Developing Business Strategy for Cloud Computing Industry

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Abstract

The recent development of Cloud Computing has invoked tremendous attention from both IT vendors and organizational IT users. Many articles have discussed the technology aspects of Cloud Computing. However, researches on the industry development and business strategy aspects of Cloud Computing are still in the early stage. This research tries to fill the gap between the technology aspect and the business aspect of Cloud Computing.

This paper focuses on the business model and business strategy that vendors may achieve in Cloud Computing market. Starting from a classification of possible Cloud Computing business models, the processes of transformation towards these business models for IT vendors are analyzed. By applying SWOT method, feasible business strategy for Cloud Computing industry is derived.

Keywords: Cloud Computing, business model, SWOT, business strategy

1. Introduction

The Cloud Computing concept has made a major impact on the products, services and business models of the IT software and hardware industries. Cloud computing has therefore become the emerging concept and technology that has drawn the most attention from the IT software and hardware industries in the period of the 2008 global financial crisis. The sheer scope of the industry as well as the fact that it spans both the enterprise and consumer markets has led to much discussion on its future business potential as well. Nevertheless, Cloud Computing technologies and business models as well as the new products, services, competition and alliances that arise as a result offer an emerging market that is well worth monitoring.

Currently, major IT firms are exploiting possible business opportunity into Cloud Computing market. The Taiwanese IT vendors are strong players worldwide in the manufacturing and integration of IT devices and services. To assist the Taiwanese IT vendors moving forward towards the emerging Cloud Computing market, this research aims to address the question of deriving possible market strategies for the Taiwanese Cloud Computing industry.

2. Literature Review

2.1 Cloud Computing Technology

Armbrust et al. (2009) presents a comprehensive discussion on the characteristics of Cloud Computing. The advantages of adopting Cloud Computing include cost down, full use of the limited computing and storage resources, and scalable commercial computing data center. Cloud Computing users are relieved of dealing with over-provisioning and under-provisioning of computing resources from their internal data centers. Buyya1 et al. (2008) indicates that cloud computing is a new and promising paradigm delivering IT services as computing utilities. They proposed architecture for market-oriented allocation of resources within clouds and discussed some representative platforms for cloud computing. Keahey and Freeman (2008) summarizes early experiences with the Science Cloud test bed, and describes configuration and tools that were used to configure the Science Clouds. They present information about how the clouds were used and what usage patterns were observed. Katzan (2009) points out the issues of transferring large amounts of data into and out of clouds, with particular emphasis on data protection. Vouk (2008) and Foster et al. (2008) also discuss the implementation issues of cloud computing services. Since Cloud Computing integrates various virtual resources, how to effectively manage large scale of infrastructure is a primary issue for vendors (Sotomayor et al., 2008). Many other research articles also have discussed the technology development of Cloud Computing. However, the industry and business aspect of Cloud Computing has not been widely discussed in the literature so far.

2.2 Business Model

The business model concept is becoming increasingly popular within MIS, management and strategy literature. It is used within many fields of research, including both traditional strategy theory and in the emergent body of literature on e-business.

Business model is a term often used to describe the key components of a given business. It is particularly popular among e-businesses and within research on e-businesses (Afuah and Tucci, 2001).

Despite of its importance, no generally accepted definition of the term ''business model'' has emerged. Diversity in the available definitions poses substantive challenges for delimiting the nature and components of a model and determining what constitutes a good model. It also leads to confusion in terminology, as business model, strategy, business concept, revenue model, and economic model are often used interchangeably. Moreover, the business model has been referred to as architecture, design, pattern, plan, method, assumption, and statement (Morris et al., 2003).

2.3 SWOT and Business Strategy

The SWOT analysis is an established method for assisting the formulation of strategy. SWOT analysis aims to identify the strengths and weaknesses of an organization and the opportunities and threats in the environment. Having identified these factors strategies are developed which may build on the strengths, eliminate the weaknesses, exploit the opportunities or counter the threats. The strengths and weaknesses are identified by an internal appraisal of the organization and the opportunities and threats by an external appraisal (Dyson, 2004).

A variation of SWOT analysis is the TOWS matrix (Weihrich, 1982). In the TOWS matrix the various factors are identified and these are then paired, for example, an opportunity with a strength, with the intention of stimulating a new strategic initiative.

The four combinations in the TOWS matrix, which are matching pairs of specific internal and external factors, are called the Maxi-Maxi (Strengths/Opportunities, SO), Maxi-Mini (Strengths/Threats, ST), Mini-Maxi (Weakness/Opportunities, WO), and Mini-Mini (Weaknesses/Threats, WT).

3. Research Method

Since many emerging technologies are still in the development phase, this study will employ qualitative methods. Qualitative data analysis are employed instead of quantitative data analysis, by way of expert panel and vendor interviews.

The methods are appropriate in this study because there is an insufficiency of well-established models for business strategy in Cloud Computing industry. These methods

aim at distilling and structuring opinions from the participants until a consensus or pattern is formed (Smaling, 2003; Vicsek, 2007).

3.1 The Expert Panel

The purpose of this investigation into Cloud Computing market strategy was to qualify, rather than quantify, and therefore the study adopted a panel group approach. The expert panel from the industry is to assist the convergence process of data analysis. To this objective, industrial experts panel of eleven people were selected. The panel consists of CEO, CIO and line of business managers from various domains of Taiwanese IT industry. All of them are from publicly listed firms. Their business domains include System Integration(SI), Independent Software Vendor (ISV), Internet Service Provider(ISV), device manufacturer, and data center operator. These are the major participants in the Cloud Computing industry. The main function of the Expert Panel is to help determining the research framework and deriving strategy. In particular, the following questions are discussed.

1. What are the possible Cloud Computing business models within the context of the Taiwanese IT industry and environment?

2. With regards to these business models, what is the process of transformation towards Cloud Computing for the Taiwanese IT industry?

3. Within this transformation process, what are the business environments in terms of internal strengths and weaknesses, as well as external opportunities and threats of the IT firms?

4. Recognizing the internal and external business environments, what are the possible business strategies that could be developed for the IT industry?

3.2 The Vendor Interviews

Representative IT firms from Taiwan are selected as the objects of study. The selection process is based on the rank of the revenue of the firms as well as their reputation in terms of technology innovation and market visibility. IT vendors of Taiwan enjoy high market share worldwide in the sectors such as computer, communication and consumer electronics manufacturing. Currently the Taiwanese vendors participate in Cloud Computing include IT device manufacturers, IT service providers, and Internet datacenter operators. We collect and analyze business proposal data of 35 Taiwanese IT vendors in cloud computing.

The selection criteria are as follows.

1. Revenue of the firm is among the top five in its industry domain.

2. The firm has announced in public its vision, strategy, products or service toward Cloud Computing market.

Based on these criteria, 30 IT firms are selected and summarized in the following table.

Table 1: Selected Cases

Business Domain	Number of Firms
Independent Software Vendor (ISV)	6
System Integration Provider (SI)	8
Telecom Operator	3
Server and storage device manufacture	5
Networking device manufacture	3
Mobile device manufacture	5
Total	30

3.3 The Research Process

The research process is depicted in Figure 1 below. On site interviews with the business managers of vendors listed in Table 1 are conducted. These interviews are for collecting the up to date development trends of the Cloud Computing industry, including the transformation process towards Cloud Computing, the possible opportunities and potential threats of the industry. These findings serve as the base data for the following phase of SWOT analysis.

Figure 1. Research Process

4. Data Analysis and Results

4.1 Cloud Computing Business Model

Several researches have proposed frameworks to identify business models. Morris et al. (2003) proposed a set of six questions for defining basic components of business models. In the context of Cloud Computing, Rappa (2004) described a framework to classify business models using the customer relationship as the primary dimension for defining categories. This has proven to be a useful framework because it builds upon a common parlance already used in many industries to describe methods of business. Using this approach, nine major categories are used to classify a number of different types of business models that have been identified in practice among Web-based enterprises and also Utility Computing firms.

By using a classification approach similar to that of Rappa (2004), business models of Cloud Computing are identified and summarized in Table 2.

Table 2. Cloud Computing Business Models

Business Model	Description	Taiwanese Vendor Examples
Cloud communication and mobile device	Entry into the cloud supply chain through smartphones, tablet, netbook PC, network communication equipment, and other products.	HTC, Asus, Acer, D-Link, Gemtek
Cloud server and storage equipment	Entry into the cloud supply chain through servers, storage equipment, power suppliers, and other branded products of OEM operations.	Quanta, Inventec, Gigabyte, Delta Electronics, Infortrend, Promise
Cloud service and data center	Provision of broadband service, data center services, and various XaaS services needed in cloud computing.	Chunghwa Telecom, Taiwan Fixed Network, FETnet, Acer eDC, ASUS webstorage, GSS
Cloud software and service	Assistance offered to cloud service and mobile device setup through system integration, software development, consultancy services, and other operations.	Systex, DataSystems, the Syscom Group, Fortune Information Sysetms Corp., Tatung System Technologies Inc., Genesis Technology, Inc., Stark Technology Inc.

4.2 Transformation towards Cloud Computing Business Models

4.2.1 Transformation towards Cloud Software and Service

With the gradual heating of the cloud computing market, Taiwan's IT services and software industry in 2011 put forward the relevant cloud computing products and services to grasp the IT business of the existing customer groups, pack existing technology or products, convert and upgrade to the new cloud computing model software and services, develop the private cloud market, and cooperate with data center industry to cut into the realm of public cloud services and diversified development.

On the aspect of private cloud market development and management, systems integration was conducted, and consultancy services manufacturers engaged to proceed with import services of the cloud server and virtualization products and cooperate with foreign firms such as IBM, HP, EMC/VMWare, and so on. Then using proprietary software and platforms, software developers began conducting the publication of SaaS services and cooperating with telecommunication operators in China, Japan, and other markets to expand their overseas market.

4.2.2 Transformation towards Cloud services and Data Center

The infrastructure provider industry of the public cloud services is the cloud data center services. Taiwan has the advantages of safety and stability, low cost water and electricity, and good basic conditions. Using the hardware and software facilities to develop differentiated and niche public cloud services can create opportunities for enterprises in the rush for the cloud.

With the development of public cloud services, information security has attracted extra attention. Cloud services and data center industry work to strengthen the security mechanism or cooperate with leading information security companies to reduce users' worry. Thus, enhancing the cloud data protection remains the key to market development. In addition, the cloud data center is also gradually transforming and upgrading to become the IT Security Operation Center (SOC) and is cooperating with the mobile device operators and the software development industry to develop the mobile application software marketplace so that it combines the market developments of the public cloud and the smart mobile devices. The impact of the recent 311 earthquake in Japan has made remote backup a serious issue, and disaster recovery and data backup programs are also value-added services that the industry has actively developed.

4.2.3 Transformation towards Cloud Servers and Storage Equipment

Taiwan maintains an important world position in the IT communication hardware equipment manufacturing industry and has the advantage of the high logistics flexibility in the global information and communications equipment manufacturing supply chain. The weak economy of the U.S. and European market in recent years, coupled with frequent natural disasters, unstable supply of raw materials, and highly competitive industry has resulted in the decline of manufacturers' gross profit. With the rise of the cloud computing market, large data centers have been built to meet the demands of server and storage equipment and the cumulative fast-growth of enterprise data year by year. The inevitable trend of the expansion of data storage capacity of the enterprise is a market opportunity for the IT equipment industry. How to conduct market transformation in response to the cloud computing trend will be a major challenge facing the industry.

Taiwan's IT communication industry has abundant experience in OEM and a complete supply chain. It has had a solid basis in the market of overall cloud computing information and communications equipment, but with the progress of the public cloud market, the OEM object may be extended from leading companies of equipment brands, such as IBM, HP, and Dell, to leading companies of cloud services, such as Google, which will create more competitiveness. Manufacturers, in addition to active transformation, also extend internal software technologies to the information services market or cooperate with the software development industry. In the development of public cloud services, it is hoped another wave of opportunity will open up in the cloud computing market.

4.2.4 Transformation towards Cloud Communication and Mobile Device

In 2011, the smartphone and tablet PC industries began making programs combining cloud services and mobile devices, such as the iCloud developed by Apple. Through the mechanism of cloud computing, collaborative applications focusing on the content, and with a cloud multi-machine development direction, future users will be able to easily experience cloud services with just a mobile terminal device and a wireless network. This is also the industry direction of Taiwan smartphone and media tablet vendors.

With the popularity of mobile application software Apps in the mobile phone and media tablet market, there will be more and more cloud applications linked to the mobile application software marketplace. Accompanying this wave of interest, more software development industries will launch innovative applications with Apps to link cloud services and create new opportunities for the mobile device operators. The communications equipment industry promotes cloud computing-related services by linking to cloud services through IoT(Internet of Things) and context sensing applications.

4.3 The SWOT Analysis

By applying the analysis method of Weihrich (1982), the SWOT matrix of the four Cloud Computing sub-industries are derived as follows.

Table 3. SWOT analysis for Taiwanese Cloud software and service vendors in global market

Strengths	Weaknesses
A. Possesses both hardware and software solutions and provides professional consultancy services experience. B. Cooperated with the global leading companies for many years, and prices are flexible. C. Possesses in-depth vertical domain knowledge, and localized Know-How as well.	A. Customers are mostly large enterprises or government agencies; fewer dealings with SMEs and consumers. B. Weak research and development of key software technologies such as virtualization and Big Data analytics.
Opportunities	Threats
A. Open up the market of private cloud deployment. B. Develop the SaaS model of software to attract new customers. C. Cloud services governance, including security, auditing, and quality control. D. Enterprise mobile application software and services.	A. Global leading companies lead technologies and standards. B. Part of the business is replaced by emerging cloud services. C. Industries rise in the emerging markets such as Mainland China, India, and so on.

Table 4. SWOT analysis for Cloud service and data center vendors in global market

Strengths	Weaknesses
A. Data center business has had operational experience in the local market. B. A strong ability to control operating costs, utilities, and other resource, prices are relatively low internationally.	A. High cost of bandwidth, small domestic market, potential users' and software manufacturers' wait-and-see attitude. B. Limited in the XaaS related business experience.
Opportunities	Threats
A. Cross-sector providing value-added software services to facilitate the transition for the development of SOC or on-demand software centers. B. Set up a service platform like the App Marketplace, matching service providers and users.	A. Foreign XaaS leading companies continue to develop the domestic market. B. Foreign government protection policies for the local data center industry.

Table 5. SWOT analysis for Cloud server and storage equipment vendors in global market

Strengths	Weaknesses
A. As an important OEM center of server and storage equipment, Taiwan has the capability of autonomous manufacturing and cheap supply of hardware equipment. B. Global deployment of production base, supply chain integrity, and high logistics flexibility..	A. OEM profit is greatly affected by raw materials and human resources costs of a production base. B. Leading foreign firms continue compression of OEM bargaining space.
Opportunities	Threats
A. Large-scale cloud data center continues to expand in scale, placing orders directly to the server and storage equipment OEM industry. B. Enterprise data continue to grow and support the needs of storage devices.	A. Enterprises' guidance in virtualization to consolidate server and storage equipment may reduce the future procurement requirements.

Table 6. SWOT analysis for Cloud communication and mobile device vendors in global market

Strengths	Weaknesses
A. Possessing brand management and OEM practice, the industry supply chain is complete. B. Grasping the R&D and manufacturing capabilities of the key components.	A. Key software such as mobile operating system relies on foreign companies. B. Communication standards are dominated by the leading foreign companies.
Opportunities	Threats

A. Intelligent terminal device market is booming. B. App mobile applications drive the use trend of consumers and businesses. C. Combination of the emerging applications of the IoT and contexture computing.	A. Leading foreign companies suppress industry exports with patent litigation. B. Low-cost competition from Mainland China, India, and other emerging regional industries

4.4 The Strategy Development

Following the reasoning for establishing TOWS matrix introduced by Weihrich (1982), strategies are developed for the four Cloud Computing sub-industries and summarized in the following TOWS matrices.

Table 7. Business strategy for Cloud software and service vendors

	Strengths	Weaknesses
Opportunities	A. Develop private cloud deployment and value-added services B. Strengthen enterprise mobile application development and deployment C. Extend cloud services governance-related business.	A. Develop the On Demand version of the application software for developing SME market
Threats	A. Strategically ally with Mainland China, India, and other industries to develop emerging markets.	A. Cooperate with leading foreign companies in promoting the emerging business of Big Data analytics.

Table 8. Business strategy for Cloud service and data center vendors

	Strengths	Weaknesses
Opportunities	A. Transform the Data Center into the IT Security Operation Center (SOC)	A. Cooperate with the ISVs in promoting the SaaS business.
Threats	A. Cope with smart terminal devices for developing the App marketplace	A. Combine proposed solutions with the issues of carbon reduction, remote back-up, and disaster recovery

Table 9. Business strategy for Cloud server and storage equipment vendors

	Strengths	Weaknesses
Opportunities	A. Enter Cloud data center server and storage OEM businesses	A. Develop cloud collaboration service with upstream cooperation manufacturers as basic users
Threats	A. Cooperate with the ISVs to develop the Cloud Appliance.	A. Transfer or extend to the field of IT services

Table 10. Business strategy for Cloud communication and mobile device vendors

	Strengths	Weaknesses
Opportunities	A. Combine multi-screen-one-cloud model to develop diverse terminal devices.	A. Develop consumers' personal cloud storage and collaboration services
Threats	A. Develop cheap mobile devices to leverage the Cloud Service leading companies' existing customer group	A. Strengthen the innovative development of mobile applications and content for enhancing the value-added products

5. Conclusions

The Cloud Computing business model and business strategy, as well as IT industry's transformation process towards Cloud Computing are presented in this research. As analyzed in the previous sections, the Cloud Computing business model are classified into four models, namely, the cloud software and services, the cloud services and data center, the cloud server and storage equipment, as well as the cloud communication and mobile device industry. Each business model of the Cloud Computing industry has different advantages, disadvantages and strategic directions for development. Vendors interested in exploring the market opportunities of Cloud Computing can use this analysis process and outcome of this research as a reference for their strategy planning, and avoid many unnecessary trial and error efforts. In particular, with a clear picture of business strategy for the emerging Cloud Computing technology, vendors can position themselves for a market sector of their competitive advantage.

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