



Discovering and creating business opportunities for cloud services



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ABSTRACT

Cloud computing provides new business opportunities for firms selling or using cloud services. However, little is known about how software firms detect and exploit these opportunities. Based on in-depth qualitative case studies, this study identified two different pathways followed by software firms when they detect and exploit opportunities. In the first pathway, the opportunity is based on an existing problem and need in the market. In the case firms, the opportunity was exploited by adapting the software to the cloud environment. In the second pathway, the opportunity arises from the founders' prior knowledge and imagination, in the absence of any existing problem or need in the market. In this case, the opportunity was exploited through the features offered by cloud computing. This research contributes to Information Systems (IS) literature by incorporating relevant entrepreneurship theories in such a way as to enrich and extend IS research.

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1. Introduction

Cloud computing is changing the ways in which information is used and delivered. The change does not only affect the information technology (IT) industry; rather, it impacts on every sector of society (Murugesan, 2013). According to the International Data Corporation (2012), international spending on public IT cloud services will increase from \$40 billion in 2012 to \$100 billion in 2016. The trend has led to cloud computing being viewed as the next revolution in IT (Bojanova et al., 2013; Buyya, 2010; Marston et al., 2011). Recent studies have indicated that cloud computing and related services can bring technical benefits and business advantages for both cloud service providers and users (Armbrust et al., 2010; Benlian and Hess, 2011; Iyer and Henderson, 2010; McAfee, 2011; Waters, 2005). In addition, cloud computing has been found to create new jobs and to promote growth in software and related industries (Liebenau et al., 2012).

Current research on cloud computing has mainly focused on the opportunities provided by the cloud, with the origins of such opportunities receiving much less attention. This opens up unique avenues for research in the field of IS. It is true that the existing literature includes extensive coverage of IS innovations (Melville, 2010; Swanson, 1994), the diffusion of innovations (Angst et al., 2010; Cooper and Zmud, 1990), and acceptance of technology-based innovations (Davis, 1989; Khanagha et al., 2013; Thong, 1999); however, there has been no detailed elaboration of how software firms

detected¹ these innovations. This is important for IS scholars who seek to develop a theoretical understanding of how opportunities related to cloud computing are detected, and whether existing opportunity theories hold true in the context of cloud computing. The topic is also important for software entrepreneurs² working in the industry, given that cloud computing is growing rapidly and that it offers a good arena for new business opportunities, so long as the opportunities can be detected and exploited. As a first step, one can turn to related research on entrepreneurship, which sheds light on how opportunities for innovation are identified in the first place.

The field of entrepreneurship offers two distinct theories on the origins of opportunities. The first theory, opportunity *discovery*, sees opportunities as existing independently of entrepreneurs, and as objective phenomena to be identified and exploited (Alvarez and Barney, 2007). Thus, opportunities exist and everyone could become aware of them; however, individual differences – such as prior knowledge, entrepreneurial activeness, alertness, and a willingness to bear risks – impact on who will discover and exploit the opportunities (Kirzner, 1979; Shane, 2000; Venkataraman, 1997). The second theory, opportunity *creation*, is based on entrepreneurial perceptions, imagination, and social interaction (Alvarez and Barney, 2007; Sarasvathy, 2001). In contrast to opportunity discovery, opportunity creation does not involve opportunities external to the entrepreneurs; rather, the opportunities are created endogenously

¹ The term *opportunity detection* is used here to include both opportunity discovery and opportunity creation.

² In this study, an organizational level analysis is applied. In other words, it is assumed that by interviewing entrepreneurs as the main decision makers within the entrepreneurial firms under examination, we can gain insights into the ways in which small firms behave.

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by the actions of entrepreneurs who are seeking to exploit new products or services. One can thus say that there is no opportunity “waiting to be recognized”; what happens is that an entrepreneur creates the opportunity and observes how customers and markets respond to the created product or service (Alvarez and Barney, 2007). However, the main focus in entrepreneurship theories up to now has been on the personal characteristics of entrepreneurs, and on how these characteristics impact on the detection of opportunities (e.g. Sarasvathy, 2001; Shane and Venkataraman, 2000). In these studies, less attention has been paid to the actual process of moving from detected opportunities to commercialization of the opportunity. In addition, entrepreneurship theories have been developed to explain opportunity detection in general, without any industry-specific focus. It thus remains unclear how well these theories can be applied to knowledge-intensive industries such as the software industry.

With these considerations in view, this study sought to contribute to IS literature in the context of cloud computing by examining: (i) how software entrepreneurs discover and create opportunities, and (ii) what kinds of processes small software firms follow when they bring new cloud services to the market. In seeking to obtain relevant insights, the qualitative case studies referred to in this paper used data from 36 semi-structured interviews with entrepreneurs and other professionals, from four small cloud service providers. It was thought that by studying small cloud service providers with limited resources for research and development (R&D) activities could yield more interesting data than would be available from large firms with well established R&D units.

2. Literature review

Here some recent empirical findings on cloud computing and SaaS are presented. The article then considers opportunity discovery and creation theories, before highlighting aspects that seem to require further exploration.

2.1. Opportunities provided by cloud services

In cloud computing, users obtain access to computing resources, storage space, and software applications via the Internet as a service. Cloud computing includes three service layers. These consist of (i) Infrastructure as a Service (IaaS), which provides computation and storage capacity, (ii) Platform as a Service (PaaS), which provides software development tools plus an application execution environment, and (iii) Software as a Service (SaaS), which provides applications on top of PaaS and IaaS (Armbrust et al., 2010; Sultan, 2014a). Thus, cloud computing refers to the provision of computing capacity, storage capacity, and applications as a composite cloud service across the Internet, or – in line with the definition given by the International Data Corporation – “consumer and business products, services and solutions delivered and consumed in real-time over the Internet” (Gens, 2009).

Most of the literature on cloud computing and SaaS has taken a practical perspective on the opportunities offered by cloud computing for cloud service providers or users (Iyer and Henderson, 2010; McAfee, 2011; Sadiku et al., 2014; Zhang et al., 2010). McAfee (2011) sets out several benefits for organizations and software providers. First of all, cloud computing makes individuals more productive by facilitating information-sharing between employees, and consequently, by facilitating collaboration between groups and communities. Secondly, it makes it possible to obtain insights from a large amount of data, via effective processing of the data over the Internet. Thirdly, it facilitates the development of more complex and advanced applications, plus the hosting of these applications, without the need for organizations to have their own servers. In line with McAfee (2011), Waters (2005) focuses mainly on the benefits available to customers from cloud computing as compared to the

traditional software delivery and sales model. According to Waters, cloud services can lead to lower IT expenses for customers, due to the fact that the total cost of ownership is more predictable than with the traditional model. Waters (2005) further points out that the implementation of the software is faster: there is no need for installation or configuration (since the service providers take care of configuration within their own data centers). The software vendors also take care of software updates, removing the need for customers to install new versions of the software.

Iyer and Henderson (2010) presented seven capabilities, or opportunities, deriving from cloud computing, suggesting that managers should be aware of these when they are considering cloud-based strategies. The capabilities were identified as: a controlled interface, location independence, sourcing independence, ubiquitous access, virtual business environments, addressability and traceability, and rapid elasticity. The opportunities arising from cloud computing were also considered by Benlian and Hess (2011). In an examination of IT executives’ perceptions of the opportunities and risks bound up with SaaS adoption they discovered that security threats were the most dominating factor in risk perception; it was the potential cost advantages of SaaS that were the strongest driver for SaaS adoption. In line with this result, a recent study by Sultan (2014b) pointed to opportunities for cost savings as the most important factor for cloud adoption. Sultan also emphasized the important role of cloud computing for new innovative solutions in the field of IS. In recent studies, Sultan (2014a) and Chou (2015) have further argued that cloud computing creates opportunities to decrease firms’ carbon footprints: use of the cloud implies that less computer hardware will be required, with fewer network devices and lower electricity consumption.

The studies above mainly concern the general opportunities provided by cloud services, from the point of view of the software provider or the customer. However, research has also been conducted on more specific areas. Böhm et al. (2010) and Ojala and Tyrväinen (2011) studied value networks in cloud computing, considering how cloud computing brings value and opportunities for the actors in a firm’s network or ecosystem. Böhm et al. (2010) developed a generic value network for cloud computing. This was seen as having the potential to help entrepreneurs to position their firm in a value network, and to identify possible business opportunities. Ojala and Tyrväinen (2011) described how a cloud service provider’s value network developed over a five-year period, and looked at the kinds of opportunities available to the cloud service provider through cooperation between different actors. Choudhary (2007) examined the opportunities opened up by software renting in the SaaS delivery model. He found that software renting in the SaaS model leads to greater investments in product development and consequently to higher software quality. In a more recent study, Laatikainen and Ojala (2014) investigated how SaaS architecture impacts on opportunities to use different pricing models among SaaS providers. They found that scalability and high levels of modularity brought opportunities to apply a greater variety of pricing models.

Overall, previous research has highlighted cloud computing as having the potential to improve efficiency, and to provide new customer value plus new business models. However, despite the increasing attention paid to the technical and business opportunities provided by cloud computing, we do not know how these opportunities come into existence. This leads to the question of how these opportunities are *discovered* and/or *created* through entrepreneurial behavior.

2.2. Opportunity discovery and creation theories

Referring to opportunity discovery, Eckhardt and Shane (2003, p. 336) define opportunities as “situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends

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