

POTENTIAL BENEFITS, CHALLENGES, AND BUSINESS MODEL OF CLOUD LEARNING: A CASE STUDY OF INDONESIA

Baginda Anggun Nan Cenka, Harry B. Santoso, Nungki Selviandro

Faculty of Computer Science, University of Indonesia

Depok, West java

E-mail: baginda.anggun@ui.ac.id, harrybs@cs.ui.ac.id, nungki.selviandro@ui.ac.id

ABSTRACT

During the last years, the most of educational institution have applying e-learning, however it is becoming not in line for social changes and educational progress. Hence, redesign the educational system is strong required. At the same time, Cloud computing is growing rapidly and created a global phenomenon on Information and Communication Technology (ICT) which playing cross over in any area, including education and often called Cloud Learning. In this paper we elaborate why cloud learning is widely accepted today, what considerable risk when adopting this practices, and what about the business model on Cloud Learning.

Kata kunci: cloud computing, e-learning, benefit, challenges, business model, cloud learning

1. INTRODUCTION

The proliferation of ICT is more increasing rapidly for decades. Surely, it will give tremendous impact on human resource development. ICT enable us to do something which never seen and thought before. It has become a trigger to revolution of many areas; the one of them is education area. In Indonesia, ICT give remarkable impact for educational development, especially since some of the leading universities began applying ICT-based learning or also known as E-Learning several years ago.

E-learning is the process of knowledge transfer through technology with provides materials relevant to the learning objectives, uses instructional methods and multimedia elements, and builds new knowledge and skills linked to individual learning goals. It also emphasizes the collaboration of self-motivation, communication, and efficiency regardless time and location (DeVecchio, 2006). In general, e-learning is the utilization of ICT to support learning processes.

At the same time, Cloud Computing is the new step in the evolution of advance technology that accelerates the innovation for the computer industry related to on-demand information technology services and products. It is a result of decades of research in Virtualization, Distributed Computing, Grid Computing, Utility Computing, Networking, Web, and Software Services. Cloud Computing brings a new business model, where user be able to consume services and product according to their need with the charge pattern. It is also one of the new technology trends likely to have a significant impact on the teaching and learning environment (Vouk, 2008) (Masud, 2012).

The combination of cloud computing and e-learning concepts is often also referred to Cloud Learning. We define Cloud Learning as an effort to improve the computing resources that will be the

foundation for available services on cloud environment and it is also going to enhance value added to learning environment.

Cloud learning will be future paradigm on ICT-based Learning, thus in this paper we elaborate why Cloud Learning is widely accepted today and what considerable risk when adopting this practices. In addition, we also introduce the business model of Cloud Learning to better understand how business activities on it. It can be consideration to adopting Cloud Learning paradigm. The remainder of this paper is organized as follows. Section 1 overview relationship between ICT-based learning and cloud computing and we also describes the goal of this study. After that, in section 2 we explain potential benefits and also elaborate potential challenges of Cloud Learning in section 3. Section 4 the proposed business model of Cloud Learning is presented. Final, we provide conclusion and future work in section 5.

2. POTENTIAL BENEFITS

Researchers have suggested the benefits of Cloud Learning such as (Laisheng, 2011) (Ouf, 2010), unfortunately they put it on broad perspective. Hence, we refill several potential benefits of Cloud Learning and to better understand we divide them into several categories, include:

2.1 Legal Aspect

In Indonesia, the utilization of e-learning methods has been held for a long time. Each educational institution either at high or medium level education work to implement it in accordance with their own resources (usually related to cost, human resources, and time). If they have own adequate resource then the implementation running well, and vice versa.

They apply this method in different ways: some of them are using the method as a supporting tool

(current practice), there is a fully implement it in the learning process (e.g., the Open University), and it also has many followers without knowing the benefits, goals, and steps for carrying out e-learning in their respective places.

Since 2003, the government has issued a policy on the utilization of ICT for education through UU No. 20 about National Education System (Law, 2003). Ironically, there are no standard guidelines to follow up these rules. Some educational institutions such as several universities and educational directorates in the ministry have proposed guidelines for the implementation. Surely, it was formulated based on their best practices on their own environment. The problems are how it can be applied on different institutional, resources, location, and infrastructure and also how the culture of resource sharing can be generated when the standard of implementation was differences.

At the same time, Cloud Learning offers an integrated learning environment both at the level of infrastructure, platforms, and applications. Certainly, it gives broad opportunities to equalize standards of implementation with expectation the resource sharing mechanism is easier compared to current practice.

One of another issue is software piracy. As we know, Indonesia is one of the largest users of pirated software, especially in the field of education. It's a big problem, because of educational stakeholder is a people should have forefront in upholding the intellectual property rights. Meanwhile, Cloud Learning provides a free application (occasionally shareware application) that can be used as needed so that copyright issues can be reduced.

2.2 Social Aspect

Now, each institution are usually assigning their own technology people to run the implementation, such as programmers, network experts, database engineers, and others. Basically, they have a good technical capability, dramatically, e-learning not only about the technical but also about educational science. However, the implementation should have administrated by a collaboration of technology and education people like: Subject Matter Expert, Multimedia Expert, Instructional Designer, and System Administrator.

Fortunately, Cloud Learning offer solutions to these problems. It provides better IT resource management. Cloud Learning allows us to ask providers hold e-learning well so as their customer will focus on their core business, spend less time on operational hurdles, more time focusing on their competitive differentiators, producing value, and innovation for the business. Cloud Learning also offers both simplicity and agility requiring minimal time and effort to provision additional resources.

2.3 Technical Aspect

E-learning is a highly dynamic environment. There are hundreds to thousands of recording activities occurred every day. It brings on large computational resources were required. Present, e-learning environment is managing by Learning Management System (LMS) such as: Moodle, ATutor, Chamilo, and others. In general, the LMS offers five of main features including the evaluation tools, activity recorder, communication tools, and sharing application. In practice, not all of these features are used. It's a problem; especially when we need a very large bandwidth to access the system but not all the applications used.

In addition, the numbers of learning material are getting a lot so it takes a very large storage to keep them. Currently, if the learning material storage overloaded, technicians then will buy a new one and it will be integrate with existing to increase storage capacity. It could raises a considerable risk, such learning material can be lost if there are problems on integration process.

Fortunately, Cloud Learning offer solutions to technical problems as discussed above. It provides large scale and elastic computational resource which aim to improve learning environment performance and also offers centralized data storage, so the monitoring of data access and quality of materials becomes easier and quickly. We do not also need for backing up learning materials to local drive and transferring it to another device. In other word, instructor and learners enable to create learning storage that stays with them and keeps growing as long as their needed.

In addition, Cloud Learning tends to ubiquitous computing, and provider plays an important role in e-learning infrastructure management. Hence, there is no necessity to upgrade the local system when new version are released, any devices with minimal hardware requirements can be used to access the environment, there is no need to set up specific application like authoring tools; it can be used even in the offline mode and then synchronization process is running automatically to refresh the previous work.

2.4 Economic Aspect

One major advantage of the Cloud Learning is offer a low cost solution to academic institutions for their researchers, faculty and students. Nowadays, any educational institution needs high costs to conduct e-learning. For example, the cost for purchasing and maintaining hardware (e.g., server, network equipment, storage, and computer), electricity, organizer, the cost for purchasing and updating applications as well as learning materials, consultant fee if there are unsolved problems by organizer, operational and bandwidth costs, licensing fees, and other. The phenomenon will lead to spending educational costs go up.

With Cloud Learning, we do not need to buy expensive hardware, no costs for maintenance of hardware and software, do not need a consultant, and licensing fees. In other word, we only have to pay for technical staff, bandwidth, electricity for the computer, cloud services charge, so the cost is cut down. It also allows the education platform is easily established, improve productivity, and increases operational efficiency by lowering up-front investment costs.

2.5 Research Aspect

The potential benefit of Cloud Learning also can be seen from research aspect. Cloud Learning consists of applications, learning material or others data, infrastructure (e.g., Physical and Non-Physical Infrastructures), and a variety of resources such as human resource and computational resources. It's very dynamic environment that so many things can be studied.

Many applications will be available in this environment, so how to integrate them would be an interesting study, for example the level of integration, what technical need and how to use it, and what problems during the integration process.

Cloud learning provides many learning materials in multimedia format (e.g., Text, Audio, Video, and Image) which can be used as test bed to study Multimedia Information Retrieval (MIR). Moreover, number of learning material requires a large storage area, it offers the opportunity to examine how compression process and how data transfer as effectively as possible.

Meanwhile, recording activities is also available which can be the initial data for the learning personalization, recommendation system, adaptive learning, and others.

3. CHALLENGES

Some of the challenges on holding Cloud Learning have also been addressed by researchers. Similar to potential benefits, dramatically they do not explain in detail what is to be a limitation in practice. Here are four main areas of challenges, among others:

3.1 Legal Aspect

One of challenges often mentioned both experts and practitioners is the legal aspect; policies for Cloud Learning. It's usually concerned on how to manage user's privacy and what roles of Service Level Agreement (SLA) are. User privacy is an important thing that must be protected by the provider, thus the rules on privacy management standards and punishments for violating much needed.

The next challenge is related to the SLA. In general, users has little understanding what does it meant to know SLA, its benefits, and what the

consequences should be obtained when the provider and customer ignore them.

At the same time, many people expect standard of the e-learning implementation was realized through the Cloud Learning. However who determines the standards are, whether these standards according to the provider, customer, or regulator.

3.2 Social Aspect

Cloud Learning make the user focus on their business activities; by assigning all of responsibilities for managing e-learning to provider. Ironically, it minimizes the opportunity for institutions to develop their human resources. In fact, the main role of educational institutions is to develop capability of human resources according to their interests and talents.

The next challenge is resistance to change. During this time, instructor and learners are comfortable to using their own e-learning environment. Of course, it will be a major obstacle, when their institutions force them to move on Cloud Learning.

Although the implementation of e-learning has taken place for long periods, it does not warrant that they are capable of using e-learning technically. It big question, how they can move if do not have the ability to do so.

3.3 Technical Aspect

Cloud Learning consists of data (e.g., learners and instructor identity, learning materials, etc) and applications. The challenges are how to keep the user's identity, copyrights of learning materials, as well as attacks on applications used. It is really important issue due to provider have to make sure their user to feel comfortable and confident when using the available services.

As we mentioned on early section, e-learning is a dynamic environment where there are various activities occurred day by day. The challenges are how provider to keep performance even though the number of learning materials, applications, and activities is growing up for each day on the environment.

For some institutions, e-learning is not something new. They already have LMS and storage to keep the materials majority. The challenges are how the mechanism of data migration and integration of e-learning applications. Another issue is how the process of recovery related to the users activities on Cloud Learning.

3.4 Economic Aspect

Cloud Learning allows us to organize e-learning at low cost due to pay as you go model. Challenges will arise when we rely heavily on e-learning services, directly it will make our investment is more increasing. It means, we cannot predict how much

money needed to implement e-learning in each educational institutions.

Actually, it is closely related to charging model of the Cloud Learning. Today, there is no standard the model used. Several of them including: pay per use, subscription, price list or menu price, service dependent feature, volume dependent, customer dependent characteristic, value-based, bargaining, and others (Osterwalder, 2004).

4. CLOUD LEARNING BUSINESS MODEL

After elaborating the benefits and challenges, we will describe the business model to provide more views of Cloud Learning. Business model can be define as the architecture for business element; the business people, potential benefits for them, their responsibility, and also description of relationship among services, product and information flows for creating value (Osterwalder, 2004). To better understand we define business model as concept of doing business usually related to everything involved to generate revenue.

In the current business practices, business model and ICT are closely related, particularly since ICT has been a strong enabler for a variety of innovative business models. Technology people should ask themselves how the business model can be improved through ICT and the other way around, business people should ask themselves what kind of ICT does a business ask for in order to be implemented. Business model can playing role as a conceptual link, forming a triangle between strategy, business organization and ICT business process (Osterwalder, 2004).

As explained in first sections of this paper the one of goal of this study is to introduce a business model that allows to accurately describing how doing business in Cloud Learning. Before describing the proposed business model, we have to know which components to build business models. Components are inter-linked elements that must be owned by a business model.

In a first step, we divide it to be four main areas that constitute the essential business model issues to have a lot of knowledge about component. Influenced by The Business Model Ontology (Osterwalder, 2004), we are adopting a framework which emphasizes on the following four areas that a business model, including:

Product – what are serviced offered to the market.

Customer – who the people need services are, what are their role and responsibility, how method of delivery for products and services, and how it builds a benefit relationship among them.

Infrastructure – how the company efficiently provides infrastructural issues; usually related to what are resources, what the series of activity, and how the cooperation to do it.

Financial Instrument – how the way of transfer service offered to generate income and how accounting mechanism on business model.

In a second step these areas we have broken down into a set of nine interrelated element that allow conceiving a business model where the each explanation summarized in Table 1. To make sense the flow of the business model, we also illustrate that in the Figure 1. It presents how the component

Table 1. The Component of Business Model (Inspired from (Osterwalder, 2004))

Component	Element	Description
Product	Cloud Services	Overall services that is of value to the customer.
Customer	Target Customer	Segment of customers need services.
	Interface	Means of getting in touch with the customer.
	Relationship	The kind of link between provider and customer.
Infrastructure	Operational Activity	Activities needed to provide and support services for the customer.
	Provider	Resource to maintain operational activity and provide services for the customer.
	Partner	Resource with agreement between providers to support services for the customer.
Financial Instrument	Charging Model	Representation in money of all the means employed in the business model.
	Revenue Model	Describes the way a provider makes money through a variety of revenue flows.

and their elements are interconnected as following briefly below.

Product

Product can be defined as all aspects of what a firm offers its customers, in this case such Cloud Services. In Cloud learning we provide many services, for instance: Evaluations as a Services, Authoring Tools as a Service, Communication as a services, Storage as a Service, Learning Object as a Services, and others.

Service is produced through a series of activities, and it is offered via the interface (e.g., catalogue services) to customers. Usually, services offered based on customer role (e.g., personal and educational institution) and supported by documentation, FAQ, personalization concept, and other supporting tool as part of a relationship with the customer. All of services used can be charged or free, it's depends on the charging model that provision by provider.

Customer

Customer is all people needed services, such as: learners and instructors. In general, they are comprised of several segments according to their criteria (e.g., role and responsibility); in this case they are personal and educational institution. They can select, use, and pay for services via the interface (for example, catalogs and dashboard services for

customers). To understand how the use of related services, benefits, features, maintenance, and upgrade, they also be able to use service documentation, manual, and other supporting tools available by provider.

Infrastructure

Infrastructure describes activities arrangement that is necessary to provide and deliver services and maintain customer interfaces. A Series of activity often called as the operational activity, include: service management, quality management, service development, user management, and others. Overall activity is managed by a provider and assisted by partner. Both of them work together not only at the operational level but also on providing and supporting services for customers. Surely, everything they done based on their agreement at beginning of cooperation.

Financial Instrument

As mentioned earlier, any services used by the customer get a charge which depends on charging model offer by provider, for example: fixed charge; pricing mechanisms not depend on customer characteristics, volume dependant, and are not based on real-time market conditions. And other models such differential charge; differential pricing refers to customer or product characteristics, volume dependant, and others. After that, we can account all

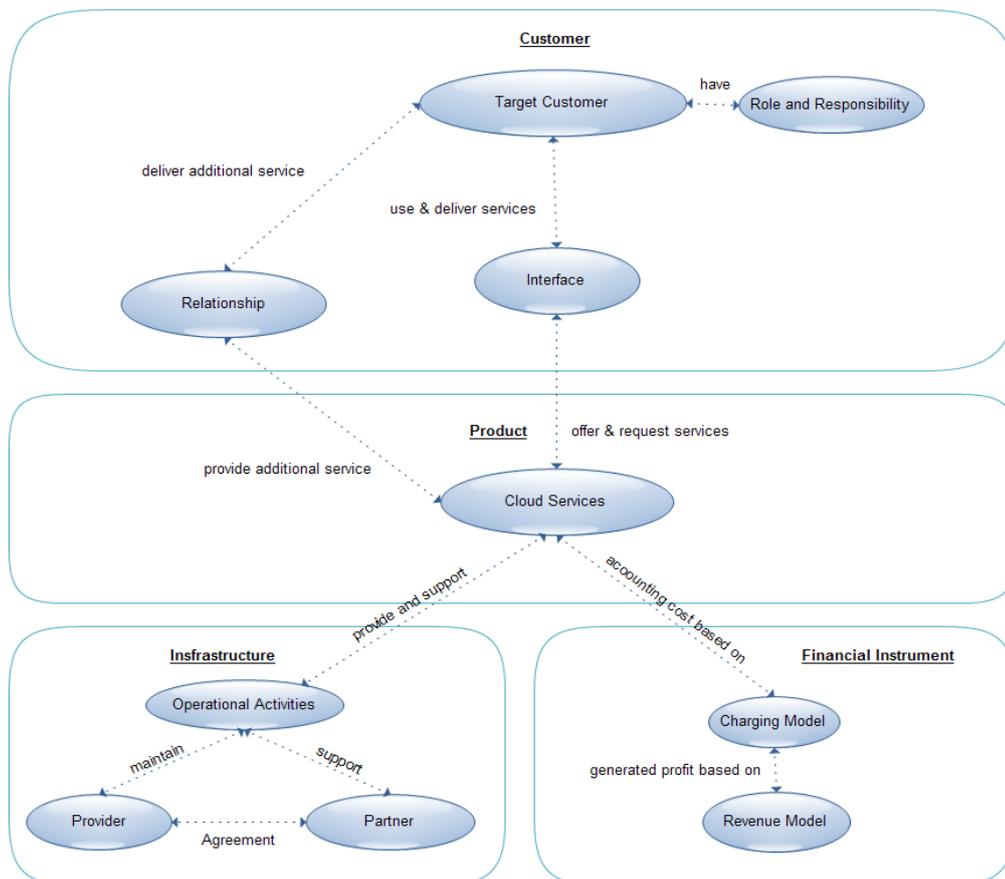


Figure 1. Cloud Learning Business Model (Inspired from (Osterwalder, 2004))

of services charge and then determined how much profit through the revenue model.

5. CONCLUSION AND FUTURE WORK

Cloud Learning is new paradigm on ICT-based learning. Researcher has introduced it several years ago, however most of them only provide the basic idea. In this paper we have elaborated and refill the potential benefit and challenges on this practice into at least five aspects and we found that Cloud Learning is suitable to be adopted as a means to promote resource sharing paradigm. Moreover, it could be an alternative way of implementing ICT-based learning in Indonesia, because it can accommodate a variety of e-learning current practices, although there are some constraints followed. Based on our finding, we hope all of stakeholders get the overview before they are adopting this practice on their environment. In addition, we also proposed the business model of Cloud Learning. It present how the business process occurred, who are the customer and what are their role and responsibility, how the way of interaction between customer and provider, what are charging and revenue model, and what services offered are. In the future we will build the strategic framework to adopt Cloud Computing for e-learning environment in Indonesia.

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