

# CLOUD COMPUTING TECHNOLOGY INFRASTRUCTURE TO SUPPORT THE KNOWLEDGE MANAGEMENT PROCESS (A CASE STUDY APPROACH)

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## ABSTRACT

This paper discussed the implementation of cloud computing as a part from technology infrastructure. Technology infrastructure well known as a key ingredient of successful knowledge management process in a company and also a strong support to improve the company's competitive advantage. Technology is rapidly changing, a lot of data from external source will give impact to the company. That's why with the right technology infrastructure will easy to manage, record, transfer the data become information and knowledge. The purpose of this paper is to know the reason behind, why the company implemented the cloud computing model as a part of technology infrastructure to support knowledge management process in the company.

**Keywords:** *Knowledge Management, Cloud Computing, Technology Infrastructure*

## 1. INTRODUCTION

Technology is rapidly changing that makes the company should be able to modify data onto information that will be developed into a knowledge as a value of the company. Collaborative with emerging technology allows the company to create a knowledge based resources and data. Other than that the company also faced with ongoing changing from external that influences the company's competitive in the marketplace. The ongoing changing also being an opportunity and challenge, so company required to improved its ability to utilize data from internal source and also from external source.

The creation of organizational knowledge relies on many systems and processes that make up the organizational infrastructure [1]. And technology infrastructure is one of important part of organizational infrastructure that plays the key of a successful knowledge management process in the company.

Some of the company maybe used a different technique to implement the technology infrastructure as part of knowledge management processes. According to this case, a company already implemented cloud computing as part to reach and combine the data from internal and external source. Storing data onto cloud need highest security and privacy concern, so in this

paper we will discuss and observe more how the company implemented the cloud and using it as a part of knowledge management process.

## 2. LITERATURE REVIEW

According to Fernandez and Sabherwal [2], Knowledge management depends on two broad aspects: Knowledge Management Solutions, which are specific to nature; and Knowledge Management Foundations, which are broader and more long-term. Knowledge Management Solutions refers to the ways in which specific aspects of KM (discovery, capture, sharing, and application of knowledge) can be accomplished. KM solutions include KM processes and KM systems. Knowledge Management Foundation, are the broad organizational aspects that support KM knowledge management in the short and long-term. They include infrastructure, mechanisms, and technologies. Thus, knowledge management solutions depend on knowledge management foundations, as shown in figure below.

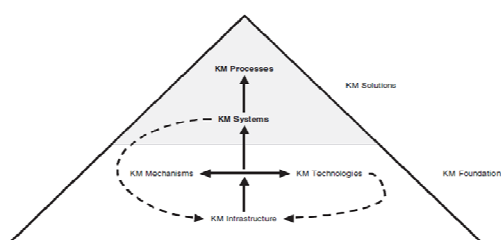


Figure 1. An Overview Of Knowledge Management Solutions And Foundation [2]

Knowledge is the principal force that determines and drives the ability to act intelligently. Wiig identifies the major purpose of KM as an effort “to make the enterprise intelligent-acting by facilitating the creation, cumulation, deployment and use of quality knowledge” [3]. The cycle of Wiig focuses on identifying and relating the functions and activities that engage in to make products and services as knowledge workers (See Figure 2).

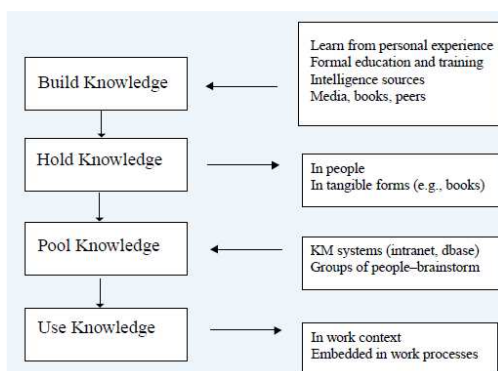


Figure 2. Km Cycle Wiig [3]

Technology infrastructure is various system and technology that provides the mechanism by which people can share and transfer information and knowledge which is the system enable to record, transmission and extraction data through information for a different purposes [4].

According to Duffy [5] the information technology infrastructure should provide a seamless pipeline for the flow of explicit knowledge through the 4 stages of the refining process to enable: 1. Capturing knowledge, 2. Defining, storing, categorizing, indexing, and linking digital objects corresponding to knowledge units, 3. Searching for and subscribing to relevant content, and 4. Presenting content with sufficient flexibility to render it meaningful and applicable across multiple contexts of use.

Cloud computing is an innovative “disruptive” technology that is changing how information and communication technologies (ICTs) are accessed and used [6]. The company doesn’t need to buy and spend a lot of expenses to support or buy the server as a data storage.

Another research shows, cloud computing provide real-time access to shared resources located anywhere on the globe. On-demand service represents a major paradigm shift from traditional ways of providing IT system infrastructure and service.[7]

Mell and Grance [8] recognized that cloud computing is Cloud computing is a model for enabling ubiquitous, convenient, on demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

According to Zimara [9] cloud computing are composed of five essential characteristics and it can define as below:

Table 1. Essential Characteristic Of Cloud Computing [8]

On Demand Self Service	A business will secure cloud-hosting services through a cloud host provider which could be your usual software vendor.
Broad Network Access	Your team can access business management solutions using their smart phones, tablets, laptops, and office computers. They can use these devices wherever they are located with a simple online access point. This mobility is particularly attractive for businesses so that during business hours or on off-times, employees can stay on top of projects, contracts, and customers whether they are on the road or in the office.
Resource Polling	The cloud enables your employees to enter and use data within the business management software hosted in the cloud at the same time, from any location, and at any time. This is an attractive feature for multiple business offices and field service or sales teams that are usually outside the office.
Rapid Elasticity	The cloud is flexible and scalable to suit your immediate business needs. You can quickly and easily add or remove users, software features, and other resources.
Measured Service	Going back to the affordable nature of the cloud, you only pay for what you use. You

and your cloud provider can measure storage levels, processing, bandwidth, and the number of user accounts and you are billed appropriately. The amount of resources that you may use can be monitored and controlled from both your side and your cloud provider's side which provides transparency.

Cloud user can consume all the capacity easily by exploring system parameters such as processing performance and storage capacity. In general, according to the type of provided capability, the services of cloud computing are broadly divided into three categories: (1) *Infrastructure-as-a-Service (IaaS)* is the delivery of huge computing resources such as the capacity of processing, storage and network; (2) *Platform-as-a-Service (PaaS)*, generally abstracts the infrastructures and supports a set of application program interface to cloud applications. It is the middle bridge between hardware and application; and (3) *Software-as-a-Service (SaaS)* aims at replacing the applications running on PC. There is no need to install and run the special software on your computer if you use the SaaS [10].

Beside essential characteristics and service capability, cloud computing also defines with four types of deployment models: (1) *Public Cloud*, it offers applications, storage and other services to the general public by a service provider. Public cloud is constructed with a view to offers unlimited storage space and increased bandwidth via Internet to all businesses; (2) *Private Cloud*, Private cloud is a cloud infrastructure build exclusively for a single organization, deployed within certain boundaries like firewall settings whether managed internally or by a third-party and hosted internally or externally; (3) *Hybrid Cloud*, combine the advantages of private and public clouds, offer flexibility, controls and security of multiple deployment models and it described in the figure 3; (4) *Community Cloud*, the cloud infrastructure is shared between the organizations with similar interests and requirements whether managed internally or by a third - party and hosted internally or externally [11].

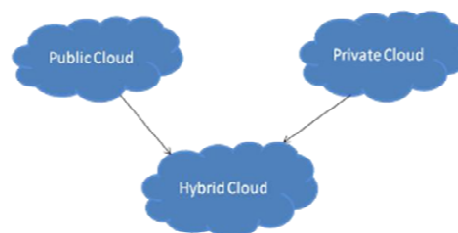


Figure 3. Hybrid Cloud As A Combination Of Public Cloud And Private Cloud [10]

Another research shows there were three major reasons why company need to use cloud computing in facing of big data in this era: (1) hardware cost reduction, (2) processing cost reduction, and (3) ability to test the value of big data. [12]

### 3. RESEARCH METHOD

The writing method of this paper is qualitative. The primary data collected during this research project included interviews with IT manager and direct observation. Based on guarantee and confidential reason interviewee name and company name could not be used in this paper. This paper focus on why company implemented the cloud computing model as a part of technology infrastructure to support their knowledge management process. The form of paper will be presented in descriptive format. The method of analysis will be used for the construction of a model of technology infrastructure for knowledge management process.

### 4. RESULTS AND DISCUSSION (A CASE STUDY)

#### A. Background

This paper will discuss about company that implemented the knowledge management process used technology infrastructure as a part of their strategy. Knowledge management is also facilitated by the organization's technology infrastructure and overall technology infrastructure, developed to support the organization's information systems needs, also facilitates knowledge management [2]. This company actually has a deep understanding concept about how information technology very useful to support and facilitate people in organization to manage internal data and external data by store it in the cloud. Using technology infrastructure will impact the company with: (a) *Reach*, pertains to access and connection and the

efficiency of such access; (b) *Depth*, focuses on the detail and amount of information that can be effectively communicated over a medium; (c) *Richness*, increase the ability to support rich communication; and (d) *Aggregation* enhanced the ability to store and quickly process information [13],[14].

The point of view of this implementation was came from two perspective views: (1) Customer; and (2) Business Process and Technology (See figure 4)

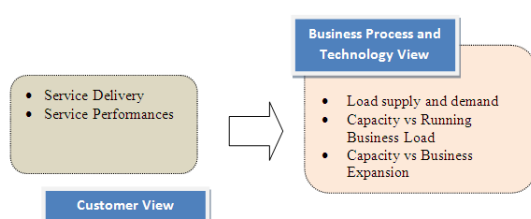


Figure 4. The Perspective View

The important perspective view comes from **customer view** that focused to improve excellent service in area delivery and performances which is it must support from **business process and technology view**, which company need to improve supply and demand because by business process running load and the other point company must prepare strategic plan for business expansion as a competitive strategic in market place.

### B. The Technology Infrastructure Model

Actually, this company adopted cloud computing theory. The infrastructure model was designing with 4 components (figure 5): (1) *Private cloud*, it designed exclusively for internal organization use only and concerned to interal generic application; (2) *Public cloud*, this cloud infrastructure was prepared for a specific community of consumers from the company that have shared with concerned like news and promotion; (3) *Hybrid cloud*, it designed and concerned to provide core business application internally and it connected with some application in other cloud infrastructure such us private cloud and public cloud; and (4) *VPC (Virtual Personal Computer)*, it designed for biz specific application that builds up internally to support core bis application.

Core business application actually put in hybrid cloud but it connected with private cloud and public cloud. It designed to easily update new customer

using CRM (Customer Relationship Management) when it was connected to the public cloud of customer's portal. The reason why generic application in private cloud connected through hybrid cloud is (1) enable staffs to access e-mails through smart phones, tablets, laptops when they are not in the office; (2) ERP (Enterprise Resource Planning) will be easily to manage and update since the company's application not only put in the private cloud but also connected in the hybrid cloud; (3) easy to backup all data; and (4) as a growth company which has many branch put the core business in hybrid cloud easily to share data and compare the new trend in each country / area as a company innovative. Although generic application connected to the hybrid cloud but company already set a secure system and procedure which it can access with password only.

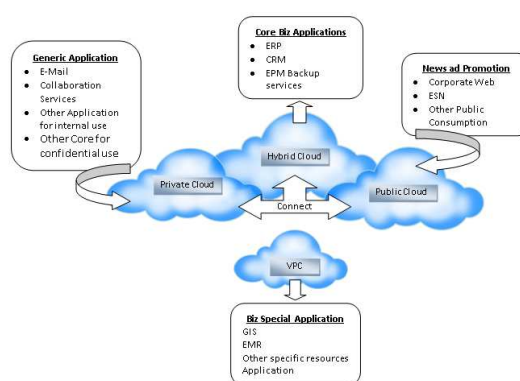


Figure 5. The Technology Infrastructure Model

### C. The Knowledge Management Process

After we saw how the company designed the technology infrastructure used cloud computing models, now this paper will discuss more about the knowledge management process used cloud computing as a part of technology infrastructure.

The knowledge management start onto process data from external that came up from public cloud as a portal and connected to the customer (**Build Knowledge phase**). All feed back and data from customer's portal will define and provide data that will manage into information. In this part the data will divide into specific categorize and will put in the group memory. After that data will transform into information and will publish as document management to enrich the information (**Hold Knowledge phase**). This information will use in the company to combine and improve

organization's knowledge. The research group of the company will explore and formulate new innovation for the company from external data as another perspective (**Pool knowledge phase**). Beside that company more easily obtain data that growing rapidly every day to set the competitive strategic, appropriate to technology and trend in the market place (**Apply Knowledge phase**) (see figure 6).

Why the company implemented the cloud system? when we asked this question, the company was answered with: (1) company doesn't need to build its own infrastructure and still focus to maintain service and operational run well; (2) Easily to module upgrades and additional user; (3) Using cloud as an infrastructure technology, will help company more easily to filter data that growing rapidly in every single day because of the ease to access and get it; (4) Cloud computing as a data store is an efficient way which company does not have to buy a server.

Another important question, about data and integration lost. The company said that it was not simple problems since many companies has implemented cloud also worried but the comparing with the benefit, company try to minimized the problem with significantly checking before choose the cloud vendor like find the vendor experience, testimonial as vendor credibility from other company that already used before and fully manage and participate prior to the transition process.

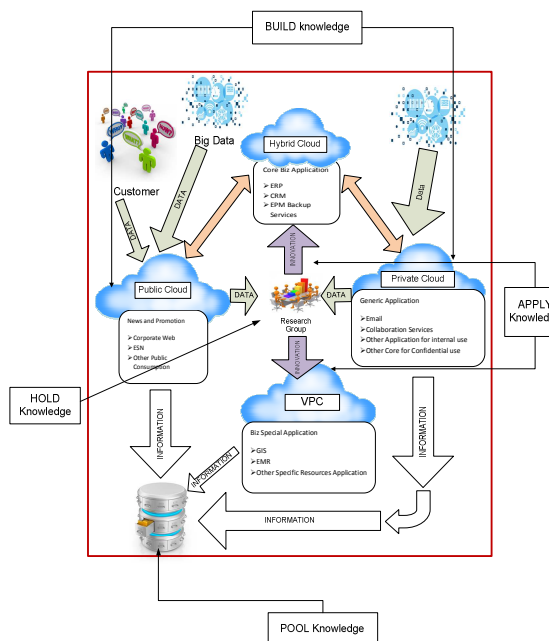


Figure 6. The Knowledge Management Process

## 5. CONCLUSIONS

After observing the technology infrastructure that was developed by the company, so it can conclude with now days implemented technology infrastructure is an effective way to compete with the market share. The explosion of data makes the company must move quickly to filter the information that will give benefit to the company in developing a competitive strategy and able to increase the value of the company's innovation. In addition, the cloud was chosen because it increases the efficiency of investment which company does not need a server with high cost investment.



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