

CLOUD COMPUTING ADOPTION IN BANKING SYSTEM (UTM) IN TERMS
OF CUSTOMERS PERSPECTIVES

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I dedicated this thesis to my beloved Mother, and father for their endless supports and encouragements.

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IN THE NAME OF GOD, MOST GRACIOUS, MOST COMPASSIONATE

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ABSTRACT

Cloud Computing is viewed as a technology where enable individuals, businesses and organizations to gain more facilities such as data storage and software services via the Internet. In fact, users rather than investing a large amount of money in purchasing servers and applications are able to rent the computing resources based on their actual demands and on a pay-as-you-go pricing model. Thus, many organizations want to move to Cloud Computing because it provides faster growing areas of the technology. One of the fields that want to move to the cloud computing is the banking field. Theoretically, adoption of cloud-based applications by bank customers, offers a wide range of opportunities for them. However, in practice, most bank customers are yet in doubt whether to adopt banks' cloud-based applications or still stick on the current banks' client/server solutions. Barriers such as data privacy and data security are the major hindrance of SaaS adoption. Since the cloud computing helps to store and keep data on remote servers and all the application are used virtually, no need to have own servers. Hence, most the enterprises move toward cloud computing to reduce the cost. Also, banking industry must meet the customer expectations and needs, so they should apply cloud computing and change way to achieve customer demands. The present study discusses about how the adoption of cloud computing assists banking context to meet customer demands and improving their work so efficiently. It is hoped that the results will help the organizations to identify the influence of cloud computing on their transactions .This study was carried out in Malaysia bank in UTM and used a survey by questionnaire to understanding bank customers to adopt new technology. A random sample of 162 respondents, who are aged 22 and older and reside in the Malaysia was recruited through Survey Sampling. Survey data were analysed using the Partial Least Squares (PLS) method with SmartPLS to test for both the validity of the structural model and the measurement model. Finally, we propose a suitable model for the adoption of cloud computing in the banking sector.

ABSTRAK

Cloud Computing dilihat sebagai teknologi di mana membolehkan individu, perniagaan dan organisasi mendapatkan lebih banyak kemudahan seperti penyimpanan data dan perkhidmatan perisian melalui Internet. Malah, pengguna bukan sahaja melabur sejumlah besar wang untuk membeli perkhidmatan dan aplikasi, mereka juga dapat menyewa sumber-sumber pengkomputeran berdasarkan permintaan sebenar mereka dan pada model harga pay-as-you-go. Oleh itu, banyak organisasi mahu berpindah ke Cloud Computing kerana ia menyediakan ruang teknologi yang lebih cepat berkembang. Salah satu bidang yang mahu berpindah ke Cloud Computing adalah bidang perbankan. Secara teorinya, penggunaan aplikasi berasaskan Cloud Computing oleh pelanggan-pelanggan bank, menawarkan pelbagai peluang untuk mereka. Walau bagaimanapun, dalam amalan, pelanggan bank adalah masih berada dalam keraguan sama ada mahu mengamalkan aplikasi berasaskan Cloud Computing atau masih bersama penyelesaian bank-bank semasa. Halangan seperti privasi data dan keselamatan data adalah halangan utama penggunaan SaaS. Sejak Cloud Computing membantu dalam proses penyimpanan data pada pelayan jarak jauh dan semua permohonan adalah digunakan dengan hampir tidak perlu mempunyai pelayan sendiri. Oleh itu, kebanyakan perusahaan bergerak ke arah Cloud Computing untuk mengurangkan kos. Selain itu, industri perbankan mesti memenuhi kehendak dan keperluan pelanggan, maka institusi ini perlu memohon Cloud Computing dan mengubah kaedah untuk mencapai permintaan pelanggan. Kajian ini membincangkan tentang konteks bagaimana penggunaan Cloud Computing membantu untuk memenuhi permintaan pelanggan dan meningkatkan kadar kerja dengan begitu cekap. Adalah diharapkan bahawa hasil kajian akan membantu organisasi untuk mengenal pasti pengaruh Cloud Computing ke atas urusan transaksi tersebut. Kajian ini telah dijalankan di bank Malaysia di UTM dan kaedah kajian soal selidik digunakan untuk memahami pelanggan bank dalam menerima pakai teknologi baru ini. Satu sampel rawak sebanyak 162 responden yang berumur diantara 22 tahun ke atas dan tinggal di Malaysia telah diambil melalui Persampelan Kajian. Data kajian dianalisis menggunakan Partial Least Squares (PLS) dan kaedah SmartPLS untuk menguji kesahihan bagi kedua-dua model struktur dan model pengukuran. Akhir sekali, kami mencadangkan satu model yang sesuai bagi penggunaan pengkomputeran awan dalam sektor perbankan.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Cloud Computing (CC) is viewed as a technology where enable individuals, businesses and organizations to gain more facilities such as data storage and software services via the Internet (D. Benton & Negm, 2010). In fact, users rather than investing a large amount of money in purchasing servers and applications, are able to rent the computing resources based on their actual demands and on pay-as-you-go pricing model (Subhas Chandra Misra, 2010).

One of the most significant current discussions is about CC. In recent years, there has been an increasing interest in CC (Foster, Zhao, Raicu, & Lu, 2008). Cloud computing decrease hardware cost and increase storage capacity. Also, there are wide spread of service adoption computing and web 2.0 applications. Thus, many organizations wants to move to CC because it provide fastest growing area of the technology. one of the filed that want to move to the cloud computing is the banking filed.

Cloud computing uses a pricing model called pay-as-you-go. Infrastructure investment to achieve advantage from cloud computing is not essential for service providers because they can hire resources from the cloud in accord with its own requirements and pay for the usage. Several providers can quickly allocate and de

allocates resources in a Cloud environment. Hence, large amount of saving is possible in this matter due to service demand is low. Large amount of resources are pooled by infrastructure providers from data centers and cause them be easily accessible in order to managing fast growth in service demands, a service provider is able to easily broaden its service to great scales (Zhang, Cheng, & Boutaba, 2010).

The cloud computing dramatically can decrease the cost of entrance for smaller organization. Also, lots of third- world countries which have been left behind in the IT revolution until now, can be advantageous of CC. Another issue of CC is adoptable infrastructure that can be shared with diverse end users, everyone can use the Cloud in different ways, even the users be separated from each other. Beside of them, CC can decrease the limitation of Information Technology to innovations; it is obvious from the several hopeful start-ups, and from the widespread applications which are online like You Tube and Facebook to the greater concentration application (Sean Marstona, 2010).

According to (Jiang & Yang, 2011) CC has four advantages: 1) Data storage are secure ; the teams of the backend Cloud are so professional that manage data also protect them from different attacks of viruses and cracks. 2) Different application can be supported with CC. 3) the share of data and applications are easily. 4) Thousands of servers exist in Cloud, which have strong storage and computing ability.

By considering the advantages and key challenges of CC adoption, it is clear that CC adoption is still as a question for some organization. The organization avoiding adopting CC but due to advantages they are in favor to move CC adoption. Amazon, Google, Microsoft, IBM contributing in terms of CC. According to International Data Corporation (IDC) 53% of Asian organizations already applying some of the CC services, and remaining 47% of the organizations have decided to adopt Cloud services (Brohi & Bamiah, 2011).

Consumers, small organization, and medium to large organization are the potential users of CC services. For adopting a new technology consumers, small business have simple needs rather than medium and large organization. There are seven types of adoption issue for CC: availability, security, cost, compliance, performance, private cloud and integration (W. Kim, S.D. Kim, E. Lee, & S. Lee, 2009).

Cloud computing have efficiency of service provider by the pay as you go pattern in this regard banking sector want moving to the CC. Despite its efficiency and host of opportunities that CC offers for the banking sector, they are not so satisfied enough due to the security and trust of provider. Thus, even CC provider make a strong security procedures to block hackers from CC accessing, clients have hesitant to adopt CC because of privacy and trust of provider (Brohi & Bamiah, 2011).

1.2 Background of the Study

With emerging of CC over the past few years it has become the most evolution technology now days (Ruan, 2013). It heightens the flexibility and scalability on internet. Every field desires to do work with aid of CC because it provides favorable business idea to the rapidest fields of the information technology. One of the areas that want to combine their business or work with the CC is the banking field (Rani & Gangal, 2012).

The banking field is one part that is possibly helped with sufficient CC models and can be manage suitably. The Cloud based services can set priorities to their services according to customer's need. They can get through the customer favor by way of social networking interface and focusing on better relationship of customer also human relation and finance supervising, helping the bank to keep

customers and attract new customers. CC supplies lots of services that are completely suitable when it comes to the banking (Rani & Gangal, 2012).

Cloud computing can help banks to use IT resources more efficiently. Services that are purchased or rented up-front without any long-term commitment. According to Gartner (2008), research anticipates that CC services will rise from \$36 billion today to approximately \$160 billion in 2015. Gartner also claimed that 20% of enterprises will be using CC for important parts of their technology environment (D. Benton & Negm, 2010).

Cloud computing technology gives a new way to create banks' information systems. CC applications provide some competitive advantages for banks, such as data security, resource sharing, and low operating costs (Jiang & Yang, 2011).

1.3 Background of the Problem

A competitive marketplace forces organizations, including banks, to rapidly deploy innovation in their current business models (Huang, Zhang, & Zhou, 2011). According to Benton (2010b), there are two areas in which cloud-based applications are able to assist bank customers. First, they provide a vast opportunity for customers to dramatically increase their interactions with the banks (Daniel Benton, 2010a). Second, cloud-based applications or, in other words, SaaS help bank customers to fulfill their daily financial transactions more easily and without any extra cost (Huang, et al., 2011). Traditional client-server technologies compared to cloud-based applications impose huge costs, time, and resource barriers (Li, 2011). However, with cloud-based applications, customers do not need to install software (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011); for banks, there is no need to install hardware to maintain, freeing up resources so employees can focus precisely on their bank's vision and mission (Daniel Benton, 2010b). Theoretically, adoption of cloud-based applications by bank customers offers a wide range of opportunities for them

(Huang, et al., 2011). However, in practice, most bank customers are yet in doubt whether to adopt banks' cloud-based applications or still stick on the current banks' client/servers solutions (Daniel Benton, 2010b). According to Catteddu and Hogben (2009), barriers such as data privacy and data security are the major hindrance of SaaS adoption. Banks are categorized in a very high level of sensitivity and risky organizations (Jain & Bhardwaj, 2010). Therefore, primary concerns such as data privacy and data security are the big concerns for bank customers to migrate to the cloud (Wu, Lan, & Lee, 2011). Going back to the emergence of Internet banking remind that most bank customers thought the Internet was the most dangerous place to perform their daily financial transactions and therefore, they deny to use it (Yousafzai & Yani-de-Soriano, 2012). However, due to realizing how advantageous online banking is and how safe it is, recently, the amount of customers who adopt Internet banking services has grown dramatically (Kesharwani & Bisht, 2012). Similarly, cloud-based applications in the bank context are currently in their early stage (Daniel Benton, 2010b) and it is predicted that it might take around ten to fifteen years to convince customers to make this trend (Daniel Benton, 2010a). Thus, due to the novelty of cloud-based applications in the bank context, the decision making in adoption of cloud services has not been empirically addressed (Low, Chen, & Wu, 2011) and as a result, there is a lack of frameworks for adoption of cloud-based applications by bank customers (Huang, et al., 2011).

CC in the bank context has two different users (Jaworski, 2009). The first is banks who benefits from the cloud and deploy cloud services in their current business model. The second is customers who might perform their daily financial transactions through the cloud-based applications provided by banks. Extant literature shows that there is a lack of study to look at the customers as the end users of CC in the bank context (Huang, et al., 2011; Jaworski, 2009). Most prior research on the CC adoption have only focused on banks rather than customers (Huang, et al., 2011). However, a report by Gartner (2012) reveals that cloud is changing the way applications are designed, tested and deployed, resulting in a significant shift in application development. The trend is compelling enough to force traditional applications to shift to the "cloud-enabled" and position them as a service to be delivered through the cloud (Jaworski, 2009; Wu, et al., 2011). Therefore, similar to

all conventional application development, banks' application needs a principle and profound change in their development (Huang, et al., 2011). Moreover, there is a fundamental need for banks to focus more on customers' perspectives on cloud-based applications and identify their attitude towards their adoption (Daniel Benton, 2010b; Jaworski, 2009).

1.4 Research Questions

Based on the study which has done in the problem background, the main research question for this study is:

How Cloud Computing Can be adopted by UTM Bank Customers?

The following sub-research questions are framed to answer the research's problems.

- What are the factors which influencing adoption of cloud-based apps by banks customers?
- What is a salient model for adoption of cloud-based apps by bank customers?
- How the proposed research model can be validated in real case study setting?

1.5 Research Objectives

Based on the research questions, the research objectives of this study are:

- To identify the factors which influencing adoption of cloud-based apps by banks customers.
- To propose a salient model for adoption of cloud-based apps by bank customers.
- To validate the proposed research model in real case study setting.

1.6 Relation between research questions and objectives

The figure below, Figure 1.1 clarifies, how the research questions and objectives are related. Furthermore it explains how the objectives are connected to the research question in-order to achieve the aim and guidelines for adoption of cloud computing in banking sector. The overall quest of the research project can be formulated as follows:

“How Cloud Computing Can be adopted by UTM Bank Customers?”

This question is related to the long-term goal of research, which should be an important extension of the research question and specific aims. There are three sub questions and research objectives that are related to these sub questions to reach the specific goal of the research. As clear in the Figure 1.1 each research question is related to research objective. For instance:

RQ1: what are the factors that influence the adoption of CC in banking sector?

Based on the research questions, the research objective of this study is Factors which influencing adoption of cloud-based apps by banks customers.

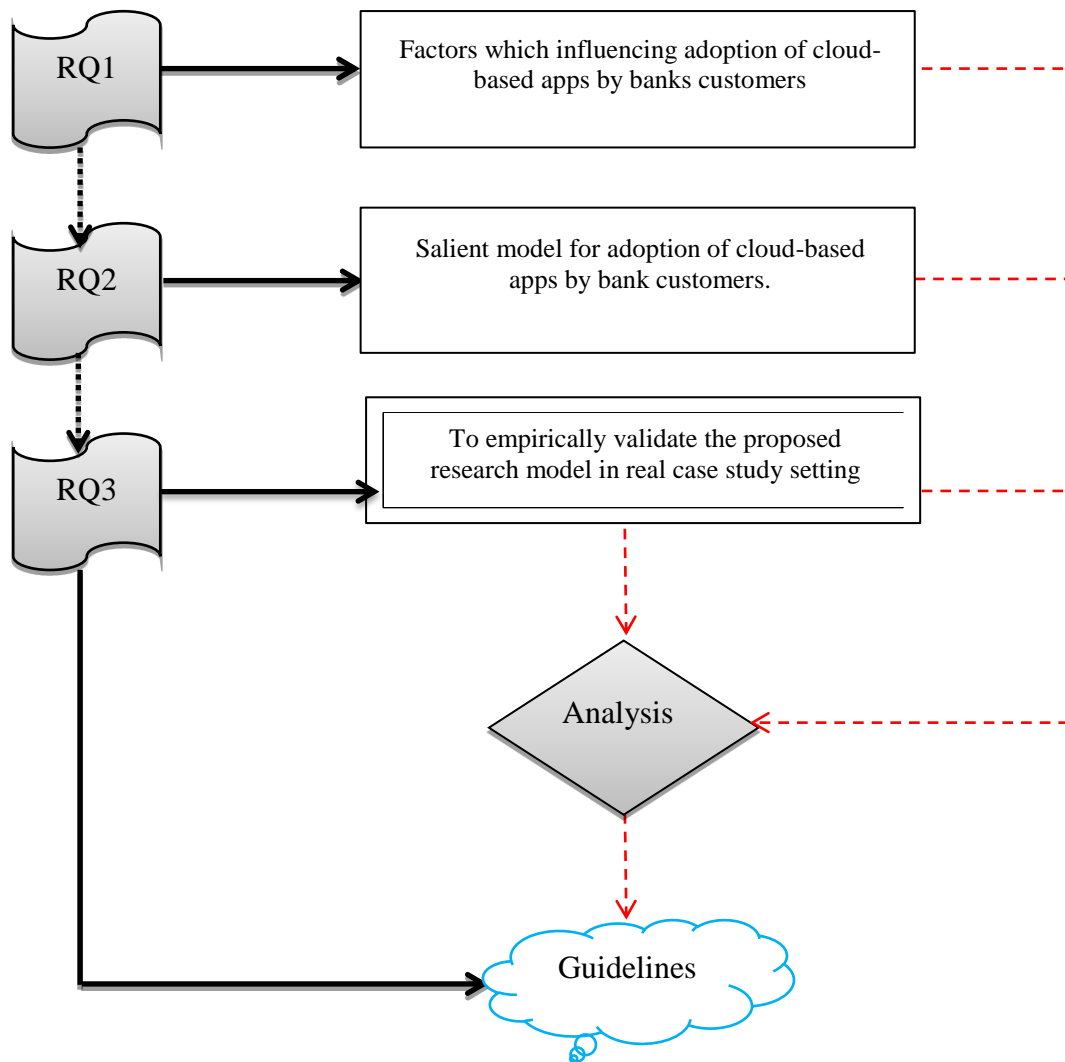


Figure 1.1 Relation between Research Questions and Research Objectives

1.7 Scope of the Study

By considering the objectives of the study, the researcher focuses on Faculty of Computing as bank customers in UTM and two staffs of UTM banking sector.

The study area and its boundaries for accomplish the objectives of the study, which is demonstrated in the following point:

At first the research aims is to identify the factors which influencing adoption of cloud-based apps by banks customers. Second is to propose a salient model for adoption of cloud-based apps by bank customers in UTM. Third one is to validate the proposed research model for banking in UTM. As mentioned before, this research is focusing on students of faculty computing. The reasons why the students are selected as the population because they have CIMB account and also majority of them use online banking CIMB Clicks for their online transactions because it is necessary for them if they want to move cloud computing and adopt this new technology they should be familiar with online banking. Because they can compare easily online banking in compare to cloud computing technology. Also for second part of data collection two staffs of UTM has chosen for interview as a respondent. Due to they have enough experiences and sufficient knowledge in online banking specially CIMB Clicks. Thus, in this case study students of faculty of computing have selected. In technology usage user awareness and knowledge are the factors that affect technology acceptance. According to (Rogers & Shoemaker, 1971) technological innovation acceptance or refuse will begin when the user are familiar or aware about innovation or product. To make sure that the respondents have adequate knowledge and suitable to response the questionnaire, these criteria are required.

1.8 Significance of the Study

Due to the numerous opportunities provided by CC, early CC users get more advantages compared to the late users (Won Kim, Soo Dong Kim, Eunseok Lee, & Sungyoung Lee, 2009). Asian governments are looking wisely at CC services to establish a CC ecosystem within the country and as a result, provide more carriers opportunities and create export chances (Catteddu & Hogben, 2009). Therefore, most Asian governments allocate a considerable annual budget for implementing CC service solutions in several sectors such as financial sectors, manufacturing sectors, ICT (Catteddu & Hogben, 2009). Main participants of this study are customers to adopt the new technology. Main purpose of this study is, to identify the factors that

influence adoption of cloud computing in banking sector that cause to acceptance that with customer. And finalize a suitable model for this adoption. The banks and CC service provider can use from this model As discussed earlier, customers' perspectives play a significant role in success or frailer of software adoption. Thus, in terms of adoption of bank cloud-based apps, customers' view and uncover their perspectives can assist cloud-based apps developers to design a software exactly based on bank customers' demands.

By discussing the benefits and challenges of cloud computing adoption it is clear that cloud adoption still remained as a question for banking sector. In terms of this challenges the organization are in doubt to adopt this technology but in terms of benefits of that they are in favor to use it. Therefore, this study can open new sides for future researchers to do more in-depth focus on cloud computing adoption and usage in banking sector.

1.9 Structure of the Study

This dissertation is formed into 6 chapters as shown in Figure 1.2.

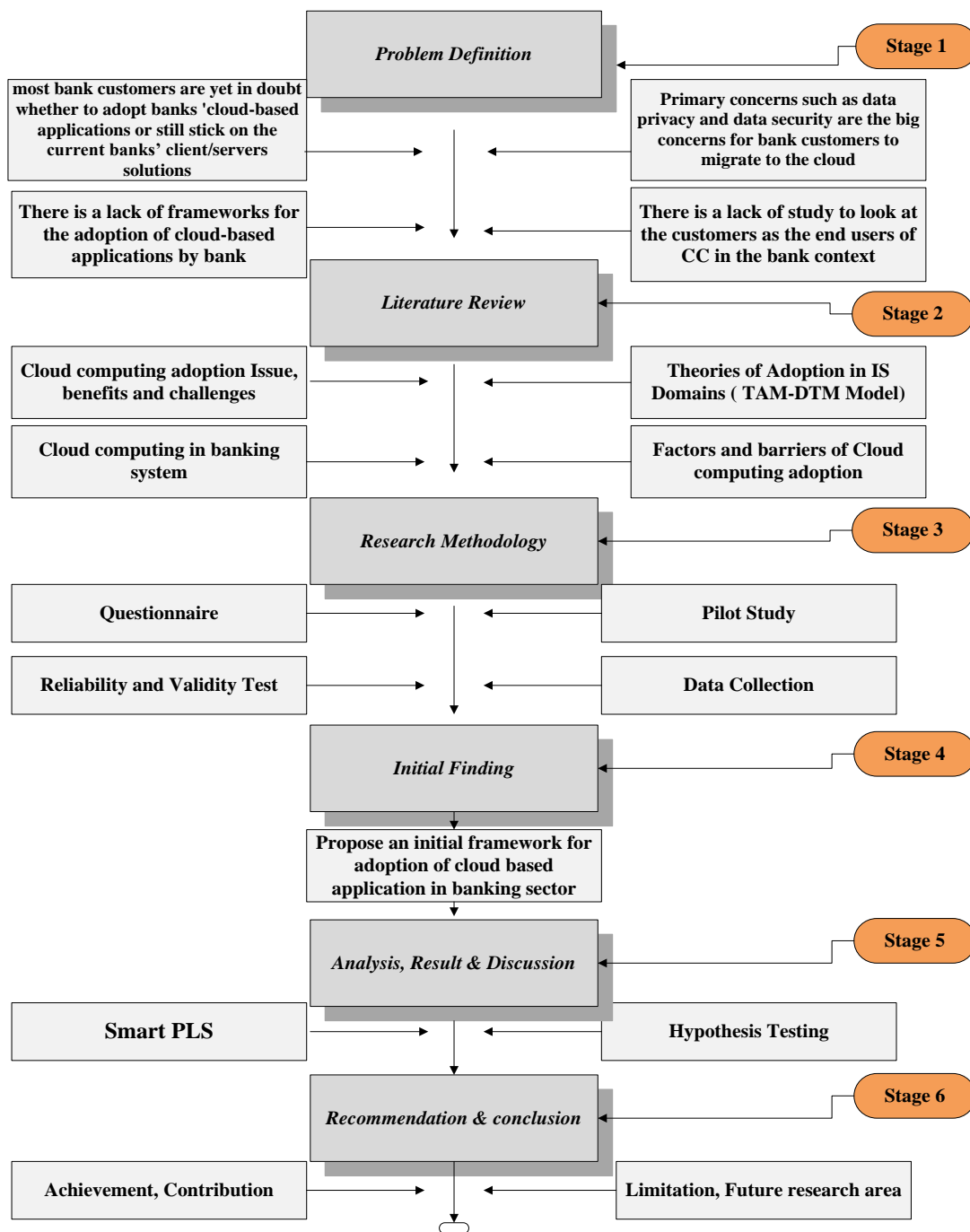


Figure 1.2 Research Strategy Diagram

1.10 Thesis Outline

Chapter No1: This chapter consists of introduction about the main points of the project and background study, problem background have also been mentioned in order to clear introduction of the project, and to explain why this project has been chosen. Research questions, research objectives have also been described. Moreover, it consists of significant of the study, scope, structure of the study and thesis outline.

Chapter No2: Academic literature will be reviewed and linked to the current problem situation. In this chapter the researcher focuses more on cloud computing adoption in bank and the technology acceptance model for adoption.

Chapter No 3: This research methodology part consists of methods, which are used in our study. Finally it described validity and reliability of measurements. We explained the results of internal consistency and the convergent validity and discriminant validity of all constructs.

Chapter No 4: proposed an initial framework for adoption of cloud based application in banking sector. The proposed an initial framework should be answer the problems and fulfill the research objectives. For evaluating the questionnaire pilot study conducted. Furthermore, the PLS 2 software used for analysis and assessment the measurement model.

Chapter No 5: In data collection and analysis chapter, researcher present analysis of the data, the validity and reliability of the measurement model with Smart PLS is assessed. After evaluating the quality of the measurement model, structural model is validated, at final section the result of “Hypothesis Testing” described.

Chapter No 6: In this final chapter, conclusions will be made up and achievement, contribution, limitations, discussion and further research and conclusion are described.

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