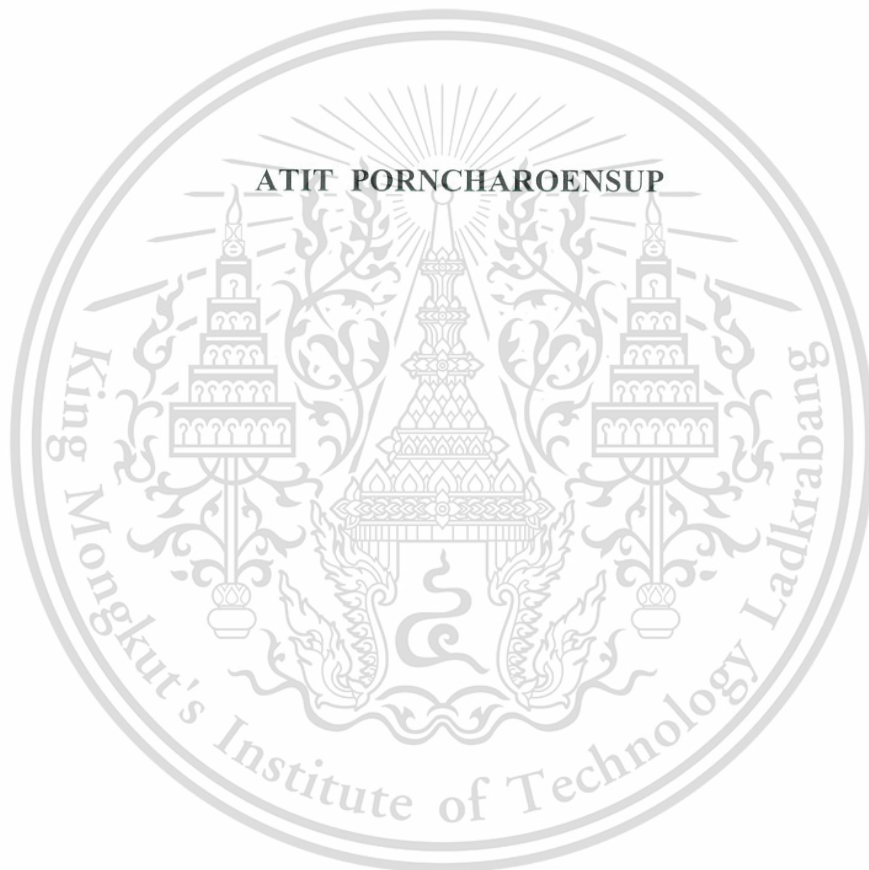


**THE ADOPTION OF CLOUD-BASED ERP IN LOGISTIC AND SUPPLY  
CHAIN INDUSTRY: A SURVEY IN LADKRABANG INDUSTRIAL ESTATE**



**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULLFILLMENT  
OF THE REQUIREMENT FOR THE DEGREE OF  
MASTER OF SCIENCES IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT  
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### ABSTRACT

Enterprise Resource Planning (ERP) is a software system that helps managing the operations of an organization. ERP has also been employed by many logistics and supply chain companies. Traditionally, ERP system has to be deployed on the client's private server. This causes a lot of technical hassles and requires high maintenance costs. However, with Cloud technology, ERP system can be deployed on off-premise third-party server. Such systems are called infrastructure-as-a-service (IaaS) cloud-based ERP. Cloud-based ERP is also available as software-as-a-service (SaaS) solution. With this approach, companies do not have to purchase or implement its own ERP systems anymore. They merely employ the ERP service provided by a service provider. Both IaaS and SaaS cloud-based ERP approaches eliminate technical and maintenance issues. A recent research showed that 44 percent of the organizations have migrated to cloud-based ERP by 27-percent of IaaS and 17-percent of SaaS, and both are retained on upward trend. However, that is general global trend. This paper investigates and discusses the trend of cloud-based ERP adoption in Thailand's logistics and supply chain industry. Several companies and individuals in the industry have been interviewed to examine the

considerations and perspectives toward cloud-based ERP adoptions in their business. The interview results reveal several users and stakeholders' issues and concerns. Such insights would be beneficial to ERP developers to address those problems, and, in turn, deliver the products that are more suitable to the users' needs. This would lead to wider adoption of cloud-based ERP.



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Author

Atit Porncharoensup

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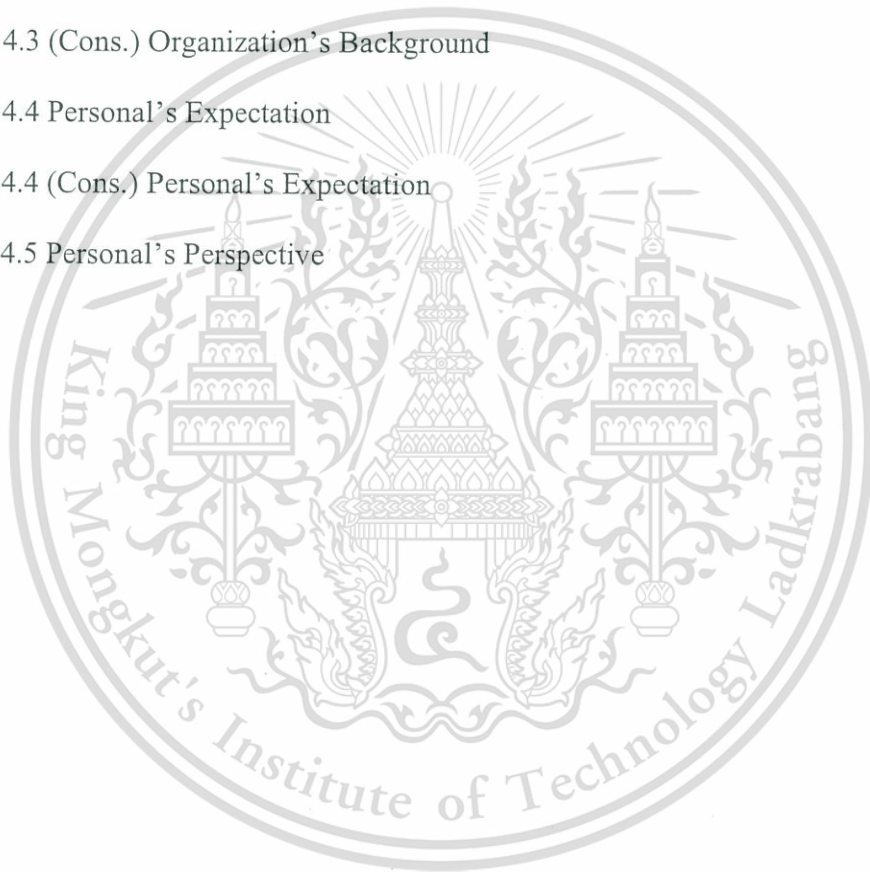


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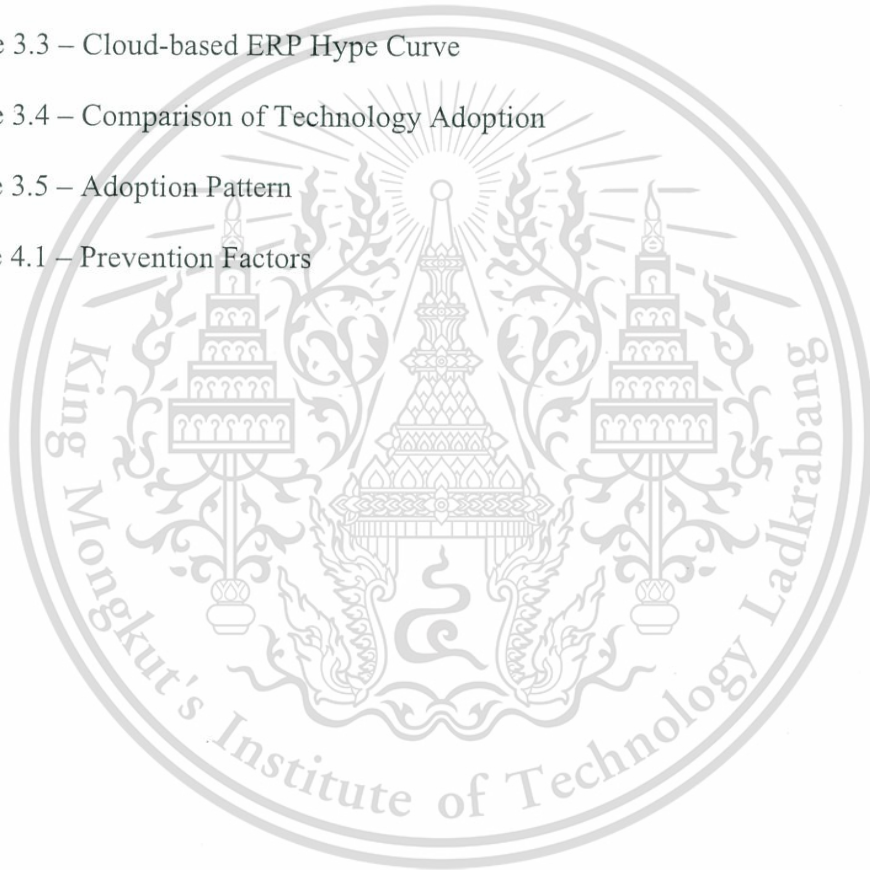
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## CHAPTER I

### INTRODUCTION

The globalization has accelerated the changes of our world in the past decades; it basically brings the entire world connected, and with technology, and introduces us the boundless communication and initiative business opportunities. Toward the changes, abounding businesses are being committed in the higher competitive environment. Consequently, diverse software applications are being considered by leaderships; especially, the famous tool which is designed mainly to support the firm, the Enterprise Resource Planning (ERP). Plenty of software brands are well known in ERP market society. Some are designed for general functionality, which can be customized for all kind of firms, while some are specifically developed for specific businesses. For examples, ERP's vendors have developed program in particular areas which are SAP, Oracle and Microsoft . The ERP are also incorporated special features to support logistic areas, introducing Warehouse Management System (WMS) and Transportation Management System (TMS) tools. These software are generally offered common functions to suit business processes: Project Planning, Manufacturing, Sales and Distribution, Purchasing, Inventory Management, and Financial Accounting.

Moreover, the rise of cloud-based technology is attracting. The ERP itself also tie up with this trend, launching Cloud ERP in these past few years. With Cloud-based, ERP will become more available to any clients in real-time. Enterprises can ensure that any necessary information among entire chain are securely stored and being accessible

anywhere and anytime. The world turns to become unignorably about the rise of cloud computing, as it has been discussed over the past few years, and also because of the existence of ERP software in the industries for long.

Nevertheless, the next wave of combination of these two technologies, the ERP over Cloud, is being captured by various stakeholders such as researchers, developers, providers, implementers, and enterprises themselves. In this research, the benefits of cloud-based ERP will be primarily discussed, also focusing the perspectives from logistics firms.

### **1.1 General Background**

The business application software is widely used in vary organizations as it is expectedly to improve business processes by increasing productivities, minimizing costs, and reducing errors. It has been introduced in different kinds of tools, but the renowned one is still the Enterprise Resource Planning (ERP) which offers most functions required among business industries. The ERP has integrated variety organization system and facility providing the overall perspectives of the firm by collecting and managing information that gathered from various level of the organization (Margaret Rouse, 2015). Multiple software is now available in the market, for business to select the best suit to their firms. The ERP itself has huge number of vendors. The top 2 vendors, are unsurprisingly SAP and Oracle which hold 24% and 12% market share among others around the world (Louis Columbus, 2014).

Cloud Computing is the hosted service over internet, it provides the ability to access data storage and application online; together with security, adjustable costs, and

allow customer to select only significant functions to be utilized without investing large volume to earn the application (Eric Griffith, 2015). For general Cloud Computing, there are 3 types of services provided: private, public, and hybrid (Margaret Rouse, 2015). In which, Private Cloud Computing is operated for single organization could managed either inside the organization or by the third-party. Public cloud computing provides a service to serve multiple users by using the same infrastructure. And Hybrid cloud computing has integrated both private cloud and public cloud to perform in the same organization but in a different platform such as in the main website their using private cloud to ensure that their website secure and scalable. (Samantha Morris, 2011).

Recently, ERP has integrated with cloud computing by using different service categories: Software as a Service (SaaS), Infrastructure as a Service (IaaS), and Platform as a Service (PaaS). While most vendors are likely to provide ERP software on the “Software as a service” platform (SaaS), which could implement with all types of cloud service (Krishnan Subramanian, 2009), to provide the new way to serve the need of customer. With SaaS platform, it allows customer to choose whether ERP software or application that needed to utilize in business individually and always up-to-date automatically without investment the IT infrastructure or maintenance costs and only pay for the monthly subscription (Nakul Patel, 2013) and also available on Infrastructure as a Service (IaaS), this platform allow customer to deploy the system on off-premise third-party server without investment the IT infrastructure but still fully maintain the system and application. With both of cloud-based ERP, business could take a huge advantage among the competitor with low-costs, easy to manage, always up-to-date the software, reliable, scalable and flexible (Alex Fesak, 2012). Cloud-based ERP as SaaS is certainly

suitable for small and medium enterprise since large enterprise usually has huge amount of information and almost every ERP software that needed to be perform the whole business that would cost higher than small or medium business size. Throughout the scalability and flexibility of cloud services, the size of data storage and number of accessibilities required should also be considered, as they are sensible to the charges for cloud-based implementation. Nonetheless, ERP on IaaS platform allows large businesses to utilize the ERP as a hosted-on cloud server, the company is a single tenant on the server meaning that the company has rent its own application and database servers. With this platform, business has significantly saving the cost by eradicating IT infrastructure and maintenance cost. There are conveniently customized the server and database to meet the business demand in within a minute, but still remain the same level of control as On-premise including update and customization (Trek Global, 2015).

In most business, different areas are cooperated to drive the business, mainly Finance and Logistics. Considering these two areas, most On-premise or cloud-based ERP offer standard functions with depended customization in their features to match the business processes, starting from purchasing raw material or semi-finished material, continuing to production process, storage management, delivery process, to real-time integration with finance and accounting process; along with tracking and reporting features to support business analysis and forecasting. The utilization of ERP in logistics and supply chain could certainly benefit to the company in term of process integration, process optimization, and effectively reflect in financial analysis. Sequentially, the faster and more reliable source of value information could certainly enhance business analysis, planning, forecasting, and gaining more competitive advantages over other companies.

In additional, there are plenty of information has reflected the benefits of cloud-based ERP. It is started to well accepted among the users. According to the Panorama Consulting Report 2016, cloud-based ERP has grown exponentially from 26-percent last 2 years to 44-percent this year. The organization that has implemented cloud-based ERP are 27-percent of IaaS, 17-percent of SaaS and still on upward and 56-percent of organization has implemented On-premise software. As the result, this research is to explore the current situation of cloud-based ERP adoption in logistics and supply chain industry and to illustrate perspectives from direct users.

### **1.2 Statement of the problem**

The benefits of cloud-based ERP are offering for businesses to take the best advantages from such as flexibility, cost reduction, high performance infrastructure, Cloud-based ERP is forecasted to have highly growth rate but this expectation is not happened in reality (Gligor Chavdarov, 2015); Moreover, the number of organization moving toward Cloud technology are not yet become remarkable. In the year 2015, there is only 11 percent of organization that has committed to fully utilized and managed with cloud ERP (Lisa Steinhart, 2016). As the result, the Cloud ERP is not well accepted among the organizations and it might not have accepted in the logistic industry as well. It has been studied and discussed among researchers to ascertain the components that cause the decelerate in the growth of cloud ERP. Therefore, the analysis and perspectives from researchers and experienced ERP users will be covered in this research.

### **1.3 Objective of the study**

The specific of this study were:

1. To investigate the factors which have an effect to decelerate the growth of cloud-based ERP.
2. To seek potential and opportunities to minimize the effect from those obstacles, to increase a number of migrated companies toward this advance technology with cloud-based ERP.

### **1.4 Scope of the study**

Two primary sources of information will be from reliable articles or public researches, and direct information from knowledgeable interviewee. The focus group for the research will be mainly from selected representatives companies which located in LadKrabang Industrial Estate, ERP users, or has experienced with ERP software and supply chain activities. The participants will be interviewed in person or through phone call. The analysis will be emphasizing discussed over logistics area.

### **1.5 Basic Assumptions**

1. It was assumed that respondents have honestly answered the questionnaire survey and were not informed or biased on the information that provided by the survey or from other sources.
2. It was assumed that respondents responded to questionnaire only one time.
3. It was assumed that the sample of the population was representative of the target's population.

## CHAPTER II

### LITERATURE REVIEW

This chapter represents a summary found from literature review regarding the combination of ERP system and cloud computing will be primarily discussed also focusing on the possibility trends in the future. Nonetheless, most of the cases shown many aspects has to be considered before the adoption of cloud-based ERP. Despite the fact that cloud-based ERP come along with tons of benefits, but the negative aspects of them still overshadow the positive in various ways. All of these particular details will be discussed in these following topics below.

#### 2.1 A Brief of ERP system

ERP started with just a calculation machines in year 1940's and the first step started by integrate various programs that could be utilize, manage and control in manufacturing sector. Then, the engineers create programs to monitor various parts in manufacture such as inventory, reconcile balance and report. This system has been developed further and further until it became the Material Requirement Planning system (MRPs) which aim for scheduling a process of production. Furthermore, MRPs has release the new version which is call "MRP-II" simply it has collecting more and more information regarding manufacturing processes and adapt itself to become more valuable. Eventually, Enterprise Resource Planning (ERP) has created and this time the system does not just included only manufacturing processes as before but also expanded to most of departments in the firm, for example, Human

Resource, Accounting, Project Management, Business Intelligence, Product Planning, Customer relationship Management and so on.

Nonetheless, ERP software has integrated these various departments into one complete system and collect the data into one single database to improve processes and information for entire organization. The main feature of ERP system is a one-single database which mean it will support all the need of multi-function for entire organization from the bottom to the top, Also ERP offer the automation and synchronized report since all those reports will be generated from single database instead of let the employee create their own spreadsheet from separate person and manually collect and merged them to become an reports which normally cause by complexity and plenty of errors that made the information even header to be correct and accurately.

According from the ERP solution it provided the link for all the report. For example, Purchase order from Material Master Module will be automatic link the information about those items in the order to Financial when they need to create a Goods Receipt all these processes do not require any of human action. Moreover, there are plenty of companies in these days such a high-growth and mid-size companies tend to adopt the ERP system more frequently. Currently, ERP has reached to the new level of service by offers Software-as-a-service (SaaS). This solution has helped accelerate the growth of ERP users also this solution made ERP system become more affordable and easier to manage and implement.

Cloud-based ERP provides real-time report and Business Intelligence which make it more valuable to CEO and more visibility for the business. For the details that

would make you to have a better look regarding cloud-based ERP will be discussed to see the whole concept in the third parts below.

## **2.2 The Benefits of ERP system**

Enterprise Resource Planning (ERP) is the system that could provide a huge benefit to an organization but it also requires time, effort and financial resource to implement ERP to the firm. Still the benefit that ERP offers to organization is far outweighing from the investment costs.

Improve the visibility – As the centralize database the organization could be able to track their own product and processes of finished goods from their inventory and also offer the ability to have better vision along with their strategy. Nonetheless, system helps collect & analyze data to become information to support for decision making.

Reduced operating costs – The system can reduce costs by avoid the duplication of information that happened when store the data from different database and that make a business had a hard time to processes those data.

Standardized business processes – ERP vendor has design their products based on standard of best business processes which been called as “best-practice”. Best-practice is a standard process which has collected by ERP vendors from the companies all around the world this method will be very helpful for every company that trying to implement ERP. In each company has been use different old-software and they going to face with different implement problems that are where the “best-practice” stepped in. It is provided plenty of solutions and standard processes to solve those problems which have been collected from successfully implemented company.

### 2.3 Overview of Cloud Computing

Cloud computing is one of the best technology that represents new way to drive user the abilities to access data, storage and functionalities by using through the internet instead of traditional way from database. The company itself does not require investing on the IT infrastructure to run the business and also help reducing the significantly amount of investment costs with the assistance of third-party providing on-demand IT infrastructure to seek the business goal. Cloud computing offers multiple advantages to companies, especially allowing small and middle-sized companies to afford advanced technology to challenge the competitors in the markets. As the usages of cloud service are increasing, the organizations start to adapt their business structure to the cloud computing model (Merve Bayramusta, 2016).

Cloud computing deployment models represent the way that cloud computing provide the service to their customer as following description:

Public Cloud: This type of cloud been provided and organized by service provider which is not required the investment of IT infrastructure and estimate the maintenances cost which could save the significant cost but still work on pay-per-use basis which the user have to pay for the subscription every month in order to use this service

Private Cloud: In this type of cloud require investing the IT infrastructure included in-house expertise and maintenance cost in order to establish the private network for organization. This private cloud could perform as a host for every department in the organization by connect it as a whole and in term of security the cloud service to a limited number of people behind the organization firewall and also give company the ability to fully control of their own data.

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Hybrid Cloud: This service is the combinations of public and private cloud by provide the extendable storage with this service allow the users to connect both storages together and still work fully-function. The user has fully controls on both storages in term of adjustment the demand and could be revoke anytime when the public storage has no longer necessary.

And there are three types of service that available on Cloud computing which will be explaining in description below:

Infrastructure as a Service (IaaS): This service delivery of computing capacity and infrastructure also known as Hardware-as-a-service (HaaS). IaaS provides the ability to access the storage on demand and it is always applied the latest technology which allows customer to get a better service and IaaS can be used in every deployment strategy which are public cloud, private cloud and hybrid cloud. As the on-demand basis, computing capacity made this service type (IaaS) useful enough for any kind of business. (Mohammad Naghavi, 2012)

Platform as a Service (PaaS): is an extension of the Software as a service model which allows customer to control over the application design but not in the infrastructure. (Merve Bayramusta, 2016) PaaS allow users to develop, test and deploy the application in a single environment which can be provides from the outsource infrastructure without purchase and implement a new platform. This allows individual clients to share the same resource also avoid the expense of upgrade and maintenance from both hardware and software which are hosted in-house. Its allows user to be charged only for the shared of the resource they use. (Apprenda Inc., 2016)

Software as a Service (SaaS): Provides specific software applications as fully remote service via internet. SaaS provides many benefits over the traditional software, it allows user to select the software application that assist the business process such as customer relationship management(CRM), supply chain management(SCM) and enterprise resource planning(ERP) to utilize in the company without major investment on hardware and software infrastructure, its cost on monthly subscription basis. (Mohammad Naghavi, 2012)

## **2.4 The Obstacles of Cloud Computing**

In this following section will mainly reveals the obstacles that have an effected thought the adoption and the growth of cloud computing. The first three are the technical obstacles that related the adoption of cloud computing, the next five are the technical obstacles that related to the growth of cloud computing and the last two are policy and business obstacles for the adoption of cloud computing. (Fox, A., Griffith, 2009)

### **2.4.1 Availability of a Service**

This factor is the scariest thing for the most organization that would interested to operate their organization systems with cloud standards meaning that the whole system will rely heavily on the stabilizing of the internet connection. For example, the outage of some large organization of internet service provider such as Gmail that have been outage for 1.5 hours in year 2008 facing with the system connection problem

### **2.4.2 The Data Lock-in Problem**

Nowadays, there are plenty of cloud computing software and service in the markets but mostly people do not temp to move to these kinds of service since customer cannot extract their data or program from one platform to another platform easily. The concern about difficulty of extract data from cloud computing is one of the most serious situation that preventing the organizations from adopting cloud computing. Nonetheless, the security and data privacy are also the critical down-sides of cloud computing software as much as data extraction.

### **2.4.3 Data Confidentiality**

Despite the fact that the approach of cloud computing has providing safe and convenience solutions to connect the information anywhere and anytime, even though you are across the globe from your information storage, but still we cannot be denied that people are not temp to trust this solution enough to operate their own company with this technology. And there are some businesses that is not be suitable with the adoption of cloud computing, mostly these kinds of companies store highly valuate information that they would not take any chance to risks the safety of their information.

### **2.4.4 Data Transfer Bottlenecks**

This issue has mainly focus on a server bandwidth form and to cloud service provider by the most variability from the costs happened by the amount of network traffic that the application used to process and migration the data from the service which responsible by cloud service provider to the customer.

#### **2.4.5 Unpredictability Performance**

Cloud computing basically operates on virtual machines with single server but it serves tons of clients at the same time. Normally, when it comes to the virtual machine or virtual hard drive in the same system. It can work perfectly but imagine cloud server that would operate multiple tasks from multiple users that made them even more complicated meaning the server performance will go up and down depended on the population at the moment of time beside if compares with in-house IT infrastructure in term of system stabilization and performances, cloud computing gets knocked entirely out of the round.

#### **2.4.6 Scalability Storage**

The complexity of data structure that are support directly to the storage system to meet the customer needs and combine it with the advantage of cloud computing by scaling a storage up and down on-demand as well as meet the programmer expectation.

#### **2.4.7 Distribution System Error**

The greatest challenge on cloud computing is solve an error in large scale distribution system. A common situation is the error could not be remove with a small configuration. This problem could be reduced be implementing virtual machine(VMs) in cloud computing

#### **2.4.8 Scaling Adjustability**

Pay-as-you-go basis are applying to storage and network bandwidth which normally count by bytes used. Be aware of the costs is the first step that should be realize before decided to implement.

#### **2.4.9 Reputation Fate Sharing**

One customer's bad actions could affect to the reputation for cloud service provider since the infrastructure is consist with many customers from many organization via sharing a same resource. Basically, one mistook action is represent for every organizations.

#### **2.4.10 Software License**

Software license are currently restricting on the computer. Users could pay for the software plus the annual maintenance fee. As consequence, cloud service provider is mostly relied of open source application since a license model are not suitable to match with utility computing.

At the main point, cloud computing has gathered a brunch of technologies and resources due the requirement of capacity that could be dynamically to match the system workloads. (Bayramusta, M., 2016)

Regardless of the cloud computing deployment approach, besides of the monthly subscription and dynamic resource matching the system still require a comprehensive of security and management capabilities and these are most of the major concern aspects for implementing cloud-based ERP.

## 2.5 The Rise of Cloud Computing

Cloud computing has gained wide acceptance for organizations as well as individuals by introducing computation, storage and software based services. It is used to address the resource scarcity issues of its clients by providing them with on-demand pay-per-use service. It incorporates a centralized collection of resources called a cloud connected through a high-speed network. The global availability of high performance resources, support of a large number of services, and ability to store large amount of data have made it ubiquitous. Even with the modern smartphones, the cloud computing is able to serve multiple purpose ranging from backup of contacts to the execution of complex applications through computation offloading. Moreover, the reduced cost of services and an assurance regarding quality make it an attractive solution for mitigating the issue of constrained resource. Since a cloud computing platform provides services by sharing valuable resources, an adequate usage of these resources may be achieved by ensuring that the platform is able to counter security threats which may otherwise deteriorate its performance and reliability. (Bayramusta, M., 2012)

## 2.6 Cloud-based ERP

Couple hundred years ago every companies and industry need generated their own electricity via steam engine and dynamo in order to use the electrical device to provide the brightness and communication device and its keep developing the new way to generate the electricity, Eventually the government build their own power plant to provide the electricity enough for every building and company. They just have to plug into the wall in order to use the power and that has changed the way of business operated and also set off the new level of the economic to this world but now

technology tend to become necessary to gained the competitiveness. In the previous era, all company have to investment a tons of resource in order to establish the IT infrastructure to keep and secure the company data also manage and analyze those data enhance it to become an information in order to do that required a great computer capability, business software and storage which also came with the team of expert, network cost, maintenance cost, and development cost and platy of problem would come when its need to upgrade the individual software application which could bring the whole system down.

Recently, cloud computing come and take the place, its work on the same basis of generated the electricity but this time for storage and computing capability. The cloud computing has offers many advantage provides the ability for business to access the IT infrastructure without the investment via using internet. And that could fulfill the demand of storage and computing capability by outsources company.

The capable of cloud as a centralize resource can match with individual scale. This mean that processing power could involve the thousands of machines embedded and worked together in the network and make this technology work through the network and available for the user by on-demand basis. However, the quality of service guarantees but still have some issue that concern every user about the security that blocked the growing popularity of cloud computing (Mohammad Naghavi, 2012).

### **2.6.1 An Advantage of Cloud-based ERP**

Overall, cloud-based ERP has offers a competitive advantage for the companies via using high-end technology to assist the business processes. It does includes cost reduction, accessibility and availability. These mentioned benefits can provide such a valuable opportunity for companies to beat their competitor. The

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capability of cloud-based ERP could improve business processes and business operations toward the improvement of business performance. Keep in mind, this technology offers bunch of benefits that similarly to the original ERP system but provided it in more useful & convenience ways. (Chen, C. S., Liang, 2015)

### **2.6.2 Efficiency of Cost Reduction**

The ultimate cost reduction is the main factor that attracts a bunch of entrepreneur attention along with the convenience implementation since every function is processes on cloud platform. cloud-based ERP has been designed to utilize as plug and play basis beside compare with traditional on-premise ERP solution. In term of costing, it has a significantly different at the beginning since cloud-based ERP used monthly subscription basis but on-permise ERP required huge amount of investment from IT infrastructure. Regarding the implementation, it is hardly to decide in which solutions is a best-fit for the organization since the complexity of the business processes that actually unique in every organization also it is based on the company customization requirement since there is the limits of implementation for particular solution meaning that there are many factors has to be consideration to define in which solutions could be the best solution for that particular organization.

Recently, there are a bunch of research has been discussed about the implementation costs comparison between cloud-based solution and on-premise solution (Partharsarthy, 2013). Nonetheless, the investment of using cloud-based ERP through pay-per-use basis as mention above that also provide the high possibility for this solution to increase the competitive advantage and plenty of benefits over the traditional solution. Additionally, cloud-based solution offer the ability to rapidly access the applications that available and operate over cloud platform which based on

customer's demand also reducing the complexity of managing and investing IT infrastructure.

Accordingly, cloud-based ERP used pay-per-use basis as monthly subscription which provides customer a certain investment cost (Arnesen, 2013) also mean that those companies who choose to implement their organization with cloud solution could easily transfer their capital expense (fix costs) to operational expenses (variable costs) since they do not have the internal expenses such as infrastructure expense and maintenances expense (Marston et al. 2011). Moreover, the advantage of cost reduction not only refer to start-up costs, but also includes software fees which the operation expenses could be predictable.

In general, cloud technology always operates their service with centralize servers as a host, their customers using cloud services through the environment that shared with another customer in one single server but the capability of those servers are extremely high and enough to served multiple tasking. Mostly researchers are believing that the small and medium sizes enterprise (SMEs) would be have better chances to gain benefits from rapid accessibility to this modern technology which it would enhancing their decisions also allow them to have instantly respond to the demand market. (Chou, D. C., 2015)

On the other hand, there are always a down-side of everything included cloud-technology, the adoption of cloud solution could offer the abilities and benefits for plenty of organizations but still this technology might not be suitable solution for some particular organizations would downgraded aiming to minimize IT infrastructure costs or reduce the implementation time since there are a certain condition or circumstance that are important such as the length time for

implementation is depends on the size of the firm and the customization scope. Cost minimization is not a core that promise to customer. The idea that companies choose to implement cloud solution mainly to minimize their costs may not be able to sustain the competitive advantages or take the advantage of new innovation because of these advantages are not sustainable when considering the risk of data privacy and collaboration in outsourcing relationship (Willcocks et al., 2012).

Every companies need to considered about the tradeoff for migrating to cloud since these tradeoffs may appear as the additional costs or some hidden costs which are not normally counted in periodic expenses. According from Arnesen (2013) said that the annual costs of subscription to cloud-based ERP tend to be higher than maintenance costs from traditional on-premise.

### **2.6.3 Availability of Cloud-based ERP**

Another major advantage of cloud-based ERP seems like to be the availability of the cloud system as the scalability and flexibility of cloud-based ERP services. Cloud services has claims with their twenty-four seven accessibility and full support with unlimited IT resource and storage through a connection of the internet on any kinds of device also operate under certain budgets as a monthly subscription.

The comparison of several cloud-based ERP advantages to the traditional on-premise. For example, the availability of cloud-based ERP that offers to access in anywhere, anytime and any device unlike the limited access that can only work through the intranet network and the scalability of cloud-based ERP that actually can be upgrade or reduce on customer demanded compare with the inflexibility of on-premise version. With the potentials of full-time accessibility can provides the ability for enterprise to respond the need of customer in real-time (Leavitt, 2009) along with

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a few concerns regarding the financial and technical issues. However, the enhancement of quality service and the availability of cloud-based ERP in order to guarantee these potentials, multiple service providers are deployed which cloud prevent the possibility of connection failure by using the existing multiple network providers (Wei and Blake, 2010)

Even though, cloud solution can offer a lot of beneficial but we cannot be denied the fact that small-sized companies can gain better advantages via using this technology, due to the different of company scale, small-sized enterprises have significantly higher success on adoption cloud solution than a large-sized company (Arnesen, 2013). Nonetheless, cloud services are now facing with a number of concern issues such as a service failure which could be a nightmare for any business operations. Additionally, cloud-based ERP are heavily relied on the internet connection despite the inconsistency of internet connection in some areas and that leads to the serious challenged for cloud solutions along with the approaches of multiple network provider to guarantee the quality of their service.

#### **2.6.4 Scalabilities of Cloud-based ERP**

According to the advantage that mentioned above, cloud computing has offers bunch of benefits includes the ability of scalable, which are allows them to efficiency utilize and manage organization's resource since the business have to operate of cloud service without carrying any of investment on IT infrastructure costs. In this case, cloud solution offers the ability to upgrade or downgrade and enhance any demanded applications and deactivate when they no longer required or upgrade additional storages are also possible. According to recent research, most of the enterprise's data centers are using their current IT infrastructure less than 50 percent of their total

resource capability (Leavitt, 2009). As consequence, cloud-based technology is likely to become a better alternative solution to increase system utilization for any organization that realized their utility of IT infrastructure are not productive enough. Nonetheless, these benefits are even suitable for small-medium size of organization or start-up organization also included. (Bruque-Cámara, S., 2016)

### **2.6.5 Flexibilities of Cloud-based ERP**

The integration of Enterprise Resource Planning (ERP) and cloud computing technology is allowing the business process (blueprint – the first stage of implementation) to be change whenever organizations needed with only few factors are required to make this change request (Sanchez and Yague, 2010). Furthermore, the businesses also get an ability of infinite resource capacity since it could be upgrade or downgrade at any time with this kind of service that cloud-based ERP are offering for their customer this could be technology power that driven any company to reach a newest innovation that would provide a better environment for those entrepreneur (Willcocks et al, 2012).

Therefore, the combination of the availability, flexibility and scalability are driven along with the company to operate with less complexity and provide a new innovation which could reduce the investment costs. In other word, these technologies together with Enterprise Resource Planning (ERP) and cloud computing together they are offer a numerous competitive advantage for the companies and it provide such an opportunity to reach the goal through an affordable technology also these could reduce some weight that companies are concerned about the IT technical function rather than focus mainly on current business situation. (Ince, H., Imamoglu, S, 2013)

### **2.6.6 A Risk Minimization**

Since cloud-based ERP has offers a benefit of availability and flexibility for every companies to deploy this technology. Consequence, those companies could have an easy accessibility on modern systems and software along with reasonable costs whenever they want and simply remove when they no longer needed it.

Due to cloud-based ERP has offers availability and flexibility for the companies to deploy this technology, provide the accessibility on modern software and system with reasonable price point whenever there is reorganization requires a company could simply remove it with no consequence. Cloud-based ERP also allows companies to integrations multiply across the software and service. Many research has claim that cloud-based ERP capability could help reduce the risk of innovation which it is costs more in On-premise systems. Purchasing and implementing a traditional ERP always a costly and difficult job for every organization and involves with a huge risk and time consumption. Cloud also providing an opportunity for enterprises to explore new business ideas that may granted an opportunity to beat the existing competitors in their markets. (Fan, H., Hussain, F. K., 2015)

### **2.6.7 Disadvantages of Cloud-based ERP**

The beneficial of cloud-based ERP technology has been introducing to business and convince them with the advantages of financial and functionality. However, there are always two sides of the coin. The common concern from the users of cloud-based ERP are plenty. For examples a lack of control, cloud service provider dependency, lack of interoperability with existing IT system and data security. Nonetheless, the insufficient example of successful technology deployments and the variety of system platforms may not suitable for every business model, prevent a user

to implement Cloud-based solutions. Several concerns with the agreement between companies and Cloud service provider must be consider the enhancement and integration process operation. The issues that related to Cloud-based solution has been pointed out by bunch of researcher.

### **2.6.8 Monitoring Failure**

One significant prevention factor of the adoption on cloud-based ERP is the loss of control, as a company my losing control on their IT infrastructure resource to a cloud service provider by becoming a fully rely on those cloud service providers. Losing control will have a greater impact on a large-scale enterprise much more than a small one. Once the agreement is made, cloud service provider are fully control on their IT infrastructure resource and responsible for all the information which normally stored as a confidential data in their own companies and any technical issues could be occurs very often since the updates on cloud-platform are automatically.

The loss of control also associates with a different location of cloud service provider. It is related to national regulation and laws to maintain a data on their properties which causing the problem regarding a data privacy and data accessibility across the countries. Leded to the utilization of multiple cloud service provider has been offered to solve a diversify risks. However, it is essential for the companies to ensure that all cloud service provider is stood in which locations. From the perspective of companies, the policies that used to protect the rights on their information from cloud service provider should be critical consideration.

### **2.6.9 The Roof of Customization**

cloud-based ERP application nowadays, has lack of the functionality of their traditional counterparts (Marston, 2011). Similarly, to On-premise ERP which it has been designed to support most of the business operation model and also providing the ability of customization to become even suitable for all kinds of business processes. The customization ability could provide a great benefit for the organization. However, software-as-a-service is normally more standardize and customize than Cloud-based solutions, basically software-as-a-service that operate on Cloud-based solution will provide a same standard service to all business users which normally a program major customization are not allow. Another researcher has also pointed out this issue and similarly mention the limitation of Cloud-based solution. However, migrating to the cloud is still a better choice for those small and medium sized enterprise (SME) as the beneficial of adaptability on their flexible business process which could be suitable for cloud-based ERP application. The limitation of customization could also a benefit for an organization since the system is not recommend modification activities. According to the system, any of modification activities will consider to constitute a threat of a system failure as they could lead to incompatibility when it time to upgrade the system newer version. As consequence, without the customization ERP has not been designed to suitable all the organization requirements, it essentially need such a modification and adaptation from either business or system, however, in case of cloud-based ERP changing a business process is much more senses. (Goode, S., 2015)

### **2.6.10 Security and Privacy concerns**

The concerns of security and privacy of cloud-based ERP are the most critical concerns in adoption of cloud-based ERP because it related to the heart of companies

which is information. Cloud-based ERP users has facing the security threats from both inside and outside cloud platform. Many of security problem has involved with the protection from outside threats, however, insider threats have a potential to damage on the information as well as outside threats. The different level of cloud services is also facing a different security concern. For example, Infrastructure- as-a-service(IaaS) providing a basic security to associate with the software accessibility while Platform-as-a-service(PaaS) provide a cloud environment for running applications and Software-as-a-service(SaaS) have a major responsibility in security term since it heavily relates to the user's information.

The suggestion for improving a security by providing a multiple virtual machine (Armbrust, 2010) to employ a physical resource and offers a protection at the level of end-user. Virtual machines (VMs) perform as a support for a better cloud management while sharing a service on the same physical IT infrastructure. Nonetheless, it enhances a system utilization and leading to operation costs reduction. Moreover, since the inconsistency of connectivity from IT infrastructure could impact to the performance of cloud-based ERP, Virtual machines also improve a better control in term of allocation the existing resources for cloud service provide with this ability cloud service provider could be ensure that their IT infrastructure could support scalability and flexibility will be effective and efficiently.

Furthermore, the discussion of collaboration between enterprise while they had implemented a different platform with multiple cloud service provider has begun widely (Willcocks et al., 2012). The cloud environment has been designed to support such a collaboration activities between organization which provide easiness of information sharing and integration service thought the same platform, for different

platform has not been mentioned, which it allows those organization to create a new form of business service integration. Therefore, another challenge for cloud service provider is to develop a new approached of sharing the information among cloud platform. Security concerns regarding collaboration has mainly focus on the information privacy and the risk of data transfer bottleneck. (Yang, Z., 2015)

## 2.7 Gartner Hype Curve

The hype cycle has inverted by American research firm Gartner, it representing the cycle of the technology and shown since the first adoption till maturity. The hype cycle provided a graphical and conceptual through five phases of technology to describe how every technology are growing through each phase. For the details of those five phases will be discuss below.

A technology kicks off for the first time to the market. There is no usable product existing just only commercial conceptual. Aim to explore the feedback of this kind of technology.

- **Peak of Inflated Expectations**

This phase companies have launched a technology to publicity for the first time. It can produce a successful score on this product sometime score on failure.

- **Trough of Disillusionment**

This is a time of publicity interest decreased, failure of implementation. The investment only continues when the provider improves their product to the satisfaction level of first adoption.

- **Slope of Enlightenment**

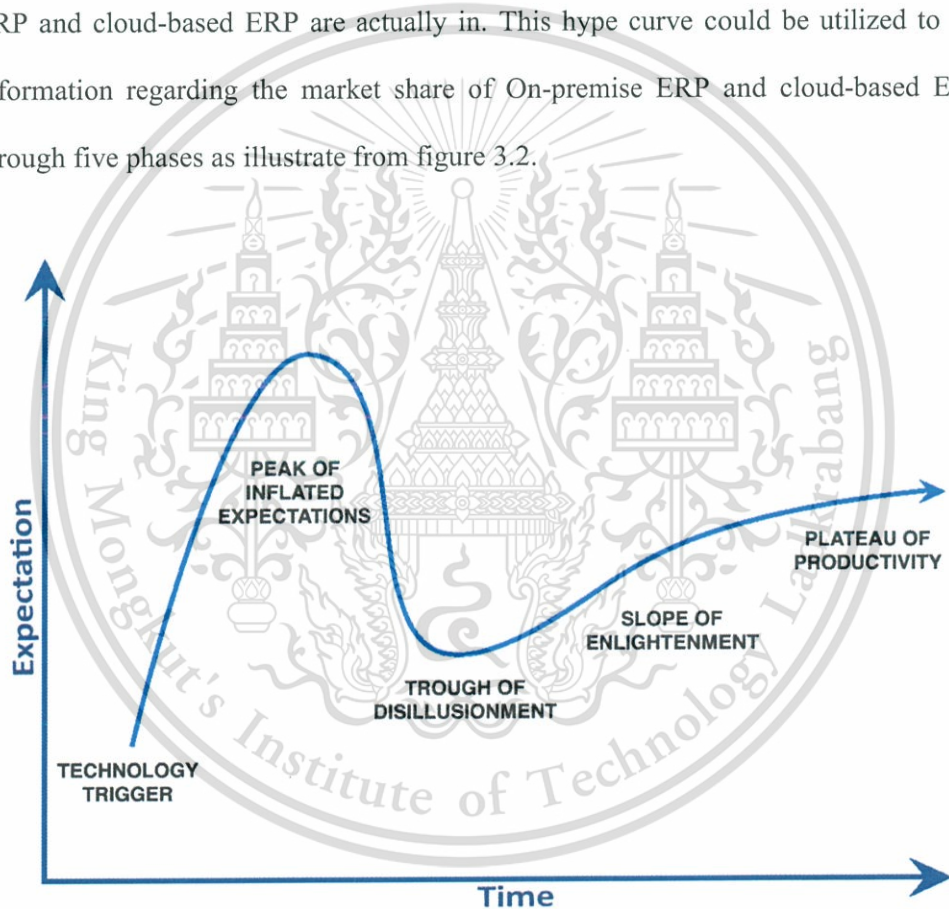
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The people start to realize the beneficial of the technology. And technology itself have already improved to the second or third generation of their product.

- **Plateau of Productivity**

This phase the people are fully aware of the technology that technology is well-known and well-accepted from the market. And the investments start to pay-off.

Researcher has provided a hype curve to describe which stages of On-premise ERP and cloud-based ERP are actually in. This hype curve could be utilized to the information regarding the market share of On-premise ERP and cloud-based ERP through five phases as illustrate from figure 3.2.



**Figure 2.1 – Gartner Hype Curve**

Source: Gartner Inc. Technology Research

## 2.8 The Approach of New Challenge

Globalization has driven typical businesses organization into highly competitive environment via providing boundless communication. In term of business, to manage the cost reduction while remaining the customer satisfaction is the best goal to be seek, considered about the sensitiveness of customer satisfaction, there are a brunch of things need to be succeed and stabilizing such as product and services quality. One of the most important factors goes to transportation management. It does help companies' delivery the shipment from source location to destination more efficiency, reliably, and cost effectively.

Introducing to Transportation Management System (TMS), this system has plenty of capability such as the analytic and optimization to reduce freight spends. Nonetheless, it can operate in any movement type; includes inbound or outbound, domestically or internationally shipment also expand to operate either transportation from company assets or third-parties or service provider. If compare with the traditional method of transportation management TMS does preform significantly better in term of service level and transportation cost reduction.

### 2.8.1 Benefits of ERP Adaptability

Increasing Customer Service – one of the ability of TMS via collecting information includes report and analysis from routine shipment, the report contains with necessary information regarding actual delivery time, duration distance and carrier. It is reveal a statistically successes rate of delivery for each carrier. This valuable information, allow company to increase the customer satisfaction by supporting company with better visibility.

Delivery Capability – TMS offers the ability to optimize to fit with company's business processes. It is customizable such as create a dummy distribute location or set up the program for multiple locations, to increase the overall efficiency and cost saving.

Inventory Reduction – The consistency of time per shipment allow company to have an accurate sight in term of forecasting for the amount of finish good and that lead the company to seek a better control for managing the inventory.

Cash flow Improvement – TMS not only offers the beneficial of reduces transportation expense but with the substantial system in term of financial TMS also prevents inaccurate charges and duplicate payments.

According from globalization, the impact has expanded in every area to every kind in term of business includes business operation system. With the drive of globalization has encouraged and push those businesses to keep on developing it to deliver a great serve for their customer. In recently, the important of logistics area has just ringed a bell as widely known from every business fields. Many of business owner starting to pay attention to the transportation in term of management via implemented TMS to their firm. However, implementing TMS not yet the final solution for the businesses firm but it is unintentionally leading the organization to use multiple operation systems in one single firm. The use of the multiple operation system in businesses can cause a plenty of complexity issues which require the tremendous of technical expertise with the professional. Despite the fact of that those systems can lead the way to gain competitive advantage, the down-side of using multiple operation system still overshadow the up-side in many ways.

### **2.8.2 Disadvantage of Multiple Operation System**

Costs – the multiple operation system can be effective and worthy in long-term, in short-term it can be cost-prohibitive to establish a system based on multiple operation system. It can be expensive to integrated and utilize the platform that can operation multiple system in parallel with one another.

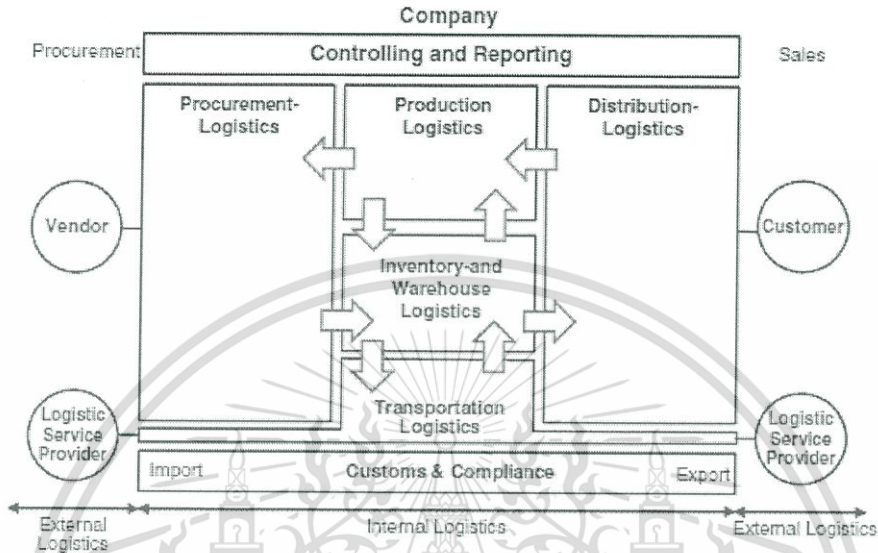
Compatibility – As mentioned above, when the operation systems are existing more than one in the same platform, the connection between those two needs to be established. If not, it can lead to failure implemented problems such as the form and data incompatibility or data redundancy. In that case, it will be literally impacts on the whole chain of business operation.

Integration – Among all operation system has been developed in different ways for seek different objective. In-term of duplicate function, it will be hard to decide which tasks should be allocated to which systems. Furthermore, the integration from both systems that operating in one single firm can get rough while trading information since they were created from different structure and source code.

### **2.8.3 The Processes of Value-added**

In recent year, several companies have lost their market shared during the transformation toward globalization, many of them need to reorganize their values-add processes in order to regain their lost maker while focusing on the interface between sale and procurement market. Similarly, there is cooperate function has grown significantly high in recently year that cannot be overlook. Logistics is now considered to be an essential element for any of businesses segments also set as standard software that every organizations should have, accordingly to the great-

demand for logistic expertise for the complexity information systems. Figure 2.1 illustrate the connection between sale, procurement and logistics activities.



**Figure 2.2 – Inbound and outbound order processes flow**

Source: Transportation Management with SAP TM9: Jayant Daithankar and Tejkumar Pandit

Nonetheless, the growth of third-party logistics industry (3PLs) has continuously high since there is a new trend for plenty of wholesalers and retailer that does not want to invest on their in-house fleet of vehicles because of in often product did not deliver on-time which lead to losing of opportunity, revenue and customer dissatisfaction. For example, in Thailand there is one of company that entirely operates and manages all the shipment via using 3PLs which is SCG public company. The SCG is a humongous company in Thailand contains with 8 sub-companies their sale several of building material and chemical but can manage their fleet fluently without owing any of in-house vehicles.

Thus, TMS has become an essential component but implementing TMS with the conditions of multiple operation system can lead to failure implementation and unreconciled data as mentioned. Nowadays, the solution for these issues has been established by integration TMS with ERP system, this integration provides the higher assured quality of data, less manual and reduce unreconciled data. They started to implement TMS to become one of their modules.

## 2.9 Related Works

These following researches are related to cloud-based ERP and they will be used as the main references for this research.

Michael Armbrust and his co-worker (2009), has revealed the arrive of the new technology trends and business model that would create a new way of IT services also determined the obstacles outline for cloud computing that have an effected on the growth of cloud computing with comparison with the explanation and prove in each obstacle.

Minihaj Ahmad Khan (2016), have studied main security issues that most people are facing the cloud computing platform also suggest the possible solutions that can prevents or decrease those issues.

Ravi Seethamraju (2015), has introduced Enterprise Resource Planning (ERP) that operates with cloud platform under Software-as-a-Service model and reviewing the advantage and disadvantage of the capability of ERP system. Suggestions with the example of the size of enterprises that can suitable for adoption and utilization.

David C. Chou (2015), has studied regarding the risks and concerns of the data protection, security and privacy while using cloud computing for an audit tasking.

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Sebastián Bruque-Cámara (2016), has revealed the positive and significant effects from using cloud-computing technology that impacts the informational-physical integration of supply chain and operational performance.

Taro Yamane (1967), has described a formula which used to calculate a number of participants that has to be collected in the certain amount of population. The number of participants has varied by confidential level of population.

Sang-Gun Lee (2012) and Seongtae Hong (2011), Sang-Gun Lee has addressed the comparison of technology adoption from different continents such as United State and Asian. Therefore, researcher has provided a factor which has an effect on the adoption percentage and duration. Innovation effect is a formed that self-perception and interests are the main reason that drive people to adopt the technology which has been considered as country type I. On the other hand, imitation effect refers to a social influences and word of mouth as a main factor that extract many people to adopt the technology which has been considered as country type II while Seongtae Hong has use UTAUT model to defined the differentiate across two countries which the results has become similarly to Sang-Gun Lee as U.S users are more likely to adopt a technology with their own characteristic fundamental toward technology while Korean users are more likely to adopt a technology by a social pressures which influenced from the environment.

## CHAPTER III

### RESEARCH METHODOLOGY AND PRELIMINARY ANALYZES

This chapter represents the research methodology which conducted to complete the study. The topic of research was set as “the adoption of cloud-based ERP in logistics and supply chain industry”. The chapter will describe the processes of the study including study’s area and the amount of the population that the researcher has aim to collect. Furthermore, this chapter will expand the methodology that researcher decided to utilize with this study also describe the interpretation processes to seek the conclusion for the study. The survey was created to collect user perspective and concern regarding adoption of cloud-based ERP from either logistics companies or different type of company but still has logistics activities and all the participants located in Ladkrabang Industrial Estate. For the details of the study are described in the following section also preliminary analysis regarding forecast the possibility for cloud-based ERP future trends.

#### 3.1 Study Population

The subject’s participant in this study consists with different kind of company and profile such as the level of education, gender and ages. The number of participant companies that located in Ladkrabang Industrial Estate are 240 companies. This group of participants has been randomly chosen as a representation for logistics and supply chain companies. For the simplified formula, has been inverted by Yamane which it has been described in the last section of literature review, the sample size is determined by level of

precision and population regarding a confidential level and population are designated via specific number.

The confident interval would be the best tool that could fit in this kind of survey sampling. The purpose of taking randomly choose various of samples it works whether those samples from the same place or not and compute those perspectives from different angel with a statistic and aim to approximate the mean of the population opinion. A confidence level refers to the percentage of all possible samples. The researcher has used random sampling to select the sample. For the formula of Taro Yamane, described from Literature Review in section 2.9, has been used with the following formula.

$$n = \frac{N}{1 + Ne^2} \quad (3.1)$$

Where  
n = size of sample group  
N = size of all population  
e = the missing adjusting rate in random sampling at level 0.05

Based on this equation, there were approximately 150 Sample were required from total 240 organizations that has been located at Ladkrabang Industrial Estate. The approximate sample size of the study was considered appropriate at 95% confidence level with a precision rate of  $\pm 5\%$  and the degree of maximum variability is 0.5. The organization were randomly visited. The list of participant companies is presented in Appendix A.

### 3.2 The Design of Methods Research

Regarding the used methods in this research, it will have divided into 3 steps and all these methods has been used for analyzed the raw data that were collected which are:

1. Questionnaire
2. Interviews
3. Preliminary Analyzes

For the further information regarding in each method will be present and explain in the following sections.

a) The chosen methods have been used in this study, to analyzed via using in both quantitative and qualitative research methods, these methods were applying in different group of participants to fulfill the main objective of the study. First of all, researcher has been gather an information for various sources among the organization research's such as Scopus, Gartner, Science Direct, Panorama and so on. These secondary data have led to the facts regarding the adoption of cloud-based ERP.

b) Afterward, the researcher has got enough of information to understand the current situation of cloud-based ERP in another country around the world. However, it is not specifically reflex on current position in Thailand. Thus, researcher decided to create an interview session with an invitation to ERP experts from Thailand with a purpose to understand a current position for cloud-based ERP in Thailand as much as possible. For the requirements of ERP expert must have up to 10 years' experience on ERP and perform in a role that covers a possibility factors that could become obstacles for the rise of cloud-based ERP such as financial module as well as logistics field.

c) Lastly, the information from an ERP experts were collected with a better visions of cloud-based ERP position in Thailand. Therefore, to be ensure regarding the understanding and all factors that has been clarified are true. Researcher has created a simulation of cloud-based ERP adoption in Thailand with 142 participant's companies

that located around Ladkrabang estate industries via using a quantitative tool which is a questionnaire with the purpose to prove the hypothesis and to understand about their perspective toward cloud-based ERP also their feedbacks regarding up-side and down-side of cloud-based ERP compare with On-premise ERP.

### 3.3 Questionnaire Form Design

The questionnaire that has been used in this research was conducted by the researcher. It was developed in both languages Thai and English. This questionnaire provided for those targeted companies those are located in Ladkrabang estate industries. With the strongly intentions to seek the obstacles that could be a major related factor to deaccelerated the growth of cloud-based ERP and find out the solutions to prevent those obstacles. The procedures of constructing the questionnaire were described as below.

- a) Literature, research and theory are related to cloud computing, Enterprise Resource Planning (ERP) and cloud-based ERP. The participation of this research are the companies that located in Ladkrabang and used to with logistics activities. A preliminary draft questionnaire was constructed on the basis of the purpose of the study and the rationale.
- b) A draft questionnaire was conducted to collected respondent's perspective and to emphasize the purpose of the study.
- c) The questionnaire was examined and revised under supervision of advisor to verify the validity of the questionnaire.

d) Afterward, questionnaire was tested with the expert in logistics field. The purpose of this trial was to indicate phrases paragraph, expression and language that has been used in the instruction and questionnaire itself.

e) Nonetheless, when the trial is done, questionnaire has been revised and adapted with the suggestions from logistics expert.

f) Begin of the questionnaire distribution.

g) Raw data was collected and analyzed.

### **3.4 Collection of Data**

There are two channels were used for the distribution of questionnaires. First channel was adopted through a survey tool which is google document. In term of distributions, researcher choose to spread the questionnaire via using e-mails with links attachment for every companies. The second one was distributed hard-copy questionnaire for 187 companies by considered a response rate estimate 80 percent of all target population, in order to successfully collected respondent as 150 from targeted respondents. All participants remained anonymous with demographic information being collected for comparative analysis only, and all questionnaires remained confidential.

### **3.5 Analysis of Data and Statistical Procedures**

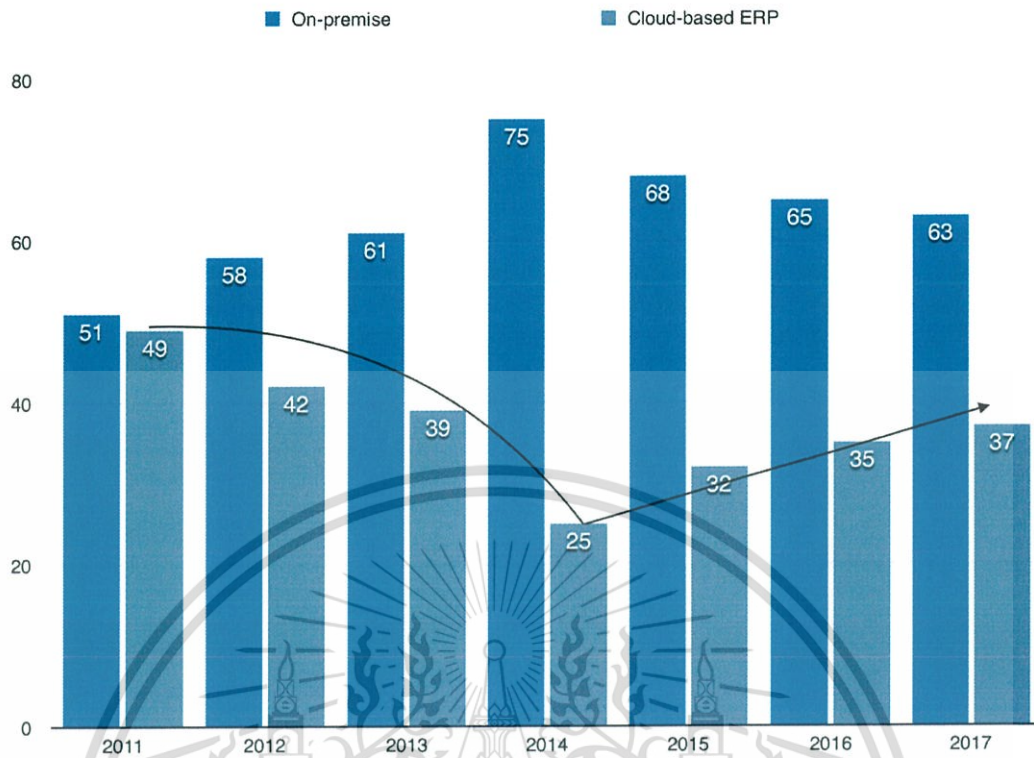
According from the collection of data, statistical analysis was based on the descriptive and It was used to analyze data via utilizing the Statistical Package for Social Science (SPSS). The statistical tools that researcher used to analyzing data will be described as following section.

1. **Percentage and Frequency** – used for analysis the answers by weighting with the number of time they have answered.

2. **T-test and One-Way ANOVA** – used to distinguish the different of attitudes between each company.

### 3.6 Preliminary Analyzes

Researcher has used secondary data as references to ensure that the collected data are accurate as possible from Panorama Consulting Solution and Gartner Inc. Technology Research. According to the trends of the growth of ERP solutions, it is significantly to notices the acceleration of market share included a well-accepted from all around the world. Since 1960, Enterprise Resource Planning starting the operation of this technology with one service which is On-premise. For the On-premise service, it is required a huge amount of investment costs on IT infrastructure and the software itself and also requires a professional for an implementation the software besides when the implementation processes are finished maintenance cost still going on and on. In recently, ERP has released a new solution with a combination of cloud-computing, cloud-based ERP is a new solution for small and medium sizes organization with an ability of plug and play basis, always up-to-date and so on. According to Panorama Consulting Solutions, the growth of cloud-based ERP is significantly higher in each year as it is displayed a illustrate of cloud-based ERP expansion from year 2011 – year 2017.



**Figure 3.1 – Comparison of Cloud-based ERP and On-premise**

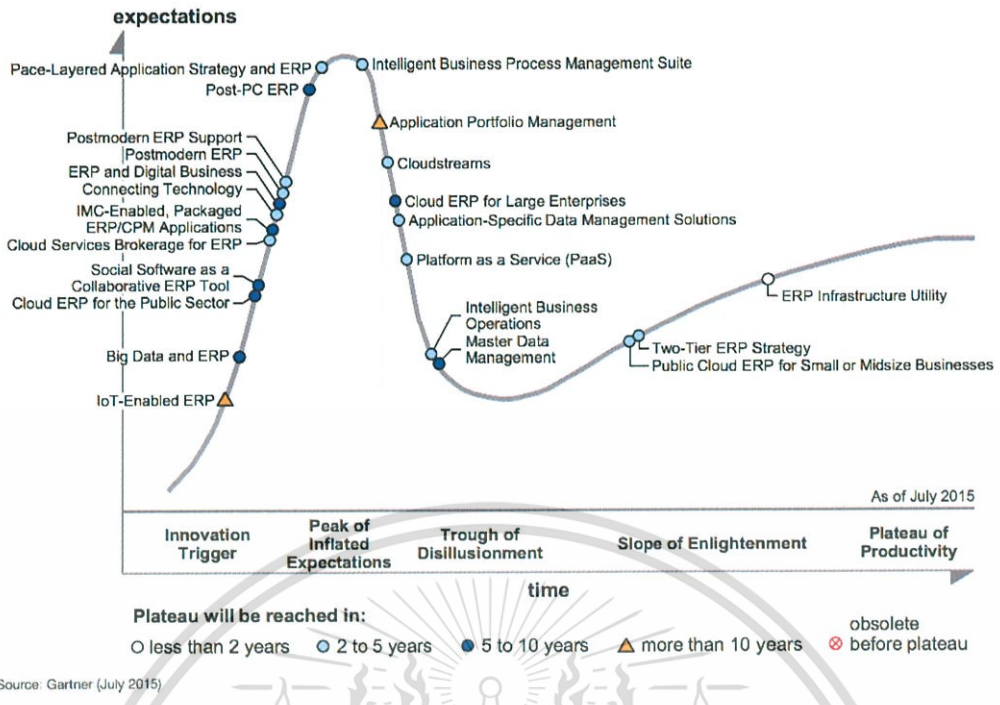
Source: Panorama Consulting Solution (2011-2017)

According from this figure, it simulated the growth of cloud-based ERP for last 5 years. In year 2011, this is the first year they had been collected the comparison ratios between cloud-based ERP and On-premise ERP. For the number of users that implemented traditional On-premise ERP was 59 percent from overall demanded and cloud-based ERP took only 41 percent. Next to year 2012, there was a slightly decreased for On-premise ERP from 59 percent to 58 percent despite cloud-based ERP was huge decreased from 41 percent to 37 percent together they both leading market with 95 percent market share for another 5 percent dominate from other program.

According to year 2013, the trends slightly got higher implemented rate by there is 61 percent of On-premise ERP comparing with last year got 58 percent and the implemented of cloud-based ERP was decreased from 37 percent to 36 percent this year. In year 2014, there is an enormously accelerated for On-premise ERP by 24 percent increase from last year despite cloud-based ERP was significantly decreased from 26 percent to just only 15 percent of the implementation rate. In year 2015, there is a huge different for both side since On-premise ERP the utilization rate was decreased from 85 percent to 56 percent despite cloud-based ERP was increased by 29 percent from last year. In year 2016, there is no different from last year the number of On-premise ERP still remain the share with 56 percent as same as cloud-based ERP still remain as 44 percent. Recently in year 2017, On-premise ERP has a significantly increased from 56 percent to 67 percent. However, cloud-based ERP the market share was decreased from 44 percent to 30 percent.

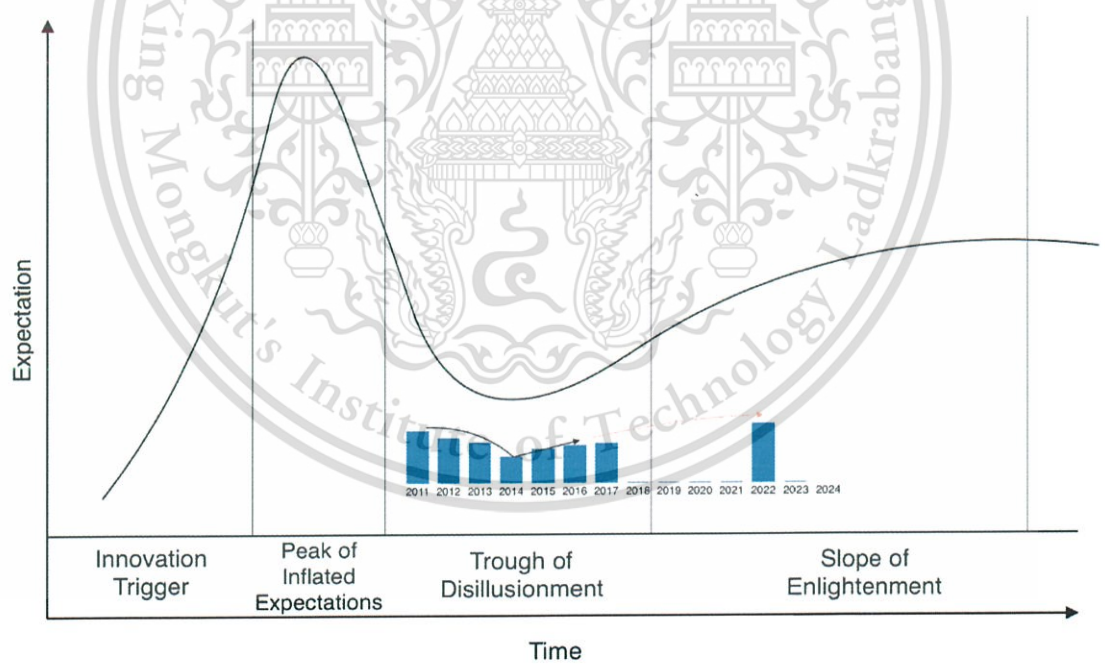
### **3.6.1 Gartner Hype Curve**

According to Figure 3.3, using Gartner hype curve, described from Literature Review in section 2.7, to definite location on phase four in the Slope of Enlightenment since cloud-based ERP has been expanded to a small and midsize business already. The position should be reach last phase in less than 2 years.



**Figure 3.2 – ERP Hype Curve Year 2015**

Source: Gartner Inc. Technology Research



**Figure 3.3 – Cloud-based ERP Hype Curve**

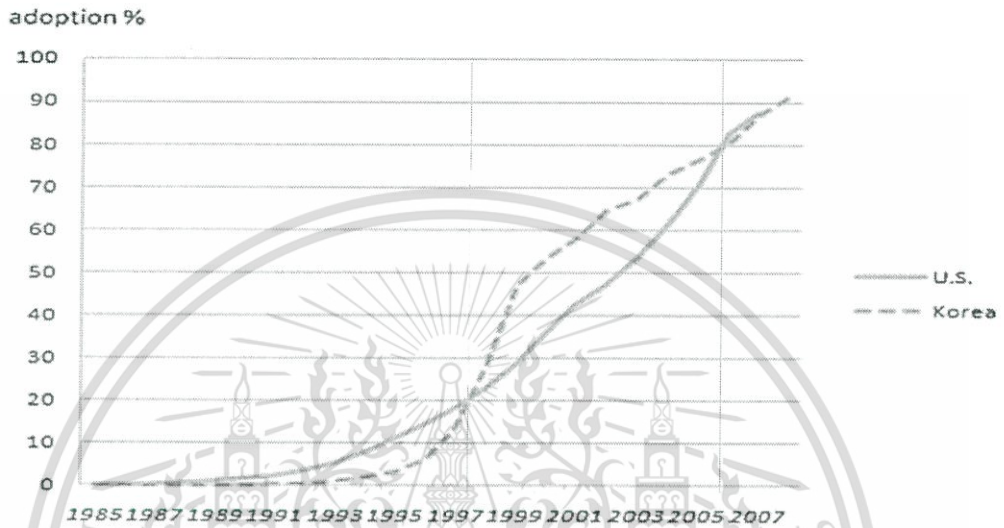
Source: Gartner Inc. Technology Research

Researcher has generated a hype curve for cloud-based ERP based on the period from year 2011 – 2017 (Figure 4.2) to simulate the collection of market share compare with a hype curve to define the stage of this technology. As Figure 3.4, a combination of hype curve and market share does have a similar pattern in the phase of ‘Trough of Disillusionment’. As a result, researcher could be able to forecast a possibility of cloud-based ERP that will reach to the phase of ‘Slope of Enlightenment’. In generally, cloud-based ERP will reach to a maturity within 3 years based on the adoption trends which has been simulated by Figure 3.1. However, the information from above could not define cloud-based ERP trend in Asian Pacific due to those data has been collected from Europe and US continents.

### **3.6.2 Technologies Adoption Theories**

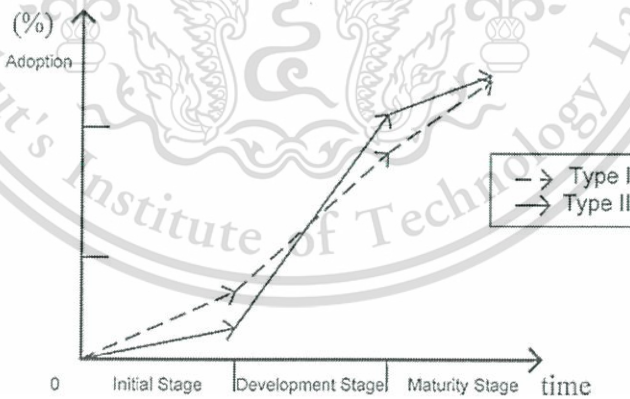
There are many researchers such as Sepongtae Hong and Sang-Gun Lee have proved that the adoption of technology can be vary by many factors such as economic and culture. Most of the researches has used the process of technology approach to each country to conducted their researches while aiming to find out a different of technology adoption in many countries. According from a research, there are two types cultures effect that could define the adoption trend in that country which are innovation and imitation effects. These culture effect has dramatically change the adoption trend upside down while another research has pointed out that behavior is one of the most important factor that entirely change the adoption trend. Both researches have their own conclusions but it seems to be harmoniously.

Therefore, these two researches have some common point of views and conclusion which can be integrated to generate an accurate conclusion to define the possibility of the adoption of cloud-based ERP in Thailand.



**Figure 3.4 – Comparison of Technology Adoption**

Source: Lee, S. G., Trimi, S., & Kim, C. (2013). The impact of cultural differences on technology adoption. *Journal of World Business*, 48(1), 20-29.



**Figure 3.5 – Adoption Pattern**

Source: Lee, S. G., Trimi, S., & Kim, C. (2013). The impact of cultural differences on technology adoption. *Journal of World Business*, 48(1), 20-29.

According to Figure 3.5 and 3.6, it has illustrated the relationship of the adoption and duration while comparing with U.S. and Korea. In the initial stage, adoption rate and duration from country type II is lower than type I. In the development stage, adoption rate from country type II is dramatically higher than type I and in the maturity stage the adoption rate is equally also considering the amount of time that country type II would be later than country type I to equally reached 10 percent of adoption percentage is approximately 2 years.

The country types are referring to innovation effect and imitation effect from individualistic cultures, described from Literature Review section 2.9. A country that represent for type I with innovation effect, for example, U.S. Australia and Canada. On the other hand, a country that represent for type II with imitation effect, for example, Korea, Japan and Thailand.

Cloud-based ERP is considering as a new approach for this generation as a support information from above section. Country type II such as Thailand will adopt new technology slower than country type I such as United State and it would take at least 3 years to become fully expanded and at least 5 years for Thailand due to the different of cultural (Sang-Gun Lee, 2012) and personal's behavior (Seongtae Hond, 2011)

### **3.6.3 Costs Comparison**

One of the most important factors that attracted great attention of all around the world. Since it has widely-spread the beneficial of cloud-based ERP that could not be denied is costs reduction. The standard costs from implement cloud-based ERP and On-premise ERP are being contentiously since there are some down-side and possibility of cost reduction will not work-out as it was claim in some circumstantial. Therefore, this

following content table are a cost break-down comparison between cloud-based ERP and On-premise ERP in 4 years' period which will focus on the leader of market share.

According to Table 3.1, this costs comparison is quite different between those 2 advance technologies. There are clearly that On-premise ERP costs is significantly higher than cloud-based ERP since it has included the investment of IT infrastructure (John Appleby, 2014) and it has some limitation of customization for cloud-based ERP. The investment cost on cloud-based ERP and on-premise ERP have been described in every detail of costs factor (Mark Canes, 2015). In this example, supposed the companies have used 12 users as a basis.

**Table 3.1 - Costs comparison from ERP vendor**

Cost Factors	Cloud-based ERP	On-premise ERP
License Fees/ Monthly Fees	\$100/User/Month	\$24,000
Maintenance Fees	Included	18%*(\$24,000)
Implementation and Customization	\$22,000	\$24,000
Infrastructure Upgrades	-	\$10,000
Backup Media/Services	-	\$1,500/year
Server Management	-	\$4,200/year
Server Software	-	\$600/year
Total	\$36,400	\$68,620

As Table 3.1, the cost comparison has significantly different with cloud-based ERP almost 50 percent cheaper than on-premise ERP considering with a similar size of companies. Nonetheless, the startup timeframe also reduces approximately 75 percent when compared to on-premise ERP (SMB Suite, 2016) and it includes tons of benefits such as backup/recovery, virus protection and automatic software updates.

From the above information, cloud-based ERP are now well-accepted and well-known for the publicity with a huge beneficial that come with substantial budget for monthly subscription. Considered these trends had effected to all around the world (Panorama, 2011-2017). However, cloud-based ERP itself still in the beginning of adoption phases. Therefore, researcher has assumed that cloud-based ERP are not yet completely expanded to the users in Thailand, it would take at least 5 more year to be exact until it could have expanded. However, Thai people are aware and realize the existing and beneficial of this technology but there are some obstacles that prevents them to migrate to cloud-based ERP also prevents the growth of the adoption of cloud-based ERP. Nonetheless, these costs break-down are from publicity SAP standard cost but the implementation cost in Thailand is still unknown. Thus, researcher decided to create sessions to interview the experts of Enterprise Resource Planning (ERP) that had an experience on SAP to be ensure whether the presumption is true and to seek an accurately of current situations and position about cloud-based ERP in Thailand.

## CHAPTER IV

### RESULTS AND DISCUSSIONS

The results of the study which are addressed from both quantitative and qualitative methods will be discussed in this chapter. First of all, Secondary data as the main source to gather effective information in order to illustrate current position of cloud-based ERP over the world trend. Apart from collecting quantitative data from varied sources, direct interview with ERP experts, emphasizing Thailand-based, has broaden vision of technological solutions towards Cloud environment. Most experts mention the growth of cloud-based technology, it is certainly increase flexibilities in accessing to reliable information everywhere and every time. In which, this could lead to the advantages over other competitors in the same market, as reliable information is known needed for decision making. Afterward, to ensure that the understanding and all factors that has been thoroughly clarified. A simulation of cloud-based ERP adoption in Thailand has been prepared, with utilization of data analysis, variance (ANOVA), and Frequency Test (it has been addressed from Research Methodology in section 5). Due to the limitation of survey collection only 63 companies are considered. Regarding the questionnaire, there are 4 parts that related to the respondent's personal information, company's information and background and personal's expectation and personal's perspective toward cloud-based ERP.

The following section will describe questionnaire results by using table to display a participant's answer while grouping a population by their answers. Moreover, it used only variance ANOVA and Frequency test due to unnecessary analysis methods since there is no hypothesis requires in this research (Nisanat Jirasit, 2014)

## 4.1 Key Participants

Table 4.1 – Key Participants

Name	Position	ERP Experiences
Seksit Sinitwarakul	Senior Consultants	18 Years
Sumalee Tirapornvadee	Senior Consultants	15 Years
Surajit Klinpakdee	Senior Consultants	15 Years

According to Table 4.1, the results of qualitative method will be used to describe with support comments from interviewee to clarifying the participant's answer which provided by questionnaire. As consequence, the combination of qualitative along with a result from quantitative could be found in the section below.

## 4.2 Quantitative and Qualitative Results

Cloud-based ERP is one of the most powerful system for any kinds of business since it has been designed to adaptable to suit any business processes with tons of customizable functions has lead this system to become a leader of business operation system which SAP vendor has dominated the ERP market (Figure 3.5). Moreover, in term of payment this version of ERP is significantly reduce huge amount of investment costs since it is not relied on any IT infrastructure (Table 3.1). The advantage seems like to be a disadvantage as well since this technology has relied heavily on internet without this connection the company are completely lost communicate with their database.

According from Panorama, the market share of cloud-based ERP has rising on 17 percent from year 2014 till now despite the world trends are getting higher and higher. However, this situation could not accurate for every country since the differentiate of personal's behavior and culture (addressed in Methodology section 9). When comparing with most leading countries since the economics on that specific time and Thai cultural also caused a delay. As consequence, researcher has created a questionnaire to investigated the obstacles that prevented the growth of cloud-based ERP in Thailand.

#### **4.2.1 General Background**

According from the sample of 150 participant's companies are randomly selected to receive a survey, for the response rate approximately 42 percentage has been collected and another 56 percent are still holding a response. The questionnaire result will be described in the following sections.

According from Table 4.2, It has shown that about 47.6 percent of them and the rest of 52.4 percent respondents are male. For the respondents, there average ages are 31 – 40 years old. with 47.6 percent of the total while there are 38.1 percent are ages between 21 – 30 years old and lastly with the least population 14.3 percent are on the ages around 41 – 50 years old. All these respondents are represented for their company opinions. In the education term, majority of the respondents have graduated in bachelor degree with 65.1 percent while there are 33.3 percent for the person who has graduated from master degree and only 1.6 percent of all respondents that got the doctoral degree.

The participant's experiences are one of the most important factor for the research, according to the results, most of respondents have been working on their fields area around 1 – 5 years with 63.5 percent while the second group has got 28.6 percent

on 6 – 10 years of an experiences and there are only 7.9 percent have been working less than a year.

**Table 4.2 – General Background**

**N = 63**

Demographic Characteristics	Participant's Companies	
	Frequency	Percentage
<b>Gender</b>		
Female	30	47.6%
Male	33	52.4%
<b>Age</b>		
21-30	24	38.1%
31-40	30	47.6%
41-50	9	14.3%
<b>Education</b>		
Bachelor Degree	41	65.1%
Master Degree	21	33.3%
Doctoral Degree	1	1.6%
<b>How long have you been working in this area?</b>		
< 1 year	5	7.9%
1-5 years	40	63.5%
6-10	18	28.6%

As a result, the majority of participants are in the middle ages and that could have provided a negativity of cloud-based ERP migration. Due to the fact that older people are more likely to be resistant a change as it has been mentioned by Sumalee.

*“If the organization is driven by new generation, we may move faster toward innovations. Since they are young, energetic, and certainly open to new technology and changes.” (Sumalee Tirapornvadee, 2017)*

#### **4.2.2 Organization’s Background**

This section has created for the purpose to understand company background regarding the business software that there are currently used to conducted results of the study. According to Table 4.3, these results has showed there are none of responded company has used cloud-based ERP with regular basis while there are 19 percent have never been aware of this existing business software. For the numbers of company that has frequently used this software are taking around 25.4 percent and lastly with the biggest populations is 55.6 percent of company that has aware this technology but never used it before.

Regarding their current business software, only 3.2 percent of them appreciated on their software. There are 55.6 percent of respondents thought their software can support major needed while there are 34.9 percent of respondents thought software was good but they rather use excel while and there are only 6.3 percent thought the software is useless. Nonetheless, business program has to many kinds in this wide world but researcher has aimed to focus on Enterprise Resource Planning (ERP). Regarding business program that they are currently used, there are an astonishing result by realize that none of respondent’s companies has using cloud-based ERP while there are 50.8 percent using On-premise ERP as their current business software and for the companies

that using an alternative software or Non-ERP program are getting around 39.7 percent. Furthermore, there are some 9.5 percent of companies does not know which program they are currently used.

Moreover, their current business software has been used for certain period. There are 12.7 percent have used their current business software less than a year while there are 14.3 percent have used their software for the period of 1 to 5 years. A majority used of current system is 6 to 10 years while taking 55.5 percent and it has been found that there are only 17.5 percent of participant have used a business software for over than 10 years.

**Table 4.3 – Organization’s Background**

**N = 63**

Demographic Characteristics	Participant’s Companies	
	Frequency	Percentage
How well you known with Cloud-computing?		
Use it on a regular basis	0	0%
Use it only sometime	16	25.4%
I’m aware of but never used it	35	55.6%
Never heard of it	12	19%
What do you think about your current business program?		
Brilliant	2	3.2%
Well support with major needed	35	55.6%
Good but I rather use excel	22	34.9%
Better than nothing	4	6.3%

**Table 4.3 (Con.) – Organization’s Background**

**N = 63**

Demographic Characteristics	Participant’s Companies	
	Frequency	Percentage
Which business program that your organization are currently used?		
Cloud-based ERP	0	0%
On-premise ERP	32	50.8%
Non-ERP program	25	39.7%
I don’t know	6	9.5%
How long does a company have been using this software?		
< 1 year	8	12.7%
1 – 5 years	9	14.3%
6 – 10 years	35	55.5%
> 10 years	11	17.5%

As a result, seem like most of participant are aware of the existence of this technology and also thought that their current business software could support a major needed while this software has been support their organization for a certain period of 6 – 10 years. Meaning, Thai employee has to talk a lot of time to adapt themselves and used to with the technology until it reaches to the acceptance of technology.

*“Comparing the e-payment, it took years to be accepted among Thai firms, while e-payment has been used regularly in several countries.” (Sumalee Tirapornvadee, 2017).*

### 4.2.3 – Personal’s Expectation

According from table 4.4, illustrates a positive response since no one had answer on strong disagree the result from using statistical tool One Simple T-test found that the benefits of cloud-based ERP are worth when comparing with the investment costs got a highest average equal to 3.89 while Implement Cloud-base ERP can significantly improve a quality of business management got the average equal to 3.76. For the lowest average in this part belong to cloud-based ERP software is fit to my business, only few enhancements are required only got 3.43 for the average. For other questions, such as You would choose to implement cloud-based ERP rather than On-premise ERP and cloud-based ERP has significantly faster than On-premise ERP both of these got the averages 3.70 and 3.60 respectively.

**Table 4.4 – Personal’s Perspective**

**N = 63**

Questions	Level of Agreement				Strongly Agree	Means
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree		
Cloud-based ERP will significantly faster than On-premise ERP.	0	2.20	3.25	3.83	4.33	3.60
Cloud-based ERP software will fit to my business, only few enhancements is required.	0	2.20	2.94	3.69	4.17	3.43

**Table 4.4 (Con.) – Personal’s Perspective**

Questions	Level of Agreement					Means
	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	
Implement Cloud-based ERP will significantly improve a quality of business management.	0	1.80	3.31	4.06	4.83	3.76
The benefits of Cloud-based ERP will be worth in term of the investment costs.	0	2.80	3.25	4.19	4.67	3.89
You would choose to implement Cloud-based ERP rather than On-premise ERP.	0	2.20	2.94	4.14	4.33	3.70

According to table 4.5, the factors that should be improves from the perspective of respondent’s. 39.7 percent has chosen the ability to integrate across platform also with 36.5 percent has chosen Costs minimization to be more stand-out and there is 19 percent has chosen on the accessibility to reliable information. Lastly, there is 4.8 percent of all respondents has chosen the adaptability to businesses requirement. The integration across platforms is require certain amount of costs and times and it will become necessary when organization has reached a roof of customizations.

*“Huge costs and bunch of things to be concerns such since interface with other On-premise system since cloud-based ERP could not handle much of customization” (Surajit Klinpakee, 2017).*

**Table 4.5 – Personal’s Expectation**

**N = 63**

Demographic Characteristics	Participant’s Companies	
	Frequency	Percentage
Regarding of the advantages of cloud-based ERP, in which factors should be more outstanding in order to attracts the attention from those organizations.		
Ability to integrate across platform	25	39.7%
Accessibility to reliable information	12	19%
Adaptability to businesses requirement	3	4.8%
Costs minimization	23	36.5%

According to Figure 4.1, has illustrate a list of factors that prevented the growth of cloud-based ERP from the respondent perspective’s. For a factor that has the people mostly consider about is expense with a 25.2 percent and running up factor is security with 21.8 percent. The limit of customization got 17.8 percent and factor of data privacy got 14.4 percent. For the system control and system flexibility got a similarly on 7.4 percent for both of them. For the system performance got only 4 percent. Lastly, the last factor that all participants would consider about when they decided to implement

cloud-based ERP is storage level with only 2 percent of respondent has chosen this factor.

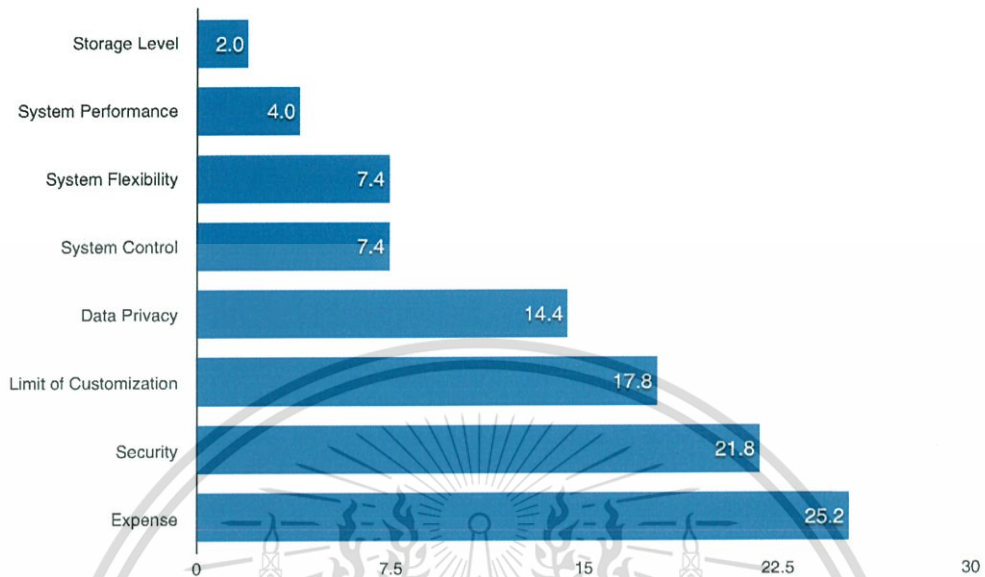


Figure 4.1 – Prevention Factors

As a result, top concerns of cloud-based ERP implementation are expense and security. In term of expense, it has been illustrated and addressed in section 3.9 of Methodology Research for both short-term and long-term with investment costs has been reduced for 65 percent compared to On-premise ERP. In-term of security, the afraid of data loss and losing control of their information are basically driven a nightmare for whoever thought about implementing Cloud-based technology.

*“Ransomwares this malware has widely-spread to all around the world and they kept your data as a hostage to make their profits.” (Surajit Klinpakdee, 2017)*

However, considering the risk of utilize the system just not enough to cover and ensure the successfulness of implementation. Chosen a potentials cloud service

provider is also a tough decision for every entrepreneur as much as it take at the very first place.

*“As consequence, the application that operates on cloud-computing system must be well-design and highly secure enough to guarantee and gain a trust from the customer.” (Seksit Sinitwarakul, 2017)*

*“Cloud-based ERP is not safe enough as it should be so it could be some kind of back-door that could be hackable since this technology rely heavily on internet connection.” (Surajit Klinpakdee, 2017)*

Even though, the beneficial that cloud-based ERP are provided seem to be overwhelmed their disadvantages such as the different of investment costs on IT infrastructure between cloud-based ERP and On-premise ERP, however, there is still arguing from both sides whether cloud-based ERP are worth for a long-term investment. Moreover, these beneficial offers seem to be available for limited size of the enterprises, there are plenty of research such as Minihaj Ahmad Khan, Ravi Seethamraju and bunch of journals has pointed out in the same way that cloud-based ERP are suitable with only small and medium enterprises.

*“According to the trends on this year in Thailand, none of large enterprises has using cloud-computing since there are afraid of the effects when it does happen in large companies it will caused huge amount of expenses and their traditional system still working well. Therefore, there is literally no a good reason to migrate from On-premise to cloud-based ERP until it has been proved that cloud-based ERP provided a great beneficial enough to beat On-premise ERP.” (Surajit Klinpakdee, 2017)*

However, it does not mean that cloud-based ERP performance not capable to support or deploy to such a large enterprise, it just only a matter of security that might not trust worthy enough to attract a certain people.

*“the company that performs as cloud-based ERP service provider surely has a capability to handle requirements from large-size enterprises since ERP requires a huge database for their general processes and the provider, they have to invest an IT infrastructure large enough to handle a bunch of customer. Then, it is possible to deploy cloud-based ERP technology to such a large enterprise.” (Seksit Sinitwarakul, 2017)*

*“I believe that cloud-based system can be well-compatible with large organizations which have complex business processes and huge database. But just we prefer to keep our secret bible in our hands” (Sumalee Tirapornvadee, 2017)*

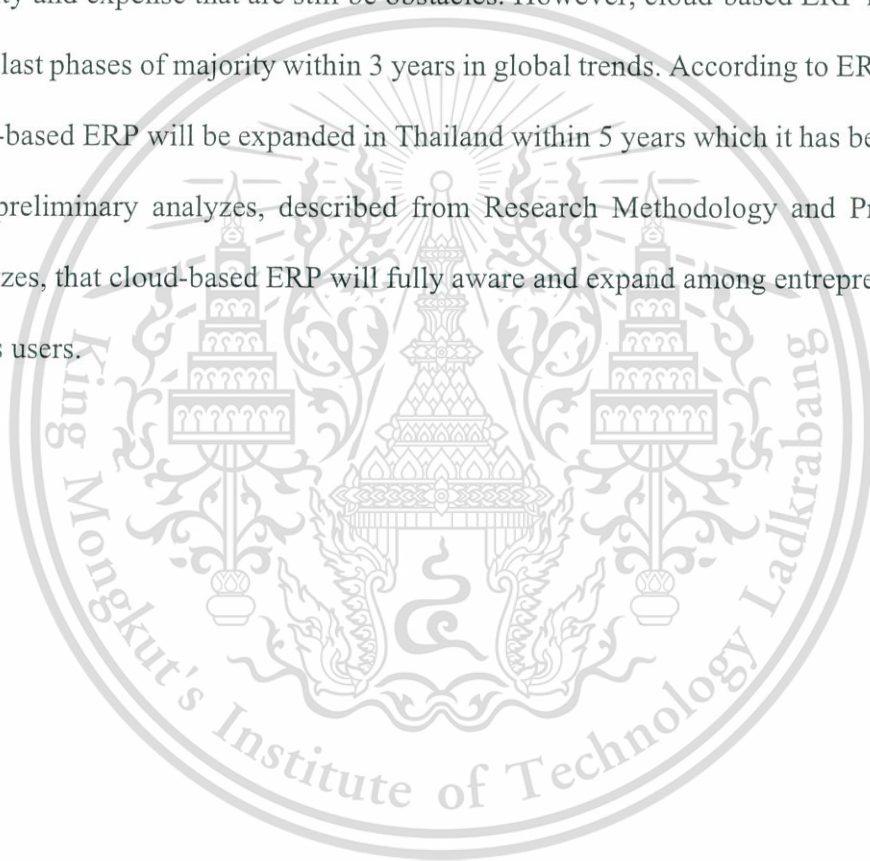
Currently, the situation of cloud-based ERP in Thailand is no-growth since there are none of the organization that fully implemented cloud-based ERP exists in Thailand. As figure 3.4, it has simulated the estimate trend that cloud-based technology will be reach a phase of majority within 2 years. As consequence, the approximate time that cloud-based ERP will fully deploy in Thailand would be later than other country around 3 years or more considered by politics and economic current situation that would delay the growth of Thai market.

*“It would take more than 5 years to expanded but in the future small and medium-sized enterprises who cannot afford the investment costs for On-premise ERP would definitely goes for cloud-based ERP” (Seksit Sinitwarakul, 2017)*

*“It would take 5 more years to build people’s trust in security of cloud-based system. We have studied their new capabilities and yes, we assure that it can increase our market advantages.” (Sumalee Tirapornvadee, 2017)*

*“It would take a long time until cloud-based ERP will fully grow approximately 10 years or more because it is unusual to rely all the information on another company”*  
(Surajit Klinpakdee, 2017)

The current position of cloud-based ERP in Thailand has been reveals with an analysis result qualitative and quantitative methods. All of these lead to a final conclusion that the utilization of cloud-based ERP along with a major concern of security and expense that are still be obstacles. However, cloud-based ERP is going to reach last phases of majority within 3 years in global trends. According to ERP experts, cloud-based ERP will be expanded in Thailand within 5 years which it has been agreed with preliminary analyzes, described from Research Methodology and Preliminary Analyzes, that cloud-based ERP will fully aware and expand among entrepreneurs and Thai’s users.



## CHAPTER V

### CONCLUSION AND RECOMMENDATIONS

#### 5.1 Conclusion

From introduction, this chapter has been described background and information regarding the study which mainly focus on cloud-based ERP and logistics industry. Moreover, it has explained the objectives of the study, state of the problem, scope of the study and basic assumption.

Form literature review, this chapter has been studied the perception of cloud-computing and Enterprise Resource Planning (ERP) has been discussed and illustrated a possibility trends in the future. Gathered and reviewed researches that related to a study.

From methodology research and preliminary analyzes, this chapter has been presented a research methodology which conducted by using qualitative and quantitative to complete the objectives of the study. And explained the processes of the study while area of the study and participant sample size has been included. Preliminary analyzes has forecast a presumption of the growth of cloud-based ERP and illustrated cost comparison across platforms between cloud-based ERP and on-premise ERP.

From results and discussion, this chapter has been addressed a result of the study from both quantitative and qualitative methods which are result from interview, result from questionnaire and secondary data while using descriptive statistics and analysis a data that has been collected from 63 companies which located in Ladkrabang estate industry.

From conclusion and recommendation, the rise of cloud-based ERP has inspired the study to seek out possible prevention factors which remarkably slow down the application of cloud solutions. Those critical factors; such as costs, flexibility, functionality, and resources, are apparently affected to logistics businesses and supply chains in Thailand. This study, therefore, aims to investigate the obstacles that decelerate the growth of cloud-based ERP and explore the potential and opportunity to minimize that effects, based on the information from knowledgeable expert from ERP field as well as reliable researchers.

The combination of cloud computing and ERP software has been studied by abundant famous researchers, as it increases opportunities for small and medium size organizations to gain more benefits of ERP. The significant advantages of Cloud-ERP include the lower costs, faster processing time, and opportunities in accessing to advanced technology. However, cloud-based ERP is still not accepted among customers due to some major concerns are still remained. For example, security, implementation and maintenance expenses, integrations and customization, or skillful resources. These factors are mainly caused the deceleration in growth on cloud-based ERP. Despite the positive aspects on the users regarding the performances and projections to utilize cloud-based ERP, there is only few number of famous firms that had implemented cloud-based ERP in Thailand.

To minimize the effects from these prevention factors, the service provider has to provide a reliable service with insurances to guarantee the performance of the security. Since all the organizations are not identical the limit of customizing concern is still reminded, ERP vendors should have to develop their own product to become even more flexibility for every type of business processes. Nonetheless, the benefits of

cloud-based ERP are not ignorable while certain obstacles are persisted. The future of cloud-based ERP is still remains to be seen.

## **5.2 Recommendations for Further Research**

As one of the reasonable directions for future research in this area we would suggest investigating the trends of cloud-based ERP adoption in Thailand and main supportive factors to increase the number of cloud adoption. Additional quantitative research evidence based on recent cases could also be helpful in getting further insight into suitability of cloud-based ERP for enterprises of different sizes and industries.



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## APPENDIX A

### Questionnaire: The Adoption of Cloud-based ERP in Logistics and Supply Chain Industry.

(แบบสอบถาม: การใช้งานเทคโนโลยีคลาวด์อีอาร์พีในสายงานของบริษัทโลจิสติกส์และซัพพลายเชน)

This questionnaire is a part of the research by Mr. Atit Porncharoensup to fulfill his independent study requirements of Master Program in Logistics and Supply Chain Management (International Program), KMITL International College, entitled as “The Adoption of Cloud-based ERP in Logistics and Supply Chain Industry”

(แบบสอบถามนี้เป็นส่วนหนึ่งของงานวิจัยโดย นาย อาทิตย์ พรเจริญทรัพย์ เพื่อจุดประสงค์ทางการศึกษาตามหลักสูตรการจัดการโลจิสติกส์และซัพพลายเชน มหาวิทยาลัยเทคโนโลยีพระจอมเกล้า เจ้าคุณทหารลาดกระบัง ในหัวข้อเรื่อง “การใช้งานเทคโนโลยีคลาวด์อีอาร์พีในสายงานของบริษัทโลจิสติกส์และซัพพลายเชน”)

#### Section A: INTERVIEWEE'S PROFILE (ประวัติผู้กรอกแบบสัมภาษณ์)

Please select the choices which the best describe your work experience and educational background.

(โปรดเลือกคำตอบที่เหมาะสมที่สุดเกี่ยวกับประวัติการศึกษาและประสบการณ์ทำงานของคุณ)

1. Gender (เพศ):  
 Male (ชาย)  Female (หญิง)
2. Age (อายุ):  
 < 20  21 – 30  
 31 – 40  41 – 50  
 51 – 60  > 60
3. Education (วุฒิการศึกษา):  
 High school diploma  Bachelor's degree  
 Master's degree  Doctor's degree
4. How long have you been working with this company?  
(ระยะเวลาในการทำงานในบริษัท)  
 < 1 year  1 – 5 years  
 6 – 10 years  > 10 years

Section B: COMPANY INFORMATION AND BACKGROUND (ข้อมูลของบริษัท)

The following questions are regarding your company please choose the best describe for your company background.

(คำถามต่อไปนี้เกี่ยวข้องกับบริษัทที่ผู้ตอบแบบสอบถามทำงานอยู่)

1. How well you know about Cloud-computing?  
(ท่านมีความรู้ในเรื่องคลาวด์อีอาร์พีดีแค่ไหน)  
 Use it on a regular basis  Use it only sometime  
 I'm aware of but never used it  Never heard about it
2. How well your company familiar with logistics activities?  
(องค์กรของท่านมีความคุ้นเคยเกี่ยวกับการทำงานเกี่ยวกับกระบวนการทางโลจิสติกส์มากแค่ไหน)  
 As a main activity  Quite usual  
 Once in a while  Never done it before
3. Which business program that your organization are currently used?  
(ขณะนี้ทางบริษัทของผู้ตอบแบบสอบถามใช้โปรแกรมทางธุรกิจอะไร)  
 Cloud-based ERP  ERP  
 I don't know  Other .....
4. How long does a company have been using this software?  
(บริษัทใช้งานโปรแกรมทางธุรกิจมาเป็นเวลาเท่าไร)  
 < 1 year  1 – 5 years  
 6 – 10 years  > 10 years

Section C: PERSONAL PERSPECTIVE TOWARD CLOUD-BASED ERP (ความคิดเห็นส่วนบุคคล)

Please select your answer by check  in the according to your information and fill in your answer on for the open-ended questions.

1. Cloud-based ERP has significantly faster than On-premise ERP.  
(ท่านเห็นด้วยหรือไม่ว่าโปรแกรมคลาวด์อีอาร์พีทำงานได้เร็วกว่าระบบอีอาร์พีแบบปกติอย่างเห็นได้ชัด)  
Strongly Agree  5  4  3  2  1 Strongly  
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง)

2. Cloud-based ERP software will fit to my business, only few enhancements is required.  
(ท่านคิดว่าโปรแกรมคลาวด์อีอาร์พีนั้นสามารถทำงานร่วมกับธุรกิจขององค์กรได้เป็นอย่างดี)  
Strongly Agree  5  4  3  2  1 Strongly  
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง)
3. Implement Cloud-base ERP will significantly improve a quality or business management.  
(ในการดำเนินการใช้งานคลาวด์อีอาร์พีนั้นสามารถช่วยเพิ่มประสิทธิภาพในการบริหารองค์กรได้ดี)  
Strongly Agree  5  4  3  2  1 Strongly  
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง)
4. The benefits of Cloud-based ERP will worth when comparing with the investment costs.  
(ประโยชน์ที่ได้จากการใช้งานคลาวด์อีอาร์พีนั้นถือว่าคุ้มค่าเมื่อเทียบกับค่าใช้จ่ายในการลงทุน)  
Strongly Agree  5  4  3  2  1 Strongly  
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง)
5. You would choose to implement Cloud-based ERP rather than traditional on-premise.  
(ท่านเห็นด้วยในการเลือกติดตั้งคลาวด์อีอาร์พีมากกว่าอีอาร์พีแบบปกติ)  
Strongly Agree  5  4  3  2  1 Strongly  
(เห็นด้วยอย่างยิ่ง) (ไม่เห็นด้วยอย่างยิ่ง)
6. In your opinions, which are the main reasons that prevent organizations from migrating to Cloud-based ERP.  
(ในความคิดของท่านคิดว่าเหตุผลใดเป็นเหตุผลหลักที่ทำให้หลายๆบริษัทไม่ใช้งานคลาวด์อีอาร์พี)  
 < 1 year  1 – 5 years  
 6 – 10 years  > 10 years
7. Regarding of the advantages of Cloud-based ERP, in which factors should be more outstanding in order to attracts the attention from those organizations.  
(ในเรื่องของจุดเด่นของคลาวด์อีอาร์พีที่ท่านคิดว่าปัจจัยใดที่ควรจะเด่นชัดขึ้นเพื่อเป็นการชักจูงให้บริษัทหันมาสนใจคลาวด์อีอาร์พีมากขึ้น)  
 Ability to integrate across platform  Accessibility to reliable information  
 Adaptability to businesses requirement  Cost minimization

8. In which following issues that you might be concern before decided to implementation Cloud-based ERP. (Participants can choose multiple answers)  
(ท่านมีความกังวลกับปัญหาใดบ้างที่อาจจะเกิดขึ้นกับระบบ Cloud-based ERP ตามตัวเลือกด้านล่าง สามารถตอบได้มากกว่า 1 ข้อ)

- Security (ความปลอดภัย)
- Expense (ค่าใช้จ่าย)
- System Flexibility (ความยืดหยุ่นของระบบ)
- Data Privacy (ความเป็นส่วนตัวของข้อมูล)
- Limit of Customization (ข้อจำกัดการปรับแต่ง)
- System Control (การควบคุมระบบ)
- System Performance (ประสิทธิภาพของระบบ)
- Storage Level (การจัดเก็บข้อมูล)



## APPENDIX B

1. According from the fact, Cloud-based ERP was not as growth as it should be especially in Thailand. What is your opinion from this situation?

- In Thailand, I thought a major concern for most people would be the security since Enterprise Resource Planning (ERP) is a system that has been designed to performs as a core in actual business. In that term, the information from business operation must be confidential. As consequence, the application that operates on cloud-computing system must be well-design and highly secure enough to guarantee and gain a trust from the customer. In case of Thai businesses, the growth of Cloud-based ERP will be going slow. For Thai people, even the technologies that operate less confidential data than ERP it still takes really slow steps to expand successful. In my opinion, ERP stored a highly important data so it will expand eventually but it going to take times until it fully expanded.

2. Do you agree with the phase 'Cloud-based ERP is only suitable for large enterprises?'

- I disagree; from my perspective, the company that performs as cloud-based ERP service provider surely has a capability to handle requirements from large-size enterprises since ERP requires a huge database for their general processes and the provider, they have to invest an IT infrastructure large enough to handle a bunch of customer. Then, it is possible to deploy Cloud-based ERP technology to such a large enterprise. For example, SAP itself (ERP vendor) they have invested on cloud-computing as well to develop their new product so I am sure, this technology

could be utilizing in large enterprises as well as small and medium-sized enterprises. However, the expansion on Thailand will be slow as usual.

3. If it was your company, how would you feel if you choose to deploy Cloud-based ERP as your core system for the company?

- This is hard to say, Cloud-based ERP surely a best choice for me but I would choose cloud service provider very carefully since information no longer stay on my company but it stored on another company. Moreover, for financial data there are more chances to get hack than On-premise ERP. As I mention, Cloud-based service provider must have a very good security policy.

4. In your opinion, how long would it take until Cloud-based ERP will fully grow in Thailand?

- We have to focus on a world trend. I thought, the largest ERP vendor is SAP so even their Cloud-based ERP from other countries are still in developing phase for their product so it is not yet fully expanded. Then, come back to Thailand just only to expand the concept of Cloud-based ERP, I guess it would take more than 5 years to expanded but in the future small and medium-sized enterprises who cannot afford the investment costs for On-premise ERP would definitely goes for Cloud-based ERP.

5. Is it possible for large-sized enterprise that already implemented On-premise ERP would migrate to Cloud-based ERP?

- I think it is, if that company is fully grown with a plenty of sub-company. When the numbers of sub-companies are increased and they do not want to invest on their own IT infrastructure because it is too large to handle so they would turn to Cloud-based ERP in term of hybrid infrastructure.

Interviewee: Mr. Seksit Sinitwarakul

Date of Interview: 20 April 2017

Job: SAP senior consultant

Background: More than 18 years with ERP experience & Used to be lecturer for SAP.



## APPENDIX C

1. According from the fact, Cloud-based ERP was not as growth as it should be especially in Thailand. What is your opinion from this situation?
  - Since I am mostly in finance and accounting field, my perspective may mainly focus on the cost and return. I personally believe in the functionalities and performance of cloud-based ERP. But I still concern about the information which will soon become paperless, over the cloud. I think we, Thai people, still not feel comfortable with digital documents, especially official documents and signature. Comparing the e-payment, it took years to be accepted among Thai firms, while e-payment has been used regularly in several countries.
2. Is there another reason that prevent an organization to implement Cloud-based ERP?
  - I think other reasons which prevented people to move to cloud-based are culture and generation. If the organization is driven by new generation, we may move faster toward innovations. Since they are young, energetic, and certainly open to new technology and changes, they are ready to try new things which are potentially better. On the other hand, if the organization is led by these senior generations, who believe in our best traditional ways. And majority of Thai organizations are like that.

3. Do you agree with the phrase 'Cloud-based ERP is only suitable for large enterprises?'
- I believe that cloud-based system can be well-compatible with large organizations which have complex business processes and huge database. But just we prefer to keep our secret bible in our hands, physically, and in the places, we can have our eyes on. As you know, there are many holes underground. People are corrupted and take advantages when they can. I don't think I can trust those vendors.
4. In your opinion, how long would it take until Cloud-based ERP will fully grow in Thailand?
- It would take 5 more years to build people's trust in security of cloud-based system. We have studied their new capabilities and yes, we assure that it can increase our market advantages. It may be a small step, the costs and economy may slow us down, but we are moving forward. I am sure we can catch up with them very soon.

Interviewee: Ms. Sumalee Tirapornvadee

Date of Interview: 20 April 2017

Job: SAP senior consultant

Background: More than 15 years with ERP experience

## APPENDIX D

1. According from the fact, Cloud-based ERP was not as growth as it should be especially in Thailand. What is your opinion from this situation?
  - First of all, this is a new technology so that will surely one of the reason why Cloud-based ERP doesn't grow in Thailand yet. Second of all, on my perspective, Cloud-based ERP is not safe enough as it should be so it could be some kind of back-door that could be hackable since this technology rely heavily on internet connection and we're used to with an information that stored inside our company environment technically a close-system that could preventing an accessibility from the out-side world. Moreover, even an e-mail which also had a process just like Cloud are still easily to be hacked so the first priority that most people are being concern is security.
  
2. If it was your company, would you choose to implement Cloud-based ERP rather than On-premise ERP?
  - Actually, I really want to use this Cloud-based ERP but I'm still don't trust on their security. For example, ransomwares this malware has widely-spread to all around the world and they kept your data as a hostage to make their profits. In this case, if my Cloud service provider has fall victim to this malware. Okay, the Cloud service provider definitely handle that but who would guarantee that all of my secret information's are still being secret? it could already spread in the internet or maybe someone has made a copied. Currently, in my firm I using close-system, manage and operate in their own server without internet connection, However, it does not

mean that Cloud-based ERP is not good enough but the people who using this technology does not have enough knowledge to secure their system. For example, my own employee they open every e-mail their got without hesitation.

3. Do you agree with the phrase 'Cloud-based ERP is only suitable for large enterprises?'
  - Yes, I agree for now. According to the trends on this year in Thailand, none of large enterprises has using cloud-computing since there are afraid of the effects when it does happen in large companies it will caused huge amount of expenses and their traditional system still working well. Therefore, there is literally no a good reason to migrate from On-premise to Cloud-based ERP until it has been proved that Cloud-based ERP provided a great beneficial enough to beat On-premise ERP. So, in the future, everything will be operating on cloud-computing includes Cloud-based ERP on large enterprises and literally everything since IOT is coming
4. Is it possible for large-sized enterprise that already implemented On-premise ERP would migrate to Cloud-based ERP?
  - Yes, it can be happened but with a huge costs and bunch of things to be concerns such as could it interface with their On-premise system since Cloud-based ERP could not handle much of customization but anyway stores all your information with one service provider is still highly risks.

5. In your opinion, how long would it take until Cloud-based ERP will fully grow in Thailand?

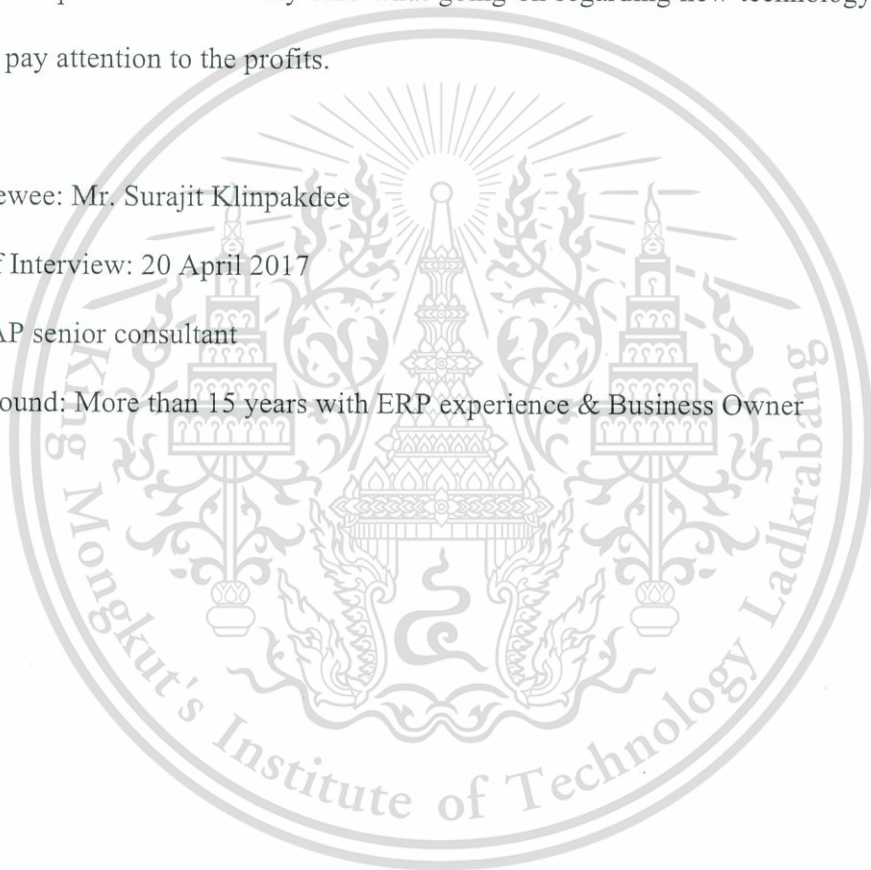
- It would take a long time until Cloud-based ERP will fully grow approximately 10 years or more because it is unusual to rely all the information on another company and most of the companies in Thailand are still using window 7 since Thai companies do not really care what going on regarding new technology they only pay attention to the profits.

Interviewee: Mr. Surajit Klinpakdee

Date of Interview: 20 April 2017

Job: SAP senior consultant

Background: More than 15 years with ERP experience & Business Owner



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Bachelor of Science in Technology Management,  
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