Entrepreneurial Value Creation in the Cloud: Exploring the Value Dimensions of the Business Model

Jyoti M. Bhat and Bhavya P. Shroff

Indian Institute of Management, Bangalore, India
{jyoti.bhat,bhavya.ps}@iimb.ernet.in

Abstract. Cloud computing's potential in creating and capturing business value is being increasingly acknowledged. Existing empirical studies of business value in cloud computing have focused on user organizations and large enterprises with legacy systems. Acknowledging the innovation opportunities created by cloud, we study entrepreneurial cloud service providers. In this paper we conduct an exploratory study of six cloud-based start-up firms in India. We examine the value dimensions of the business model concept to study entrepreneurial value creation in the cloud. We find that cloud is a key resource in the structural configuration of their business model and enables the value proposition.

Keywords: Cloud computing, entrepreneurship, start-ups, value creation, business model.

1 Introduction

Cloud computing brings in new market players and value networks [1] with different business values for the various players [2]. The access, affordability and fast setup of IT infrastructure provided by cloud computing enables firms to focus on core competencies, addresses issues of IT inefficiency [3]; lowers the entry barriers for entrepreneurs [4] and acts as a catalyst for innovation [5]. Literature reviews of academic publications find that empirical studies related to business issues and business value of cloud computing is limited [6]. The limited empirical studies on the business impact of cloud computing have focused on service providers' value creation with cloud [7] and benefit patterns that organizations achieve by leveraging cloud capabilities [8]. Venters and Whitley [9] found that cloud was being used by start-ups to innovate, but how cloud-computing supports innovation and value creation is largely an unexplored area in empirical research. Business value of cloud-computing for adopter organizations is apparent with benefits related to cost and efficiency, but value creation by cloud service providers is an unexplored area.

The tremendous growth of the cloud computing market has brought in a significant number of cloud start-ups. Hence entrepreneurial value generation in the cloud is relevant in this growing market space. Investigating the value of cloud computing faces the typical challenges highlighted in IT value research, as the economic impact and competitive benefit depends on several firm level factors [10]. We attempt to

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explore the following research questions - *How do firms leverage cloud computing to create and derive business value?* We use an exploratory approach and study value creation by six cloud based start-ups. A business model is "the rationale of how an organization creates, delivers and captures value" [11]. Hence we use the business model concept to examine value creation through exploitation of opportunities provided by cloud computing.

In the next section we describe the theoretical background and the framework used in the study. We then outline the case study data and the method adopted for the study. Section 4 details the findings and analysis of the case studies. In section 5 we discuss our findings with respect to other studies and conclude with directions for future research.

2 Theoretical Background

2.1 Business Model Concept

The business model (BM) concept is gaining importance in IS, strategy and technology management research, particularly when studying ICT-enabled businesses [12]. The BM concept has been used to study e-business [11], [13], telecommunication [14] and other IT innovations like ERP implementation [15]. Viet et al. [16] review the BM literature in IS and identify BMs in IT industries as one of the pillars for future BM research within IS. BM is identified as crucial to value creation not only for the focal firm but also for its suppliers, customers and partners [13]. The success and sustainability of the firm is dependent on the underlying business rules and several exogenous factors such as the value created for the consumer, value chain position, capturing the market, industry factors, etc. Therefore, the design of the BM model is said to be a very important decision for new firms [17].

Amit and Zott [13] argue that in e-business BMs can create value through efficiency, novelty, complementarities, and lock-in. Hedman and Kalling [15] propose a more generic BM concept based on strategy literature and integrate RBV, five forces model, generic strategies of the firm, value chain analysis and process research. Afuah and Tucci [18] examine internet business models and identify the components of the BM and provide guidelines for evaluating a BM. From an entrepreneurial point of view the BM helps narrow down entrepreneurial ideas to specific opportunity and establishes the goals of the firm [19].

A conceptual framework proposed by Al-Debei and Avison [20] based on a comprehensive literature review of the BM concept identifies 4 primary value-based dimensions. We use the V4 ontological structure of BM for our study of the cloud-based start-ups as it provides clarity to the BM concept from a value creation perspective.

2.2 The Fundamental Elements of a Business Model

The four value dimensions of 'V4 Business Model'- value proposition, value-network, value-architecture, and value-finance are the aspects which need to be examined when designing, evaluating, and managing BMs. A detailed description of the dimensions and elements is available in [14]. The operationalization of the BM

elements depends on the context; hence we define below the dimensions and elaborate the concepts being used in the proposed study from an entrepreneurial perspective. Figure 1 shows the V4 BM dimensions and elements considered for this study.

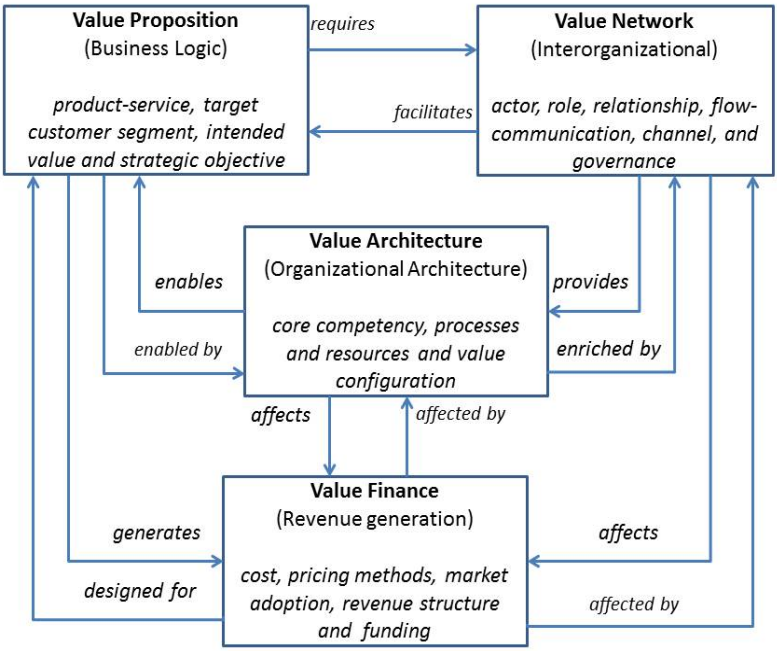

Fig. 1. V4 Business Model Dimensions for Cloud-based start-ups (Adapted from [14])

- *Value proposition* demonstrates the business logic of creating value through products/offerings targeted to specific market segments. The strategic objective of the product/service is also an important aspect of this dimension.
- *Value architecture* specifies the holistic structural design of the organization which includes the technological architecture and organizational infrastructure.Value configuration is an important element as it enables the combinatorial innovation capabilities required for cloud-based start-ups [5].
- *Value network* represents the interorganizational perspective and shows how value flows across the actors. Customers, complementaries and partners are expected to be the key actors in the network. Competitors are not pertinent in an opportunity-centric view [19].
- *Value finance* describes the cost and pricing methods, and the revenue structure that ensures the economic viability of the offering. In the context of start-ups the focus is more on market penetration than on immediate financial returns. Also the pricing methods and revenue models for start-ups can be volatile in their early days.

3 Research Method and Data

3.1 Research Method

We adopted a multiple case study method to explore how technology start-ups leverage cloud computing for value creation. The case studies method is a good strategy to study contemporary phenomenon in its real-life context [21]. To meet the needs of the exploratory study the cases were purposefully chosen to span across all layers of the cloud - software-as-a-service(SaaS), platform-as-a-service(PaaS), and infrastructure management. Some of the criteria for choosing the cases were: 1) cloud-based offering is the predominant focus of the company 2) the cloud services are offered to businesses (B2B space). We also ensured that the start-ups have a viable business potential by verifying that they have a product which has been used by some paying customers or the venture has the backing of an investor or incubation cell.

The six companies are based out of Bangalore, India and provide different products in the cloud environment for global customers. All the companies chosen have been around for 1 to 3 years and have less than 25 employees.

Table 1 provides details of the individual case studies.

Table 1. Start-ups for the case study

C1. Cloud Manager*: (Technology/ Infrastructure Management) A cloud management product which helps consume and manage any cloud service from any cloud provider. Their product provides a self-service portal which integrates with a firm's workflow systems and enables centralized control of cloud service consumption and governance across the enterprise. The product is offered in SaaS and in-house hosted models.
C2. PrivateCloud: (Technology/ Infrastructure Management) A cloud engine that helps medium sized enterprises to migrate existing IT infrastructure to a private cloud. Their platform provides tools for monitoring and allows the virtualization of IT infrastructure.
C3. CloudALM: (Software / Development Platform & PaaS) A development platform for cloud based agile software development. The platform orchestrates and manages the various software development tools and the cloud infrastructure services procured by their customers. The product is primarily a hosted solution, but is also offered on the cloud to small companies.
C4. VC-on-demand: (Technology/ SaaS) A cloud based video bridge as a widget on the customer's website. The product integrates video conferencing with the workflow of the firm and provides certain intelligence and analytics of the video call.
C5. e-voucher: (Accounting/SaaS) A cloud based pre-accounting and compliance product which allows firms to define financial rules, prevent data errors and creates an intelligent digital voucher. E-voucher leverages the global access of cloud to connect remote stakeholder of firms and eliminate data errors at the point of entry.
C6. MicroAnalytics: (Analytics/SaaS) A sophisticated analytics which can be run on small datasets. The product offers affordable analytics to SMEs.

* All names are pseudonyms to ensure anonymity.

3.2 Data Collection and Analysis

The data collection was primarily through semi-structured interviews with the founders of the six firms. As the business model reflects the management/entrepreneur's hypothesis about the value proposition and customer requirements [22], interviews were conducted with the entrepreneur/founders. We adopted face-to-face interviews as it allows delving deeper into the areas of importance [21]. Each interview lasted between 45 to 80 minutes. We used 20 open-ended questions based on the V4 BM dimensions to guide the interview. In addition to the notes taken by two researchers, each interview was audio-recorded with the interviewee's consent to further aid data analysis. Supporting documents obtained from the interviewees and their firm websites included brochures, demos, firm related information and social media entries.

For each interview we prepared the answers to our framework elements from the interview notes, recording and documents available. The data was initially coded using an open approach to identify the main ideas which were emerging. These ideas were then grouped using the V4 dimensions to identify categories. The ideas were also grouped using interactions between the V4 dimensions. The data was analyzed and observations discussed between the two researchers to reach an agreement about the findings. We first analyzed each case using the V4 dimensions and then conducted a cross-case analysis to identify the role of cloud in the BM.

4 Findings and Analysis

We present our findings and analysis along the value dimensions of the V4 BM. We associate individual findings with specific cases (C1 to C6 from Table 1) to bring clarity.

4.1 Value-Proposition

Value proposition is a critical dimension of the business model for most technology organizations. The growth of cloud technologies which created *new markets* for cloud resource management was leveraged by the start-ups (C1,C2,C3). The SaaS startups (C3,C4,C5,C6) productize the entrepreneurs' domain expertise and deliver them using cloud technologies. Their businesses exist because the capabilities, reach and affordability of cloud helped them implement their ideas to cater to unsatisfied needs of the customer. *"...all traditional industries are moving to the cloud…there is compute,… network…and a lot of things are falling in place which makes it* (this idea) *possible now*" –Founder, C4.

The cloud-based start-ups focus on providing *new niche capabilities* (such as microanalytics, accounting, agile development, etc.) and are not trying to replace existing capabilities or change existing processes in their customer organizations. The offerings plug on to existing enterprise systems and IT infrastructure. The features consider local infrastructure conditions (like 200kbps or 2G connection, prepaid billing plans, etc.) (C4,C5,C6). The start-ups provide different usage scenarios of their products as the value proposition in technology products depends on the context of its use (C1,C4,C5,C6). "*The framework is one… right, but the use cases of this product is a lot and that's why we are pitching it to different players*" – Founder, C1. All the

start-ups said that they did not have any direct competitors and their focus is on increasing the size of the targeted market.

4.2 Value-Architecture

Cloud is an important resource for the start-ups as it enables product development with minimal IT investment. For SaaS products cloud is the channel for product delivery and usage (C4,C5,C6). For start-ups providing on premise hosted services, the IT infrastructure and cloud based services at their customer site are necessary resources for their product (C1,C2,C3). The SaaS products have a dependency on complementary products used by the customer organizations (such as enterprise systems, web browsers, etc). *"…we verified the products they* [SME customers] *use and built data adaptors for those…*" – C6. Though technical skills is an important resource, most of the start-ups have a lean development team (C1,C2,C4,C6).

The core-competency of the start-ups is the skills and expertise of the founders. Though a differentiated product strategy is adopted, a cloud based model forces a low-cost requirement from the start-ups. *"…customer pays 10 bucks for the cloud services, so why will he pay me 10 more bucks to manage it for him?"* – C1. Hence resource optimization and customer relationship becomes important for the start-ups. Most of the start-ups continuously evaluate the resources and cloud services which were being used to deliver their products (C1,C3,C4). Product enhancement and resource optimization are the main drivers of this continuous review.

4.3 Value-Network

All the start-ups interviewed mentioned leveraging external networks for value creation. The start-ups use expert groups or online social networks as intermediaries to gain access into customer organizations. They use their free version to create awareness in the expert group through which they can connect to the decision makers in the enterprise (C1,C3,C5). The products have globally relevant features and added capabilities to cater to India specific infrastructure requirements. The low price points allow these products to compete with global products having similar or less features. *"…our input costs are 100 times lower, we can directly compete on price and can give high quality work…but I can't tie up with cloud service providers in US, I need the system integrators and consultants... who can bring in their connects to make it happen*" – C1. C5 uses its professional contacts within the network of accountants to acquire customers in US, Middle East, Africa and India. Hence developing value networks and partners is very critical for the cloud-based start-ups.

Some start-ups maintain a free and paid version of the product (C1,C3,C5). The free customers are valuable resources for product testing and feedback. None of the start-ups leverages the multiple-tenancy of their products. All of them mentioned that data is owned by the client and they do not plan to use data across tenants. Most start-ups leverage the brand value and trust of the large cloud providers (Microsoft, Amazon, IBM), especially when it comes to security and reliability aspects with their customers.

4.4 Value Finance

Subscription based pricing with slabs was the popular model adopted by the start-ups. Even on premise products adopt this model, "*renting even if on premise*", due to customers' expectations. This reduces the variability for themselves and their customers. The SaaS subscriptions have a base price range of $15 to $25, which is *"...less than the monthly mobile phone bill"* – C6. Such low price points are possible only due to cloud and the reduced input costs in India. The main costs for the start-ups are the cloud services and human resources; but most of the start-ups are not too concerned about both these costs. But not all start-ups pursued a low-cost model; start-ups with higher input costs or niche products adopt a value-based pricing.

Market penetration and acquiring customers is the focus of the startups, hence they have not explored revenue structures in detail. But availability of funding was critical for many of them. "*The subscription based model requires upfront investment whereas the revenue has a long tail.*" – C4. Some of the startups have explored different revenue flows like build domain specific solutions (C4,C6) and embed the SaaS product in other products.

The key findings across the four BM value dimensions are summarized in Table 2.

Table 2. Key Findings across the value dimensions of the BM

BM Value Dimension	Key Findings
Value Proposition	• Infrastructure management and platform start-ups exploited markets created due to cloud • SaaS players created a new/niche market which was enabled by cloud.
Value Architecture	• Have a dependency on complementary products and resources owned by customers • Need to respond rapidly to new trends and continuously innovate in the cloud environment
Value Network	• Use experts and social networks as intermediaries for customer acquisition • Cloud B2B start-ups do not aggregate across customers
Value Finance	• Subscription based pricing (Flat rates) with slabs is the popular model, but complex and niche products use value-based pricing • Only mature start-ups have explored multiple revenue flows

5 Discussion

Cloud-based entrepreneurial ventures offer functionalities which are at the boundaries of the firm and integrate into the existing enterprise systems. Though they do not replace existing enterprise capabilities, their value propositions include enabling new business models, decision support, real time data/process transparency, etc. Cloud computing has created new markets for specialized knowledge like accounting and analytics [23] which previously required expensive resources like IT investments and

consultants. Chen and Wu [4] show that on-demand services are more profitable for firms with differentiated products, we found that the cloud start-ups were all focused on differentiating their products on features. All the start-ups position their products into market segments where large CSPs and product vendors currently do not operate and hence their BM increases the size of the market [17]. We found cloud technology is an enabler of the BM in cloud-based start-ups. This aligns with the functionalist perspective of BM (at the firm level) where technology complements the BM as an enabler and the core logic of the BM deals with the value proposition to the customer, value capture and revenues for the firm [12].

The low-priced subscription based billing model may not be a sustainable model as the cloud-based product offerings matures with more features based on complementors and network partners. The "utility model" which was popularized by the cloud infrastructure providers may not be adequate to handle the complex architecture and networks of cloud offerings [5]. Koehler et al. [24] find three types of cloud computing customers based on their preference for different billing models (pay-per-use, flat rate and one-time), which provides an opportunity for price discrimination. This is an opportunity which the cloud-based start-ups can explore.

In line with previous empirical studies [1], [7], [8], the importance of partner network for value creation was reiterated in the current study. Unlike [7] who found human resources as the biggest cost for CSPs, the cloud-based start-ups in India did not mention this as an issue. Hence India based cloud start-ups may have a unique value proposition of low price- high quality in the emerging cloud-based market. All the entrepreneurs in the study used the global CSPs when it came to storage and compute services. India based IaaS may make infrastructure cheaper and can create more opportunities for value creation for the cloud-based start-ups and their customers. This calls for action from the Indian government to ensure suitable policy and support for cloud computing.

6 Limitations, Conclusion and Future Work

Deviating from the larger stream of research focusing on technical aspects and capabilities of cloud the current study explores business value creation in cloud computing. We find that cloud computing created markets for cloud management which was exploited by start-ups; also the characteristics of cloud enabled start-ups to create new opportunities and markets for niche products. The start-ups derive value from two aspects of cloud –1) access to affordable IT infrastructure for product development 2) Ability to deliver products and services by making cloud part of their BM. This reiterates the importance of BM in unlocking the value of new technologies.

There are several limitations in this study. As an exploratory study with a small sample of six start-ups, our findings cannot be generalized without further study. This study provides insights for a detailed study as it highlights many aspects where more clarity is required. The start-ups we interviewed experience steady loads in their activities as they onboard customers in a planned manner. Hence some of the technological features of cloud (like elasticity) are not fully experienced by these start-ups. The combination of technological features and BM-enabling features could not be investigated in this study. The BM is a function of its environment; hence the country

context has an influence on some of the findings which we have highlighted. Future studies can explore newer themes such as the innovation-enabling role of cloud technologies in the start-ups, new cloud-enabled business model taxonomies, cloud enabled BM innovation in adopter organizations.

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