II this study goes on to study how macroeconomic forces may affect the adoption of cloud computing technologies by end-user organizations. The aim is to find out whether SaaS services and cloud computing technologies are adopted in a variety of ways or in a uniform way.

In the light of claims to there being differences in the business model elements (Cusumano, 2008), and properties of software firms (Yao, 2002) as well as what the application service providers offer (Currie & Seltsikas, 2001), this study empirically investigates how SaaS firms differ in their business model and properties. Both Articles III and IV of this study therefore address the first research question by examining the following aspects of SaaS firms:

- Size of the customer organization, thus indicating the customer segmentation
- Buyer's role in said organization, indicating both customer segmentation as well as marketing and sales activities
- Features of the software application, i.e., value proposition
- Requirements for integration and training in software application functionalities, i.e., software-related activities
- Customer relationship management practices, that reflect marketing and sales activities
- Allocation of employees, reflecting organizational structure
- Functions outsourced by SaaS firm, reflecting organizational structure
- Use of subscriptions, i.e., temporal rights
- Pricing, revenue sources, sales case size, i.e., revenue logic.

Article V addresses the second research question – the ways business models of SaaS firms have adapted to change – with regard to the new industry structure (Iyer & Henderson, 2010; Leimeister et al., 2010; Weinhardt et al., 2009), and particularly in the case where SaaS firms are required to take over a continuous customer relationship (Stuckenberg et al., 2011). Article IV also addresses this second research question, but particularly with regard to the strategic aims of two different SaaS firms, and how these aims put into effect changes in their business models. Finally, in Article VI, this study examines the changes, with the advent of cloud computing, to software firms' value propositions, activities, structure and revenue logic. Have the changes occurred simply because of increased access to this new technology or actually because of competitive pressures?

4.2 The scope of the study

In looking at IT outsourcing from the end-user organization's perspective, this study has looked specifically at the vertical software industry in telecommunications. This vertical sector was considered a particularly suitable context for observing SaaS as a form of IT outsourcing (in Article I and in Article IV), since it was observed to comprise of vertical industry enterprises (secondary software companies) and software firms (primary software companies) providing suitable setting for IT outsourcing studies. Further, it was observed to exhibit the common development in the vertical software industries that once unique and differentiating software depreciate into commodity (Tyrväinen, 2009; Tyrväinen, Warsta, & Seppänen, 2008). Also, telecommunications is a research setting with all the complexities that modern software applications and IT infrastructures entail. In other words, the system environment for a telecommunications service provider consists of possibly hundreds of individual software applications and their supporting IT infrastructures (Frank, Luoma, Mazhelis, Pulkkinen, & Tyrväinen, 2012, p.152) In such a scenario, the end-user organizations would

very likely be pain points for traditional forms of IT outsourcing, so it would seem natural for enterprises in the telecommunications sector to turn to, or at least consider SaaS as means of IT outsourcing.

In studying the business models of Software-as-a-Service firms, this research derives its findings from Finnish software firms. According to Nukari and Forsell (1999), Finnish software industry consists of three types of software firms: (i) of those producing software products; (ii) of those producing customised software applications (i.e. software services); and (iii) of software firms producing embedded software used in electronic devices. Further, some of the software applications are sold to any industry (i.e. horizontal software), whereas vertical software applications are developed for the needs of a particular business or industry segment (Sallinen, 2002). The findings in Article III and Article VI are derived from survey questionnaire targeting practically all Finnish software firms, which fall under the NACE industry code 62 ("Computer programming, consultancy and related activities"). Producers of embedded software applications were omitted from the analyses.

As already noted above, the distinction between software product and software services companies is not clear. Similarly to the international studies, previous studies focusing on the Finnish software industry have found 'Pure-play' software product companies, 'Pure-play' software services companies and several types of hybrid firm that provide their customers both standardised products and customer-specific services in the Finnish software industry (Hätönen, 2008; Sallinen, 2002). Sallinen (2002) finds that the source for this variation is in the different competences that the software companies possess. Hätönen (2008) in addition suggests that the variation is because of different lifecycle stages of software companies. That is, software companies start with a minimal software product and an abundance of customised services required to make the application work for the customer. In the next stage, the software companies expand their client base and build competences for project work. By gradually learning from projects and adding standardised products and services across customers, the software company becomes a provider of parameterised software solution. Finally, as an outcome of the ongoing standardisation, the software firm is capable of building a commoditised software product and both the software application and related services can be leveraged from customer to customer (Hätönen, 2008).

Sallinen (2002) suggests that the Finnish software industry is changing continuously, making classifications difficult. In this dissertation, the author believes this difficulty is due to the variety of activities that the software firms are performing to provide their customers a complete solution. Studying also the Finnish software industry, Lilius (2012) introduces a plethora of services a software company could offer. First, a software company may provide services helping the customer to utilise the software and IT and find appropriate software applications, IT systems and services (i.e. consulting). Second, a software company may help the customer to implement, operate and maintain the software application and related IT systems (i.e. developing customised applica-

tions, system integration services, R&D services, infrastructure management, hardware support, hosting services, etc.). Finally, the software company may operate the IT parts of the customer's business process (i.e. business process outsourcing). (Lilius, 2008).

There are two Finnish reports touching upon the SaaS phenomenon, one focusing mainly on the competence development of software firms and another aiming at introducing a practical account of SaaS firms business. Von Hertzen, Laine, Kangasharju, Timonen, & Santala (2009) suggest that SaaS shall change sourcing of software applications radically within the next few years. Software firms should therefore consider new competences in the areas of product development and business management to enable reacting faster to the changes within the firm as it is growing as well as in the environment and in the customer needs (von Hertzen et al., 2009). Järvi, Karttunen, Mäkilä, & Ipatti (2011) on the other hand introduce the guidelines on how to develop SaaS business. They suggest that different approaches should be taken by different SaaS firms in terms of software development, marketing, sales and support services.

Using Finnish software firms in deriving the empirical results implies a geographical limitation of the empirical studies. Finnish software industry has been characterized as the second most favorable environment for the development and growth of IT firms in the world, right after the U.S. This relates to the world's highest ratio of IT-related R&D investments to GDP, to the quality of a country's ICT infrastructure and the ability of actors to use ICT to their benefit. Consequently, establishing new software business is relatively easy. There are approximately 8000 IT companies in Finland, out of which two thirds focus on producing software. Most of software firms serve other businesses and organisations in the public sector. While there are some Finnish software companies and IT services firms that have succeeded internationally, Finland is still a net importer of software products and smaller software firms are more typical for the software industry. The Finnish software firms serve mainly the local markets, but due to the limited size of the domestic market many software firms also attempt international operations. Overall, the market conditions are deemed equal to most other European markets in terms of distribution of software firms into large, small and medium-sized and micro-sized firms, in terms of industry consolidation and the effects of globalization, IT outsourcing and offshoring. (Rönkkö, Peltonen, & Pärnänen, 2011, p. 7-10; Ali-Yrkkö & Martikainen, 2008; Kontio et al., 2008).

4.3 Literature reviews

Existing literature on Software as a Service and on business models has already been analyzed, summarized and discussed above. However, this section describes the protocol that was used to do this. The purpose of the literature reviews was threefold: 1) To apprehend the stream of research on both subjects; 2) to locate gaps in the research; and 3) to elicit the relevant concepts, as well as a

research framework for studying the business models of software firms. The method for conducting the review followed steps and guidelines suggested bothKitchenham (2004) and Okoli and Schabram (2010). The protocol for the literature review resulted in strategies for searching and screening the literature on business models that would be included, criteria for quality appraisal, and procedures for data extraction and synthesis.

Three literature databases (Scopus, Proquest, Aisnet) were thus searched. The search was limited to refereed journal articles, to particular subject areas and to a set of keywords (see Appendix 1 for details). While the search was mostly limited to refereed journal articles, during the screening process several particularly relevant refereed conference articles were discovered through a backward reference search and, based on the qualitative standards for inclusion and exclusion, a decision was made to also include these in the review.

The practical screening (i.e., screening for inclusion) was based on keywords and abstracts. Aligned with the set objectives, only the articles contributing to understanding of SaaS as a concept, of its adoption and its acceptance, or of business factors associated with these were included. Aligned with the objectives of the review on business models, only refereed articles that either theorized on business models, provided means for framework development, or examined providers' business models in the information technology domain were included.

For the quality appraisal (i.e., screening for exclusion), two subjective qualitative standards were applied. Firstly, studies were excluded when they considered the subject in only a marginal manner. Secondly, studies were excluded when the article didn't contribute to any further understanding of the SaaS phenomenon or business model concept (either because they replicated a study already included, or presented similar conceptual considerations).

Reading the articles as part of the quality assessment also enabled me to identify emergent themes within the screened literature sources, especially in the case of the literature on business models. Grouping the articles was then followed by data extraction and synthesis. The data extracted for each article included a full reference, the research questions, the research framework where possible, key assertions, and conclusions. Following the guidelines by Levy and Ellis (2006), syntheses covering the main points from the extant literature were presented. I found that although the choice of articles and practical screening were conducted in a systematic manner, the quality appraisal was certainly subjective and therefore the literature review was in the end a narrative review. This means that the literature review was then more skewed towards a qualitative interpretation of the literature.

4.4 Qualitative approaches: Case studies

This dissertation uses case studies as a research approach for gaining new insights and information to understand and portray the SaaS phenomenon. Case studies were deemed a suitable approach as this study focuses overall on organizations and relies on the experiences, choices and actions of practitioners regarding changes to the business models and the adoption of SaaS. With case studies, this dissertation attempts to show both the complexity and singular details of the phenomena – both SaaS and changes to business models (Bhattacherjee, 2012; Yin, 2009).

In Article I, the study uses an exploratory case study approach (Benbasat, Goldstein, & Mead, 1987; Yin, 2009) to simultaneously gain understanding on how SaaS is adopted in the context of vertical software industries, and to facilitate further research in the area. An exploratory approach was chosen because of a lack of practical knowledge at the beginning of the study, and because of the need to explain some of the reasons why SaaS might be adopted at the overall beginning of the study. The companies chosen for this case study were therefore picked through both purposive and convenience sampling (Miles & Huberman, 1994). For the former, the sampling frame consisted of finding case companies of different sizes, with concomitantly different scales of operation. Eight companies were included, six of which were telecommunications service providers in Europe and China and two of which were globally operating IT companies producing software products and services. The data gathered for this study followed the common practice of collecting background information on the companies via public documents and then collecting primary data through focused and in-depth interviews (Yin, 2009).

In Article IV, this dissertation applies the interpretive case study approach (Walsham, 1995, 2006) to go deeper into the operations, revenue logic and organizational structures of SaaS firms. Interpretive case study was applied to enable rich qualitative information to be collected on the business models of SaaS firms. This study is also considered as a holistic comparative study with a multi-case design (Benbasat et al., 1987; Yin, 2009). The cases were selected for this study via purposive sampling and in two phases. After the initial round of interviews with five SaaS firms, four of the companies were found in fact to be vastly similar in terms of their age and the standardized software applications that they were offering as start-ups. Only one of the firms was found to have a background in professional services and, additionally, this was the largest and oldest of them. Therefore to enable an effective comparison of these SaaS firms' characteristics, a decision was made to compare the latter firm against only one of the start-ups. Thus, the two firms finally selected for comparison were chosen for both their similarity as well as their differences, as this made it easier to compare their characteristics. In the interpretive case study several interviews with key informants were conducted over a longer period of time. Specifically, the interviews were executed during the Fall of 2011 and throughout 2012.

Regarding the frame of reference for the interpretive case study, the business model parameters of the two SaaS firms were examined by employing the concepts of a business model suggested by Osterwalder et al. (2005). In particular, the concepts include value propositions, customer segmentation, channel preferences, key activities and partnerships, revenue logic and cost structure. Later on, the framework by Davies et al.. (2006) for examining integrated solutions and related organizational structure was used to examine SaaS businesses. This framework divides organization into a front-end unit, performing customer-specific work, two back-end units producing standardized products and services, and a strategic center that coordinates activities between front and back-end units.

In cases where interaction with a case company or informants lasted over a longer period of time, data collection, coding and analysis were conducted in an iterative fashion (Glaser & Strauss, 1967). This effectively meant that during the first round, the interviews and analyses were considered more relaxed. In the later phase however, more structured interview procedures were used. In the cases of a focused interview, more structured interviews were evidently preferred. For both the exploratory and the interpretive case studies, analysis of the data followed the principles of qualitative research on parallel data reduction, data display and drawing conclusions (Miles & Huberman, 1994). Firstly, the data was organized by identifying unique patterns in each case on the basis of interview questions. Pattern matching (Yin, 2009) revealed whether observations matched or didn't match the expected pattern within cases, and also provided some degree of explanation as to why this might be. In order to produce and report the findings, a cross-case synthesis technique was employed, enabling comparison of the cases and aggregation of the data (Yin, 2009).

4.5 Qualitative approaches: Scenarios

In studying the macroeconomic forces (in Article II) and their effect on the adoption of cloud computing technologies by the end-user organization, this dissertation employed an exploratory approach, in which future scenarios were created based on expert interviews and scenario analysis. Scenarios are defined as a tool 'to examine fundamental uncertainties and expand people's thinking' (Schoemaker, 1993, p. 194). For this reason, the scenarios are not used as some kind of fortune-telling, but to discuss possible outcomes for several alternative and possibly co-existing developments. Such an approach was deemed appropriate, as the adoption of cloud computing technology is a complex phenomenon with a high degree of ambiguity. Under such circumstances, scenarios make it possible to anticipate developing needs.

In general, scenario elaboration includes a number of identifiable tasks related to generating ideas: i.e., gathering data, integrating ideas, and checking the consistency of scenarios. The process of elaborating scenarios in this study followed the general guidelines suggested by Schoemaker (1993), which include

steps for identifying the current trends and uncertainties, constructing scenarios and assessing their plausibility.

To facilitate the scenario elaboration, empirical data was gathered through a set of interviews among representatives of the service providers (in this case, the potential adopters of cloud computing technologies) and software vendors, who were considered as industry experts. The data collection aimed to reveal the political, economical, societal and technological incentives affecting ICT and the adoption of cloud computing in China. The interviewees represented a mix of Chinese mobile operators (three interviews), Chinese content providers (one interview), foreign infrastructure software providers (two interviews), and foreign system integrators (four interviews).

The scenario elaboration methods vary in rigor and scope (Bishop, Hines, & Collins, 2007). They might employ techniques relying on the researcher describing the future or techniques in which cross-impact analyses are used for calculating relative probabilities for future events. In this study, the GBN matrix and morphological analysis were employed. In GBN, a matrix of polar dimensions is created and the combinations of the dimensions incorporate the scenario logic (Schwartz & Ogilvy, 1998). Morphological analysis (MA) uses a 'future table', in which each (in this case) incentive is given a column in one of the table's two dimensions, and on this column several alternative future states can be determined (Godet, 2000; Rhyne, 1981).

In particular, this study applied a deductive GBN approach, that compared and contrasted the different incentives for adopting cloud computing technologies, and which meant that the incentives could be reduced to two principle drivers: social identity and technology sourcing. Once these dimensions were identified, initial scenario descriptions could then be formed based on causal logic from the present to the future.

Following the first iteration, morphological analysis was then used to verify the consistency of scenario logics, and initial scenarios were then reiterated based on conflicts in the logic. Also, another set of interviews was conducted in China among Chinese academics and representatives (seven in total) of a standardization body that was developing cloud computing specifications, to verify results from the first round of analysis. Initial scenarios were presented to the interviewees and the plausibility of conclusions were then discussed. While minor modifications were made to the scenario descriptions, it was found that the trends and various possible developments that had been identified using GBM and MA were largely applicable and relevant for the Chinese ICT environment.

4.6 Quantitive approach: Surveys

This dissertation uses data from cross-sectional surveys on the status of the Finnish software industry, specifically the annual Software Industry Survey. The intent was to generalize (from the sample to a population) on the character-

istics of different SaaS firms (in Article III), and on the changes in business models caused by cloud computing and other external pressures (in Article VI).

The annual Software Industry Survey follows a modified version of the tailored design (Dillman, 2007), using postal mail and a web-based form with email invitations to collect the data. The survey has been developed in a group of researchers in Finnish and is then delivered to respondents in either Finnish, Swedish or English, and provided an opportune source of data for this research. In addition to the filled questionnaires, various secondary data related to each firm's financial figures, dates, and location were collected. In 2011, the mailing list for the survey had key informants for 5469 software companies (used in Article III); and in 2013, the list had 4878 names (used in Article VI). The data collection lasted for about two months and after contacting the firms five times each, this data collection resulted in 506 complete and 168 partial answers for 2011, while in 2013 there were 379 complete and 121 partial responses. The author notes that whereas the items in the questionnaire were developed in cooperation with a larger research group the data collection is administered by researchers in the Aalto university.

Various checks were made prior to data analysis to make an informed choice of the statistical method to be used. These checks included examining the distribution of responses via descriptive statistics and the Shapiro-Wilk's test, and detecting the most influential responses visually using box plots. In addition, the checks included assessing the potential for common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) using Harman's single-factor test, and multicollinearity was also assessed using binary correlation analyses.

In article III, to examine the association between ASP/SaaS revenue and customer segmentation, marketing activities and the revenue logic of SaaS firms in operation, bivariate correlations and linear regression analyses were used. In the same article, to develop a classification of the different kinds of SaaS firms, a family of cluster analyses was employed (Hair, Anderson, Tatham, & Black, 2006). The analysis of 163 SaaS firms involved hierarchical average linkage clustering to determine the number of clusters and, to arrive to the final results, a confirmatory k-means cluster analysis was conducted. After the memberships of each cluster were established, each cluster was examined through descriptive statistics. A non-parametric Mann-Whitney U-test was then conducted to find statistically different characteristics between the SaaS firms in each cluster.

In Article VI, to examine and compare how different software firms changed their business model, descriptive statistics were also used. In particular, non-parametric binary correlations and U-tests were conducted firstly to compare the business model changes of those adopting cloud platforms, and those who were not; and secondly to compare software product and software service firms both adopting cloud platforms. In Article VI, to assess whether the changes to business models were either attributable to adopting cloud platforms or to competitive forces in the software firms' environment, ordinal regression analyses were used. This choice was due to the characteristics of the data. Ordinal regressions treat each ordinal value as an independent variable, which makes it

therefore possible to examine parameter estimates for a certain range of values within an independent variable (McCullagh, 1980).

5 INCLUDED ARTICLES

5.1 Article I: Adoption of Open Source Software and Software-as-a- Service models in the Telecommunication Industry

Luoma, E., Helander, N., & Frank, L. (2011). Adoption of Open Source Software and Software-as-a-Service Models in the Telecommunication Industry. In B. Regnell, I. van de Weerd, & O. De Troyer (Eds.), *Lecture Notes in Business Information Processing, Vol. 80, Proceedings of the Second International Conference on Software Business (ICSOB 2011),* (pp. 70–84). Berlin Heidelberg: Springer.

Research objectives

The first article examines the adoption of open source software (OSS) and Software-as-a-Service (SaaS) in the telecommunications industry. Although there has been general accounts about the benefits and issues in SaaS adoption (Choudhary, 2007; Gold et al., 2004; Greschler & Mangan, 2002; Jacobs, 2005) as well as an empirical investigation revealing evidence about varying adoption patterns (Benlian et al., 2009), none of the earlier works has considered the SaaS adoption in a specific vertical domain. The objective was therefore to find which types of software applications are deployed in the SaaS format among telecommunications service providers. . In addition, another objective was to find out firstly how much value these providers ascribed to SaaS, and secondly to discover the benefits and drawbacks of adopting such a format in this vertical industry. The primary data was collected by interviewing representatives from six telecommunications service providers operating in Europe and in China and three large software vendors serving them.

Findings

The results from the study indicated that SaaS was adopted as an outsourcing option by only some of the telecommunications service providers. The software

applications were used in customer relationship management and financial management processes. These represent horizontal software applications, which could be used in many vertical industries. The SaaS format in these cases was regarded as beneficial in terms of flexibility and cost, but problematic in terms of security and integration with the existing software and IT infrastructure. These findings on the benefits and drawbacks are in line with the above-mentioned previous studies on SaaS, and show that it is not (as yet) employed for industry-specific software applications. The reason for it not being adopted in some cases was when it would have been needed for company-specific processes and technology interfaces. Because SaaS would be in a highly standardized format, it was therefore found to be unsuitable for such applications.

Summary and interpretation in context of the dissertation

To summarize, this study showed that a high level of process and interface specificity were factors hindering the adoption of SaaS as an outsourcing option. While a high level of process specificity may impede using a standardized SaaS option altogether, it still however leaves room for the software firms to provide a customized software application in ASP mode that would support the process. As for a high level of interface specificity, this should not in itself impede using a standardized SaaS option if the process is simple and common enough in the industry. Nevertheless, this would require the software firm to offer integration services.

In conclusion, the study covered in this article suggests that there is a demand for different value propositions. The level of specificity in the processes and technologies of customer organizations has a direct impact on the viable value propositions that a software firm may offer. Also, the need for integration has a direct impact on the value proposition and necessary activities that the software firm has to carry out.

5.2 Article II: Four Scenarios for Adoption of Cloud Computing in China

Luoma, E., & Nyberg, T. (2011). Four Scenarios for Adoption of Cloud Computing in China. In V. Tuunainen, M. Rossi, & J. Nandhakumar (Eds.), *Proceedings of the 19th European Conference on Information Systems (ECIS 2011). Paper 123.* Helsinki, Finland.

Research objectives

The second article argues that the existing studies on cloud computing (Alter, Peng, Runhua, & Harris, 2010; Armbrust et al., 2009; Gartner, 2009; IDC, 2009; Lin, Fu, Zhu, & Dasmalchi, 2009) tend to focus on questions of why cloud computing technologies might be adopted or how much they have been adopted,

whereas this article focuses on how it would be adopted, using the scenario approach. Based on interviews with representatives from Chinese and global ICT companies serving a specific geographical market, this study identifies the political, economical, societal and technical trends affecting the development of the geographical market in question for cloud computing technologies. The trends are prioritized to formulate four future scenarios and the validity of the scenario logics are assessed through a second round of interviews with Chinese scholars studying the market as well as representatives of a Chinese standardization body.

Findings

The scenario approach concludes in suggesting two alternative but potentially co-existing developments related to the uptake of cloud computing technologies in a specific geographical market. Firstly, the trends in the market may lead to data-intensive development, where investments are made to build capabilities related to the IT infrastructure. This development would be telecom operator driven, due to their scale and connection to the central administration. Secondly, the trends in the market may lead to developments where investments are made to cater for the growing demand for online content and services by individuals and SMEs. It is argued that opportunities under both circumstances include fulfilling the demand for innovative solutions and that software firms should therefore differentiate themselves in terms of services, which are built on top of a standard cloud infrastructure. It is further suggested that in a collectivistic environment, one must also invest in high quality support services and long-term contracts to achieve trust among the customers.

To speculate on the findings, in the geographical area of this study, the telecom operators are likely to acquire customized software applications to support the treatment of vast amounts of data. Whether these are deployed in ASP mode or as on-premise installations was beyond the scope of this study. However, SMEs on the other hand are more likely to opt for commodity SaaS offerings for online content and services.

Connection to the objectives of the dissertation

The analysis of interviews with experts, using a qualitative approach, suggests that cloud computing technologies are and would be adopted in a variety of ways, and not uniformly. In conclusion, this study suggests that there is therefore a demand for different value propositions.

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

Luoma, E., Rönkkö, M., & Tyrväinen, P. (2012). Current Software-as-a-Service Business Models: Evidence from Finland. In M. Cusumano, B. Iyer, & N. Venkatraman (Eds.), *Lecture Notes in Business Information Processing, Vol. 114, Proceedings of the Third International Conference on Software Business (ICSOB 2012),* (pp. 181-194). Berlin Heidelberg: Springer.

Research objectives

In the third article, it is argued that the contemporary literature on SaaS adoption (Benlian et al., 2009; Susarla et al., 2003) considers SaaS as a fairly uniform offering and, therefore, fails to consider the different value propositions of SaaS firms, their different means of value creation and their different ways to capture value. For that reason, Article III focuses attention to the different characteristics and business models of Software-as-a-Service firms and produces a novel classification of these firms. The classification is produced to enable identification of business model parameters and configurations thereof that are typical for different SaaS companies' business model. In particular, this study investigates SaaS firms' descriptive characteristics and the choices of customer segments, value proposition, revenue logic, marketing channels and customer relationship.

Findings

By analyzing the characteristics and business model parameters of 163 Finnish software firms – i.e. the effective sample of ASP and SaaS firms – the article concludes in finding four cluster profiles;, two types of ASP firms and two types of SaaS firms. The cluster profiles are shown in table 4 below. The SaaS taxon are labeled according to the existing classification of ASP firms (Currie & Seltsikas, 2001) as 'Pure-play SaaS' firms and 'Enterprise SaaS' firms.

The 'Pure-play SaaS' cluster suggests a business model configuration, where a standardized software application is delivered over the Internet, without the need to instruct the users or integrate the software application. Therefore, this configuration is associated with lower price and targeting smaller customer segment. The 'Pure-play SaaS' model is also associated with using online channels for marketing, sales and delivery.

The 'Enterprise SaaS' cluster indicates a business model configuration where the software application is also standardized for all customers and delivered online. However, in this model the software application is possibly more complex or supports more comprehensive process and, therefore, requires offering adjacent services like consultancy, training and integration to existing systems. These components of the value proposition and the larger size of the customer may demand more effort in nurturing the customer relationship. Con-

sequently, online marketing and sales channels are not employed, but the business may be based on more personal business relations. For these reasons, the size of the transaction for 'Enterprise SaaS' is generally higher compared to 'Pure-play SaaS'. This suggests that in addition to the subscription fee, the software firm belonging to this cluster may charge on time and materials related to the customer-specific activities.

TABLE 4 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. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Connection to the objectives of the dissertation

In this dissertation, business models of software firms are observed through their value propositions, activities, structure and revenue logic. This article therefore provides a partial answer to the first research question by I) making available a classification of the Software-as-a-Service firms, II) by providing means to identify the dimensions which serve as basis for elaborating a taxonomy of SaaS firms and finally, III) by describing value propositions, activities and revenue logics of the two different SaaS firms.

With regards to the first research question, this article identifies customer-specificity of the software application and customer-specificity of the activities as the key differentiating dimensions between the two types of SaaS firms. Whereas the former dimension enables distinguishing between the ASP and SaaS firms, the latter dimension enables telling the difference between 'Pure-play' and 'Enterprise SaaS' firms. This study also contributes to understanding that the characteristics of SaaS firms resemble the essential qualities of software product firms and, likewise, the ASP model has the characteristics of traditional software services business.

5.4 Article IV: Examining Business Models of Software-as-a-Service Firms

Luoma, E. (2013). Examining Business Models of Software-as-a-Service Firms. In J. Altmann, K. Vanmechelen & R. Omer (Eds.), *Lecture Notes in Computer Science, Vol. 8193, Proceedings of the 10th International Conference on Economics of Grids, Clouds, Systems and Services (GECON 2013)*, (pp. 1-15). Berlin Heidelberg: Springer.

Research objectives

In this study, author detected a lack of examinations capturing the aims and outlooks of Software-as-a-Service companies. Therefore, he conducted an empirical investigation on the scope and strategic aims as well as on the operations, revenue logics and structures of two different SaaS firms. The examination of both the strategic choices and the business models enabled the author to observe both i) the characteristics of different business models of SaaS firms and ii) the impact of strategic choices to the selected business model parameters. To work towards these objectives the author conducted a multicase study comparing a 'Pure-play SaaS' firm and an 'Enterprise SaaS' firm. Table 5 below summarizes the findings of comparing the case firms.

TABLE 5 Comparison of the business models of the case companies.

	Case Sopima	**Case Qvantel**
Scope and aims	Horizontal focus Balanced business model Cost efficiency Maintain standardization Increase automation	From vertical to horizontal Integrated solution Customer intimacy Increase standardization
Operations	Target on SMEs One application to all customers 100% standard application Inside sales, low-touch	Target on key customer One platform to all customers 90% custom-tailored Long-term relationships Helping customers
Revenue Logic	Recurrent monthly fee Service fees 100% of total Tailoring 0% of total	Revenue share Service fees 70-80% of total Time and materials 20-30%
Structure	Approx. 60% in front office Approx. 40% in back office Sw implementation outsourced Infrastr. Services fully outsourced Value adding services outsourced	Approx. 80% in front office Approx. 20% in back office R&D 10%, Managed services 10%

Findings

The case of Sopima Ltd. demonstrates a business model configuration with focus on cost-efficiency. This involves providing a fully standardized, horizontal software application to SMEs. The key activities include inside sales and designing the software application. Most of the employees are allocated to sales activities and the company has outsourced software development, hosting of the IT infrastructure and potential value-added services. The company sells subscriptions and avoids customer-specific work to maintain the business model configuration as efficient as possible.

The business model configuration of Qvantel Ltd. is vastly different from case Sopima. It is also very different from the prevailing interpretation of SaaS business model parameters in the extant literature (Benlian & Hess, 2011; Schwarz et al., 2009; Stuckenberg et al., 2011). Their focus is on helping the customers, which stands for a customer intimacy strategy. What Qvantel provides to its set of key customer is a custom-tailored solution running on a standardized IT platform. Here, the notion of solution is similar to Gold et al. (2004) vision on Software-as-a-Service with fine-grained pieces of *standard* software applications bundled to form a functioning whole. This logic where the standard pieces are integrated to a customer-specific solution enables the firm to charge service fees as well as time and materials of the customer-specific work. The activities are focused on providing an integrated solution to the customers' need, which then realizes as software development, deployment and operating activities as well as business process outsourcing activities. Approximately 80 percent of employees work towards customer-specific solutions and the rest are allocated to R&D activities and standardized hosting services. Qvantel has aims to make their offerings even more uniform, for both the software components and a common set of services. This would help them to match the prices of existing SaaS vendors or to make better margins.

Summary, interpretation and connections to the dissertation

The study in Article III revealed a possibility that two types of SaaS firms exist. In this study, the characteristics of the 'Pure-play' SaaS firm and the 'Enterprise SaaS' firm were elaborated. This article therefore provides a partial answer to the first research question by investigating the value proposition, activities, structural aspects and revenue logics of different Software-as-a-Service firms. Specifically, the study was able to illustrate the difference between a SaaS firm focusing on cost efficiency and a SaaS firm whose business was based on customer intimacy. Similarly as in Article III, the activities performed by the different SaaS firms reflect the characteristics of software product firms and software services firms.

However, despite their positioning as a SaaS firm, Qvantel's offering represent the characteristics of and ASP firm. The interpretation is that rather than representing a case of an 'Enterprise SaaS' firm, Qvantel is a software services

firm in transition towards being a SaaS firm providing a standardized software application and a set of adjacent services. In author's view, this presents a common fallacy which is attributable to the multiple connotations of SaaS.

By investigating the effect of managers' decisions to the business model elements, this study contributes to the second research question by focusing on the internal influences. Scope and aims of a software firm reflect the strategic choices originating from within the company, as a response to the managers' cognition of the changes in the external environment (Aspara et al., 2011; Cavalcante et al., 2011; Zott & Amit, 2007). The choices of scope have the potential to either fix certain business model parameters as immutable and the choices of strategic aims have the potential to change certain parameters of the firm's business model. Specifically, this investigation examined operations, revenue logics and internal structures of the two different SaaS firms. It was found that the 'Pure-play' SaaS firm tries to fix the business model parameters to maintain cost-efficiency. On the other hand, the 'Enterprise SaaS' firm strived for more standardized offering due to the cost pressures in their business environment, while maintaining a profitable mix of standardized and customer-specific offerings. This is in line with the arguments by Tyrväinen et al. (2008) and Cusumano (2008) on the effects of lifecycle dynamics to the software firms business; in software business with low competitive advantage the focus is on process innovations.

5.5 Article V: Utilizing Ecommerce Framework to Analyze the Changes in Software Business

Luoma, E. (2010). Utilizing Ecommerce Framework to Analyze the Changes in Software Business. In Z. Lin & X. Luo (Eds.), Proceedings of Joint Conference on eServices and Business Intelligence, Chengdu, China: eBEREA.

Research objectives

This study contemplates the changes to the software firms activities and structure associated with the introduction of the SaaS business concept (Choudhary, 2007). The author argues that a SaaS vendor may accomplish pre-integration of software infrastructure and application, operate the software system and, consequently, bypass the traditional software value network (Messerschmitt & Szyperski, 2003). The author also suggests that the software provided as a service is becoming a virtual good, and the trade of such goods may be observed through the lenses of ecommerce. Starting from these assumptions, this study shows how the customer channels (Vepsäläinen & Saarinen, 1998) will evolve when transforming from traditional software business to SaaS business. The analysis leads to suggesting that the communication service providers (CSPs) may play a role as an intermediary. The strengths of CSPs in this role are con-

sidered. In addition, findings from CSPs interviews are presented to uncover whether CSPs have plans to occupy such role.

Findings

The conceptual analysis results in suggesting several implications of SaaS uptake to the firm's activities. With regards to the marketing channel, the major change induced by SaaS provisioning is that the channel will become pull-oriented, representing similar change as witnessed in the music industry in the beginning of the millennium. In such case, the SaaS firm must be able to attract a large existing customer base to be profitable, hence increase online marketing activities. With regards to the financing channel, smaller transactions will require efficient billing processes. The software firms are used to small volume of large transactions and new capabilities need to be developed to manage the billing processes efficiently. The swift from license agreements in traditional software business to service level agreements in SaaS business also necessitates new capabilities, namely the software vendor are required to perform service assurance processes differing from what they are accustomed to. One option is to organize the channels in a way that the software vendor focuses on the (production and) transferring channel, marketing and ordering channels are handled by online portal and financing channel is accomplished by credit card companies. Such restructuring is visible in small applications, for instance in the case of Apple's online store.

For enterprise-grade software applications, however, the communication service providers are observed to already possess certain assets, which would allow them to enter the SaaS business; network assets to guarantee the quality of service, mature service assurance processes, billing expertise and functioning marketing channels. As expected, the interviewed CSPs already have plans to utilize their assets to occupy the intermediary role.

Connection to the objectives of the dissertation

The previous literature and industry reports (Desai & Currie, 2003; Lassila, 2006; Software & Information Industry Association, 2004) had already considered how the start-ups, software product firms, software services firms and system integrators would enter the SaaS business. This article suggests the mechanism how communication service providers would work their way to become an 'Enterprise SaaS' firm is by bundling software offering from independent software vendors and using their existing assets to deliver solutions serving their customers needs.

5.6 Article VI: Exploring Business Model Changes of the Software-as-a-Service Firms

Luoma, E., Laatikainen, G., & Mazhelis, O. (2013). Exploring Business Model Changes of the Software-as-a-Service Firms. Submitted to the 22nd European Conference on Information Systems (ECIS 2014), 24.11.2013.

Research objectives

This article suggests a gap in understanding the changes in software firms' business models induced by the introduction of cloud computing technology and competitive forces. In the article, it is also argued that cloud computing may be employed differently by software firms and, thus, adoption of cloud computing technology by a software firm may also have varying effects on business model. The article therefore examines the changes in software firms' business model induced by the cloud computing technologies and competitive pressures, and seeks to find whether there are differences in changes caused by the adoption of cloud computing technologies between software product firms and software services firms. To pursue these objectives, the article analyzes an effective sample of 324 Finnish software firms. The analysis sought to confirm the hypothesis regarding the expected change on the basis of the literature and, thus, the expected effect of adopting cloud computing technologies.

Findings

The results of the study indicate that software firms adopting cloud computing technologies are unifying their offering and pricing across different customers. The cloud adopters were also found to increase their sales efforts, which was seen as being connected to offering commodity software and, thus, to the decreasing competitive advantage. These findings are in line with the descriptions of SaaS firms' business model elements in the literature (Benlian & Hess, 2011; Lehmann, Draisbach, Buxmann, & Dörsam, 2012; Stuckenberg et al., 2011)

However, the adoption of cloud computing technologies has not had the hypothesized impact towards decreasing customer-specific software development activities or decreasing allocation of employees into customer-specific activities. Instead, these were found attributable to the type of the software firm suggesting an effect of lifecycle dynamics. That is, software product firms are striving for efficiency regardless whether they are adopting cloud computing technologies. Besides, the changes in increasing sales efforts, adding more employees to sales activities and increasing the length of subscriptions are associated with increasing environmental dynamism. If present, these forces affect activities and revenue logic for all software firms.

Software product firms – as compared to the software services firms – that had adopted cloud computing were found significantly different in terms of i)

changing to offer more standardized product or service, ii) towards extending the duration of customer contracts and iii) towards reducing the customer-specific activities. In addition, the difference towards change in unifying the pricing across their client base is almost statistically significant.

Summary and connection to the objectives of the dissertation

The findings indicate that cloud computing technologies increases the effect of lifecycle dynamics for software product firms that are increasingly unifying their software applications and pricing across their client base and decreasing the volume of customer-specific activities. The findings also indicate that the software services firms adopting cloud computing technologies are also increasing sales activities and unifying their software applications and pricing across their client base. However, the findings indicate that these firms are instead increasing their customer-specific activities.

This article provides insights into how both software product firms and software services firms are transforming the business models in a holistic way to become Software-as-a-Service firms. These findings contribute to answering the second research question. In addition, the findings can be considered as supporting the findings on SaaS firms' business model characteristics.

5.7 Contributions in joint articles

The author of this thesis collected the data and wrote the Articles IV and V by himself. In the rest of the articles, the author's contribution was as follows.

For the Article I, the authors jointly collected the data. Luoma wrote the article.

For the Article II, Luoma collected the first round of data and the authors jointly elaborated the scenarios. Nyberg conducted the second round of interviews. Luoma wrote the article.

For the Article III, the authors jointly design the survey questions. Rönkkö administered the data collection. The statistical analyses were performed jointly by all the authors. Luoma was the main contributor in writing the article.

For the Article VI, Luoma and Laatikainen designed the survey questions. Researchers in Aalto University administered the data collection. Luoma conducted the statistical analysis. Luoma was the main contributor in writing the article.

6 DISCUSSION OF THE RESULTS

Software-as-a-Service is defined as providing an online access to a remotely managed software application, that permits concurrent utilization of the same application installation by a large number of independent end-users, and utilization is provided on a subscription basis. This definition follows the delivery model, in that it combines a uniform software application for all end-users with a subscription-based service. Another definition of the SaaS concept however, comes from those software-related activities which the customers or clients outsource to the software firm. These software-related activities include design, implementation, deployment and operating, and particularly in SaaS concept implementation, the deployment and operating activities are outsourced. Through extensive analysis of the extant literature, two research gaps were discovered.

First, while there are studies exploring the differences between SaaS and the traditional software product business (Choudhary, 2007; D'souza et al., 2012; Stuckenberg et al., 2011), not to mention SaaS and the software services business (Schwarz et al., 2009; Yao, 2002), and while the archetypal SaaS business model could be derived from articles written that look at discrete aspects of SaaS; there is nothing that focuses on the range of business models for SaaS firms currently in existence. This is surprising since it is evident from previous studies (e.g. Benlian et al. (2009) and Articles I and II) that SaaS is adopted in a number of ways. It would therefore seem to follow that there might be several different business models for SaaS firms. This needs to be addressed, as it might well be that studies on the way SaaS is adopted are biased simply due to the different connotations that SaaS has. For instance, a software firm may be in transition from ASP to SaaS, but could announce and market themselves as a SaaS firm. For these reasons, this dissertation has investigated the various connotations SaaS and its business models go by. Reviewing the business model literature also allowed me to identify a set of business model elements and parameters that best describe the specificities of SaaS business models.

Secondly, the examination of current literature revealed a shortage of studies that focus on how business models for software firms evolve. Since it

has a major impact on the structure of the value network, cloud computing clearly presents an opportunity for software firms to extend their business model. In addition, studying how SaaS firms have evolved in the past might give some indication as to how they, and other software firms, will evolve in the future. Reviewing the business model literature helped to identify the key factors that might cause change in the business models.

What are the different business models of Software-as-a-Service firms?

A business model was defined as an interpretation of what a company offers, how it operates, organizes itself and how it makes money. Accordingly, the conceptual framework for this dissertation has four elements; the value proposition, the activities, the organizational structure and the revenue logic A business model is a holistic approach for interpreting the characteristics of a firm and, therefore, the business model elements are interrelated and should be observed as part of a whole configuration. Based on the present research (Articles III and IV), an answer to the first research question can be provided from two perspectives.

Firstly, the similarities and differences between the business models can be presented in the form of a taxonomy. This taxonomy includes dimensions enabling the classification of the business models. In this research, two potential dimensions were considered originating from the transaction cost theory and the resource theories. While the concept of inimitability from the resource theories was considered as applicable for describing the Software-as-a-Service offering, the author chose to apply the notion of asset specificity as the basis for creating the dimensions. This selection was made due to the theoretical soundness between the transaction cost theory and the business model concept, but also because the notion of specificity emerged as an important factor in the study on the adoption of SaaS (see Article I).

Based on the two studies reported in Articles III and IV, it was found that the difference between any two SaaS firms' business models can be determined by the amount of customer-specific activities. The 'Pure-play' business model for a SaaS firm can be identified through a very small amount (if any) of customer-specific activities, whereas the 'Enterprise SaaS' business model of a SaaS firm has a sizeable amount of customer-specific activities. Another way that distinctions can be made, in this case between the business models of ASP and SaaS firms, is when comparing the value proposition across their client base. The ASP includes a more or less customized software application, whereas in SaaS the functionalities are the same across end-user organizations.

The resulting SaaS taxonomy shown in Table 6 is both novel and of practical value for analyzing and understanding the business models of SaaS firms. The closest thing to a taxonomy of SaaS up to this point have been classifications of ASPs (Currie & Seltsikas, 2001; Kern et al., 2002), but these have been merely illustrative and thus fail to provide an exhaustive and mutually exclusive classification of ASP business models. By contrast, the SaaS taxonomy pre-

sented here allows for statistical inferences to be made about asset specificity which could prove useful, as asset specificity has already not only been cited and employed in multiple studies examining outsourcing decisions (Poppo & Zenger, 2002; Subramani, 2004; Zaheer & Venkatraman, 1994), but also as an independent variable in studying the incentives for adopting SaaS (Benlian et al., 2009).

It is evident that the resulting taxonomy presented here does bear some resemblance to the classification of software firms by Rajala and Westerlund (2007), but this is to be expected, since their classification also describes the inherent properties of software product and software service firms. But there are three significant and fruitful ways in which the present taxonomy can be compared with the earlier study.

Firstly, one difference is that this study looks at the delivery of software functionalities over the Internet. Software as a Service is perhaps therefore more of an evolutionary development associated with increased bandwidth rather than any kind of revolutionary, competence-destroying innovation (Tushman & Anderson, 1986). On the other hand, SaaS could be considered as a business model innovation, as it creates a value proposition that may attract smaller customers into the market (Markides, 2006), and it reconfigures the value proposition and revenue logic (Giesen et al., 2007).

Secondly, comparing the differences between the two taxonomies allows for a degree of prediction on the ways in which traditional software product vendors, software service companies or system integrators might adopt an ASP or SaaS format for their business in the future.

Thirdly, the SaaS firms whose intrinsic properties were analyzed seem to closest to the type of software product firms that Rajala and Westerlund call 'Applied formats' and 'Standard offering' in their classification. The examples given for each of these types were SAP and Microsoft, as we knew them in 2007. SAP has traditionally made most of its revenues since from services, although it is a software product company, whereas Microsoft represents a 'pure' software product company It means that there are also two basic strategies to compete with the SaaS format. SaaS firms with the properties of Microsoft would therefore perhaps compete following an operational efficiency strategy, and SaaS firms originating from similar business set-ups as SAP would follow the customer intimacy strategy (Treacy & Wiersema, 1993). However, this is an oversimplification and leaves out, for instance, the possibilities of SaaS firms to create value by differentiating what they offer (Amit & Zott, 2001; Treacy & Wiersema, 1993).

Business models are, as mentioned earlier, configurations of many interconnected elements and parameters, and the value of interpreting a firm's properties and behavior through them, is in being able to select the appropriate level of detail. This takes the discussion on to answering the research question from the second perspective. The two kinds of business model for SaaS firms explored in detail here were, as mentioned earlier, called 'Pure-play' and 'En-

terprise SaaS', with each consisting of a value proposition, activities, organizational structure and revenue logic.

Combining the findings from the cluster analysis (in Article III) and the comparative case study (in Article IV), the 'Pure-play' business model for a SaaS firm offers a standardized software application and targets smaller customers. This type of SaaS firm performs less customer-specific activities and uses efficient means for marketing and sales. The 'Pure-play' SaaS firm has fewer employees allocated to customer-specific work and more employees dedicated to sales. The revenue in this type of firm is subscription-based, and the transaction size is smaller. There are interconnections between these parameters. Targeting smaller (or any) customer segment, providing less customer-specific activities, employing a 'low-touch' management of the customer relationship and charging a smaller price are all intuitively connected.

The business model for an 'Enterprise SaaS' firm also offers a standardized software application or perhaps a bundle of standardized applications, but the firm targets larger customers or perhaps focuses on certain key customers. The 'Enterprise SaaS' firm performs more customer-specific activities and uses personal sales as means to contact customers. This type of SaaS firm dedicates more people to customer-specific activities as well as allocating plenty to sales activities. The revenue logic is based on service level agreements and the firm charges its customers both a service fee and fees based on time and materials. The parameters for the business model of an 'Enterprise SaaS' firm can also be observed holistically, although they target larger customers, employ a 'high-touch' management of the customer relationship. Activities that cater to a customer's specific needs and time and material fees are all connected.

It therefore seems that the attributes of the 'Pure-play' SaaS are close to the ones characterized by Stuckenberg et al. (2011) and the details in articles examining individual aspects of SaaS business (Armbrust et al., 2009; Benlian & Hess, 2011; Mäkilä et al., 2010; Ojala & Tyrväinen, 2006; Sääksjärvi et al., 2005; Schwarz et al., 2009; Software & Information Industry Association, 2004; Tyrväinen & Selin, 2011). There also seem to be two descriptions of platform-as-a-service business models (Beimborn et al., 2011; Giessmann & Stanoevska-Slabeva, 2012) that come close to the definition of the 'Enterprise SaaS' business model. Beimborn (2011) introduces the concept of an application-based PaaS (aPaaS), which means a large platform provider allow software product firms to develop extensions to the platform provider's software application. Giesmann and Stanoevska-Slabeva (2012) calls this business concept application-based integration. Cusumano (2010) however, calls such a phenomenon an industry platform. While an 'Enterprise SaaS' may also offer multiple software applications, these descriptions of a platform-as-a-service provider's business model reflect the realities of competing in a dual-sided market. In dual-sided markets the business model is based on simultaneously serving two groups of customers; developers and end-users (Rochet & Tirole, 2006). By contrast, SaaS business is an embodiment of a one-sided market (Gonçalves & Ballon, 2011) and therefore the business models of aPaas and 'Enterprise SaaS' are different defi-

nitions. Moreover, the articles suggesting these business models do not elaborate the details of the business models beyond descriptions of the value proposition and pricing logic, disallowing comparison of the business model definitions.

Details of the taxonomy presented in this study can be found in table 6. It-presents the classification of companies, dimensions to distinguish the particular taxon and the different features of the two abovementioned business models of Software-as-a-Service companies. To conclude and provide a condensed answer to the first research question:

Two types of business models for Software-as-a-Service companies currently exist and they can be distinguished by the amount of customer-specific activities they are willing to perform. The two types of SaaS firms are essentially software product firms and therefore their business models can be characterized through the inherent properties of different types of software product firms.

TABLE 6 Taxonomy of Software-as-a-Service firms

<table>
<tr><td rowspan="3">The amount of customer-specific activities</td><td>A Lot</td><td>Taxon: Enterprise ASP
Characteristics of this business model are outside the scope of the research question.</td><td>Taxon: Enterprise SaaS
Characteristics (Articles III and IV):
- standardized software application(s)
- target on larger customers
- more customer-specific activities
- traditional means of sales
- more people at customer-specific work
- more people at sales activities
- more outsourcing
- service level agreements
- service fees and time and materials
Potential entrants:
- Software services firms
- System integrators (Lassila, 2006)</td></tr>
<tr><td>None</td><td>Taxon: Pure-play ASP
Characteristics of this business model are outside the scope of the research question.</td><td>Taxon: Pure-play SaaS
Characteristics (Articles III and IV):
- standardized software application
- target on smaller customers
- less customer-specific activities
- efficient means of marketing and sales
- less people at customer-specific work
- more people at sales activities
- activities insourced
- subscription-based logic
- smaller transaction size
Potential entrants:
- Software product firms
- Start-ups</td></tr>
<tr><td></td><td>Unique</td><td>Similar</td></tr>
<tr><td colspan="3">Value proposition across client base</td></tr>
</table>

What are the changes in software firms business models induced by internal and external influences of the firm?

As previous studies have also found, I argue that new technology and competitive forces are potential triggers for changing a business model (see section 3.4). In the case of SaaS firms, new technology in effect refers to cloud computing. Competitive forces, in this context, are specifically the actions of competitors, of changes in customer demands, and of changes in lifecycle dynamics on the business model (Cusumano, 2008). As previously noted here as well as in the literature, these forces may well also take effect through the manager, and hence through the strategic aims and scope of the company, thus introducing an internal influence. Strategy has the potential to change business model parameters, whereas decisions of scope should fix certain parameters. Based on the studies in this dissertation, multiple patterns of change would seem to answer the second research question.

The analysis of internal influences in article IV exhibits two different patterns of change. The case company with properties of a 'Pure-play SaaS' firm sought to stabilize their business model design. That is, a decision was made to fix the value proposition and the activities. In particular, the managers aimed at reducing the amount of customer-specific activities to the minimum. Failing to do so would lead to increasing marginal costs. This pattern implies that the 'Pure-play SaaS' firms would make decisions on the business model to try to maintain a low amount of customer-specific activities. Article IV shows that the case company with properties of an 'Enterprise ASP' firm sought to change its value proposition and activities towards offering more standardized operations. This pattern implies that the ASP firms would make decisions on the business model to increase the operational efficiency for better margins or to match the competition.

These findings have lead the author to speculate that there are three viable means for SaaS firms to change their business model design. The two case companies each represent the first two means, while the third viable option would seem to be a hybrid, where a company starts off as a 'Pure-play SaaS' firm and turns itself into an 'Enterprise SaaS' firm. The logic behind this development is in the lifecycle dynamics. The challenge for 'Pure-play SaaS' firms is in the marginal advantage over competitors, and since the price is already set at a minimum, the only way to differentiate is to add functionalities to the software application. Over time, this will lead to increasing complexity in the application and the SaaS firm is forced to add customer-specific activities and personnel to help their customers use it. This increases the marginal costs and under such circumstances, the only viable option is to start charging for the extra activities. Consequently, the software firm changes into an 'Enterprise SaaS' firm.

Secondly, the conceptual account in Article V is related to the external influences, and suggests a large structural change to the value network. That is, owing to the delivery of software functionalities and computing capacity over the Internet, the traditional value network consisting of implementing, deploy-

ing and operating software applications (Messerschmitt & Szyperski, 2003), pp.122-125) is turned upside down. In the new structure of the software market, the firms operating the software – that used to be next to the end-user in the value network – are now at the bottom of the cloud stack (Iyer & Henderson, 2010; Mell & Grance, 2011) and the software firms are now in direct and continuous relationship with the customer (Stuckenberg et al., 2011). Although the article is speculative, the changes are observable in the present-day software industry. Therefore, it is suggested that as a result of the reshaping, two more patterns of change can be identified. With regards to the activities, the continuous relationship implies that the software firm needs to change its business model towards increasing activities in marketing, ordering, financing and transferring channels. With regards to the structural changes, in case the software firm does not have the capabilities to execute the new activities, it may need to enter into new partnerships for these channels. Also there are major changes in the sourcing of IT infrastructure services. In traditional value networks, the system integrators acted as channel partners for the software firm. Now, system integrators potentially offering a platform-as-a-service format are seen as suppliers to the software firm. These statements should be considered with caution.

Thirdly, the empirical examination of changes in software firms' business models (Article VI) indicates that software firms adopting cloud computing technologies are increasingly unifying their product, service portfolio, and pricing across the client base. The cloud adopters were also found to increase their sales efforts, which were seen as associated to offering commodity software and thus to a decreasing competitive advantage. In other words, these three patterns of change represent the holistic effect of an external influence on the business model. Value proposition, revenue logic and activities are all affected. Finally, the study revealed that software product firms adopting cloud computing are more likely to extend the duration of customer contracts and reduce customer-specific activities, compared to the software services firms that adopt cloud computing technologies.

The patterns of change, induced by internal and external influences, that have been identified in the business models of SaaS firms are gathered together in Table 7. Table 7 also provides a detailed answer to the second research question, by indicating all the various individual patterns of change identified as a consequence of internal and external influences. The details also give rise to the following conclusion and to elaborate an answer to the second research question:

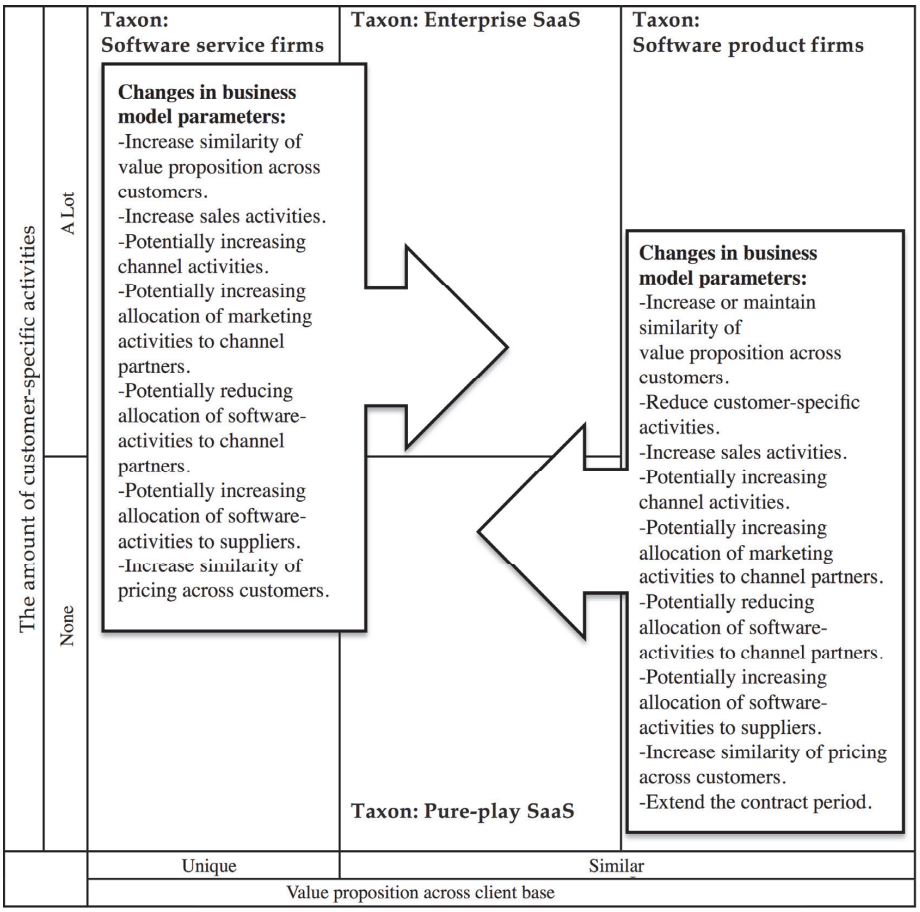
The software product firms are increasingly moving towards a SaaS business model where standard software application is provided without customer-specific services. The software services firms are also moving towards offering a SaaS format with standardized yet more complex applications that require adjacent services such as customization, consultancy, training and integration. Both types of firm configure their business model according to the value proposition, based on a strategy of either increasing cost-efficiency or customer intimacy. The thus identified changes in software firms' business models follow common developments identified in the context of vertical soft-

ware industries (Tyrväinen et al., 2008) and in the software industry in general (Cusumano, 2008).

In other words, if there is a lack of distinct features in the software applications, firms shift their emphasis to process innovation and services. The 'Pure-play SaaS' business model exhibits is currently extremely effective in the software business, hence software product firms affected by external competitive pressures turn to towards a SaaS business model. Software services firms are for similar reasons turning towards a SaaS business model. However, their value proposition intrinsically includes customer-specific activities.

However, this conclusion is made, and should also be taken, with caution. Both the software product firms and the software services firms engaging in SaaS business seem to be 'optimizers', to borrow Berman's (2012) term. According to this view, both would use technology only to enhance their value proposition and efficiency. I am therefore fully aware that this conclusion is a product of the selected theoretical perspective and scope, which took asset specificity as the dimension or design theme for the business model. Consequently, these theoretical lenses do not fully consider novelty and complementaries (Amit & Zott, 2001) as other potential sources of a SaaS firms' value creation.

TABLE 7 Identified change patterns in software firms' business model parameters.



6.1 Contributions

The dissertation makes its contribution to research and practice by providing novel results that should increase understanding of the business models of SaaS firms and changes to software firms' business models. These contributions are both theoretical and practical in nature. In addition, this dissertation contributes to research by making available a conceptual business model framework for analyzing both the attributes of business models from different angles, and how these models might evolve.

The first result is a conceptualization of Software-as-a-Service. In previous literature, the ASP model has been conceptualized as the outsourcing of de-

ployment and operating. In comparison to application service provisioning however, Software-as-a-Service offers a standard software application, which makes it outsourced in a similar way to software products. As a result, in SaaS the customer organization outsources implementation, deployment as well as operations to a single software firm. This conceptualization of SaaS as an outsourcing decision enables distinguishing it explicitly from the software services business, software product business and concepts related to provisioning applications, such as ASP and managed hosting. This definition can be employed in studies on the adoption and acceptance of SaaS. Operationalization however, also needs to include online delivery and a subscription-based logic.

The second result of this dissertation is that it provides a conceptual framework to examine a firm's current business model and how it might change. The framework is based on an extensive literature review, that synthesized key elements of the business model. In addition, the framework includes business model parameters, which enable the observation of a firm's essential characteristics. Neither the current literature nor the current business modeling tools present such explicit guidelines for observing or designing the connections between elements or parameters. The author found this engaging, since the current literature calls for a holistic approach to the business model concept. In this research, the connections between elements and parameters were examined through the selected "design theme". The selection was theory-informed and it was made between two theoretical constructs, namely, inimitability and asset specificity, which can both be gainfully used for the examination of SaaS businesses.. Moreover, the framework identifies factors for assessing business model changes. These factors represent a firm's internal and external influences, which were also identified in the literature. This framework facilitated the examination of multi-faceted business models of SaaS firms.

Thirdly, this dissertation increases understanding of the different business models of SaaS firms by developing and presenting a taxonomy of viable business models. Whereas there have already been taxonomies of traditional software firms, application service providers and platform-as-a-service providers; there has not as yet been a taxonomy of SaaS firms. The present taxonomy also includes the business models of ASP firms as well as SaaS firms, and makes their distinction possible. The taxonomy also makes it possible to tell the difference between two different business models for SaaS firms as well as finding the dimension that differentiates them. In addition, the taxonomy characterizes the two kinds of SaaS firm according to a conceptual business model framework. Since the taxa are distinct and the distinctive facets have been identified, the taxonomy can then be used as the basis for a statistical inference. Specifically, the taxonomy is created for the purpose of investigating the adoption of SaaS, its acceptance and outsourcing.

In addition to serving as a tool for research, the taxonomy and this characterizations of SaaS firms' business models have managerial implications. First, it can be used for classifying competitors and – used together with the conceptual business model framework of this study – it can assist in finding sources of dif-

ferentiation within SaaS businesses. This is a matter of scope and strategy for the firm. Also, the taxonomy can serve as a baseline or template for developing new business models for SaaS firms. In this regard, the description of the two business models help in identifying the interconnected elements and thus in assisting managers to design a balanced business model for a SaaS firm or to discover the source of imbalance.

Finally, this dissertation provides a perspective on the changes in software firms' business models that cloud computing and competitive forces have engendered. The results of analyzing the patterns of change for software firms indicate that they are likely to change their business model in several ways, and that consequently their value proposition, activities, organizational structure and revenue logic are all affected. Both software product firms and software service firms are changing their value proposition to include a standard set of software functionalities across different end-users and changing their activities and structure to support a more direct customer relationship. However, the two types of firm configure their business model according to a strategy of either cost-efficiency or customer intimacy. This means the software product firms adopting cloud computing will reduce their customer-specific activities to the minimum. Software services firms, on the other hand, will maintain customer-specific activities to gain additional revenue in addition to the subscription fees.

7 CONCLUSIONS

Software-as-a-Service (SaaS) represents a novel form of outsourcing software-related functions from a customer organization to a software company. In SaaS, all the functions from implementing to deploying and operating the application are outsourced to the software company. It is therefore distinct from traditional IT outsourcing, which is based on software products and software services. The key factors in enabling this form of outsourcing are using the same application installation with every customer and provisioning its functionalities over the Internet. Otherwise, the characteristics of what SaaS and software firms offer are actually quite similar.

The contemporary literature on adopting Software-as-a-Service to a large extent fails to consider the possibility that anything other than a standard software application might be offered via SaaS. Then again, the studies on its acceptance consider a variety of notions in terms of software quality and software firm performance. In comparison, the studies in this dissertation imply that Software-as-a-Service is not adopted in a uniform manner and that SaaS firms may need to develop varying value propositions to match the different requirements of their prospective customers. It is likely that in many cases the standard software application needs complementary services for design consultation, integrating the application to an existing infrastructure, training the end-users , or performing modifications to some of the functionalities while still keeping most of the functionalities standard.

This study indicates that there are basically two types of Software-as-a-Service firm: one kind which operate to fulfill the demand for a standardized software applications and another for the more specific solutions. Using the terms from the outsourcing literature, these SaaS firms can be distinguished by the amount of customer-specific work they are willing to perform. Performing customer-specific work is a viable option for a SaaS firm, since it provides additional revenue on top of the subscription fees. Deciding not to perform customer-specific activities is also a viable option, since it more certainly leads to cost-efficient operations, hence the SaaS firm can offer its customers an outsourcing option at a marginal price compared to the more traditional software firms.

This dissertation has presented a taxonomy for differentiating the business models of SaaS firms. The taxonomy is the first of its kind and it helps in understanding what different SaaS offer, how they operate, how they organize themselves and how they make money. It is not merely a description, but also contains dimensions that can be measured. Researchers can therefore improve their knowledge on how SaaS is adopted, accepted, and outsourced by taking into account the different aspects of how a software firm may contribute to the outsourcing decision and performance. Aspects or dimensions that are measured include the level of similarity in software functionalities across the client base, and the amount of customer specific work.

Deploying Software-as-a-Service has the potential to accrue benefits for both the customer organization and the software firm. Consequently, many software product firms and software services firms are transforming themselves into SaaS firms. This dissertation also investigated whether this change is because of the new cloud computing technologies or rather because of the competitive forces in the firms' surroundings.

The author believes that a combination of cloud computing technology and competitive forces will indeed lead to a change whereby more software product and software service firms will become SaaS firms. This research shows that many software product firms are reducing the amount of customer-specific work they do, and switching to a more efficient SaaS mode of operating. In contrast, the software services firms may well turn into SaaS firms that provide customers both with the standard software applications and complementary services related to design, integration and training.

7.1 Limitations and further study

When assessing the generalizibility of the findings of this dissertation, certain limitations of this study needs to be taken into consideration. First, the conceptual analysis of changes in the activities in relation to the structural change (in Article V) is solely based on the author's understanding of the ongoing changes as reported in the available literature. Although the author considers the arguments to have decent face validity, the arguments about the need to increase activities were not empirically tested beyond investigating the kind of activities described in Articles III and IV and the increase of sales activities in Article VI.

Also the results of scenario elaboration (Article II) are mostly the outcome of conceptual work. Although the proposed scenarios are based on two rounds of empirical data gathering – one to generate the scenarios and another to test their plausibility – in this dissertation the author still refrains from using the results as any more than as a support for the assumption of different needs for cloud computing services, such as SaaS. Overall, the scenario approach does not forecast the future, but rather it can be seen as a tool for elaborating plausible and potentially overlapping future circumstances.

Although the cluster analysis (Article III) is an established family of methods used in various studies, its key weakness is that it will always provide a solution even in the case when there is no structure in the data and, additionally, cluster analysis does not have proper test statistics that can be used to assess statistical significance of the resulting classification (Ketchen & Shook, 1996). Therefore, one should generalize from the results with caution. Recognizing this issue, the author conducted an interpretive and in-depth case study with the same intention to identify the properties of SaaS firms.

While in this dissertation the case studies (Article I and IV) were used for their strengths in providing insights into further research and enabling rich qualitative information to be collected on the business models of SaaS firms, the author is aware of the general problems with case studies. These include the difficulties with researcher bias and problems of generalizing from small number of cases. Recognizing the latter issue, for the key objectives of this dissertation (RQ1 and RQ2), the author included in the overall research two sets of cross-sectional survey data, one to analyze the properties of business models and another to assess the changes. These provided support for the findings of the case study. As a remedy to the researcher bias, the author employed in each study similar concepts for analyzing the business model elements. However, constraining the theoretical perspective to the notion of specificity has affected the scope of the findings. That is, the selected theoretical lenses made it impossible to consider more fully novelty and complementaries (Amit & Zott, 2001) as sources of a SaaS firm's value creation

With regards to the scope of the vertical software industry (Article I), the author considers it as more a benefit than hindrance to the dissertation to discover the variety of reasons for adopting SaaS. However, the results of that individual study may have to be limited to the software business in the telecom sector. I nevertheless plan to continue studying the peculiarities of this vertical software industry and welcome further research on the promising notions of process and interface specificity as determinants of SaaS adoption.

Finally, for the studies that contribute most to the key objectives of this dissertation (Article III, Article IV and Article VI), data was collected among Finnish software companies. The author acknowledges some details, which may affect the generalizibility of the results. Firstly, the Finnish software firms are reported to mainly focus on the domestic market. While this might be a feature of the Finnish software services firms, the author did not verify whether the Finnish SaaS firms have succeeded in their attempts to generate international revenue. In addition, while the Finnish software market is considered to be similar to the ret of the European market, even the biggest Finnish software companies are relatively small compared to large European, U.S. and Far East software firms. The results may therefore leave out some important characteristics of how large software firms operate and make money. Although the business of SaaS is less limited to national borders, the author would welcome insights from similar studies in other countries.

YHTEENVETO (FINNISH SUMMARY)

Ohjelmistojen tarjoaminen palveluna (engl. Software-as-a-Service, SaaS) tarkoittaa sovelluksen toiminnallisuuden tarjoamista loppukäyttäjille Internetin yli. Konsepti yhdistetään usein pilvilaskennan teknologioiden hyödyntämiseen osana loppukäyttäjän palvelua. Ohjelmistojen tarjoaminen palveluna tarkoittaa myös sitä, että ohjelmistotuotannon arvoketjun toiminnoista ohjelmiston toteutus, käyttöönotto ja operointi on ulkoistettu asiakasyrityksestä yhdelle ohjelmistoyritykselle. Tässä tutkimuksessa tarkastellaan SaaS-palveluja tarjoavien ohjelmistoyritysten liiketoimintamalleja. Tarkastelu tehdään yritysten arvolupausten, toimintojen, rakenteellisten seikkojen ja ansaintalogiikan kautta.

Osa aiemmista tutkimuksista on käsitteellistänyt SaaS-konseptin välttävästi huomioidessaan vain yhdenlaisen arvolupauksen. Tämä tarkoittaisi sitä, että asiakkaiden tarpeet olisivat täysin yhdenmukaiset ja SaaS-palveluja tarjoavat ohjelmistoyritykset eivät pyrkisi erottautumaan toisistaan. Tässä tutkimuksessa nimenomaisesti keskitytään SaaS-palveluja tarjoavien yritysten *erilaisiin* liiketoimintamalleihin sekä liiketoimintamallin muutoksiin, jotka ovat seurausta pilvilaskennan teknologioiden käyttöönotosta. Tutkimus käsittelee lisäksi kilpailuvoimien vaikutusta SaaS-palveluja tarjoavien yritysten liiketoimintaan.

Suomalaisten ohjelmistoyritysten vastauksiin perustuva kyselytutkimus viittaa siihen, että palveluna ohjelmistoja tarjoavia yrityksiä on neljän tyyppisiä. Näistä kaksi ovat asiakaskohtaisia ohjelmistoja Internetin yli tarjoavia yrityksiä. Kaksi muuta tarjoavat vakioituja eli kaikille asiakkaille samanlaisia ohjelmistoja, ja nämä ymmärretään varsinaisiksi SaaS-palveluja tarjoaviksi yrityksiksi. SaaS-palveluja tarjoavat yritykset eroavat toisistaan sekä arvolupauksen, toimintojen että ansaintalogiikan osalta. Yritykset voidaan erottaa kahteen tyyppiin sen mukaan kuinka paljon asiakaskohtaista työtä yritykset haluavat suorittaa.

Tehdyt laadulliset ja määrälliset tutkimukset osoittavat sekä ohjelmistotuotteita että asiakaskohtaisia ohjelmistoja tuottavien yritysten ottavan käyttöön pilvilaskennan teknologioita ja vakioivan palvelujaan muuttuakseen SaaS-palveluja tarjoaviksi yrityksiksi. Tästä johtuen SaaS-palveluja tarjoavat yritykset ovat paljolti perinteisten ohjelmistoyritysten kaltaisia.

Tutkimuksen osana tehdyt tapaustutkimus ja kyselytutkimus osoittavat näiden SaaS-palveluja tuottavien yritysten muuttavan arvolupaustaan siten, että se sisältää vakioidun sovelluksen, joka on sama kaikille loppuasiakkaille. Lisäksi SaaS-palveluja tarjoavat yrityksen muuttavat toimintojaan ja rakennettaan tukemaan suoraa asiakassuhdetta. Sen sijaan muutokset ansaintalogiikassa vaihtelevat sen mukaan onko yritys kustannustehokkuutta tavoitteleva ohjelmistotuotteita valmistava yritys vai tiivistä asiakassuhdetta rakentava asiakaskohtaisia ohjelmistoja tuottava yritys.

Tutkimuksen havainnot tarjoavat näkymän muutoksiin ohjelmistoteollisuudessa ohjelmistoyritysten liiketoimintamallin muutosten kautta. Tämän lisäksi tutkimuksen tulokset lisäävät ymmärrystä SaaS-palveluiden sisällöstä yhtenä informaatioteknologian ulkoistuksen muotona.

APPENDIX 1: DETAILS OF THE LITERATURE REVIEW

Keywords for business model (example as used Scopus):

TITLE-ABS-KEY(business model)
LIMIT-TO(SUBJAREA, 'BUSI')
LIMIT-TO(SUBJAREA, 'SOCI')
LIMIT-TO(SUBJAREA, 'BUSI')
LIMIT-TO(DOCTYPE, 'ar')
LIMIT-TO(EXACTKEYWORD, 'Electronic commerce')
LIMIT-TO(EXACTKEYWORD, 'Information systems')
LIMIT-TO(EXACTKEYWORD, 'Information technology')
LIMIT-TO(EXACTKEYWORD, 'Internet')
LIMIT-TO(EXACTKEYWORD, 'Management information systems')
LIMIT-TO(EXACTKEYWORD, 'Computer software')
LIMIT-TO(EXACTKEYWORD, 'Information systems')
LIMIT-TO(EXACTKEYWORD, 'Innovation')
LIMIT-TO(EXACTKEYWORD, 'New business models')
LIMIT-TO(EXACTKEYWORD, 'Strategic planning')
LIMIT-TO(EXACTKEYWORD, 'Cloud computing')
LIMIT-TO(EXACTKEYWORD, 'Information management')
LIMIT-TO(EXACTKEYWORD, 'Decision making')
LIMIT-TO(EXACTKEYWORD, 'Business modeling')
LIMIT-TO(EXACTKEYWORD, 'Telecommunication services')
LIMIT-TO(EXACTKEYWORD, 'Strategic planning')

Excluded: Articles on computer science, business management and accounting, social sciences, decision sciences, business models of customer organization (alignment of sourcing strategy), business modes innovations in other domains (e.g. healthcare, manufacturing), duplicate reports of the same study.

Keywords for Software-as-a-Service (example is used in Scopus):

TITLE-ABS-KEY('Software-as-a-Service')
OR TITLE-ABS-KEY('software as a service')
OR TITLE-ABS-KEY('application service provision')
OR TITLE-ABS-KEY('application service provisioning')
OR TITLE-ABS-KEY(software renting))
LIMIT-TO(DOCTYPE, 'cp')
LIMIT-TO(DOCTYPE, 'ar')
LIMIT-TO(DOCTYPE, 'ip'))

Excluded: Computer Science (Different applications provided as a service, design science papers, architectural matters, technical characteristics of SaaS systems, technical methods for building, improving or testing SaaS applications, security measures, networking, service mgt., performance issues), use of SaaS-based systems in certain context (healthcare, education), language (German), own work.

REFERENCES

Al-Debei, M. ., & Avison, D. (2010). Developing a unified framework of the business model concept. *European Journal of Information Systems*, *19*(3), 359–376.

Ali-Yrkkö, J., & Martikainen, O. (2008). *The Software Industry in Finland* (Discussion Paper). Helsinki, Finland: ETLA, The Research Institute of the Finnish Economy.

Alt, R., & Zimmermann, H.-D. (2001). Introduction to Special Section – Business Models. *Electronic Markets*, *11*(1), 3–9.

Altaf, F., & Schuff, D. (2010). Taking a flexible approach to ASPs. *Communications of the ACM*, *53*(2), 139–143.

Alter, A., Peng, Y., Runhua, L., & Harris, J. (2010). China's Pragmatic Path to Cloud Computing. Accenture Institute for High Performance. Retrieved from http://www.accenture.com/us-en/Pages/insight-china-path-cloud-computing-summary.aspx

Amit, R., & Zott, C. (2001). Value Creation in E-Business. *Strategic Management Journal*, *22*(6-7), 493–520.

Andriole, S. J. (2012). Seven Indisputable Technology Trends That Will Define 2015. *Communications of the Association for Information Systems*, *30*(1), 61–72.

Armbrust, M., Fox, A., Griffith, R., Joseph, A., Katz, R., Konswinski, A., … Zaharia, M. (2009). *Above the Clouds: A Berkeley View of Cloud Computing* (No. Technical Report No. UCB/EECS-2009-28). Electrical Engineering and Computer Sciences University of California at Berkeley. Retrieved from http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-28.html

Armbrust, M., Fox, A., Griffith, R., Joseph, A., Katz, R., Konswinski, A., … Zaharia, M. (2010). A View of Cloud Computing. *Communications of the ACM*, *53*(4), 50–58.

Aspara, J., Lamberg, J.-A., Laukia, A., & Tikkanen, H. (2011). Strategic management of business model transformation: Lessons from Nokia. *Management Decision*, *49*(4), 622–647.

Baden-Fuller, C., & Morgan, M. (2010). Business Models as Models. *Long Range Planning*, *43*(2), 156–171.

Ballon, P. (2007). Business modelling revisited: the configuration of control and value. *Info*, *9*(5), 6–19.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120.

Beimborn, D., Miletzki, T., & Wenzel, S. (2011). Platform as a Service (PaaS). *Business & Information Systems Engineering*, *3*(6), 381–384.

Benbasat, I., Goldstein, D. ., & Mead, M. (1987). The Case Research Strategy in Studies of Information Systems. *MIS Quarterly*, *11*(3), 369–386.

Benlian, A., & Hess, T. (2011). Opportunities and risks of Software-as-a-Service: Findings from a survey of it executives. *Decision Support Systems*, *52*(1), 232–246.

Benlian, A., Hess, T., & Buxmann, P. (2009). Drivers of SaaS-Adoption – An Empirical Study of Different Application Types. *Business & Information Systems Engineering*, *1*(5), 357– 369.

Benlian, A., Koufaris, M., & Hess, T. (2011). Service quality in Software-as-a-Service: Developing the SaaS-Qual measure and examining its role in usage continuance. *Journal of Management Information Systems*, *28*(3), 85–126.

Berman, S., Kesterson-Townes, L., Marshall, A., & Srivathsa, R. (2012). How cloud computing enables process and business model innovation. *Strategy & Leadership*, *40*(4), 27–35.

Bharadwaj, A., El Sawy, O., Pavlou, P., & Venkatraman, N. (2013). Digital Business Strategy: Toward a Next Generation of Insights. *MIS Quarterly*, *37*(2), 471–482.

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices* (Second edition.). USF Tampa Bay Open Access Textbooks Collection. Book 3. Retrieved from http://scholarcommons.usf.edu/oa_textbooks/3

Bibi, S., Katsaros, D., & Bozanis, P. (2012). Business application acquisition: On-premise or SaaS-based solutions? *IEEE Software*, *29*(3), 86–93.

Bishop, P., Hines, A., & Collins, T. (2007). The current state of scenario development: an overview of techniques. *Foresight*, *9*(1), 5–25.

Campbell-Kelly, M. (2009). The rise, Fall, and resurrection of software as a service. *Communications of the ACM*, *52*(5), 28–30.

Casadesus-Masanell, R., & Ricart, J. (2010). From Strategy to Business Models and onto Tactics. *Long Range Planning*, *43*(2), 195–215.

Cavalcante, S., Kesting, P., & Ulhøi, J. (2011). Business model dynamics and innovation: (re)establishing the missing linkages. *Management Decision*, *49*(8), 1327–1342.

Cheon, M., Grover, V., & Teng, J. (1995). Theoretical perspectives on the outsourcing of information systems. *Journal of Information Technology*, *10*(4), 209–219.

Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Long Range Planning*, *43*(2), 354–363.

Chesbrough, H., & Rosenbloom, R. . (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*, *11*(3), 529–555.

Chong, F., & Carraro, G. (2006). Architecture Strategies for Catching the Long Tail. Retrieved from http://msdn.microsoft.com/en-us/library/aa479069.aspx

Chou, S.-W., & Chiang, C.-H. (2013). Understanding the formation of Software-as-a-Service (SaaS) satisfaction from the perspective of service quality. *Decision Support Systems*, *56*(1), 148–155.

Choudhary, V. (2007). Comparison of Software Quality Under Perpetual Licensing and Software as a Service. *Journal of Management Information Systems*, *24*(2), 141–165.

Clemons, E. (2009). Business Models for Monetizing Internet Applications and Web Sites: Experience, Theory and Predictions. *Journal of Management Information Systems*, *26*(2), 15–41.

Coase, R. (1937). The Nature of the Firm. *Economica*, *4*(16), 386–405.

Creswell, J. (2002). *Research design: Qualitative, quantitative, and mixed method approaches*. Thousand Oaks: Sage Publications.

Currie, W. ., & Seltsikas, P. (2001). Exploring the supply-side of IT outsourcing: evaluating the emerging role of application service providers. *European Journal of Information Systems*, *10*(3), 123–134.

Currie, W., Desai, B., & Khan, N. (2004). Customer evaluation of application services provisioning in five vertical sectors. *Journal of Information Technology*, *19*(1), 39–58.

Cusumano, M. . (2003). Finding your balance in the products and services debate. *Communications of the ACM*, *46*(3), 15–17.

Cusumano, M. . (2004). *The Business of Software*. New York: Free Press.

Cusumano, M. . (2008). The Changing Software Business: Moving from Products to Services. *IEEE Computer*, *41*(1), 20–27.

D'souza, A., Kabbedijk, J., Seo, D., Jansen, S., & Brinkkemper, S. (2012). Software-As-A-Service: Implications For Business And Technology In Product Software Companies. In S. Pan & T. Cao (Eds.), *Proceedings of the 16th Pacific Asia Conference on Information Systems (PACIS 2012). Paper 140.* Ho Chi Minh City, Vietnam.

Davies, A., Brady, T., & Hobday, M. (2006). Charting a Path Towards Integrated Solutions. *MIT Sloan Managment Review*, *47*(3), 39–48.

Demil, B., & Lecocq, X. (2010). Business Model Evolution: In Search of Dynamic Consistency. *Long Range Planning*, *43*(2), 227–246.

Deodhar, S., Saxena, K., Gupta, R., & Ruohonen, M. (2012). Strategies for software-based hybrid business models. *Journal of Strategic Information Systems*, *21*(4), 274–294.

Desai, B., & Currie, W. (2003). Application Service Providers: A model in Evolution. In Q. Li & T.-P. Liang (Eds.), *Proceedings of the 5th international conference on Electronic commerce (ICEC '03)* (pp. 174–180). New York: ACM Press.

Dhar, S., & Varshney, U. (2011). Challenges and business models for mobile location-based services and advertising. *Communications of the ACM*, *54*(5), 121–129.

Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method*. Hoboken, NJ: Wiley.

Doganova, L., & Eyquem-Renault, M. (2009). What do business models do? Innovation devices in technology entrepreneurship. *Research Policy*, *38*(10), 1559–1570.

Du, J., Lu, J., Wu, D., Li, H., & Li, J. (2013). User acceptance of software as a service: Evidence from customers of China's leading e-commerce company, Alibaba. *Journal of Systems and Software*, *86*(8), 2034–2044.

Dubey, A., & Wagle, D. (2007). Delivering software as a service. *The McKinsey Quarterly, Web Exclusive*, *6*(1), 1–12.

Dubosson-Torbay, M., Osterwalder, A., & Pigneur, Y. (2002). eBusiness Model Design, Classification and Measurements. *Thunderbird International Business Review*, *44*(1), 5–23.

Durkee, D. (2010). Why Cloud Computing Will Never Be Free. *Communications of the ACM*, *53*(3), 62–69.

Ekanayaka, Y., Currie, W., & Seltsikas, P. (2003). Evaluating application service providers. *Benchmarking: An International Journal*, *10*(4), 343–354.

Enders, A., & Jelassi, T. (2000). The Converging Business Models of Internet and Bricks-and-Mortar Retailers. *European Management Journal*, *18*(5), 542–550.

Erdogmus, H. (2009). Cloud Computing: Does Nirvana Hide behind the Nebula? *IEEE Software*, *26*(2), 4–6.

Feller, J., Finnegan, P., & Hayes, J. (2008). Delivering the "Whole Product": Business Model Impacts and Agility Challenges in a Network of Open Source Firms. *Journal of Database Management*, *19*(2), 95–108.

Frank, L., Luoma, E., Mazhelis, O., Pulkkinen, M., & Tyrväinen, P. (2012). Software Business in the Telecommunications Sector. In A. Hadjiantonis & B. Stiller (Eds.), *Lecture Notes in Computer Science, Vol. 7216, Telecommunication Economics* (pp. 148–155). Berlin Heidelberg: Springer.

Fulford, R. (2003). A Conceptual Model for ASP Adoption. In *Proceedings of the Seventh Pacific Asia Conference on Information Systems (PACIS 2003). Paper 89.* Adelaide, Australia: AISeL 2003.

Fuller, S., & McLaren, T. (2010). Analyzing enterprise systems delivery modes for small and medium enterprises. In *Proceedings of the 16th Americas Conference on Informations Systems (AMCIS 2010). Paper 380.* Lima, Peru.

Galbraith, J. (2002). Organizing to Deliver Solutions. *Organizational dynamics*, *31*(2), 194–207.

Garrison, G., Kim, S., & Wakefield, R. L. (2012). Success factors for deploying cloud computing. *Communications of the ACM*, *55*(9), 62–68.

Gartner. (2009). Gartner Identifies the Top 10 Strategic Technologies for 2010. Retrieved from http://www.gartner.com/newsroom/id/1210613

George, G., & Bock, A. (2011). The Business Model in Practice and its Implications for Entrepreneurship Research. *Entrepreneurship Theory and Practice*, *35*(1), 83–111.

Giesen, E., Berman, S., Bell, R., & Blitz, A. (2007). Three ways to innovate your business model. *Strategy & Leadership*, *35*(6), 27–33.

Giessmann, A., & Stanoevska-Slabeva, K. (2012). Business Models of Platform as a Service (PaaS) Providers: Current State and Future Directions. *Journal of Information Technology Theory and Application (JITTA)*, *13*(4), 31–55.

Glaser, B. ., & Strauss, A. . (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. London: Wledenfeld and Nicholson.

Godet, M. (2000). The Art of Scenarios and Strategic Planning: Tools and Pitfalls. *Technological Forecasting and Social Change*, *65*(1), 3–22.

Gold, N., Mohan, A., Knight, C., & Munro, M. (2004). Understanding Service Oriented Software. *IEEE Software*, *21*(2), 71–77.

Gonçalves, V., & Ballon, P. (2011). Adding value to the network: Mobile operators' experiments with Software-as-a-Service and Platform-as-a-Service models. *Telematics and Informatics*, *28*(1), 12–21.

Gordjin, J., & Akkermans, H. (2001). Designing and Evaluating E-Business Models. *IEEE Intelligent Systems*, *16*(4), 11–17.

Greschler, D., & Mangan, T. (2002). Networking lessons in delivering, Software as a Service' Part I. *International Journal of Network Management*, *12*(5), 317–321.

Grigoryan, A. (2006). Case Study of E-commerce Business Models. *Information Technology Journal*, *5*(5), 842–850.

Gupta, P., Seetharaman, A., & Raj, J. R. (2013). The usage and adoption of cloud computing by small and medium businesses. *International Journal of Information Management*, *33*(5), 861–874.

Hacklin, F., & Wallnöfer, M. (2012). The business model in the practice of strategic decision making: insights from a case study. *Management Decision*, *50*(2), 166–188.

Hair, J. F., Anderson, R., Tatham, R. L., & Black, W. C. (2006). *Multivariate Data Analysis* (6th ed.). Upper Saddle River, NJ: Prentice Hall.

Hätönen, J. (2008). *Managing the Process of Outsourcing: Examinig the Process of Outsourcing Product-development Activities in Software Firms.* (Doctoral dissertation). Turku School of Economics, Turku.

Hayes, B. (2008). Cloud computing. *Communications of the ACM*, *51*(7), 9–11.

Heart, T. (2010). Who is Out There? Exploring the Effects of Trust and Perceived Risk on Saas Adoption Intentions. *The DATA BASE for Advances in Information Systems*, *41*(3), 49–68.

Hedman, J., & Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. *European Journal of Information Systems*, *12*(1), 49–59.

Huyskens, C., & Loebbecke, C. (2006). Determinants of Netsourcing: an Empirical Evaluation. *Journal of Information Technology Management*, *17*(3), 1–10.

IDC. (2009). IT Cloud Services Forecast: 2009-2013. Retrieved from http://blogs.idc.com/ie/?p=543

Iyer, B., & Henderson, J. (2010). Preparing for the Future: Understanding the Seven Capabilities of Cloud Computing. *MIS Quarterly Executive*, *9*(2), 117–131.

Jacobs, D. (2005). Enterprise Software As Service: Online Services are Changing the Nature of Software. *ACM Queue*, *3*(6), 36–42.

Janssen, M., & Joha, A. (2011). Challenges for adopting cloud-based software as a service (SAAS) in the public sector. In V. Tuunainen, M. Rossi, & J. Nandhakumar (Eds.), *Proceedings of the 19th European Conference on Information Systems (ECIS 2011). Paper 80.* Helsinki, Finland.

Järvi, A., Karttunen, J., Mäkilä, T., & Ipatti, J. (2011). *SaaS-käsikirja*. Turku: Tekes and University of Turku.

Jetter, M., Satzger, G., & Neus, A. (2009). Technological Innovation and Its Impact on Business Model, Organization and Corporate Culture – IBM's Transformation into a Globally Integrated, Service-Oriented Enterprise. *Business & Information Systems Engineering*, *1*(1), 37–45.

Johnson, M., Christensen, C., & Kagermann, H. (2008). Reinventing Your Business Model. *Harvard business review*, *86*(12), 50–59.

Kallio, J., Tinnilä, M., & Tseng, A. (2006). An international comparison of operator-driven business models. *Business Process Management Journal*, *12*(3), 281–298.

Kamoun, F. (2008). Rethinking the Business Model with RFID. *Communications of the Association for Information Systems*, *22*(1), 635–658.

Kern, T., Kreijger, J., & Willcocks, L. (2002). Exploring ASP as sourcing strategy: Theoretical perspectives, propositions for practice. *Journal of Strategic Information Systems*, *11*(2), 153–177.

Ketchen, D. J., & Shook, C. L. (1996). The Application of Cluster Analysis in Strategic Management Research: An Analysis and Critique. *Strategic Management Journal*, *17*(6), 441–458.

Kindström, D. (2010). Towards a service-based business model – Key aspects for future competitive advantage. *European Management Journal*, *28*(6), 479–490.

Kitchenham, B. (2004). Procedures for Performing Systematic Reviews. Keele, UK: Keele University.

Kontio, J., Rönkkö, M., Mutanen, O. P., Ahokas, M., Junna, O., Ali-Yrkkö, J., … Maisala, T. (2008). *Kasvufoorumi 08 Loppuraportti*. Helsinki: Ohjelmistoyrittäjät ry.

Koo, C., Koh, C., & Nam, K. (2004). An Examination of Porter's Competitive Strategies in Electronic Virtual Markets: A Comparison of Two On-line Business Models. *International Journal of Electronic Commerce*, *9*(1), 163–180.

Kraemer, K., Dedrick, J., & Yamashiro, S. (2000). Refining and Extending the Business Model with Information Technology: Dell Computer Corporation. *Information society*, *16*(1), 5–21.

Kuk, G., & Jansen, M. (2013). Assembling infrastructures and business models for service design and innovation. *Information Systems Journal*, *23*(5), 445–469.

Laplante, P. A., Zhang, J., & Voas, J. (2008). What's in a name? Distinguishing between SaaS and SOA. *IT Professional*, *10*(3), 46–50.

Lassila, A. (2006). Offering software as a service: Case study of system integrators. In J. Ljungberg & M. Andersson (Eds.), *Proceedings of the Fourteenth European Conference on Information Systems (ECIS 2006). Paper 97.* Göteborg, Sweden.

Lee, C.-S. (2001). An analytical framework for evaluating e-commerce business models and strategies. *Internet Research*, *11*(4), 349–359.

Lee, S.-G., Chae, S. H., & Cho, K. M. (2013). Drivers and inhibitors of SaaS adoption in Korea. *International Journal of Information Management*, *33*(3), 429–440.

Leem, C., Suh, H., & Kim, D. (2004). A classification of mobile business models and its applications. *Industrial Management & Data Systems*, *104*(1), 78–87.

Lehmann, S., & Buxmann, P. (2009). Pricing Strategies of Software Vendors. *Business & Information Systems Engineering*, *1*(6), 452–462.

Lehmann, S., Draisbach, T., Buxmann, P., & Dörsam, P. (2012). Pricing of software as a service - An empirical study in view of the economics of information theory. In M. . Cusumano, B. Iyer, & N. Venkatraman (Eds.), *Lecture Notes in Business Information Processing, Vol. 114, Proceedings of the Third International Conference on Software Business (ICSOB 2012)* (pp. 1–14). Berlin Heidelberg: Springer.

Leimeister, S., Böhm, M., Riedl, C., & Krcmar, H. (2010). The business perspective of cloud computing: Actors, roles, and value networks. In P. Alexander, M. Turpin, & J. van Deventer (Eds.), *Proceedings of the 18th European Conference on Information Systems (ECIS 2010). Paper 56.* Pretoria, South Africa.

Levy, Y., & Ellis, T. (2006). A Systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research. *Informing Science: International Journal of an Emerging Transdiscipline*, *9*(1), 1–32.

Lilius, R. (2012). *The Finnish it industries in transition. Defining and Measuring the Finnish Software Product and IT Services Industries by Applying Theoretical Frameworks*. (Doctoral dissertation). University of Lappeenranta, Lappeenranta.

Lin, G., Fu, D., Zhu, J., & Dasmalchi, G. (2009). Cloud Computing: IT as a Service. *IT Professional*, *11*(2), 10–13.

Magretta, J. (2002). Why Business Models Matter. *Harvard Business Review*, *80*(5), 86–92.

Mäkilä, T., Järvi, A., Rönkkö, M., & Nissilä, J. (2010). How to define Software-as-a-Service - An empirical study of Finnish SaaS providers. In P. Tyrväinen, S. Jansen, & M. . Cusumano (Eds.), *Lecture Notes in Business Information Processing, Vol. 51, Proceedings of the First International Conference on Software Business (ICSOB 2010)* (pp. 115–124). Berlin Heidelberg: Springer.

Mäkinen, S., & Seppänen, M. (2007). Assessing business model concepts with taxonomical research criteria. *Management Research News*, *30*(10), 735–748.

Markides, C. (2006). Disruptive Innovation: In Need of Better Theory. *Journal of Product Innovation Management*, *23*(1), 19–25.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, a. (2011). Cloud computing — The business perspective. *Decision Support Systems*, *51*(1), 176–189.

McCullagh, P. (1980). Regression Models for Ordinal Data. *Journal of the Royal Statistical Society. Series B (Methodological)*, *42*(2), 109–142.

McGrath, R. (2010). Business Models: A Discovery Driven Approach. *Long Range Planning*, *43*(2), 247–261.

Mell, P., & Grance, T. (2011). The NIST Definition of Cloud Computing. Gaithersburg, MD: National Institute of Standards and Technology.

Messerschmitt, D., & Szyperski, C. (2003). *Software ecosystem : understanding an indispensable technology and industry*. Cambridge, Massachusetts: The MIT Press.

Miles, M. ., & Huberman, M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks: Sage Publications.

Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: toward a unified perspective. *Journal of Business Research*, *58*(6), 726–735.

Nelson, P., Richmond, W., & Seidmann, A. (1996). Two dimensions of software acquisition. *Communications of the ACM*, *39*(7), 29–35.

Novelli, F. (2012). A mixed-methods research approach to investigate the transition from on-premise to on-demand software delivery. In K. Vanmechelen, J. Altmann, & R. Omer (Eds.), *Lecture Notes in Computer Science, Vol. 7714, Proceedings of the 9th International Conference on Economics of Grids, Clouds, Systems and Services (GECON 2012)* (pp. 212–222). Berlin Heidelberg: Springer.

Nukari, J., & Forsell, M. (1999). *Suomen ohjelmistoteollisuuden kasvun strategia ja haasteet: haasteina pk-yritysten kansainvälistyminen ja koulutetun henkilöstön saatavuus* (Teknologiakatsaus 67/99). Sipoo: Tekes.

Obal, M. (2013). Why do incumbents sometimes succeed? Investigating the role of interorganizational trust on the adoption of disruptive technology. *Industrial Marketing Management*, *42*(6), 900–908.

Ojala, A., & Tyrväinen, P. (2006). Business Models and Market Entry Mode Choice of Small Software Firms. *Journal of International Entrepreneurship*, *4*(2-3), 69–81.

Ojala, A., & Tyrväinen, P. (2011). Developing Cloud Business Models: A Case Study on Cloud Gaming. *IEEE Software*, *28*(4), 42–47.

Okoli, C., & Schabram, K. (2010). A Guide to Conducting a Systematic Literature Review of Information Systems Research. *Sprouts: Working Papers on Information Systems*, *10*(26), 1–51.

Ordanini, A., Micelli, S., & Di Maria, E. (2004). Failure and Success of B-to-B Exchange Business Models: A Contingent Analysis of Their Performance. *European Management Journal*, *22*(3), 281–289.

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Hoboken, NJ.: John Wiley & Sons.

Osterwalder, A., Pigneur, Y., & Tucci, C. . (2005). Clarifying Business Models: Origins, Present, and Future of the Concept. *Communications of the Association for Information Systems*, *16*(1), 1–25.

Palmer, J., Kallio, J., Saarinen, T., Tinnilä, M., & Tuunainen, V. (2000). Online Grocery Shopping Around the World: Examples of Key Business Models. *Communications of the Association for Information Systems*, *4*(3), 1–44.

Penrose, E. (1959). *The Theory of the Growth of the Firm*. New York: Blackwell.

Podsakoff, P., MacKenzie, S., Lee, J., & Podsakoff, N. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879–903.

Poppo, L., & Zenger, T. (2002). Do formal contracts and relational governance function as substitutes or complements? *Strategic Management Journal*, *23*(8), 707–725.

Porra, J. (2000). Electronic Commerce Internet Strategies and Business Models-A Survey. *Information Systems Frontiers*, *1*(4), 389–399.

Porter, M. (1996). What is Strategy? *Harvard Business Review*, *74*(6), 61–78.

Porter, M. E. (2001). Strategy and the Internet. *Harvard Business Review*, *79*(3), 62–76.

Pussep, A., Schief, M., Weiblen, T., Leimbach, T., Peltonen, J., Rönkkö, M., & Buxmann, P. (2013). Results of the German Software Industry Survey 2013. Technische Universität Darmstadt.

Rajala, R., Rossi, M., & Tuunainen, V. (2003). A Framework for Analysing Software Business Models. In C. Ciborra, R. Mercurio, M. de Marco, M. Martinez, & A. Carignani (Eds.), *Proceedings of the 11th European Conference on Information Systems (ECIS 2003).* (pp. 1614–1627). Naples, Italy.

Rajala, R., & Westerlund, M. (2007). Business models – a new perspective on firms' assets and capabilities: Observations from the Finnish software industry. *Entrepreneurship and Innovation*, *8*(2), 115–125.

Rappa, M. (2004). The utility business model and the future of computing services. *IBM Systems Journal*, *43*(1), 32–42.

Rhyne, R. (1981). Whole-pattern futures projection, using field anomaly relaxation. *Technological Forecasting and Social Change*, *19*(4), 331–360.

Rochet, J.-C., & Tirole, J. (2006). Two-sided markets: a progress report. *The RAND Journal of Economics*, *37*(3), 645–667.

Rönkkö, M., Peltonen, J., & Pärnänen, D. (2011). *Software Indusry Survey 2011*. Retrieved from http://www.softwareindustrysurvey.fi/ReportFinland2011.pdf

Sääksjärvi, M., Lassila, A., & Nordström, H. (2005). Evaluating the Software as a Service Business Model: From CPU Time-Sharing to Online Innovation Sharing. In P. Isaias, M. McPherson, & P. Kommers (Eds.), *Proceedings of the IADIS International Conference e-Society* (pp. 177–186). Qawra, Malta: IADIS.

Sallinen, S. (2002). *Development of industrial software supplier firms in the ICT cluster An analysis of firm types, technological change and capability development.* (Doctoral dissertation). Department of Marketing, University of Oulu, Oulu.

Schief, M., & Buxmann, P. (2012). Business models in the software industry. In *Proceedings of the 45th Hawaii International Conference on System Science (HICSS 2012)*. Maui, Hawaii: IEEE.

Schoemaker, P. (1993). Multiple scenario development: Its conceptual and behavioral foundation, *14*(3), 193–213.

Schwartz, P., & Ogilvy, J. (1998). Plotting Your Scenarios. In L. Fahey & Randall (Eds.), *Learning from the future: competitive foresight scenarios*. New York: John Wiley & Sons.

Schwarz, A., Jayatilaka, B., Hirschheim, R., & Goles, T. (2009). A Conjoint Approach to Understanding IT Application Services Outsourcing. *Journal of Association of Information Systems*, *10*(10), 748–781.

Seddon, P., Lewis, G., Freeman, P., & Shanks, G. (2004). The Case for Viewing Business Models as Abstractions of Strategy. *Communications of the Association for Information Systems*, *13*(1), 427–442.

Shafer, S., Smith, J., & Linder, J. (2005). The power of business models. *Business Horizons*, *48*(3), 199–207.

Software & Information Industry Association. (2004). *Software as a Service: Changing the Paradigm in the Software Industry*. Washington, DC: SIIA and TripleTree Industry Analysis Series.

Stuckenberg, S., Fielt, E., & Loser, T. (2011). The Impact Of Software-As-A-Service On Business Models Of Leading Software Vendors: Experiences From Three Exploratory Case Studies. In P. Seddon & S. Gregor (Eds.), *Proceedings of the 15th Pacific Asia Conference on Information Systems (PACIS 2011). Paper 184.* Brisbane, Queensland: Queensland University of Technology 2011.

Subramani, M. (2004). How do suppliers benefit from information technology use in supply chain relationships? *MIS Quarterly*, *28*(1), 45–73.

Susarla, A., Barua, A., & Whinston, A. B. (2003). Understanding the service component of application service provision: An empirical analysis of satisfaction with ASP services. *MIS Quarterly: Management Information Systems*, *27*(1), 91–123.

Tankhiwale, S. (2009). Exploring the interrelationship between Telco business model innovation and the change in business process architecture. *Journal of Telecommunications Management*, *2*(2), 126–137.

Tebboune, S. (2003). Application service provision: origins and development. *Business Process Management Journal*, *9*(6), 722–734.

Tebboune, S. (2010). A Theoretical Approach to Netsourcing Research. In *Proceedings of the 16th Americas Conference on Informations Systems (AMCIS 2010). Paper 466.* Lima, Peru.

Teece, D. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, *43*(2), 172–194.

Timmers, P. (1998). Business models for electronic markets. *Journal of Electronic Markets*, *8*(2), 3–8.

Treacy, M., & Wiersema, F. (1993). Customer intimacy and other value disciplines. *Harvard Business Review*, *71*(1), 84–93.

Turner, M., Budgen, D., & Brereton, P. (2003). Turning software into a service. *Computer*, *36*(10), 38–44.

Tushman, M., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative science quarterly*, *31*(3), 439–465.

Tyrväinen, P. (2009). Model for Evolution of a Vertical Software Industry. In P Tyrväinen & O. Mazhelis (Eds.), *Contributions to Management Science. Vertical Software Industry Evolution - Analysis of Telecom Operator Software* (pp. 25–33). Berlin Heidelberg: Springer-Verlag.

Tyrväinen, P., & Selin, J. (2011). How to sell SaaS: A model for main factors of marketing and selling Software-as-a-Service. In B. Regnell, I. van de Weerd, & O. De Troyer (Eds.), *Lecture Notes in Business Information Processing, Vol. 80, Proceedings of the Second International Conference on Software Business (ICSOB 2011)* (pp. 2–16). Berlin Heidelberg: Springer.

Tyrväinen, Pasi, Warsta, J., & Seppänen, V. (2008). Evolution of Secondary Software Businesses: Understanding Industry Dynamics. In G. Leon, A. Bernardos, J. Casar, K. Kautz, & J. De Gross (Eds.), *IFIP International Federation for Information Processing, Vol. 287, Open IT-Based Innovation: Moving Towards Cooperative IT Transfer and Knowledge Diffusion* (pp. 381–401). Boston: Springer.

Vaezi, R. (2012). Cloud computing: A qualitative study and conceptual model. In *Proceedings of the 18th Americas Conference on Information Systems 2012 (AMCIS 2012). Paper 3*. Seattle, Washington.

Vaquero, L. M., Rodero-Merino, L., Caceres, J., & Lindner, M. (2009). A Break in the Clouds: Towards a Cloud Definition. *ACM SIGCOMM Computer Communication Review*, *39*(1), 50–55.

Vepsäläinen, A., & Saarinen, T. (1998). Channel Separation for Electronic Commerce. In A. Bask & A. Vepsäläinen (Eds.), *Proceedings of 10th Annual Conference for Nordic Researchers in Logistics (NOFOMA'98)* (pp. 275–288). Publications of Finnish Association of Logistics 11/1998.

Von Hertzen, M., Laine, J., Kangasharju, S., Timonen, J., & Santala, M. (2009). *Drive for Future Software Leverage - The Role, Importance, and Future Challenges of Software Competences in Finland.* (Tekes 269/2009). Helsinki: Tekes.

Walsh, K. (2003). Analyzing the application ASP concept: technologies, economies, and strategies. *Communications of the ACM*, *46*(8), 103–107.

Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, *4*(1), 74–81.

Walsham, G. (2006). Doing interpretive research. *European Journal of Information Systems*, *15*(3), 320–330.

Walther, S., Plank, A., Eymann, T., Singh, N., & Phadke, G. (2012). Success factors and value propositions of software as a service providers - A literature review and classification. In *Proceedings of the 18th Americas Conference on Information Systems 2012 (AMCIS 2012). Paper 1*. Seattle, Washington.

Weill, P., & Woerner, S. (2013). Optimizing Your Digital Business Model. *MIT Sloan Managment Review*, *54*(3), 71–78.

Weinhardt, C., Anandasivam, A., Blau, B., & Stoer, J. (2009). Business models in the service world. *IT Professional*, *11*(2), 28–33.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171– 180.

Williamson, O. (1975). *Markets and Hierarchies, Analysis and Antitrust Implications : A Study in the Economics of Internal Organization*. New York: Free Press.

Williamson, O. (1991). Comparative economic or- ganization: The analysis of discrete structural alternatives. *Administrative Science Quarterly*, *36*(2), 269–296.

Wirtz, B., Schilke, O., & Ullrich, S. (2010). Strategic Development of Business Models: Implications of the Web 2.0 for Creating Value on the Internet. *Long Range Planning*, *43*(2), 272–290.

Xin, M., & Levina, N. (2008). Software-as-a-service model: Elaborating client-side adoption factors. In *Proceedings of the 29th International Conference on Information Systems (ICIS 2008). Paper 86.* Paris, France.

Yang, H., & Tate, M. (2012). A Descriptive Literature Review and Classification of Cloud Computing Research. *Communications of the Association for Information Systems*, *31*(1), 35-–60.

Yao, Y. (2002). Client Relationship Development witf Different Sectors of Application Service Providers: an Extended Research Model. In *Proceedings of the Eighth Americas Conference on Information Systems (AMCIS 2002). Paper 312.* Dallas, Texas.

Yin, R. . (2009). *Case Study Research: Design and Methods* (Fourth edition.). Thousand Oaks: Sage Publications.

Yip, G. (2004). Using strategy to change your business model. *Business Strategy Review*, *15*(2), 17–24.

Zaheer, A., & Venkatraman, N. (1994). Determinants of electronic integration in the insurance industry: an empirical test. *Management science*, *40*(5), 549–566.

Zott, C., & Amit, R. (2007). Business Model Design and the Performance of Entrepreneurial Firms. *Organization Science*, *18*(2), 181–199.

Zott, C., & Amit, R. (2008). The fit between product market strategy and business model: implications for firm performance. *Strategic Management Journal*, *29*(1), 1–26.

Zott, C., & Amit, R. (2010). Business Model Design: An Activity System Perspective. *Long Range Planning*, *43*(2), 216–226.

Zott, C., Amit, R., & Massa, L. (2011). The Business Model: Recent Developments and Future Research. *Journal of Management*, *38*(1), 375–414.