A Study on Cloud-Based Software Marketing Strategies Using Cloud Marketplace

Wonju Park and Kwang-Kyu Seo

Department of Management Engineering, Graduate School, Sangmyung Univ., Seoul, Korea

whatwillbe@wonjuzzang.com, kwangkyu@smu.ac.kr (Corresponding author)

Abstract. Cloud service maximizes efficiency in information technology resource operation management. Local and global markets are expected to expand rapidly in the future, as cloud service is being activated in various fields of on-demand and the information and communication technology industry. Each cloud service provider (CSP) secures a distribution channel using its own service, defined as "marketplace" for efficiency and transparency in supporting and distributing software services rather than using the existing license-based distribution platform. Cloud technology allows users to freely store and access data anytime and anywhere, and it provides various applications in the form of services. Various cloud-based software registered in the marketplace provide an improved user interface and guarantee expandability, stability, and security based on the benefits of cloud technology. Software developers can efficiently provide their software to customers of CSPs around the globe and create a profit model by simply registering on a marketplace. Service can be used efficiently as the processes of the existing application are reduced. Various payment methods such as usage-based system based on cloud service characteristics can be employed. The cloud marketplace guarantees rapid cloud service construction and operation, contributing to overall cloud industry development. In this study, we analyze marketplace status and suggest a marketing strategy for optimal service distribution and operation using the marketplace. We also provide user feedback regarding business model usage and cloud service purchase.

Keywords: Cloud Service Provider, infrastructure as a service, service as a service, marketplace, cloud service brokerage, cloud-based software, marketing strategy.

1. Introduction

Cloud service provides virtualized computer resources through the cloud. As a type of internet-based computing, it provides various types of data through user requests (on-demand) of internet-connected virtualized computers. Physical computers are not employed. Cloud service not only provides user information (data) via network connection globally but also provides data in various service types.

Cloud service providers (CSPs) try to build a marketplace where software can be easily used for their customers and try to acquire a wide variety of software developers. Software developers can achieve global sales at lower costs than conventional software distribution methods by registering their own software in their marketplaces without a need to build separate applications and distribution services.

In addition, users can register the required cloud-based software without any time and space constraints. Distribution and technology support do not require separate written contracts or requests and are efficiently provided through console screens of existing CSPs.

In this study, we examine the status of marketplaces built by many CSPs and help software developers select a marketplace suitable for both their purpose of use and business model based on a strength, weakness, opportunities, and threats (SWOT) analysis.

The scope of this study is shown in Table 1. We analyzed the procedures, forms, and policies that software-as-a-service (SaaS) developers need for entering the marketplace and presented utilization strategies for application developers and users.

Table 1: Study scope and methods

Define	Data Collection	Case study	Result
• Purpose of study • Study range	• Recent CSP reports • Marketplace case research • SW sale type research • Previous studies	• CSP marketplace analysis • License method analysis • SWOT analysis	• Suggest marketplace registration strategy per service • Suggest marketing utilization strategy • Suggest business model utilization strategy

This paper consists of six chapters. Chapter 1 describes the background and purpose of this study; Chapter 2 describes the differences between this study and previous studies; Chapter 3 deals with global and local cloud service platforms; Chapter 4 analyzes the advantages and disadvantages of marketplace business via a study regarding marketplace registration methods and actual case analysis; Chapter 5 suggests SWOT analysis and cloud platform based on marketplace strategy; finally, Chapter 6 summarizes the study results and draws conclusions, also it presents future research projects.

2. Literature Review

Research on software distribution channels and cloud-based marketplaces focused on market research and the distribution status of existing package software. Recently artificial intelligence (AI) and machine learning technologies are operated in a cloud environment. AI is employed in various non-information technology industries for practical research analysis (Chang *et al*.,2020).

Kee researched on distribution channels and status of existing package software (Kee, 2015) and Hong conducted empirical studies on factors affecting the behavioral intentions of individual users wanting to use SaaS. Hong's study confirmed that SaaS provided by recent CSPs has drawn keen attention as a means to enable innovation in the software distribution paradigm, but not many users have actively used it (Hong *et al.*, 2018).

Regarding the value of marketplace, Menychtas presented that the latest applications—from enterprise software to mobile and social networking—are adopted and available through the cloud, enabling broader adoption and advanced function. The study also analyzed that the cloud creates a marketplace where more products participate in the service providing process and easily develop applications through reuse and aggregation of services and resources (Menychtas, 2011).

Yan *et al.* classified user-specific items via the analytic hierarchy process (AHP) analysis and studied requirements of specific user groups, e.g., enterprises (Yan *et al.*, 2019).

Jung and Seo (2020) emphasized and analyzed the level of security required by cloud users and the need for management policies; the study enables users to standardize the criteria and requirements for choosing security services in a cloud marketplace. Park and Seo (2020) conducted an analysis and case study of independent software vendor's specific software on cloud platforms, and Yoo *et al.* (2017) confirmed the need for policies and software that meet the requirements of specific industrial environments.

While marketplace definition and analysis data have been reported in previous studies, this study directly analyzes the marketplaces of major local and global CSPs. Discussion of practical registration methods and suggestions of major marketing strategies via SWOT analysis differentiates this study from previous ones.

3. Global and Local Cloud Marketplace Survey

This chapter analyses the characteristics and registration services of local and global cloud marketplaces.

3.1. Korea Telecom (KT) CLOUD

KT Cloud is a domestic cloud provider that holds a "cloud marketplace." As of January 2020, it has 65 registered services in its key categories including "server & application," "high availability," and "database". Table 2 lists the key categories

and registered services.

Table 2: Key categories and registered services of KT Cloud marketplace

Category	Number of Registered Services
Server & Application	11
High Availability	2
Database	11
Storage	3
Network	1
Big Data	3
HPC	1
Management	10
Development Tools	2
Security Tools	17
Business Tools	4
Total	65

KT Cloud marketplace registration method is as follows. KT Cloud users are provided a KT Cloud server (virtual machine [VM]) machine image. Software solution providers willing to sell solutions (machine image) to KT Cloud users register their products after signing up as sales members.

This marketplace registration provides KT Cloud users with a simple VM image, and usage cost is added to KT Cloud cost.

If cloud service is provided in a VM form, the registrant has to pay all expenses that are not charged to the users who apply for the product. KT provides the product by applying a discount rate of less than 30 percent via separate consultations. The billing system for each service is applied differently depending on the number of virtual servers and services, VMs, licenses, and users, as well as capacity and operation methods. There are also discrepancies in policy among services.

3.2. NAVER Cloud

NAVER Cloud is a local cloud provider that holds a "marketplace" software type that is divided into two categories - "business software" and "infrastructure software" -and there are 23 subcategories. Some of these categories are classified but not registered, and the registration is supported through alliance proposals. However, cloud service has to normally operate on the NAVER Cloud platform, and registration can be limited to prevent excessive competition if there are several solutions with the same function. Table 3 lists the key categories and registered services.

NAVER's cloud platform marketplace features not only infrastructure, but also solutions and services optimized for a particular infrastructure. The billing system is not specified on the website and for several services it consists of requesting an estimate from the registrar. Unlike KT, the payment method consists of direct billing.

Table 3: Key categories and registered services of NAVER cloud marketplace

Category	Number of Registered Services
Management	1
OS	0
Networking	0
Storage	1
Database	9
Security	18
Backup & Recovery	4
Games	2
Website	6
e-Commerce	3
ERP	5
CRM	4
CMS	0
Digital Marketing	12
Health & Medicine	1
Broadcasting & Entertainment	2
DevOps	1
IoT	4
Contact Center	6
Migration	3
Big Data	4
Business Productivity	3
Etc	7
Total	96

3.3. Cloud Store Ceart

CEART - Cloud Ecosystem Application maRT - is a specialized cloud service store that enables search, selection, and usage of cloud-based services in Korea. CEART was developed to support the expansion of the cloud market and the development of a cloud-based society. Table 4 lists its key categories and registered services.

CEART provides cloud service security certification and customer retention cases on the detail page, and separately provides information on 221 partnership companies (360 registered exhibition services). It also provides information about 1,381 public institutions among potential customers.

Users are either lay members or public members. Lay members include private companies and individuals. National institutions (government and public) are separately managed as public members.

Through CEART marketplace, users can search and install their cloud services through 'category' and 'search' function. Users can check service estimate and registration of contract results that occur during the purchase process of search and installation, and public institution users can later issue service performance certificate.

Table 4: Key categories and registered services of CEART marketplace

Category	Number of Registered Services
Computing	75
Networking	71
Storage	66
Data Management	50
Decision Support & Data Analysis	37
Security	76
AI	43
Blockchain	2
IoT	14
Mobile	27
Software Development Tools	14
Platform	20
Customer Relationship Management (CRM)	27
Marketing & Sales	47
ERP	22
Collaboration Tools	74
IT Management	58
Project Management	23
Human Resource Management	13
Electronic Documents & Record Management (EDRM)	34
Industry	12
Education & Books	26
Broadcasting & Culture	20
Health	2
Consulting Service	4
Migration	1
Total	858

3.4. Amazon Web Services

AWS is a global public CSP with the largest market share, holding the "AWS marketplace." A total of 7213 services are registered in seven categories. Table 5 lists the key categories and registered services.

Table 5: Key categories and registered services of AWS marketplace

Category	Number of Registered Services
Infrastructure Software	3188
DevOps	2543
Business Applications	1131
Machine Learning	3541
Data Products	1706
IoT	211
Industry	433
Total	7213

3.5. Oracle Cloud Infrastructure

Oracle is a global CSP. As a relational database software provider, Oracle holds "ORACLE Cloud Marketplace". As of January 2020, there are two categories — "applications" and "services." In "applications," there are 621 products, while "services" products consist of infrastructure-as-a-service (one product), SaaS (21 products), and platform-as-a-service (17 products). Notably, the products are categorized also by industry so that users can search and select based on their preferences.

The registration method is to get an Oracle account issued through the marketplace department e-mail, sign up for the Oracle PartnerNetwork, and write the Publisher Application.

4. Case Study

Through this case study, we discussed the procedures and methods for cloud-based software developers to register their software on a marketplace and classified CSPs operating their respective marketplaces. In addition, we researched cases of services and solutions registered in the existing marketplaces, with an analysis of the advantages and disadvantages of marketplace business.

4.1. Marketplace Registration Method

Each affiliation must include, at the very least, the name of the company and the name of the country where the author is based (e.g. NADIA Pub, Australia).

There are two marketplace registration methods—image upload and SaaS registration. The registration method depends on the software distribution and function enhancement method of the software.

4.1.1. Image Upload Method:

Marketplace can register different versions of software to meet users' needs. Software has to be converted into a machine image format suitable for marketplace product policy and then signed up in the marketplace portal, registering user information.

4.1.2. SaaS Registration Method:

SaaS-type products are built on computing resources of CSPs and grant access to those services. Time unit charges and service usage charges depending on the payment method have to be determined. Service access authorization is provided by CSPs, and the development of predictable metering and billing methods is necessary.

4.2. Marketplace Registration Analysis

This section analyzes cases in which domestic software providers registered their software in global and local cloud marketplaces.

4.2.1. Daou Office, AWS Marketplace Registration:

In the second half of 2019, Korea's Daou Technology registered its own

groupware "Daou Office" products on AWS Marketplace. Daou Office is a groupware service with 18 major collaborative functions and is provided in both deployment and SaaS types. Daou Office's Marketplace service is offered in the form of "bring-your-own-license (BYOL)." If you purchase a Daou Office license, you can receive services through every process from installation to operation by the AWSs console. After purchasing a license through a separate purchase page, it can be used immediately by installing the product in the marketplace and registering the license. This approach enables the efficient operation of time and input personnel required to install groupware. As it is easy to distribute services and bill users through AWSs, user convenience is increased and management costs are reduced, hence facilitating service globalization.

4.2.2. Hancom Office, AWS Marketplace Registration:

In the second half of 2019, Hancom company introduced "Hancom Space" and its subscription-type licensing policy. Apart from the existing Korean-language licenses, the company has launched a cloud-based service through AWS Marketplace that provides storage functions along with office products for web browsers that allow users to write and edit various documents without installing the software on their PCs. It is charged in the form of monthly or annual subscriptions and supports continuous functional improvements through updates.

4.2.3. TMAX, JEUS Service AWS Marketplace Registration:

TMAX's TIBERO is a local database service. It is a database management system that holds shared disk-based cluster functions and it stably provides non-disruptive services. It is registered in the NAVER Cloud Platform Marketplace in the form of BYOL and charged per virtual processor.

4.2.4. ZConverter, KT Cloud Marketplace Registration:

Through KT Cloud Marketplace registration, KT Cloud users can easily migrate to KT Cloud from an "on-premise" environment. ZConverter Cloud Migration's cloud image migration technology quickly and easily migrates Windows and Linux servers operating in an on-premise environment to the same environment without reinstalling operating system (OS) applications into a KT Cloud environment.

ZConverter Cloud Migration service operates in the KT Cloud server, and it works in the same configuration with an on-premise operation without reinstalling the application or OS.

Usage fee is charged based on the type and range of migration for a one-time cost and the total migration capacity. It can be paid in installments for 12 or 24 months.

4.3. Analysis of Business Pros and Cons Using Marketplace

Cloud-based software developers using the marketplace can overcome a lot of constraints. The advantage is that the physical limitations of business selling software can be minimized, and the online implementation of sales channels can simplify customer secure methods.

Further, it can protect existing customers because it does not overlap with existing markets that were being distributed in the form of licenses or packages. Moreover, in SaaS form, it can reduce the time required to apply service enhancements or additions to marketplaces. The time required to distribute existing software can be drastically reduced.

As time required for sales and marketing to be delivered to customers is reduced after service package implementation and offering establishment, rapid sales can be realized.

In addition to this reduction in time, financial risks can also reduce. On-premise form hardware, software, facility costs, support personnel, and essential elements of the existing package/license-based approach are not required, which can reduce the cost of input and time.

Moreover, software distribution through the marketplace has limited support for customer-tailored services. This limitation may be a constraint that does not meet the user's needs, making it difficult to attract users. Reliable service delivery by service providers is essential, and separate costs can be incurred to ensure infrastructure availability.

Reliable alternative or immediate response to a user's service failure cannot be provided in the case of service provider failures. Response to local law and specific regulations is also impossible. Although services are developed and provided in accordance with marketplace policies, they may not be able to respond to control or legal regulation of key information, such as data collection, processing, and procedure issues, based on user's local law. Connection with existing applications and data can be difficult.

This limitation can lead to an additional charge for data storage, processing methods, and data movement, resulting in an overall increase in operating costs and issues concerning the establishment and development of additional infrastructure.

For applications on the public cloud, service and performance issues in the form of existing deployments can cause overall performance degradation. This may be an issue of transient and sustained performance degradation resulting from multi-tenants employing cloud computing resources for public use. It can be due to increased network and data throughput, which can slow down the performance of VMs on the host machine, resulting in operation failure. Therefore, always-on computing resources must be maintained at a certain level to prevent performance degradation, which may require additional cost investments. Users should be aware of these disadvantages.

5. Swot Analysis and Cloud Platform Based on Marketplace Strategy

We performed a SWOT analysis of marketplaces of CSPs. We classified the cloud

platform based on the marketplace of each operator by establishing the items that can be the criteria for each factor and derived development strategies (Osterwalder, 2010).

Based on the SWOT analysis results summarized in Table 6, CSPs can establish their service strategy in the direction of supplementing weak internal environmental factors and invigorating their strengths. We apply the strategy of maximizing opportunity while eliminating the external environment as a threat (Natalia *et al.*, 2014).

Table 6: SWOT analysis and strategy of cloud service marketplace.

Strength	Weaknesses
Secure abundant product/customer case (number of category registration) Partner ecosystem (number of registered partners) Multiple global customer success stories	Price competition with regional operators Restriction on the presence or absence of area (lack of overseas service area) Lack of service stability
Opportunity	**Treats**
Overseas/regional specialized infrastructure Opportunity to introduce specialized business groups(finance/medical/public) Developer support program Cloud for the purpose of cost reduction	Risk to regional regulations Service stability (security/infrastructure) Market protection due to national regulations
Division	**Strategy**
SO Strategy	Leverage the advantages of competitive software to register in multiple marketplaces to generate additional revenue.
WO Strategy	By securing excellent global customer cases, emphasizing the differences from other software, premium strategies are required with quality and service, not price, with technical support and best practices
ST Strategy	Prepare alternative and bypass measures for domestic regulations and restrictions and to plan specialized products and services for regional niche markets.
WT Strategy	Cost reduction method through technical support and maintenance within the software price, additional promotions, etc.

In addition, we set priorities for each combination of strategies and used them as a basis for selecting each cloud marketplace. In the mid- to long-term, the case where a developer's services and solutions are not competitive due to the basic

provision of services and solutions internalized by each CSP should be considered (Ghaffari *et al*., 2014).

6. Conclusion

Software distribution methods through the cloud marketplace have many advantages.

The cloud marketplace is largely characterized by the ease of technical support for infrastructure and the absence of computing performance degradation at the client level for quality of service. Moreover, without a separate system for remote technical support and development deployment, software is provided through existing systems of CSPs.

Global marketing and sales to users is possible without overseas branch establishment or local office and physical asset securement. Moreover, installation and deployment of services and solutions can be handled remotely by both users and sellers through an automated platform.

Despite these benefits, modification and application programming interface development are necessary in the form required by the CSP, with the same services targeted at users of a particular CSP. Another constraint is that the user must use a virtual server from a CSP without an infrastructure choice.

When the user changes cloud service, separate migration or renewal of those services is necessary, and the cost of data loss and migration can be challenging to some users (Dubey and Wagle, 2007).

At this point, we expect that sales will be generated in the form of direct selection and deployment in marketplaces by users rather than from choosing specific cloud services.

Therefore, being capable of applying continuous functional improvements and developing software to meet the requirements that occur when registering on the market are crucial.

In addition, unnecessary costs due to a particular cloud service function or billing method, as well as implementation constraints also have to be considered in marketplace registration. Certain CSPs have registration restrictions due to duplication and competition issues with existing marketplace products. Registration availability based on nonfunctional business and marketability should be extensively included in research criteria such as extensive market research, marketplace registration, and market entry.

The limitation of this study is that the range of each CSP's marketplace and software functions do not provide a design and verification method for applying to a particular cloud service. It also does not consider restrictions related to marketplace registration based on nonfunctional marketability and business factors. Consequently, quantitative evaluation indicators that consider all of these factors are needed in the future.

In addition, we will determine the final weight of assessment factors for each SWOT group as mention in chapter 5, such as the AHP technique. Once it is determined, we intend to derive marketing strategies using cloud platform-based marketplaces by reflecting the final weight and priority results of the sub-factors of each group.

References

Amazon Web Services Marketplace Homepage https://aws.amazon.com/marketplace

Chang, Jaesung. Yoon, Jaeyoung. Lee. (2020). Gunho. Machine Learning Techniques in Structural Fire Risk Prediction. *International Journal of Software Engineering and Its Applications*, 14, 25-30.

Cloud Store Ceart Homepage. https://www.ceart.kr /korean/pt/index.do

Dubey, Abhijit. Wagle, Dilip. (2007). Delivering software as a service. *The McKinsey Quarterly Web exclusive.*

Ghaffari, Kimia. Mohammad, Soltani. Abdolvand, Neda. (2014). Towards Cloud Computing: A Swot Analysis on its Adoption in Smes. *International Journal of Information Technology Convergence and Services*, 4(2), 13-20.

Hong, Il-Yoo. Lee, Seung-Min. Cho, Hwi-Hyung ong, Il-yoo. (2018). An Empirical Study on Factors Affecting an Individual User's Behavioral Intention to Use SaaS. *Informatization Policy*, 25(3), 75-94.

Jung, Hyun Chul. Seo, Kwang-Kyu. (2020). Prioritizing Cloud Service Threats for Succession to Information Security Management System. *International Journal of Digital Contents and Applications for Smart Devices,* 7(1), 1-8.

Kee, Hoi-Gyu. (2015). Study on Domestic Package Software Distribution Channels. *Master Thesis, Graduate School of Soongsil University.*

KT Cloud Marketplace Homepage. https://cloud.kt.com/cloudmarketplace/

Menychtas, A. Gatzioura, A. Varvarigou, T. (2011). A Business Resolution Engine for Cloud Marketplaces. *IEEE Third International Conference on Cloud Computing Technology and Science, Athens, 29 Nov.-1 Dec. 2011. IEEE Computer Society*, 462-469. IEEE Xplore, ieeexplore.ieee.org/document/6133177.

Natalia, Kryvinska. Bauer, Christine. Strauss Christine. Michal, Gregus. (2014). A SWOT Analysis of the Soft-Computing Paradigms SOA/SOC/Cloud Combination (C-SOA) in Software Development. *Eighth Mediterranean Conference on Information Systems, At Verona, Italy, 19 September*, 1-14. https://aisel.aisnet.org/mcis2014/27/.

Naver Cloud Marketplace Homepage. http://www.ncloud.com/marketplace

Oracle Cloud Marketplace Homepage https://cloudmarketplace.oracle.com/marketplace

Osterwalder, Alexander. Pigneur. Yves. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. Wiley.

Park, Wonju. Seo, Kwang-Kyu. (2020). Cloud Platform based Software Marketing Strategy Using SWOT and Case Analysis. *International Journal of Software Engineering and Its Applications*, 14(1), 27-32.

Yoo, Hyoung Sun. Jun Seung-Pyo. Won, DongKyu. (2017). A Study on Strategic Industry Selection by Analysis of Inter-Industry Network: The Case of Korea. *International Journal of IT-based Management for Smart Business,* 4(2), 1-6.

Yan, Liu. Wanting, Zhou. Lingyue, Meng. Ying, Lu. Zhipeng, Fan. (2019). Research on the Influencing Factors of Customer Experience of Retail Enterprises Based on AHP in the Background of New Retail. *International Journal of IT-based Business Strategy Management*, 5, 13-22.