

Adoption of the Cloud Business Model in Indonesia: Triggers, Benefits, and Challenges

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ABSTRACT

The objective of this paper is to identify the current state of cloud business model adoption in Indonesia. We use an exploratory case study approach, since the number of publications on this topic is limited. We conducted 12 case studies with cloud service providers in Indonesia, which consisted of interviews and document studies. The analysis of our interviews revealed that the cloud business model adoption in Indonesia is mainly initiated by the local IT services providers. We also found that market demand was the main triggering factor for adopting the cloud business model. One of the key benefits that was mentioned, is the positive trend in revenue gains. The most encountered challenge for Indonesian cloud service providers is the low speed of internet connection in rural areas. The findings revealed from our study can serve as reference for IT practitioners and researchers who look for information and understanding on cloud business model adoption in Indonesia.

Categories and Subject Descriptors

[K.6](#) Management of Computing and Information Systems

Keywords

Adoption, Cloud Business Model, Triggers, Benefits, Challenges, Indonesia

1. INTRODUCTION

Since the emergence of cloud computing in 2008, this phenomenon remains an interesting discussion amongst Information Technology (IT) practitioners and researchers. The actual term of cloud computing is still being defined and open to interpretation, since no single understanding of the term has gained sufficient traction to be called a standard [13]. One of the definitions widely used reference in the Cloud Computing community is the one proposed by NIST (U.S. National Institute of Standards and Technology). They define cloud computing as a model that enables the leveraging of fast and convenient access to the on-demand network and configurable computing resources (i.e., networks, servers, storage, applications, and services), with a

minimum management effort and interaction with service providers [5]. Basically, there are three service models of cloud computing: SaaS (Software as a Service), PaaS (Platform as a Service), and IaaS (Infrastructure as a Service) [22]. However, as promoted by the vision of “everything as a service”, some of the key players of cloud services, such as Amazon, Google, Salesforce.com and Microsoft, added several new products offered as a service under the umbrella of cloud computing: DaaS (Database as a Service), BPaaS (Business Process as a Service) and People as a Service [4, 5, 10, 21]

Over the last couple of years, the cloud computing market in emerging economies showed a rapid growth, even though it still in its infant stage [2]. Cloud computing has several benefits to both the cloud providers and the end users in emerging economies, as well as potential challenges in its process to be adopted and diffused. A growing number of companies are riding this wave to provide cloud services and offer a variety of options in pricing, performance, and features [16]. Although there seems to be a positive trend, the adoption of cloud business model among the emerging economies varies highly [22]. This is caused by various reasons, such as the extent of governmental support, the business expansion of national or local ICT-related companies, the search of multinational companies’ for opportunities [14], as well as the social cultures and habits [22] of the different countries.

Indonesia, as an emerging economy, is also affected by the euphoria of cloud computing. Some companies claim themselves as cloud computing providers. However, it is unclear to what extent cloud computing is actually adopted. Not much is known about the launch and adoption, the major players and the triggering factors of their business expansion as cloud service providers, the adopted cloud business models, and the benefits and challenges in providing cloud services to the Indonesian customers. Several publications in professional outlets, such as personal websites, blogs, discussion forums, and online or printed news media give an ambiguous understanding regarding these issues. Meanwhile, according to our preliminary literature findings, the number of scientific publications concerning these topics is limited.

The main research question of this paper is: “*How is the cloud business model adopted in Indonesia?*” Particularly, we shed light on which cloud business models are adopted by the cloud service providers, the triggering factors that make providers adopt cloud computing as a business model, as well as the benefits and challenges obtained when providing the cloud services.

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We mainly contribute to enrich the literature on cloud computing adoption in emerging economies, specifically in Indonesia. The findings revealed by our field study can be used as reference to IT practitioners and researchers who look for information and understanding on how cloud computing is adopted in Indonesia, specifically from the perspective of cloud service providers.

We adopt an exploratory case study approach to study the adoption process. Exploratory case studies are suitable to find out the actual state of an innovation, as well as to seek new insights about this innovation [26, 37]. We conducted 12 case studies with cloud service providers in Indonesia, which consisted of interviews and document studies. Before we provide further explanation about the data gathering and analysis, we introduce a theoretical background of the innovation diffusion theory and cloud computing. We then present the results and discuss their implications. Finally, we explain how these results can be used as reference for further research.

2. THEORETICAL BACKGROUND

The adoption of innovations and the wide usage by individuals, groups and organizations have made changes to the way of people interact with their jobs [7]. Many studies are still being initiated to investigate the adoption of new technologies from both the individual and organizational perspective [1]. Research on Information Systems (IS) has become increasingly popular as IS continues being implemented in almost every aspect of organizational life [7], is an important driver of organizational competitiveness [11]. IS innovation adoption is one of the most widely studied areas in academia [25], and has been described as one of the most mature areas in IS literature [34]. An innovation is “an idea, practice, or object perceived as new by an individual or other unit of adoption” [28]. Newness of an innovation does not just involve new knowledge, but might also be expressed in terms of persuasion or a decision to adopt [28]. Therefore, getting new ideas or new innovative technologies to be adopted by users, even though it has obvious advantages, requires a lengthy period, often of many years, from the time they become available to the time they are widely adopted [27].

In the following section, we provide a brief description about the cloud computing business models, and about cloud computing adoption in emerging economies.

2.1 Cloud Computing Business Models

Since the birth of the Internet in the 1990s, even though the public was uncertain on the exact meaning of this term, it promised to change everything and everyone it touched [13]. This was confirmed by the emergence of new innovations in software applications as well as IT infrastructure. One of these innovations, which has gained tremendous momentum in recent years, is recognized by the term of cloud computing.

Cloud computing has both business and technological aspects. A cloud service provider does not only provide a technology, such as a server or data storage, but also the product maintenance. All is offered in one package service, referred to as a Service Level Agreement, which contains information on how the product is delivered to the customer in a secure, reliable, and trustworthy services. According to the literature, there are three basic types of cloud services: Infrastructure as a Service (IaaS), which offers IT infrastructure such as servers, processing units, media storage, networks and other computing resources, provided in the IaaS cloud [2, 7]; Platform as a Service (PaaS), which allows the application developers to develop and upload their applications into the cloud [10]; and Software as a Service (SaaS), which allows customers to access the applications put into the cloud environment without requiring them to install the applications on their local machine [5,7].

The providers and the customers are the two main entities in the business market of traditional computing. The customers use, own, maintain and upgrade the systems, while the providers focus on the sale, installation, licensing, consulting and maintenance of the involved technology [18]. The launch of cloud computing in the IT marketplace changes the role of traditional computing entities. There are many studies that introduced new different business models of cloud computing as well as the entities involved in these business models [3, 6, 18, 35].

In this paper, we adopt the cloud computing business model proposed by Fang et al [6], called *value net based cloud computing*. This model proposed after a series of in-depth studies on service delivery and value creation processes in cloud computing as well as the current research findings of the value net theory and business model, and is therefore highly applicable to our study. The value net based cloud computing model consists of several elements (see Figure 1) that we will shortly elaborate on in the remainder of this section.

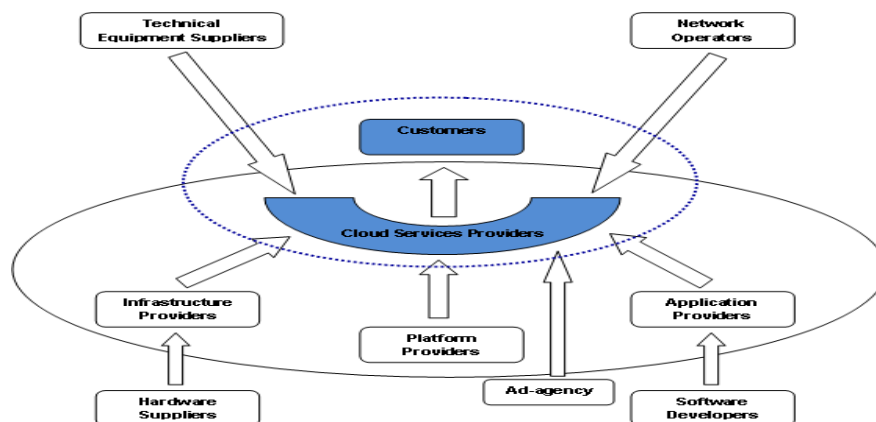


Figure 1. The Value Net based Cloud Computing Business Model [6]

Customers. Customers are the center of the value net. Customers request services and pay these to the cloud service providers or directly to the platform providers on a basis of operational expenses. Corresponding roles are found, for example, in Menyctas & Gatzoura [19], Marston et al. [18], and Teixeira et al. [31].

Cloud service providers. Cloud service providers own and deliver cloud services to third parties. They function to identify the specific customer's demands, and to coordinate the resources and capabilities offered by application providers, network operators, ad-agencies, software developers and hardware suppliers. Other researchers call this role "cloud provider" [10, 31] or "service provider" [35].

Infrastructure Providers, Platform Providers, and Application Providers. Each of these entities provides their products to the cloud service providers to support the delivery of the cloud services to customers. Infrastructure providers supply the required network computing, storage media services and the technical backbone to run applications within the cloud. Sometimes they are called "IT vendors" [38]. Platform providers offer an environment with monitoring and management mechanism, as well as application programming interfaces (APIs) for developing, testing, and operating applications in the cloud. Application providers provide software applications as services to the customers, either developed by themselves or outsourced applications from software developers that are hosted on a cloud platform.

Hardware Suppliers and Software Developers. The hardware suppliers offer hardware products to the infrastructure providers. The software developers support the applications necessary to the application providers and the platform providers. The software developers build applications that are offered to the cloud service providers and/or to the application providers. They do not directly offer the application to the end users or customers. Tapscott et al. [30] call this role "content provider".

Network Operators and Technical Equipment Suppliers. Both of the entities support in providing a basic network and terminal access for operation. The network operators not only offer the basic network access to the cloud service providers, but also to the customers directly.

Ad-agencies. This entity can act as a broker organization that facilitates the negotiation and communication process between consumers and providers without owning or managing the whole cloud infrastructure. A similar concept is called "marketplace operator" by Menyctas & Gatzoura [19].

2.2 Cloud Computing in Emerging Economies

Theoretically, cloud computing has the potential to create new possibilities for developing countries and emerging economies to catch up with the developed countries, since it allows them to gain access to the same IT infrastructure, data centers and applications [14]. The advantages of cloud computing might be more pronounced in emerging economies than in the developed countries, since they often have limited ability to access resources and need more times to build out a robust IT infrastructure [9].

Cloud computing advantages include a reduction of the capital expenditures on IT [4, 8, 10]; an increase in IT capacity, scalability, sustainability, and agility [13, 18, 24]; the possibility to capture new markets and opportunities [10, 13]; a dramatic decrease of the start-up costs for small and medium enterprises (SMEs) [2, 18, 22, 35]; a better availability and stability of

business continuity [8, 12, 13]; a focus on the core business [2]; more flexibility of services that can be adjusted to the needs of the company [4, 10, 13, 24]; and elimination of procurement and maintenance [8, 18, 22]. These benefits have made cloud computing predicted as one of the innovations that will have mid to long term impact in most industries in developing countries [14].

Like any new technology, cloud computing also creates potential challenges that might affect the adoption and diffusion. These challenges include issues concerning data security and privacy [4, 5, 10, 24]; availability, reliability and resiliency of users' data [12, 13, 20, 23]; payment models [5]; training and education [13]; service quality and performance [4, 10, 12]; cost saving [4, 5, 12] and energy efficiency of cloud infrastructure [20], trust [20, 23, 24]; and standards and interoperability [2, 4, 10, 24]. Especially for emerging economies, important challenges are the lack of capital and physical infrastructure [2, 13]; lack of governments' support and economic structure [13]; low awareness levels [2]; and lack of major cloud providers [4].

However, despite these challenges, the number of cloud service providers in emerging economies is increasing, especially since the prominent players of global cloud computing, such as IBM, Salesforce.com, VMWare, and Microsoft, considered expanding their business in several emerging economies [14, 33].

3. METHOD

The research method we use in this study is an exploratory case study. According to Yin [37], a case study is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". Therefore, it is highly suitable to use in our research to cloud computing adoption and diffusion in Indonesia.

The questions that we want to answer with the case studies are:

- Who are the cloud service providers in Indonesia and which cloud business models do they use?
- What are the triggering factors of the adoption of the cloud business model among cloud service providers in Indonesia?
- Which benefits and challenges did Indonesian cloud service providers encounter in their shift to the cloud business model?

In order to answer these questions, we use a holistic, multiple case design, in which the unit of analysis is the Indonesian cloud computing provider.

In the remainder of this section, we first show how we selected the cloud service providers in Indonesia as our cases. Then we describe the process of data collection and data processing.

3.1 Case Selection

It is unclear how many cloud service providers currently exist in Indonesia. Therefore, we used Google search, to get an overview of the amount and types of cloud computing providers in Indonesia. In February 2012, we searched with the terms "cloud di Indonesia (cloud in Indonesia)", "penyedia cloud di Indonesia (cloud provider in Indonesia)", and "penyedia layanan IT di Indonesia (IT services providers in Indonesia)". We analyzed the first 200 results of each terms and found 20 cloud service providers in Indonesia. Of these providers, there were four multinational companies and 16 local IT services providers. We then sent each organization a permission letter in which we asked for an interview session with the person(s) in charge of handling

the cloud services to their customers. These letters consisted of two pages with a short explanation of the research background, and an explanation of the procedure. As a follow up to the permission letters, we contacted them by phone. Out of the 20 companies that we sent the letters, 12 companies responded to our letters by giving us the contact information of the person(s) in charge of handling cloud computing. Of these 12 companies, two were multinationals, namely IBM Indonesia and Dimension Indonesia. The other 10 were local IT service providers. Table 1 gives an overview of the case companies.

3.2 Data Collection

We conducted semi-structured interviews lasting 30 to 90 minutes. The background of our interviewees ranged from middle to top management level, with functions such as senior supervisors, general managers, and directors.

Before starting the interviews, the interviewer first introduced herself and gave a brief description about the research goals. Furthermore, she gave a general description about the topics to be discussed and assured the interviewees that all sensitive data will be treated with confidentiality. Permission was asked to use a tape recorder during the discussion.

During the interviews, we followed a case study protocol that contained the topics to be discussed. These topics were:

- the reasons for becoming a cloud service provider,
- the cloud services that are provided to Indonesian customers,
- the benefits derived from adopting the cloud business model, as well as the challenges and how they encountered them.

We asked for concrete examples and stories rather than to direct or suggest the respondents how they should answer. Sometimes, we confronted the respondents with existing literature in order to elaborate their answers. After ending the interview sessions, the interviewer explained how we would process the data and asked their permission to mention their company's name in our research paper. To support the data gathered by the interviews, we also studied the companies' documents, either from the companies' website or from the documents provided by the companies. We studied the companies' profile and the products and services, specifically the cloud services.

3.3 Data Processing

We used NVivo 10.0, a software package for qualitative research, to code the transcribe interviews. In NVivo, coding means we gather all materials under one or several themes.

Table 1. Overview of Case Companies

Case Company	Type	Year of Adoption	Cloud Business Model Adopted	Cloud Services	Main Target Markets
BizNet	Local	2011	Cloud Services Provider	IaaS	Medium to Large Enterprises
Codephile	Local	2008	Software Developers / Independent Software Vendors (ISVs)	SaaS Applications	Small to Medium Enterprises
Dimension Data	Multinational	2010	Cloud Services Provider	IaaS & SaaS	Medium to Large Enterprises
IBM Indonesia	Multinational	2007	Cloud Builder		
Indosat	Local	2012	Cloud Services Provider	IaaS & SaaS	Medium to Large Enterprises
Infyns System Indonesia	Local	2007	Cloud Services Provider	IaaS, PaaS & SaaS	Medium to Large Enterprises
Lintas Arta	Local	2011	Cloud Services Provider	IaaS	Medium to Large Enterprises
Lintas Media Danawa	Local	2009	Cloud Services Provider	IaaS & SaaS	Medium to Large Enterprises
Telkom	Local	2010	Cloud Services Provider	IaaS & SaaS	All types of enterprises
Telkom Sigma	Local	2006	Cloud Services Provider	IaaS & SaaS	Medium to Large Enterprises
Net Solution	Local	2008	Cloud Services Provider	IaaS & SaaS	Medium to Large Enterprises
Walden Global Solutions (WGS)	Local	2009	Cloud Builder		
			Software Developers / Independent Software Vendors (ISVs)	SaaS Applications	Medium to Large Enterprises

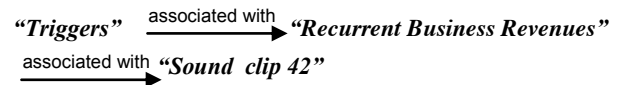
In our research, we used four themes, which are:

- Benefits, which contain the collection of the advantages that our case companies received from the provision of cloud services to their customers.
- Challenges, which contain the collection of the challenging issues which have to be anticipated by our case companies as cloud service providers.
- Cloud Business Models, which contain the collection of cloud business models adopted by each of our case companies.
- Triggers, which contain the collection of the triggering factors that made our case companies decided to adopt cloud business models.

After we coded all transcripts and linked them to each theme, we then continued with the second step: open coding using "memo(s)" to identify new ideas, concepts, opinions, uncovered issues, or phenomena, which were derived from the coding step. We identified seven memos in this step. Table 2 gives an overview of our memos, with corresponding themes and examples.

When no more new memos emerged, we continued with the third step: axial coding. Axial coding aims to develop a model that

visually displays the interrelationships between categories (the codes) or a set of propositions [42]. We made connections or relationships between the themes and memos to look for patterns in the data and generated propositions.



From the relationship above, we could generate proposition: "Recurrent business revenues is one of the triggering factors which made "Sound clip 42" adopted a cloud business model". The "Sound clip 42" is the recorded interview of one of the case companies, which mentioned this triggering factor.

The final step of the data processing was selective coding. We identified a single code for each theme as the central phenomena by using the most frequently mentioned concept in each theme. Then we described this finding in more detail referring to the existing literature. For example, for the theme of "Triggers", we obtained the word "Demand" as the most frequently mentioned concept.

3.4 Data Validity

To ensure rigidity in the case study, the four types of validity described by Yin [37] are taken into account: construct validity, internal validity, external validity and reliability.

- *Construct validity is satisfied when the concepts being studied are operationalized and measured correctly.* Before we started the case study, we studied the related literature thoroughly. Aim of this literature research is to have a deeper understanding about the topics and context of our research. We used this to build the list of interview questions.
- *Internal validity is defined as establishing a causal relationship and distinguishing spurious relationships.* The internal validity is threatened by incorrect facts and incorrect results from the different sources of information. We cross-checked our interview results with documentation, such as the cloud services offered, to conform facts stated. All interviewees had sufficient experience and knowledge about the cloud business model, which reduces the risk that they misinterpreted our questions.
- *External validity is defined as establishing the domain to which a study's findings can be generalized.* The number of case companies in our study is relatively large and most of the case studies are large IT services providers located in Jakarta, which is the location where most of the cloud service providers in Indonesia are. Therefore, we believe that our research findings can be generalized to the cloud services industry of Indonesia. However, although we believe there are similarities between Indonesia and other emerging economies, we do not have ground enough yet to generalize our results to this group.
- Reliability is satisfied if the study can be repeated with the same results. Having a case study protocol and case study database ensures the reliability of the case study. Also, the interviews are based on questions that are explicitly related to the dimensions investigated.

We believe that by taking these four types of validity into account from our case study, a satisfactory level of validity can be achieved.

4. RESULTS

In the following section, we describe our field data findings in four parts: the cloud business model adoption; the triggering factors of cloud service providers emergence; the benefits and challenges involved in providing cloud services; and the government's support.

4.1 Cloud Business Model Adoption

By adopting the Value Net-based Cloud Computing Business Model (Figure 1), we propose a Cloud Business Model, as seen in Figure 2, to grab a big picture of which cloud business entities are involved in the cloud computing adoption in Indonesia.

Compared to the original cloud business model seen in Figure 1, we combine the two cloud business entities "Technical Equipment Suppliers" and "Network Operators" into one cloud business entity called "Internet Service Providers (ISPs)", since we found that this business entity has similar functions compared to the two previous business entities. The ISPs provide Internet connection, as well as the technical infrastructure to support the connection. They can provide their services directly, either to the end users or the customers, or to the cloud service providers.

We added one new business entity as well on this model, called "Cloud Builders". A cloud builder provides services on the building of cloud infrastructure for companies in the cloud business industry. In this collaboration model, cloud builders may serve as the resellers of cloud services offered by their clients, based on a sharing profits system. They may also directly offer their clients' cloud services to their existing customers, based on a rebranding system, depending on the mutual agreement between the cloud builders and their clients, which are the start-up cloud service providers.

Table 2. Overview of Themes and Memos

Theme	Memo	Example
Benefits	Strengthening of customer's dependency	<i>...ok...there are several benefits...number one is...if we provide our cloud services directly to our clients...they will keep staying with us...</i>
	Enlargement of customer base	<i>...but there are others benefits when we provide our cloud services with our business partner...it could open new target markets which we never been touched before...they are our partner's customers...since there is a partnership system with our business partner, we then at least could touch their customers as well..</i>
	Business continuity	<i>...in the short term, maybe we will suffer, since there will be few companies buy our hardware product...but in the long term, the adoption of cloud business model is one of the survival ways to keep exist in IT business....</i>
	Positive trend in revenue gains	<i>...in 2011, the percentage of our gross income derived from the cloud services were bigger than from the training center, as our main business...in 2008, the percentage is 70% or 80% of our gross income mainly from the training center...</i>
	Increase in Operational Expenses Efficiency	<i>...if we provide cloud services, we automatically provide our telecommunication services as well...the network, the Internet and the cellular bandwidth will be enhanced..</i>
Challenges	Users' anxiety	<i>...in general, it is related to the organizational culture of the customers...in my opinion, either they are small, large or medium companies, they usually have their own existing system...when we offer the cloud services, there must be "a system migration"...and since they already busy with the productivity, they assume that the system migration will effect to the budget and the time to learn " a new system"...</i>
	Business analysis capability	<i>...we must have ability to define the customers' needs...what are their problems...which appropriate solutions that we can offer to the customers...including the reasonable price for them...we must have ability to design the customers' needs in more detail, specifically related to the price offered...</i>

Most of our case companies are cloud service providers and few of them are software developers or ISV's (Independent Software Vendors) and offer IaaS and SaaS services to Indonesian customers, as seen in Table 1. Some of the case companies invested their capital budget to build their own cloud infrastructure, and some of them used a partnership system or an acquisition. For example, Telkom partnered with Codephile, a

SaaS application developer, to provide SaaS applications to Telkom's customers. Another example is Dimension Data, which acquired several multinational companies to support them in providing cloud IaaS and SaaS to their existing customers. One of the interviewees mentioned the cloud business model they adopt: *"...we first started our cloud services by delivering IaaS and SaaS...we did collaborate with other companies, instead of*

delivering the services by our own...in order to be able to provide IaaS and SaaS, we collaborated with one of Microsoft partner's company."

We found that four of the case companies extended their roles as cloud service provider to cloud builder, as mentioned by one of our case companies: "...now we are a cloud builder and a cloud providers as well...we acquired three companies to support our cloud services to the existing customers..."

It shows that the role as cloud builder starts to be an alternative choice in the cloud business industry in Indonesia. As a cloud

builder, it requires a good understanding of cloud computing, both technical and non-technical, such as the nature of cloud computing business models, as well as a wide network of partnerships with the providers involved in the cloud business model, such as ISPs, ISVs and Hardware Suppliers. In each country, the number of cloud service providers varies, which might be caused by the difference in the triggering factors of cloud business model adoption. As we see in Table 3, our field data reveals several triggering factors of cloud business model adoption in Indonesia that we describe in more details in the following section.

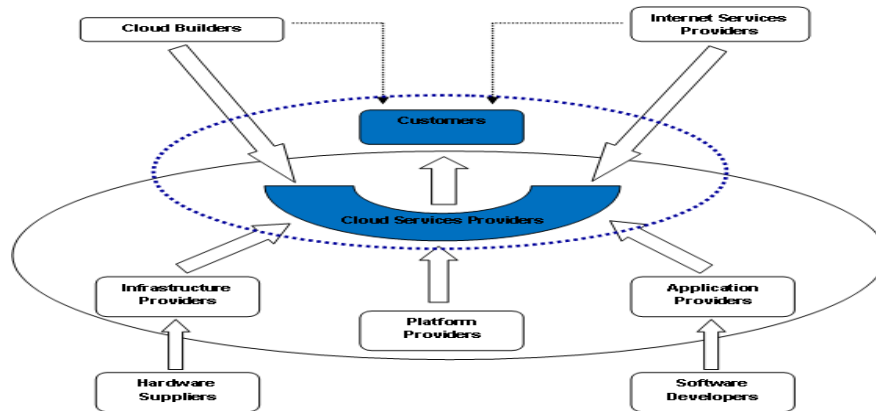


Figure 2. A Proposed Cloud Business Model in Indonesia

Demand. Seven case companies proposed the demand factor as the most triggering factor that made them decide to provide cloud services to the Indonesian market, either as cloud service providers or as SaaS application developers. Demand may come from corporate customers or from market surveys conducted by research institutes, such as Gartner or Frost & Sullivan. One of our case companies mentioned this factor: "...we actually see that many of our clients demand to have faster time-to-market to be able to deliver their product faster for their customers..."

Table 3. Triggering Factors of Cloud Business Model Adoption

Triggering factor	Number of interviewees mentioning it
Demand	7
Cloud phenomenon	4
Lower demand for hardware procurement	3
Cloud extensive market	3
Business portfolio alignment	2
Business enhancement	2
Recurrent business revenues	1

Cloud Phenomenon. The second triggering factor is the cloud phenomenon itself as innovation in the IT industry. One of the interviewees mentioned this factor as one of the driving factors of their initiative to adopt cloud business model: "...in 2008 or 2009, the term of cloud computing started to emerge...our CEO asked me to investigate cloud computing...from the business perspective, we have an interest in it...and then at the end of December, we decided to provide cloud services for our customers..."

Low Demand for Hardware Procurement and Cloud Extensive Market. These two other factors underlie the initiative taken by some of our case companies to provide cloud services for Indonesian customers. Two interviewees support these two

factors: "...if we see the trend of hardware and software demand in the IT business nowadays, they began lower, than the service demand, which began to increase...", and "...the market of cloud computing has existed since few years ago, mainly in Jakarta..."

Business Portfolio Alignment. The transformation of the business portfolio and the alignment to the vision and mission of a company, are two issues of the business portfolio alignment factor. Two of our case companies mentioned these factors: "...the market demands were being considered, as well as the company's vision and mission...", and "...the first reason is because of the transformation in our business portfolio...and also the market demand..."

Business Enhancement. Because of the cloud emergence in IT business industry, two of our case companies decided to involve themselves as cloud service providers, as part of their business enhancement. One of the interviewees mentioned this factor: "...it is because...to enlarge our business...it's not because of the cloud booming..."

Recurrent Business Revenue. This factor was mainly proposed by the services providers that receive their revenue income based on the project. The term scheme of payment, instead of the monthly payment, and the unpredictable received project nominal effect to their financial cash flow, and finally led one of our case companies to take initiative to be involved in the cloud industry as SaaS application developers, in order to obtain the stability cash flow of the company's income. "...we want to get fixed revenues...it's difficult for our financial cash flow, if we're still running this business based on the term scheme of payment..."

4.2 Benefits and Challenges

The decision to take part in the cloud business involves considering both tangible and intangible benefits. Likewise, as in any innovation is always new, there are always challenging issues

associated with adoption. In Table 4, we present several tangible and intangible benefits derived from our case study, as well as the challenges that were encountered when delivering the cloud services to Indonesian customers.

4.2.1 Benefits

Positive Trend in Revenue Gains. All of our case companies agreed that there is a positive trend of the profit received from the cloud services. Some of the case companies that invested in hardware and software procurement to build their own cloud infrastructure, acknowledged that their revenue gains keep moving to the positive direction, therefore, they believe that they will reach the break-even-point in a few years. As one of our interviewees explained: “...in 2011, the percentage of our gross income derived from the cloud services were higher than from the training center, as our main business.... in 2008, the percentage is 70% or 80% of our gross income mainly from the training center...”

Table 4. The Benefits and Challenges Involved in Cloud Business Model Adoption

		Number of interviewees mentioning it
Benefits	Positive trend in revenue gains	12
	Enlargement of customer base	2
	Strengthening of customer's dependency	2
	Business continuity	2
	Increase in operational expense efficiency	2
Challenges	Security issues	7
	Low speed of internet connection in rural areas	5
	Cost expensive bandwidth services and hardware procurement	4
	Slow user adoption	4
	Business analysis capability	3
	Users' anxiety	2
	Lack of knowledge on cloud computing business model	1
	Partnership opportunity	1

Enlargement of Customer Base. As we mentioned above, we need to consider the intangible benefits as well before we take initiative to be involved in any types of business. One of the intangible benefits proposed by some of our case companies is the enlargement of their customer base, specifically via the partnership system. The large customer base of the partner company gives benefit in reducing the marketing expenses, as mentioned by one of the case companies: “...but there are other benefits when we provide our cloud services with our business partner...it could open new target markets which we never touched before...since there is a partnership system with our business partner, we then at least could touch their customers as well...”

Strengthening of Customer's Dependency. This kind of dependency can be created through the delivery of value added services, such as cloud services, which can be as one the alternative solutions to solve customers' problems. One of the opinions mentioned by the case is: “...ok...there are several benefits...number one is...if we provide our cloud services directly to our clients...they will keep staying with us...”

Business Continuity. The IT business in Indonesia starts to move from hardware product providers to managed services providers, where it is partly affected by the emergence of cloud computing. The trend of hardware demand tends to get lower than trend of the services demand. This fact has made the hardware providers look for other solutions to keep their existence in IT business industry

by offering the value added services to their customers in a form of cloud services. As proposed by one of the interviewees: “...in the short term, maybe we will suffer, since there will be only few companies buy our hardware product...but in the long term, the adoption of cloud business model is one of the survival ways to keep exist in IT business...”

Operational Expenses Efficiency. The nature of multi-tenancy in the cloud business model creates efficiency in the operational expenses from the perspective of cloud service providers. For example, a SaaS application, which is built on the concept of “one for all users”, is more efficient in operational expenses, than an application built on the concept of “one for each single user”. This example applies for the hardware infrastructure as well, such as the data storage. A single data storage that is utilized to put multiple users' data makes the cost efficiency in the hardware procurement. This is supported by one of the interviewees: “... if we provide cloud services, we automatically provide our telecommunication services as well.. the network, the Internet and the cellular bandwidth will be enhanced...”

4.2.2 Challenges

Security Issues. Security issues, such as data confidentiality and data recovery, remain the first consideration of customers before adopting one of the cloud services. This challenge mostly comes from large enterprises that have a large amount of data. The majority of our case companies faced the challenge in convincing the customers to adopt the cloud services they offered. One of the case companies explained: “...Indonesian customers still have no trust to put their data outside their local site...several reasons came up to this issue, such as security, confidentiality, etc...”

Low Speed of Internet Connection in Rural Areas. This challenge arises due to the lack of Internet access infrastructure in Indonesia, specifically in the East part of Indonesia and in the rural areas. The geographical conditions of Indonesia, which consist of hilly areas and is surrounded by water, gives difficulty for data communication channel providers or Internet providers to build base transceiver station (BTS) towers or to deploy fiber optic cables in those areas. However, this does not apply to the urban areas, specifically in Jakarta, where the Internet connection speed is no longer a problem, because of the good infrastructure. As one of the interviewees mentioned: “...one of our clients said that they always have difficulties in order to get a good internet connection in the areas outside of Jakarta...but this should be not a problem for companies in Jakarta...the main barrier is the speed connection...”

Cost Expensive on Bandwidth Capacity and Hardware Procurement. To be able to access cloud resources in a high speed, it takes a large amount of bandwidth capacity. In Indonesia, the bandwidth price is still relatively high. For cloud service providers that do not have their own data communication channel infrastructure, this made them invest more money in order to obtain enough bandwidth capacity. The challenge comes when they have to set a reasonable and affordable price to their customers. Even though the gross income received from providing cloud services tends to get higher, the profit margin received remains relatively small. Two of our interviewees elaborated on this issue: “...for example, in order to be able to use our cloud services, such as IP telephony and video conference, we suggested our client to lease a bandwidth capacity of minimal 5 Mbps, which cost 12 million rupiahs a month... can you imagine how we can provide our cloud services to the SMEs...”, and “...we have invested billion of rupiahs to build our cloud infrastructure...the

price for hardware procurement is very expensive...and the impact of this investment is that we have to provide the services with a quite expensive price for our customers..."

Slow User Adoption. Some of our case companies acknowledged that the slow user adoption is one of the challenging issues that should be anticipated on. This challenge mentioned by one of our case companies: *"...the cloud adoption, specifically for the local companies in Asia, is relatively slow...why?...because they still 'wait and see'...they want to see how is the cloud adopted in other companies...I assume that the number one challenge is the slow adoption of cloud computing for Asia companies..."*

Users' Anxiety. One of the issues that is mostly faced when dealing with customers, is the data migration issue. Companies perceive that the data migration process will affect their productivity, where they need to spend more time to learn the new applications, as mentioned by one of our case companies: *"...in general, it is related to the organizational culture of the customers...in my opinion, either they are small, large or medium companies, they usually have their own existing system...when we offer the cloud services, there must be a system migration...and since they already busy with the productivity, they assume that the system migration will effect to the cost and the time to learn the 'new system'..."*

Lack of Knowledge on Cloud Business Model. The cloud business model adoption in Indonesia is relatively new. However, we found that since two or three years, there has been an increase in the number of cloud service providers, even though its progression is quite slow. One of the challenging factors in this adoption is the lack of knowledge understanding on the concept of cloud computing, specifically on the cloud business model, as proposed by one of our case companies in the interview session: *"...the main challenging issue is that we don't have any knowledge about this business..."*

Business Analysis Capability. There is a cure for every disease. This also applies for the 'pain', which suffered by the customer, and should be 'treated' with a proper treatment. Therefore, the capability to identify and analyze the customers' problems, as well as the capability to provide solutions through the development of proper applications and the selection of required hardware, are some of the crucial challenges that should be considered by cloud service providers. As one of the interviewees mentioned: *"...we must have the ability to define the customers' needs...what are their problems...which appropriate solutions can we can offer to our customers...with a reasonable price...we must have ability to design the customers' needs in more detail, related to the price..."*

Partnership Opportunity. All cloud service providers we interviewed, used a partnership system. How to find a good partner is one of the challenging processes. One of our interviewees stated: *"a good business partner ideally should have a large customer base, has its own cloud infrastructure, both the data center infrastructure and the network access infrastructure, and has the customers' profile that fit into the cloud services we offered..."*

5. DISCUSSION AND CONCLUSION

In this paper, we investigated the adoption of the cloud business model in Indonesia. We found several interesting findings from this research which we describe in the following paragraph.

Most of our case companies chose the medium to large enterprises (MLEs) as their primary customers, instead of SMEs, as we see in Table 1. This fact is contrary with earlier research findings on cloud computing adoption, where was suggested that SaaS was most interesting for SMEs [17] that have limited capital to be invested in IT and limited internal knowledge to handle the adoption process and maintain the acquired IT resources [29]. Especially since Indonesia has such a large number of SMEs (reaching up to 616.232 business units in 2011, according to the Ministry of Cooperative and SMEs of Indonesia), this is surprising.

Some of the cloud service providers argued the SMEs in Indonesia put their concern more in budget expenses. For the cloud providers that have to invest lots of money to lease bandwidth capacity from Internet providers or for hardware procurement, it is difficult to adjust the price of their cloud services to SMEs that have limited budget to spend in IT. The need to reach the breakeven point of their investment within a certain period is also the reason why most of the cloud service providers in our case study, especially for the non-telecom cloud service providers, chose the MLEs as their primary customers.

We found two triggering factors of cloud business model adoption which are also found in other emerging economies. These triggers are the business expansion of national or local IT services providers, and the search for business opportunities of multinational companies [22]. Of the several triggering factors we found, the demand factor is the number one factor that initiated the cloud business model adoption in Indonesia. The demand mostly came from existing customers who required alternative solutions to solve their problems, for example related to the need to market their products faster and the need to put more focus on their business core.

We found three benefits that have similarities with the benefits found in other literature, namely enlargement of the customer base, continuity of the IT business, and efficiency in operational expenses [8, 13, 18]. Beside those benefits, we also found some challenging issues that should be considered by the cloud service providers in Indonesia. Of these adoption challenges, security issues, slow user adoption caused by the low level awareness, as well as low speed of internet connection in rural areas caused by the lack of infrastructure, are some of the challenges that also occur in other emerging economies [2, 4, 13].

Several solutions to overcome these challenges have been applied by the case companies. The main challenge proposed by our case companies is security, specifically concerning data security or data privacy. This challenge can be minimized by providing education such as training, seminars and focus group discussions, both to the existing customers and to the prospective customers. In order to increase the ability to diagnose the customers' problems and to select the appropriate software and hardware to solve them, these trainings and seminars were conducted not only for the customers, but also for the IT personnel who support the delivery process of cloud services.

Another challenge was the long distance connectivity. Increasing the number of BTS towers and fiber optic cables in some of the big cities in Indonesia, such as Medan, Surabaya, Makassar, and Batam, and in the east part of Indonesia, are some of the solutions proposed by the case companies to reduce the long distance connectivity and increase the speed of Internet connection in the rural areas. Telkom has even planned to launch a new satellite,

called Telkom 3, which is expected to solve the problem of Internet access in the east part of Indonesia.

In order to increase the adoption of cloud services among customers, some of the case companies provided a free trial package for few months of usage to their customers. Aim of this trial program is to give more chances for the customers to experience the ease of use and the safety use of the cloud services offered.

6. FURTHER RESEARCH

This paper focused on the triggering factors, benefits, and challenges of cloud adoption from the cloud service providers' perspective. Adoption and diffusion of innovations is a process that involves different actors. In this paper, we focused on cloud adoption from the perspective of the cloud service providers. In future research, we plan to conduct an extensive case study research on cloud computing adoption of both the customer perspective, as well as the governmental perspective.

7. REFERENCES

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