<table>
<thead>
<tr>
<th>Title</th>
<th>The times they are a-changin for ICT service provision: A cloud computing business model perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s)</td>
<td>Clohessy, Trevor; Acton, Thomas; Morgan, Lorraine; Conboy, Kieran</td>
</tr>
<tr>
<td>Publication Date</td>
<td>2016-06-12</td>
</tr>
<tr>
<td>Publisher</td>
<td>AIS Electronic Library (AISeL)</td>
</tr>
<tr>
<td>Link to publisher's version</td>
<td><a href="https://aisel.aisnet.org/ecis2016_rp/142">https://aisel.aisnet.org/ecis2016_rp/142</a></td>
</tr>
<tr>
<td>Item record</td>
<td><a href="http://hdl.handle.net/10379/7252">http://hdl.handle.net/10379/7252</a></td>
</tr>
</tbody>
</table>

Some rights reserved. For more information, please see the item record link above.
THE TIMES THEY ARE A-CHANGIN
FOR ICT SERVICE Provision:
A CLOUD COMPUTING BUSINESS MODEL PERSPECTIVE

Complete Research Paper

Trevor Clohessy, Business Information Systems, J.E. Cairnes School of Business & Economics, National University of Ireland Galway, trevor.clohessy@nuigalway.ie

Thomas Acton, Business Information Systems, J.E. Cairnes School of Business & Economics, National University of Ireland Galway, thomas.acton@nuigalway.ie

Lorraine Morgan, School of Business, Maynooth University, Lero: The Irish Software Research Centre, lorraine.morgan@nuim.ie

Kieran Conboy, Business Information Systems, Lero: The Irish Software Research Centre, National University of Ireland Galway, kieran.conboy@nuigalway.ie

Abstract

Cloud computing has accelerated business model evolution for delivering information, communication and technology (ICT) solutions. In transitioning from traditional to cloud-based service provision, some ICT vendors have experienced substantial difficulties in realising effective business models. Taking the perspective of 15 large business model mature and small and medium enterprise born-on-the-cloud multinational ICT vendors, this qualitative study contributes to the dearth of research examining the broader impact of cloud computing on ICT vendor business models. The study provides two core insights. First, using the STOF business model framework, the paper provides a vivid contextual understanding of the nuanced impact of cloud computing along four core business model domains: service, technological, organisational and financial. Information systems business model research areas which are ripe for further investigation are also delineated. Second, the study identifies a number of salient challenges which are impacting ICT vendor’s efforts to effectively leverage cloud-based business models. Subsequently, the paper provides a number of specific recommendations which can be used by practitioners in order to minimise or eliminate these challenges.

Keywords: Information Systems, Business Model, Cloud Computing, ICT vendor

1 Introduction

“Come gather ’round people, wherever you roam, and admit that the waters around you have grown, and accept it that soon you’ll be drenched to the bone...” Bob Dylan (1963)

This premise of unprecedented change rings no truer than in the current information, communication and technological (ICT) landscape, characterised by rapid fluctuation and turbulence. It is a landscape where a multitude of new and incumbent ICT organisations are attempting to embrace and leverage emerging technological advancements. One such nascent technological development is cloud computing. Cloud computing encompasses a recombination of existing and new technologies, and has built its foundations “on decades of research in virtualisation, distributed computing, utility computing, networking and more recently web and software services” (Vouk, 2008). Cloud computing enables ICT providers to virtualise their computational resources and concurrently provision them, via a service orchestration process, typically in the form of Software-as-a-Service (SaaS), or Platform-as-a-Service (PaaS) or Infrastructure-as-a-Service (IaaS) (Mell and Grance, 2011). However, the ability for organisations to leverage the business model value of cloud technologies is proving challenging whereby “the cloud is the latest example of Schumpeterian creative destruction: creating wealth for those who exploit it and leading to the demise of those that don’t” (Weinman, 2012). Thus, this research is motivated by two factors.
First, ICT vendors are currently experiencing substantial difficulties in their attempts to effectively leverage the transformational business model capabilities afforded by cloud computing (Conboy and Morgan, 2012; Linthicum, 2012; Da Silva, Trkman, Desouza and Lindiæ, 2013). This is reinforced by international surveys of ICT vendors which have identified that lack of business model innovation (CSA and ISACA, 2012) and an inability to produce compelling business cases for customers (KPMG, 2012) represented salient challenges which were currently stagnating customer adoption of cloud technologies. These difficulties raise pertinent questions not only as to how cloud computing can impact ICT vendor business models but also to how ICT vendors are leveraging and managing these impacts. Second, this research is motivated by previous IS studies such as (i) Al-Debei and Avison, (2010) who issued a call for “information systems researchers to provide new insights into how digital organisations can develop compatible business models in order to cope with internal and external turbulent technological environments” and (ii) Lacity et al., (2011) who assert that further academic research is required to identify the extent to which cloud computing is “incrementally or radically different” from traditional methods of ICT service provision. Specifically, this paper describes a comparative case study of fifteen large and SME European ICT vendor organisations to explore the following research question:

How does cloud computing impact the core components of ICT vendor’s business models?

The remainder of the paper is structured as follows: The next section provides the theoretical background for the study, followed by a description of the research method adopted. The case study findings are presented followed by a discussion. Finally, the study’s core contributions for theory and practice and limitations are presented.

2 Theoretical Background

Cloud computing “represents a fundamental change in how information technology is provisioned” (Creeger, 2009), in that “it induces a shift in task responsibilities during decision processes and self-service procurement, provides standardised services with a narrower scope, enables new scenarios of outsourcing and governance arrangements, and uses short-term usage-based contracts” (See Schneider and Sunyaev, 2014). Provisioning cloud technologies enables ICT vendors to benefit from both business and technical point of views (Leimeister et al., 2010; Böhm et al., 2010). From a business point of view, provisioning cloud technology enables ICT vendors to experiment with new value chains and new business models (Leimeister et al., 2010; Böhm et al., 2010). However, while extant research has logically outlined the general technical and business benefits ICT vendors can derive from cloud computing technologies, there is currently a dearth of in-depth case study research which has explored and confirmed the impact of cloud-based business models from an ICT vendor perspective (Whitley, Mooney et al., 2013).

The business model concept has been used extensively in IS research to examine how organisations can create and capture value with ICT (e.g. the internet, e-commerce applications, mobile applications). Driving factors such as the emerging knowledge economy, the restructuring of global financial services, increased outsourcing of business processes and information systems, rapid advancements in ICT and the repeated failure of organisations to capitalise on the capabilities afforded by these ICTs have catapulted the business model concept back into the public arena (Teece, 2010; Zott, Amit and Massa, 2011). The IS literature is in general consensus that the business model is a multi-faceted concept. Business models can (i) serve as a holistic, system-level approach at characterising how an organisation does business, the concepts of value creation and capture and the activities that take place between the focal organisation and its partners (Teece, 2010; Zott et al., 2011), (ii) represent an “architectural blueprint” for the formation and execution of an organisation’s IT strategic objectives (Rajala, Rossi and Tuunanen, 2003; Patelli and Giaglis, 2003; Richardson 2008; Zott and Amit, 2008; Casadesus and Ricart, 2011), (iii) serve as a “conceptual tool of alignment” to fill the gap between corporate strategy and business processes in order to provide a crucial harmonisation among these organisational layers (Al-Debei and Avison, 2010; Osterwalder and Pigneur, 2010), and (iv) assist organisation’s to successfully leverage and commercialise early stage promising ICT in order to achieve sustainable competitive advantage (Chesbrough and Rosenbloom, 2002; Rajala and Westerlund, 2007). In order to address the study’s research question, the study used the STOF business model framework (Bouwman, et al., 2008) which encapsulates four core business model domains (Table 1). The researchers selected the aforementioned categorisation as a basis for conceptualising the business
model concept for the following reasons. First, the categorisation is comprehensive, coherent and comprises business model components which were identified by the study’s content analysis and (ii) which are similar to other widely cited categorisations such as the business model canvas (Osterwalder and Pigneur, 2010), the balance scorecard (Kaplan and Norton, 1992) and the V² business model ontology (Al-Debe and Fitzgerald, 2010). Second, the categorisation has been previously utilised to assess the impact of cloud technology on business models (Ghezzi, 2009; Nedyalkov 2013; Lee et al., 2014). However, it should be noted that these aforementioned studies have not focused on ICT vendors. Finally, the model is also dynamic in nature as it encapsulates external factors of influence in terms of market dynamics, technological advancements and regulatory changes which all represent salient factors in the context of provisioning cloud computing technologies.

Table 1. STOF Business Model Research Framework (Bouwman et al., 2008)

<table>
<thead>
<tr>
<th>Business Model Domain</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Domain</td>
<td>Delineates an organisation’s service offering and the inherent value propositions and the specific end-users in particular target customer segments.</td>
</tr>
<tr>
<td>Technological Domain</td>
<td>Delineates the technical functions and core competencies needed to realise the service offering.</td>
</tr>
<tr>
<td>Organisational Domain</td>
<td>Delineates how the organisation creates value from a service offering via the configuration of actors (value network) comprising resources which together perform value activities.</td>
</tr>
<tr>
<td>Financial Domain</td>
<td>Delineates the revenue and cost structure arrangements operationalised in order to capture value from a service offering.</td>
</tr>
</tbody>
</table>

3 Methodology

The central objective of this study is to explore the impact of cloud computing on ICT Vendor’s business models. Due to the dearth of empirical research pertaining to examining the relationships of the focal phenomena under scrutiny, our study is exploratory. Thus, a multi-method, comparative case study research design was selected for the study (Stebbins, 2001, Yin, 2003). Case studies are especially useful when the “boundaries between the phenomenon and context are not clearly evident” (Yin, 2003). Largely informed by the study research question (Benbasat, Goldstein and Mead 1987), our unit of analysis was the organisation. The research sampling approach was directed by evolving theoretical concepts, whereby we identified organisations and people from which we expected to elicit the majority of insights into the phenomena of interest (Strauss and Corbin, 1998). For example, this study includes both large and SME ICT vendor firms. The large business model mature (BMM) ICT ventures represent organisations that have significantly longer tenure as ICT vendors that are currently transitioning from ‘pre-cloud’ to ‘cloud-based’ business models. The SME born-on-the-cloud (BOC) ICT ventures represent organisations who do not possess the requisite existing maturity or tenure of pre-cloud business models. These firm’s business models originated on the cloud (See Table 2). Data collection took place between January 2015 and August 2015 using semi-structured interviewing based on a common protocol across 15 ICT vendor organisations. Following the standard practice of using senior management as data sources, (Creeger, 2009; Iyer and Henderson, 2012) we chose a senior manager from each targeted organisation. A case study approach to analyse emergent complex field problems “more than anything else, requires experience” (Flyvberg, 2001). As such, the 15 interviewees were selected based on the following criteria: first, the respondents should have experience working with cloud technology. Second, the respondents should hold managerial positions, for example, chief executive officer (CEO), chief technology officer (CTO), chief information officer (CIO) and senior IT manager, which would enable them to have an in-depth knowledge of the business and strategic intricacies of their cloud operations. Third, the respondents should preferably have responsibility for overseeing their organisation’s business model and/or strategy. Interviews were carried out in person, by loud speaker telephone or IP telephone software (Skype). Participants were ensured anonymity, and the data elicited has been sanitised so that no individual person or organisation can be identified. Interviews lasted between 70 and 120 minutes. The interviews (including follow-up interviews) were conducted until theme exhaustiveness was reached, which manifested when similar themes were being identified and no new themes emerged. All interviews were transcribed, proof read and annotated and then coded using NVivo 10. Extensive field notes and observations were written immediately after each interview. After the interviews we
allowed for further follow up inquiries in order to clarify any ambiguities or to gain a deeper understanding of subject matter. In order to improve the credibility of the data and provide cross and complementary perspectives on emerging elements, supplementary evidence in the form of archival documents and published materials sourced from the ICT Vendor’s websites (e.g. white papers, specific ICT vendor case studies, brochures, reports) were collated and analysed. While the study did not undertake a grounded theory approach, in analysing the data, the researcher used an analytical hierarchical data analysis process adopted from Ritchie, Spencer and O’Connor (2003) incorporating open and axial coding techniques based upon the recommendations of Strauss and Corbin (1998).

Table 2. Data sources for the study.

<table>
<thead>
<tr>
<th>ICT vendor*</th>
<th>Size**</th>
<th>Cloud Offering(s)/Business Model***</th>
<th>Interviewee</th>
</tr>
</thead>
</table>
| Inno Ltd.   | Large  | ▪ Hybrid, public and private managed and self-service hosting cloud offerings.  
▪ Outsourcing and consultancy services. (BMM) | Cloud CTO |
| MobCon      | Large  | ▪ Provision connectivity into cloud IT solutions via their existing next generation Telco network and bespoke software solutions.  
▪ Manage the design, build and implementation of their customers cloud solution ensuring seamless network integration. (BMM) | Cloud CTO |
| Sigmathen Systems | Large | ▪ Hybrid, public and private managed and self-service hosting cloud offerings.  
▪ Outsourcing and consultancy services.  
▪ Microsoft and SAP value added resellers. (BMM) | Cloud CTO |
| Gaviour Ltd. | Large  | ▪ Hybrid, public and private managed and self-service hosting cloud offerings.  
▪ Outsourcing and consultancy services. (BMM) | Cloud Manager |
| ZystemTech  | Large  | ▪ Hybrid, public and private managed and self-service hosting cloud offerings.  
▪ Outsourcing and consultancy services. (BMM) | Cloud Manager |
| SandstemTech | SME    | Bespoke software solutions enable travel companies to derive maximum benefit for their customers. (BOC) | Cloud Manager |
| Levatte     | SME    | ▪ Bespoke procurement software solution.  
▪ Enables customers to source and evaluate new suppliers. | CEO |
| Yet3        | SME    | Bespoke CRM sales management and membership body software solutions. (BOC) | CEO |
| FieldZuite  | SME    | ▪ Supply IT infrastructure in the form of public, private and hybrid cloud infrastructure hosting.  
▪ Disaster recovery and virtual desktop services. (BOC) | CEO |
| VClazz      | SME    | ▪ Supply IT infrastructure in the form of public, private and hybrid cloud infrastructure hosting.  
▪ Outsourcing and consultancy services.  
▪ Microsoft value added resellers. (BOC) | CTO |
| Zeta2k      | SME    | Bespoke software solution enables customers to visualize their raw log data in order to unlock real time critical insights. (BOC) | CTO |
| Med3Care    | SME    | Bespoke software solutions aimed at the travel clinic service market segment. (BOC) | CEO |
| Braavos PLC | SME    | Bespoke software solution enables customers to integrate and connect their existing core IT infrastructure into an ICT vendor’s offering. (BOC) | CEO |
| LYS         | SME    | ▪ Supply IT infrastructure in the form of private and hybrid cloud infrastructure managed hosting.  
▪ Outsourcing and consultancy services.  
▪ Microsoft and Citrix value added resellers. (BOC) | CIO |
| WebReve     | SME    | Bespoke software solution enables customers to design and build cloud-based website solutions. (BOC) | CEO |

*Company pseudonyms have been applied to protect anonymity. ** Firm size categorised using limits as set by the European Union along the dimensions “number of employees” (e.g. Small 10-49, Medium 50-249, Large 250+) and “annual turnover”. ***Large firms categorised as ‘business model mature’ (BMM) ventures (e.g. extant pre-cloud business models) while SME firms categorised as “born-on-the cloud” (BOC) business model ventures (e.g. current business model originated on cloud).
4 Findings

In this section, we report the empirical results obtained during the analysis of the 15 semi-structured interviews (denoted as sanitised quotes), archival documentation and published materials. Table 3 summarises the key findings which emerged from the study. It is evident that while cloud computing has presented the majority of study participants with many significant unique opportunities for innovation along the four business model domains, the study also revealed the disruptive impact associated with provisioning cloud technology. Using the STOFF business model framework we now delineate in detail how cloud computing is impacting on ICT vendor’s business models.

4.1 Service Domain

From a service business model domain perspective, the analysis reveals that the value propositions for both small and medium enterprises (SME) and large organisations were quite similar (e.g. virtualisation, multi-tenancy, low CAEX and OPEX, agility, scalability, dynamic allocation, elasticity, resource pooling). For all SME ICT vendors, the ability to acquire large ICT vendor infrastructure, solutions, services and certifications, in addition to the provision of their bespoke cloud offering, resulted in the manifestation of new value propositions. It became clear from the interviews that the traditional barriers to entry for SME application ICT vendors were dramatically minimised when provisioning cloud offerings. For example, the CEO at Med3Care mentioned that “the company’s use of the Salesforce’s PaaS has resulted in tailored security and compliance value propositions which enable us to achieve differentiation from our competitors”, while the CTO at Zeta2k explained that “whether you’re a start-up or a large company cloud computing enables you to adopt an agile approach to software development and provision”. The CTO in SandTechTech further elucidated “the biggest advantage of the cloud for our company is the associated scalability and velocity of software development and deployment. The cloud enables us to demonstrate to potential customers the actual scalability of our technological product offerings. This is very important in the context of airlines where they can have quieter parts of the year for business. Therefore, it becomes imperative that we can demonstrate to them the elasticity and the scalability of our offerings in demonstration environments. Without the cloud we would not be able to facilitate this”. Moreover, the CEO at WebReve pointed out, “for us an SME, being able to avail of Rackspace’s IT support and security offerings is paramount given that we have currently over 6000 global cloud-based websites in operation. Without Rackspace we would not possess the manpower to ensure the continuous uptime of these websites”. The value proposition for large ICT vendors was also quite evident whereby cloud computing’s innovative delivery system enabled the organisations to successfully leverage their existing infrastructure, expertise and software application portfolios. For instance, the CTO at INNO and the CTO at MobCon explained that unlike traditional methods, the cloud is an extremely innovative delivery system that enables them to deliver a broad range of services with more efficiency. ICT vendors are currently experiencing substantial challenges in facilitating effective differentiable customer value propositions around their cloud offerings. For example, the CEO in Yet3 discussed how many of their competitors are pushing similar value propositions and it can lead to customers procrastinating whether or not to acquire their particular cloud offering. This manager further elaborated that, “we are currently working changing the manner we position our value proposition. The simplicity and intuitive nature of our offering is still not enough to differentiate ourselves from competitors”, while the CEO at Bravos pointed out that, “anybody can slap on a cloud tag slogan to their cloud offering and market the same generic value propositions. Firms must be able to distinguish themselves in some fashion”.

Customers’ knowledge and comprehension of cloud offerings was also identified by the study participants as a salient challenge for ICT vendors. Study participants at LYS, Levatte and MobCon explained that for many customers, the transition to the cloud is not as straightforward as they would like it to be. Thus, challenges related to training and learning need to be addressed on an ongoing basis. Concerns pertaining to cloud security were also identified by ICT vendors. For Zeta2k, alleviating customer security concerns represented a significant obstacle. The CTO in this company pointed out that, “our biggest challenge is convincing enterprises that their data is fully secure in a cloud-based environment”. Similarly, the CEO at Bravos explained how customers were hesitant to use some cloud services due to security concerns (e.g. migrating build machines and code base intellectual property rights in the cloud).

Target customer segments for ICT vendors include private (business-to-business and business-to-customer) and public sector organisations. The cloud deployment models and the ICT vendor’s indigenous websites has enabled the organisations to target new and niche customer segments which would not have
been previously possible. Large ICT vendor study participants (e.g., MobCon, INNO, Sigmathen Systems) specifically target global SME and large multinationals with enterprise grade cloud technologies. Cloud computing has enabled these aforementioned ICT vendors to leverage their existing infrastructure and customer base in order to successfully commercialise their cloud technologies. As pointed out by the CEO in MobCon, “we have developed a unique SaaS solution, which is a game changer for cloud performance delivering up to millisecond latency across a secure, private and high performing network for Irish businesses”. For SME ICT vendors, cloud computing has enabled them to target global markets which would not have been accessible via traditional software provision methods. For example, the CTO at VClazz described how “cloud computing, coupled with our niche set of expertise and skills, has enabled an SME such as our organisation to flourish and become a serious challenger for hosted cloud services in the channel market”. Similarly, the CEO at Yet3 commented how the low CAPEX and OPEX afforded by cloud computing technologies had enabled an SME ICT vendor such as themselves to have an international presence facilitating their ability to prioritise certain international market segments such as Vietnam, Israel and Iran (countries largely ignored by the international IT community). The CTO at INNO elaborated that large ICT vendors are “unwilling to foot the costs for government clouds as they are uncertain whether they will be used or not”. The CTOs in MobCon and VClazz explained that despite governmental commitment to cloud computing technologies, at the ground level, the companies are experiencing substantial difficulties due to compliance and red tape issues.

### 4.2 Technological Domain

In relation to the technological business model domain, ICT vendors possess a capacious range of knowledge, technical, business, research and development (R&D) and service internal capabilities. The cloud manager in Gaviour explained, “our main core competency revolves around hybrid cloud and our ability to integrate existing on premise systems and networks with cloud-based offerings”. While the cloud manager at SystemTech stated that, “our expertise resides in our ability to engineer, deploy and maintain agile and flexible cloud infrastructures and architectures, which manifests in attractive value propositions for our customers”. The CTO at VClazz pointed out their technical expertise had enabled the company to utilise Microsoft, VMWare and CISCO technologies in order develop their own bespoke cloud infrastructure on which they host SaaS. Additionally, all ICT vendors identified their employees as a source of competency. For example, the CEO at Yet3 pointed out, “our people are a core and they bring the competencies. Our software development team have a set of specialised competencies pertaining to building, testing and operationalising cloud services,” while the CIO at LYS explained that the company “possess a strong core DNA of experience and expertise across traditional lines of virtualisation offerings which enable us to implement cloud solutions in a manner which brings core value to our customers businesses”. However, there are some challenges related to sourcing employees who possess the requisite cloud computing software development skills and expertise. For example, the CEO in FieldSuite explained how “it can be very hard to find the right people in terms of engineers to run your IaaS”. Likewise, the CEO in Yet3 described how it is quite challenging in terms of financial resources to source cloud competent personnel. The study also found that R&D was considered a core competency for all ICT vendors.

All ICT vendors possessed departments/units/laboratories dedicated to R&D where they trial and experiment with cloud computing technologies in sandbox environments prior to deployment. The CTO in Zeta2k explained that, “Our R&D, innovation capability and track record has enabled us to build a bespoke technology which sets ourselves apart from the rest of the competitors”. Zeta2k have an R&D laboratory located in Prague and cloud computing enables them to operationalise agile and DevOps software development processes in order to release service features on a daily basis. The CTO in Zeta2k further stated that “we can thus get early feedback on these service releases and iterate and improve on them if required”. Additionally, the study identified market analysis as a source of core competency for ICT vendors. The cloud manager at Levatte explained that “our other source of competency is our ability to carve out a market niche and identify appropriate market channels. We are doing a lot of selling through partner channels so we have been able to find channels that other companies have not been able to find”. Similarly, the CEO at Med3Care and CTO at VClazz described how the combination of expertise, technological skills and their in-depth understanding of niche markets has enabled their company to concurrently deliver sophisticated cloud services to clients and sustain a competitive advantage.
4.3 Organisational Domain

In terms of organisational business model domain, all large ICT vendors believed that acquisitions of other ICT vendors and strategic partnerships had played pivotal roles in their ability to competitively position themselves in the cloud market. For example, the CTO in INNO pointed out the salient role of their business partners as key differentiators that provide cogent value to their business model, stating that “the business partners have always played a very valuable role in making large companies work for smaller companies”. The CTO in SigmaNet Systems also explained how certain acquisitions have enabled the company to achieve a shorter time to market with a broad portfolio of global cloud services. For instance, this study participant described how partnering with SAP - a certified global provider of cloud and hosting services - has enabled SigmaNet Systems to leverage their existing cloud infrastructure in order to provide a cost effective delivery model for mission-critical SAP applications. Similarly, the CTO in MobCon discussed how the company had taken a strategic decision to partner with AWS in order to catalyse their global cloud footprint. This partnership enables MobCon to provision unique services, for example, one of their cloud offerings enables clients to connect their existing infrastructure to AWS, without having to access it over the internet. In addition, the cloud manager in Gaviour pointed out, “a big part of our business model innovation strategy resolves around acquisitions. If we run into difficulties developing a particular cloud offering then we acquire”.

In relation to the competitive positioning of SMEs, partnerships and specific features which were unique to their particular cloud offerings were considered competitive positioning factors. In terms of unique features, the CEO in Yet3 explained how their SaaS multilingual platform enabled the organisation to target regions similar ICT vendor offerings would not be able to. Additionally, the CTO in Zetta2k pointed out that, “for us it all about making the service accessible for everybody. Log management for years has been only accessible by the experts or by the big companies with the big budgets. It is our one outstanding positioning tool”. The CEO in WebReve highlighted the advantages of using a third party large ICT vendors, explaining that, “Our customers want flexibility with regards to where there data is stored. Rackspace has a number of global data-centres thus enabling us to provide the flexibility to our customers if they have a preference to where they would like their data stored. Data security and privacy is currently a Pandora’s box which will become more important for cloud customers in the next coming years and will provide companies such as ourselves with a key differentiating factor through the use of Rackspace”.

In terms of partnerships, the CTO in FieldZuite explained that “it is imperative for ICT vendors to select the right supply chain partners”. This CTO elaborated how during the seven years since the company’s inception, their decision to partner with larger globally recognised ICT vendors such as Hewlett Packard, Cisco, IBM, VMWare and Microsoft had significantly accelerated their business model growth. The CEO in Med3Care also described how their partnership with SalesForce.com and other health care software providers has enabled an SME company such as themselves to punch above their weight in a niche medical software market. The CEO in this company further elaborated that “partnering with SalesForce.com, who are security (e.g. HIPPA, SAS, ISO, NHS) and safe harbour compliant (salient as the company deal with individual medical records), ensures our customers that our security measures are more robust than the security that would exist in the clinic settings if the software was to be locally hosted servers”. The CEO in WebReve identified that their partnership with Rackspace encompassed a multitude of attractive value propositions for their company. This study participant stressed that, “I know that when I and my team are sleeping Rackspace are monitoring our portfolio of websites 24/7/365. That’s a massive advantage for an SME start-up such as ourselves”. Customer engagement and relationship management were also considered to be a competitive positioning factor for all ICT vendors. The CTO at FieldZuite explained that customer relationship management is essential whereby, “in the traditional IT world the main focus was on the sale. Often, following the sale the customer was left to deal with problematic issues. However, with the recurring cloud revenue model, the company has had to place greater emphasis on customer retention”. Additionally, the CEO at Yet3 pointed out that customer relationship management in terms of engagement and intimacy were key differentiators between their company and other ICT vendors, explaining that “ICT vendors need to know their customer. Once you know your customer you can build better products and services which can better fulfil their needs better than a competitor. They move from being a customer to being an advocate for your business”. The cloud manager at Gaviour also pointed out, “our cloud offering must be capable of continuously delivering the requisite value to retain a customer to that particular offering”. Similarly, the CTO at Zetta2k described how their SaaS offering is continually evolving based on customer feedback via a tool which is embedded into their niche cloud offering.
4.4 Financial Domain

From a financial business model domain perspective, the revenue model of ICT vendors comprises licensing, pay-per-use, monthly and annual billing models. The CTO in StandstemTech explained that “cloud computing has enabled us to provide five offerings in comparison to our traditional business model which had a single offering. However, with cloud computing it is imperative to operationalise a basket of business models to deal with the elastic and consumption based metrics inherent to cloud technology”. Some of the ICT vendors have applied unique features to their revenue models. For example, Sigmathen Systems provide a “ramp model” credit service for new customer organisations that are in the embryonic stages of increasing their sales pipeline line. These customers initially incur relative low monthly charges which “ramps up” accordingly as their organisations becomes more established. As pointed out by the CTO the advantage of this ramp model is that it ensures the “alignment of service with the likely revenues that they are going to acquire”. Additionally, INNO provides a financing facility which enables credit qualified customers to acquire cloud technologies in a cost effective manner. All ICT vendors (large and SME) indicated that the formation and operationalisation of effective revenue models for cloud computing technologies represented a salient challenge for their organisations. For example, the CEO at Med3Care pointed out that “the pricing model for cloud services is extremely difficult and has been a major stickler point for us especially as we are catering for a niche market”, while the CTO at INNO described how they, “have to get used to dribs of cash with a SaaS model compared to our previous model where we would get large payments. Shareholders do not like this change and it constitutes the main reason why larger companies are slow to move to cloud technologies”. Similarly the cloud manager at ZystemTech identified that “many of the main ICT vendors might have to wait years before they see a return on their massive cloud investments as they are getting the revenue in drips and drabs. The main advantages of cloud offerings at the moment are for the customers who can scale up and down as they need the service”. The cloud manager at Gaviour elucidated “the main problem with the cloud is that you are now selling a service. We integrate our cloud services with additional suppliers which result in multiple revenue sources. However, the returns from these are minimal. The biggest difficulty is deciphering how much to charge the customer for their usage”. In terms of cost structure, all SME ICT vendors suggested that employees, who are involved in the development, maintenance, sales and marketing of cloud offerings, represented the largest cost to their businesses. The cloud manager in Levatte explained, “by far our largest cost is salaries by orders of magnitude”. The CEO in FieldZuite pointed out, “the whole business model has changed from the traditional mode of operation. What most ICT vendors don’t realise is that there is still a large upfront investment with regard cloud technology and that manifests through investments in people. Instead of investing in infrastructure ICT vendors are now migrating that investment into state of the art support teams and facilities which must be fully operational 24/7/365. ICT vendors must determine if they can measure the return on that by having a large number of small paying users.” The CEO in Yet3 elucidated how cloud computing has enabled the organisation to maintain an international presence (e.g. Tehran, Tel Aviv, Tokyo, Taipei, Vietnam) while also concurrently maintaining a low footprint in terms of employees, explaining that “the cloud facilitates our low CAPEX and OPEX ethos. All of our globally distributed employees work from their own home offices”.

For large ICT vendors, data-centres and operating costs were identified as the two largest costs to their businesses. The CTO in INNO explained that while the ethos of the cloud is about making the technology invisible to the users, behind every cloud, however, there is a data-centre. Thus, there are substantial costs involved in terms of ensuring that the data-centre is up and running 24/7/365 year, monitoring security and performance insurance so that the cloud experience is scalable and transparent from anywhere. The CTO in Sigmathen Systems explained that the company were striving to make better use of cloud technologies internally within the organisation, describing how “we have to drink our own kool aid”, in order to reap the associated cost saving benefits. He pointed out how customers were currently experiencing the vast majority of cost savings, elaborating on how “customers no longer have to foot large capital investments. They can build up environments and tear them down just as quickly without large contractual commitments”. The CTO in INNO also highlighted that the company’s transition to cloud computing provision had resulted in significant cost savings, describing how “our new cloud billing format has significantly changed our business model. In principle, you could disintermediate supply chain distributors and middlemen which would then reduce the cost of provisioning these cloud technologies to our customers and increase our profits as well”. However, the CTO issued a caveat pertaining to disintermediation whereby, “in doing so, you run the risk of losing flexibility in terms of working with other large ICT vendors".
### Table 3. The Impact of Cloud Computing on ICT Vendor’s Business Model Domains

<table>
<thead>
<tr>
<th>Business Model Domain</th>
<th>Cloud Computing Impact</th>
<th>Empirical Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Value Propositions</strong></td>
<td>1. Attractive aggregate provider and customer orientated value propositions</td>
<td>All ICT vendors</td>
</tr>
<tr>
<td></td>
<td>2. New value propositions as a result of acquiring main cloud provider cloud offerings and services</td>
<td>All SME ICT vendors - Examples from Med3Care, Zeta2k, SandstemTech, WebReve</td>
</tr>
<tr>
<td></td>
<td>3. Innovative delivery capability</td>
<td>All ICT vendors - Examples from INNO, MobCon</td>
</tr>
<tr>
<td><strong>Target Customer Segments</strong></td>
<td>1. Local and international private and public sector target segments</td>
<td>All ICT vendors</td>
</tr>
<tr>
<td></td>
<td>2. Enables SMEs to target diverse global markets</td>
<td>All SME ICT vendors - Examples from VClazz, Yet3</td>
</tr>
<tr>
<td></td>
<td>3. Leverage existing infrastructure to enhance existing market reach</td>
<td>All large ICT vendors - Example from MobCon</td>
</tr>
<tr>
<td><strong>Key Challenges</strong></td>
<td>1. Value proposition differentiation</td>
<td>Yet3, Braavos</td>
</tr>
<tr>
<td></td>
<td>2. Customer knowledge</td>
<td>LYS, Levatte, MobCon, VClazz</td>
</tr>
<tr>
<td></td>
<td>3. Security</td>
<td>Zeta2k, Braavos</td>
</tr>
<tr>
<td></td>
<td>4. Public sector organisations</td>
<td>INNO, MobCon, VClazz</td>
</tr>
</tbody>
</table>

#### Technological

**Technological Capabilities**

ICT vendors utilise the following core competencies in order to leverage the capabilities of cloud computing:

1. Technical expertise
2. Research and Development
3. Market analysis

<table>
<thead>
<tr>
<th><strong>Key Challenges</strong></th>
<th><strong>Sourcing technical expertise</strong></th>
<th><strong>All ICT vendors - Examples from FieldZuite, Yet3</strong></th>
</tr>
</thead>
</table>
Cloud computing enables ICT vendors to strengthen their competitive positioning in the cloud market via:

1. Leveraging Heritage
2. Leveraging existing infrastructure capabilities and software portfolios
3. Offering differentiation – unique product offerings and services
4. Acquisitions - facilitate faster time to market
5. Partnerships – facilitate faster time to market and new value propositions
6. Customer relationship – enhanced emphasis on customer retention

<table>
<thead>
<tr>
<th>Business Model Domain</th>
<th>Cloud Computing Impact</th>
<th>Empirical Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organisational</strong></td>
<td><strong>Competitive Positioning</strong></td>
<td>All large ICT vendors- Example from MobCon</td>
</tr>
<tr>
<td></td>
<td>Cloud computing enables ICT vendors to strengthen their competitive positioning in the cloud market via:</td>
<td>All large ICT vendors- Example from INNO</td>
</tr>
<tr>
<td></td>
<td>1. Leveraging Heritage</td>
<td>All ICT vendors- Examples from Sigmathen Systems, ZystemTech, Zeta2k, VClazz, Yet3, WebReve</td>
</tr>
<tr>
<td></td>
<td>2. Leveraging existing infrastructure capabilities and software portfolios</td>
<td>All large ICT vendors - Examples from Sigmathen Systems, INNO</td>
</tr>
<tr>
<td></td>
<td>3. Offering differentiation – unique product offerings and services</td>
<td>All ICT vendors- Examples from MobCon, Zeta2k, LYS, FieldZuite, Med3Care, WebReve</td>
</tr>
<tr>
<td></td>
<td>4. Acquisitions - facilitate faster time to market</td>
<td>All ICT vendors- Examples from FieldZuite, LYS, Yet3, Zeta2k</td>
</tr>
<tr>
<td></td>
<td>5. Partnerships – facilitate faster time to market and new value propositions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Customer relationship – enhanced emphasis on customer retention</td>
<td></td>
</tr>
<tr>
<td><strong>Financial</strong></td>
<td><strong>Economic Model</strong></td>
<td>All ICT vendors</td>
</tr>
<tr>
<td></td>
<td>Multiple and Flexible Revenue Models:</td>
<td>All ICT vendors</td>
</tr>
<tr>
<td></td>
<td>1. Freemium trial</td>
<td>INNO, MobCon, Sigmathen Systems</td>
</tr>
<tr>
<td></td>
<td>2. Pay-per-use, monthly, annual, licensing billing formats</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Consulting fees, purchasing order and financing packages</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Cost Structure:</strong></td>
<td>All SME ICT vendors- Examples from FieldZuite, Yet3</td>
</tr>
<tr>
<td></td>
<td>4. Facilitate SME low CAPEX and OPEX ethos with employees constituting the largest cost component</td>
<td>INNO, Sigmathen Systems, MobCon</td>
</tr>
<tr>
<td></td>
<td>5. Data-centres and employees represent largest cost component for Large CSPS</td>
<td></td>
</tr>
<tr>
<td><strong>Key Challenges</strong></td>
<td>Revenue model differentiation and Return on investment forecasting.</td>
<td>All ICT vendors - Examples from INNO, Med3Care, Gaviour</td>
</tr>
</tbody>
</table>

Table 3. The Impact of Cloud Computing on ICT Vendor’s Business Model Domains
5 Discussion

Using the STOF business model framework proposed by Bouwman et al. (2008), this study sheds light on how cloud computing has enabled SME born-on-the-cloud and large business model mature ICT vendors to commercialise their hardware and software along each of the four business model domains (See Figure 1). The study identified that the provisioning of cloud technologies encompassed attractive value propositions. For example, ICT vendors are attracted to the agile cloud business model insofar that cloud technology allows them to manage their costs more effectively, lowers traditional barriers to entry and innovation, facilitates the operationalisation of multiple revenue streams and facilitates faster software development and deployment. From an SME ICT vendor born-on-the-cloud business model perspective, cloud computing has lowered the traditional barriers to targeting global markets. SME ICT vendors, in an effort to penetrate specific international markets, are specifically tailoring their software solution in order to enhance its indigenous appeal while others are choosing to strategically partner with international ICT vendors who are in similar lines of business. From a large ICT vendor business model mature perspective, cloud computing has enabled the organisations to not only leverage their existing customer base but also target new horizontal and vertical customer market segments which would not have been previously (for example, developing countries, SMEs, mobile, social, telecommunications, and so on).

![Figure 1](image-url)  
*Juxtaposing the impact of cloud computing on SME and large ICT vendor’s business models.*

The study also found that the majority of ICT vendors are leveraging cloud technology by means of their core competencies, namely, industry experience, technical expertise, R&D and market analysis. ICT vendors have developed these competencies around the varying services (infrastructure, platform, software) that make up their core cloud offerings. ICT vendors revealed that both the intricacies of cloud computing architecture and the customer orientated nature of provisioning cloud technologies has resulted in a significant shift in their traditional organisational norms as different expertise are now required in the areas of research, technical development and customer service. From a customer service perspective, our findings suggest that the role of the customer is exacerbated and more heightened in the context of provisioning cloud technologies due to its inherent customer-friendly value propositions (e.g. scalability, self-service, utility billing etc.). In line with extant research (Teece, 2009; Zott et al., 2011), we argue that ICT vendors should embrace this transformation from internal facing to customer facing service and facilitate the convergence of the roles of their firms and their customers “toward a unique co-creating experience, or an experience of one” (Prahalad and Ramaswamy, 2004). Since many ICT vendors are currently still maturing
their core competencies of interacting with customers and onboarding, we foresee an increasingly important role for emerging ICT vendors who can effectively facilitate the seamless delivery and adoption (e.g. training, use, technical support) of cloud technology. All ICT vendors revealed that they were experiencing substantial challenges when attempting to source cloud competent candidates who possess the requisite training, certification or experience. We foresee the narrowing of this cloud skills gap due to the recent global growth of cloud dedicated training courses from education establishments (e.g. Bachelor and Master of Science degrees). Industry is also creating and reinventing certifications specifically for cloud computing (e.g. Microsoft certified solution developer, IBM certified solution advisor and so on). From a competitive positioning perspective, the study revealed how both large and SME ICT vendors are tactically manoeuvring themselves in the cloud market. Large ICT vendors are leveraging the vast resources at their disposal in terms of heritage, infrastructural capabilities, existing supply chain relationships, existing customer base, and broad software portfolios as competitive positioning factors. SMEs ICT vendors are focusing on the targeting of niche markets, product uniqueness and customer engagement as market differentiators.

From a financial business model domain perspective, all ICT vendors revealed that, in comparison to traditional methods of hardware and software delivery, the provisioning cloud of technologies encompassed significant costs savings. The main costs incurred by large ICT vendors pertain to investments in large scale infrastructure and related capabilities and ongoing operating costs which are required in order to enable the essential characteristics and economies of scale associated with cloud technologies. With regards to SMEs, all of the ICT vendors indicated that employees constituted the largest cost element to the business. However, there may be additional hidden costs that ICT vendors, in general, may not fully understand, for example, the costs involved in overprovisioning/under provisioning cloud services, training customers, and providing 24/7/365 technical support. In terms of the revenue model, the study revealed that ICT vendor’s inability to effectively leverage the measured service essential characteristic afforded by the cloud computing paradigm is resulting in salient revenue model challenges. Large ICT vendors can supplement the initial high margins associated with the with recurring service fees with multiple additional revenue sources such as private cloud sales, consulting, financing, reselling and so on.

The study revealed that both customer retention and product differentiation become paramount for ICT vendors who are reliant solely on recurring service fees. As cloud computing continues to mature in an increasingly crowded marketplace, we believe that the short term focus for ICT vendors should lie in developing a customer base rather than profitability. This process can be facilitated by developing distinctive and unique features to support their recurring service billing model. By enticing customers to try these novel features, with the overall objective of increasing familiarity, it will enable ICT vendors to not only attract and retain new customers but also assist ICT vendors to differentiate themselves from competitors. Additionally, given the perpetual level of customer apprehension towards security, ICT vendors should focus on enhancing their security protocols and gaining accreditation to recognised security standards as it may prove to be a decisive market differentiator. ICT vendors should also focus on managing the continual improvement of end-user expectations in terms of developing comprehensive migration and onboarding strategies for their existing cloud technology infrastructure and software portfolios. This will enable ICT vendors to alleviate customer’s fears of the complexity, risk, timeframe and costs that maybe involved when transitioning their applications to the cloud.

All ICT vendors identified that cloud computing has enabled their organisations to experience substantial growth opportunities. In comparison to the traditional capital expenditure IT investment model, SMEs identified how provisioning cloud technology can fundamentally transform the cost of ownership, thus enabling them to operationalise operating expenditure models. SMEs ICT vendors can acquire scalable and measured infrastructure and software resources from large ICT vendors while also not having to assume the responsibilities and costs associated with managing these resources. Also, despite the disparity that exists in terms of the financial resources for investment and reinvestment between large and SME ICT vendors, cloud technology enables SMEs to “punch above their weight” by assuming tactical positions in dynamic cloud supply chains (e.g. targeting niche markets with bespoke cloud software offerings, strategic partnering with large ICT vendors and so on) which can lead to rapid growth and speculative investment opportunities.
While this study provides empirical evidence that contributes to the limited research on the impact of cloud computing from an ICT vendor’s business model perspective, the findings support previous studies which outline the benefits and challenges of migrating towards cloud-based business models (See Armbrust et al., 2010; Marston et al., 2011; Wilcocks, et al., 2013; and Whitley, et al., 2013). However, this study provides a nuanced perspective on the commonalities that exist with regards to the business model challenges currently being experienced by both SME and large ICT vendor’s business models as a result of migrating to provisioning cloud computing services. However, it would seem logical to argue that these challenges would be more exacerbated in a large ICT firm context. For instance, the larger organisations provide a broader and comprehensive portfolio of services. This is in comparison to the SME organisations who provision a narrow scope of specialised cloud services using third-party providers for commodity infrastructure and platform services. Moreover, while the SME’s business models lack ‘pre-cloud’ business model maturity, the large firms in the study have significantly longer tenure as ICT service providers who are currently transitioning from ‘pre-cloud’ to ‘cloud-based’ business models. This transformation of extant mature business models encompasses potential nuanced legacy liabilities and issues which merit further investigation.

6 Contributions and Limitations

The objective of this study was to conduct an exploratory investigation into how cloud computing impacts the core components of ICT vendor’s business models. Both theoretical and practice contributions stem from this research. From an IS theory perspective, the following study has demonstrated the salient role that “IS research can play in informing and contributing to the understanding of the essence of business models in improving their design” (Osterwalder and Pigneur, 2013). Hitherto extant empirical research in the area of cloud-based business models has largely focused on adopter perspectives. However, this study is the first to elucidate the impact of cloud computing on both large business model mature and SME born-on-the-cloud ICT vendor’s business models. Moreover, this is the first study to use the STOF research lens (Bouwman et al., 2008) to investigate the impact of cloud-based business models in the context of ICT vendors. The STOF business model research lens facilitated a vivid contextual understanding of the broader impact of the supply-side of cloud computing services. From a practitioner perspective, the study has served to demystify both the cloud-based business model benefits which ICT vendors are currently experiencing as a result of provisioning cloud technologies, which to date, and specifically from a cloud-supply viewpoint, have been largely anecdotal. Additionally, this study identified a number of salient challenges that are currently stagnating ICT vendor’s abilities to leverage cloud-based business models. The researchers have subsequently provided a number of recommendations which practitioners can execute in order to dilute or eliminate these challenges. Our findings should also sound out a warning to those organisations that did not fall under the umbrella of the study who are contemplating migrating to provisioning cloud technologies. Whereby, yes, the benefits of cloud-enabled business models are very appealing, however, challenges do exist which may result in subpar business model outcomes.

While the comparative case study proved to be rich in detail, the findings are based on a small purposeful sample of firms. Thus, this study is naturally limited in terms of it generalisability. However, we took care in relating our research findings in order to relate the idiosyncratic details of the cases to theoretical concepts. Additionally, qualitative research can be prone to “multiple sources of analytic bias which can weaken or even invalidate” (Miles and Hubermann, 1994) research findings. For example, while interviewing senior management has a number of strengths, it can also result in the manifestation of elite bias. In order to minimise the impact of analytic bias, the researcher deployed a number of prescribed tactics (e.g. data source triangulation, case study protocol etc.) in order to ensure the validity and reliability of the research design. To validate our findings we encourage more empirical research on emerging business models for ICT vendors. For example, the findings suggest that specific coping mechanisms are required to enable ICT vendors to fully leverage the benefits of cloud-based business models. The concept of coping mechanisms (see Lederer and Mendelow, 1990 for example) in the context of emergent ICT based business models, such as Cloud Computing, Big Data, 3D Printing and so on, represents an IS research area which is ripe for further exploration. For instance, future research could identify the specific coping mechanisms that firms need to operationalise in order to minimise challenges to cloud-based business models to realise benefits.
Acknowledgments

This work was supported, in part, by Science Foundation Ireland grant 10/CE/I1855 to Lero - the Irish Software Research Centre (www.lero.ie).

References


