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SaaS in Business: Exploring Strategic Benefits and Considerations of Software as a Service (SaaS) Model in Business Organizations

Than Htaik Aung

Dissertação de Mestrado

Orientador na FEUP: Prof. António Ernesto da Silva Carvalho Brito

Universidade do Porto

Faculdade de Engenharia

FEUP

Faculdade de Engenharia da Universidade do Porto

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Abstract

Cloud computing has become a great shift in the way business organizations manage Information Technology (IT). Emergence of Software as a Service (SaaS) applications allows the business organizations to consider the possibilities of running a virtual business in which business functions are outsourced to cloud services. SaaS applications emerged as one of the advance technologies under the umbrella of cloud computing and is a great potential for the strategic management of IT in dynamic business environments. SaaS applications allow businesses to outsource IT as services that are more affordable and flexible. Traditionally, companies were required to purchase, setup and maintain their IT infrastructure regardless of exponential costs. SaaS model gives the companies an alternative to built, run and manage IT services on shared infrastructure via the internet. However, in order to achieve the potentials of SaaS, there should be a clear understanding of strategic management issues from the perspectives of IT service providers as well as the business-to-business (B2B) consumers of the IT. Despite several researches and publications in the technology context, there is still lacking the understanding of business and IT strategy issues surrounding SaaS model. This study scrutinizes the strategic values of Software as a Service (SaaS) model from the economical point of view. Firstly, this dissertation briefly studies the background and advances in SaaS model, and discusses the benefits of using SaaS for businesses and trade-offs that they have to consider. The report explores the strategic benefits that can achieve by implementing SaaS in the business organizations, outlines some of the critical issues for the successful implementation of SaaS in enterprises, and finally issues a set of recommendations for the managers who will implement and manage SaaS within business organizations.

Keywords

Software as a Service, SaaS, Business Strategy, Strategic IT Management

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Than Htaik Aung
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Abbreviations

ASP Application Service Provider

CRM Customer Relationship Management

ERP Enterprise Resources Planning

EU European Union

IaaS Infrastructure as a Service

IT Information Technology

IS Information Systems

ICT Information and Communication Technology

ISV Independent Software Vendors

NIST National Institute of Standards and Technology

PaaS Platform as a Service

R&D Research and Development

SaaS Software as a Service

SLA Service Level Agreement

TCO Total Cost of Ownership

1 Introduction

1.1 Overview

Cloud computing emerged from the infusion of advance developments in information technology (IT) over recent decades. While IT plays an important role in the strategic management of modern business organizations to cope with changes in the market and financial conditions, costs of IT infrastructure and information system implementations became a financial burden. As the global economy sluggish back from recession, it is critical for the business organizations more than ever in history to reduce risks and assure safe returns for their investments. Most of the companies started finding ways to reduce their operation and production costs by any possible means and reducing the IT costs are part of it. Companies started to find solutions to operate their information systems on a pay-as-you-go basis instead of investing large amount of money in IT infrastructure. This objective became possible with recent developments of cloud computing. Apart from this, understanding and implementation of IT infrastructure and business information systems are challenging tasks for managers while managing the risks of ongoing global economic crisis.

Software as a Service (SaaS) model emerged as an element under the umbrella term of cloud computing, along with Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). Rising popularity of SaaS among the businesses stemmed from its unique subscription based pricing model rather than traditional one-off pricing of information systems (IT applications) and services. With SaaS model, companies only need to pay for what they use and can flexibly adjust the service level agreements as IT requirements increase or even fall over time.

Introduction of SaaS model can be trace back in 1990s. Since then it has gradually made its way to mainstream IT arena. Even though it was less known for many years, we have seen the magnificent rising of SaaS in recent years. Gartner (2012) reported that "*worldwide software-as-a-service (SaaS) revenue is forecast to reach $14.5 billion in 2012, a 17.9 percent increase from 2011 revenue of $12.3 billion. SaaS-based delivery will experience healthy growth through 2015, when worldwide revenue is projected to reach $22.1 billion.*" It

is almost double what it was in 2011. In Gartner Worldwide IT Spending Forecast 2012, research director Sharon Mertz concluded:

> *"After more than a decade of use, adoption of SaaS continues to grow and evolve regionally within the enterprise application markets. Increasing familiarity with the SaaS model, continued oversight on IT budgets, the growth of platform as a service (PaaS) developer communities and interest in cloud computing are now driving adoption forward."* (Gartner 2012)

1.2 Problem statement

SaaS model has flourished in recent years thanks to the business benefits which it brings to the businesses of all types and sizes. Strategic benefits such as high adoption rates, lower initial costs, provider-managed upgrades and updates, and seamless integration with existing ERP (Enterprise Resource Planning) systems makes SaaS as a major differentiator in the IT services management market. However, there are still sensitive issues for many organizations in the market considering the adoption of SaaS. Several questions about SaaS regarding the issues around performance, security and integration with existing ERP or legacy applications inside a corporate network. As the use of SaaS applications increase, business enterprises need to establish a more strategic approach towards IT operations and service management in order to make best benefits for the business. Adoption and exploitation of SaaS model remains as a main challenge for business organizations. It is important and worthy to discuss the impacts and establish recommendations for the business organizations which are considering the adoption of SaaS while highlighting the values of SaaS model in the context of strategic IT management.

While a great rise in SaaS adoption among business enterprises has been expected, there is still a vacuum of understanding the concept and benefits of SaaS among business enterprises and managers. Many companies are hesitating to jump into the unknown waters giving that the security of data and information are top concerns. Apart from that, the enterprises concern the availability of applications and data redundancy as the management of SaaS applications is solely vendor responsibility. There is a need to establish the comprehensive preconditions

to be considered before the adoption of SaaS as well as the guidelines for the effective strategic IT management within business organizations. The major aims of this dissertation is to highlight the strategic benefits of SaaS model, to explore the key issues which must be considered for a successful adoption of SaaS and to provide relevant guidelines for the business organizations in a context of strategic IT management.

1.3 Research Questions

Thanks to fast-paced technology innovations, business models are changing rapidly in today's business environments. In order to implement business strategies successfully, managers required a perspective of how to make the best profits out of aligning business and IT strategies. Strategic planning and strategic implementation are imperative in strategic management of IT in business enterprises given that the strategic mistakes are the ultimate sources of business failures. While global economic recession is still in recovery, business organizations are looking at ways to innovate in a cost-effective fashion. In order to deliver strategic value for business success, IT should provide efficiency and innovation in business operations in such a way it propels the management and operations of business processes. Software as a Service (SaaS) model represents an opportunity for the business enterprises to make profits while staying competitive within a range of sustainable budgets. SaaS allows the companies to save on software licensing and maintenance fees, provide a common platform which works on different hardware and operating systems, reduce operational risks and expenditure compare to traditional information systems. While these strategic advantages point to opportunities for savvy business organizations, companies with lesser knowledge about SaaS tread in carefully as they explore the new business model.

Considering above mentioned opportunities and limitations, this study intends to answer the following questions:

Q1: Which strategic benefits can be achieved adopting SaaS model in business organizations?

This question explores the strategic benefits that can be achieved by adopting SaaS model in business organizations.

Q2: What are the advantages of adopting SaaS applications compare to traditional business-critical software systems in business organizations?

This question explores the benefits of adopting SaaS applications compare to that of traditional business-critical software systems, such as Enterprise Resources Planning (ERP) and Customer Relationship Management (CRM) application suites.

Q3: What are the key issues that need to be considered when adopting SaaS model in business organizations?

This question explores the key issues to consider before a decision to adopt SaaS model in business organizations.

1.4 Methodological Approach

Qualitative research methods supported by integrative literature review will be used to pursue concrete answers for the provided research questions. Empirical analysis is based on previous researches and publicly available survey results from the respective research firms in search for answers to given research questions in this study. Empirical data in this study will be drawn either from the research literature of cloud computing and more specifically Software as a Service (SaaS) model conducted by various scholars or cloud computing surveys conducted by professional services farms. Research approach for this study concentrated on the business strategy inputs of Software as a Service (SaaS) in business organizations.

1.5 Document Outline

This document comprises five chapters. First chapter is an introductory chapter that provides a brief overview for the background of the study, a problem statement, research questions, research design of the study and a document outline of the dissertation. Research approach,

design and methodology will be presented in the second chapter. The third chapter is the literature review that discusses the conceptual background for the strategic IT alignment, cloud computing and more specifically Software as a Service (SaaS) model. Literature review will also initiate a discussion regarding the business-level benefits and considerations for adopting SaaS model in business organizations. Empirical analysis and findings of the study will be presented in the fourth chapter. And the fifth chapter is going to be conclusions and recommendations based on the analysis and findings of the study.

2 Research Approach, Design and Methodology

In this chapter the research approach, design and methodology will be stated that should lead to answer previously mentioned research questions addressing the strategic benefits and considerations of SaaS model. This chapter intends to provide a guidance and structure for the research in terms of fact findings and documenting the outcomes of the study.

2.1 Research Approach

In academic research, there are two predominant research approaches of reasoning towards the acquisition of new knowledge in academic research i.e. inductive and deductive. Inductive research shifts *"from particular situations to make or infer broad general ideas or theories"* (Neville 2007). Inductive approach begins by collecting relevant data for a chosen topic of interest from different sources. Collected data then be collated, analyzed and presented. Inductive research might lead the researcher to arrive at a new definition or it might not. Inductive research approach can be very lengthy however the result might be *"in terms of arriving at a fresh way of looking at the subject"* (Neville 2007). Deductive research shifts *"from general ideas or theories to specific particular and situations"* (Neville 2007). Deductive approach demands a clear theoretical positioning prior to data collecting. Collected data then be collated, analyzed and presented. Deductive research *"offers researchers a relatively easy and systematic way of testing established ideas"* (Neville 2007). Induction research usually describe as moving from the specific to the general, while deduction research begins with the general and ends with the specific (see Fig. 1).

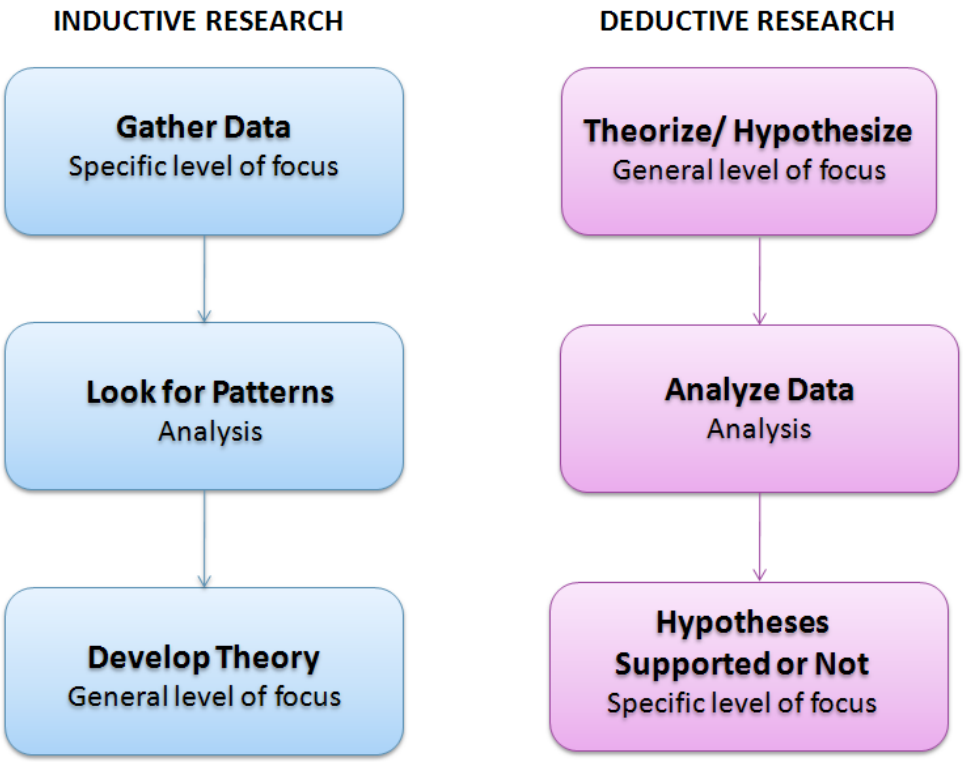

Fig 1: Inductive Vs. Deductive research approach

When considering whether to use inductive or deductive approach, it is important to envision the purpose of research and research methods which suited the best to answer specific research questions. This study follows the deductive research method which concern with the confirmation of specific research questions. The research begins with the general level of focus on the cloud computing service models. Then the analysis moves to the specific level of focus to SaaS model and its strategic benefits and considerations for the business organizations.

Another consideration is to decide whether a qualitative or quantitative approach will be conducted. Quantitative methods are a group of research methods mainly focus on quantities such as scale, range and frequency. Measurable data gathered and analyzed using mathematical or statistical techniques in order to establish quantitative relationship among variables. Quantitative research tends to *"quantify data and generalise results from a sample of the population of interest"* (McDonald and Headlam 2009). Qualitative research methods involves examining and reflecting on the less tangible aspects of a research subject such as

values, attitudes and perceptions (Neville 2007). Qualitative methods generally associated with the evaluation of social dimensions and provide results that are usually rich and detailed, providing ideas and concepts to inform the research. Qualitative methods can provide the researcher how people feel and what they think.

This study follows the exploratory qualitative research approach based on reviewing previous literature and secondary survey data. Exploratory research provides a better understanding of a situation but not designed to come up with final answers or decisions (Brown and Suter 2012). The purpose of exploratory qualitative research is to understand and report the phenomena of research interest. Exploratory research might involve literature search, depth interviews, focus groups or group analysis. Among them, literature search is the quickest and least costly way to conduct. Concerning time and financial constraints of collecting primary data, this study will be based on literature search. Integrated literature review methodology will be used for the literature search in this study and more details will be discussed in research methodology section.

2.2 Research Design

Research design serves as an architectural blueprint which linking the design, data collection and analysis of a research project to the research questions (Bickman et al. 1997). Fig. 12 visualizes the research design model of this study based on the research process presented by Kothari (2004).

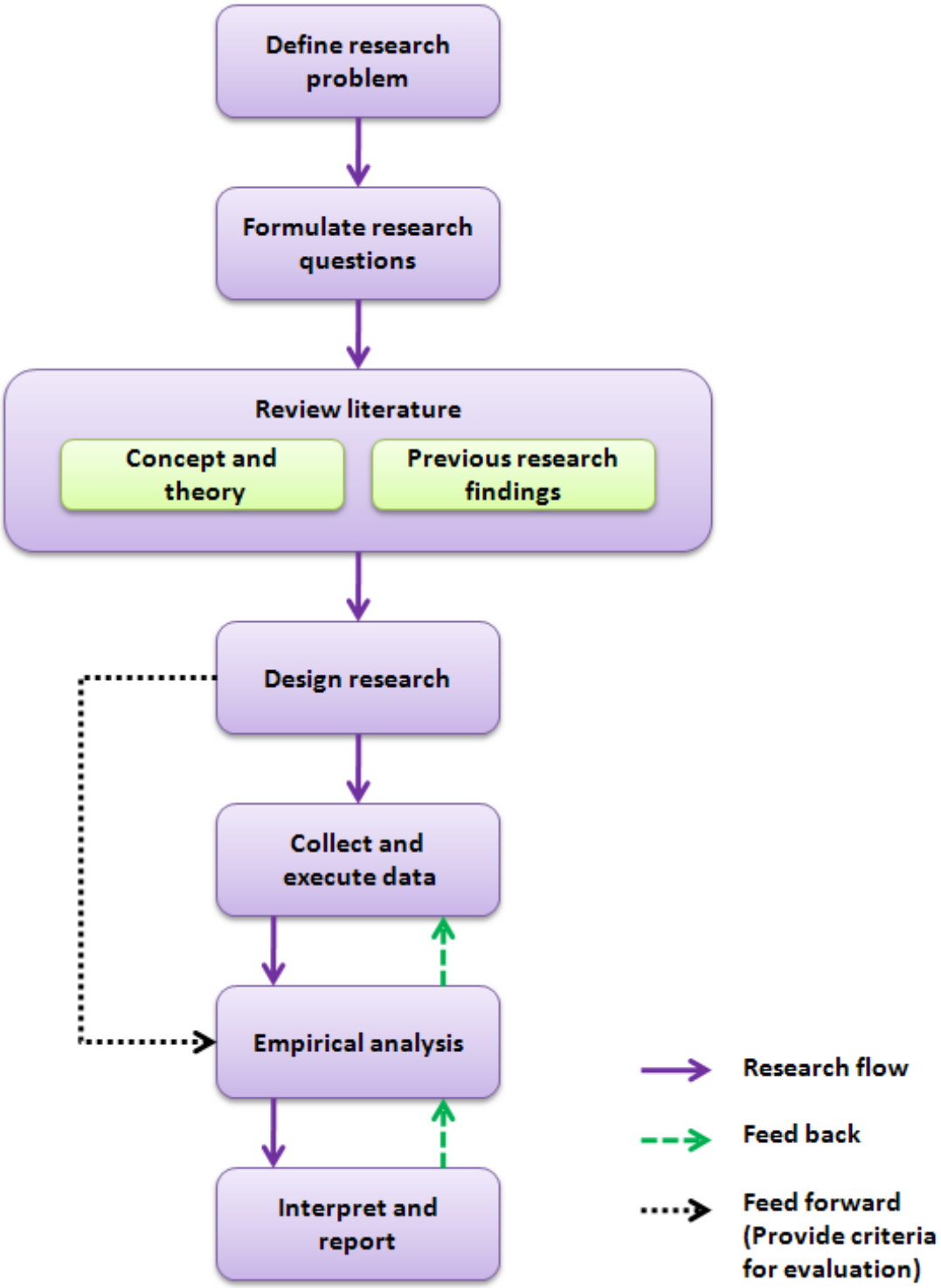

Fig 2: Research design model

Initial step of this study is to define the research problem which is a general statement of the issue raising the questions raised for investigation. Careful understanding of the research problem leads to the formulation of research questions in meaningful terms. After the formulation of research questions, all available literature are to be examined for literature review. Literature review involves conceptual literature which concerning concepts and theories, and empirical literature which consisting previous studies similar to the proposed research (Kothari 2004). Books, academic journals, conference proceedings, government reports, industry surveys and other published or unpublished bibliographies are being carefully study, abstract and index. Related literature being read to the fullest possible coverage of chosen research topic in order to develop working hypotheses. Theoretical framework of the research extracted based on this knowledge. Once the research problem formulated clearly, a research design will be prepared. Research design serves as a *"conceptual structure within which the research would be conducted"* (Kothari 2004). The purpose of the research design is to provide efficiency in collecting relevant evidence. After the research design phase, appropriate data will be collected and executed. Data collection methods will be considered based on the scope and objectives of the study. Collected data will be executed in a systematic manner and empirical analysis will then be able to conducted. Data analysis methods will depend on research paradigm. Finally, empirical evidences will be interpreted and findings will be reported in an analytical manner that generates knowledge and insight in order to answer the research questions.

2.3 Research Methodology

Research methodology is the overall approach to systematically resolving the research problem and involves the issues a researcher needs to consider about. It is the philosophy or general principle which will guide the researcher through the research process. This study will be guided by the framework of integrative literature review methodology presented by Whittemore and Knafl (2005). An integrative literature review is *"a form of research that reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated"* (Torraco 2005).

Rocco and Plakhotnik (2009) argue that an integrative literature review would lead to an initial holistic conceptualization of the phenomenon as well as new understandings and re-conceptualizations in a field. Integrative literature review enables the scholarly reviewer to evaluate the strength of the scientific evidence, identify gaps in current research, identify the need for future research, bridge between related areas of work, and identify central issues in an area (Russell 2005). Conducting integrative literature reviews requires *"a description of the research design where search terms used to collect the literature as data, criteria for a piece's inclusion or exclusion, and data analysis techniques are described"* (Rocco and Plakhotnik 2009). Integrated literature review allows simultaneous inclusion of different kind of researches in order to have more complete understanding of a phenomenon of concern and also combines data from theoretical as well as empirical literature.

Whittemore and Knafl (2005) presented a framework for integrative literature review process proceeding the stages of problem identification, literature search, data evaluation, data analysis and presentation. The problem identification is the initial stage of integrative literature review that involves a clear identification of research problem and the purpose of the review. Whittemore and Knafl (2005) argued that *"a clear problem identification and review purpose are essential to provide focus and boundaries for the integrative review process"*. The literature search stage applies a comprehensive search for an integrative review using at least two or three literature search strategies in order to identify the maximum number of eligible primary sources. Well-defined literature search strategies are crucial for enhancing the rigour of any type of review since incomplete and biased searches result in an incompetent data and the potential for inaccurate results (Cooper 1998, Whittemore and Knafl 2005). The data evaluation stage involves a meaningful evaluation of diverse primary sources which included both theoretical and empirical reports. The process neither includes nor excludes the reports, instead prioritizes the reports based on the rigor and relevance to the research of interest. In data analysis stage, the data from primary sources are extracted and categorized into a unified and integrated conclusion about the research problem. The last stage of the integrative literature review process is the presentation stage. Explicit details from primary sources and evidence are presented to *"capture the depth and breadth of the topic and contribute to a new understanding of the phenomenon of concern"* (Whittemore and Knafl 2005).

2.4 Data Collection

Previously described in research methodology, this study intends to follow the exploratory qualitative research approach. Data collection will be based on the existing literature and secondary survey data in order to extract required information for the research. A qualitative analysis will be followed up to address the strategic benefits of SaaS as well as future considerations for successful adoption of SaaS in business organizations. Secondary analysis of survey data is *"the extraction of knowledge on topics other than those which were the focus of the original survey"* (Hyman 1972). Glass (1976) argue that *"secondary analysis is the re-analysis of data for the purpose of answering the original research questions with better statistical techniques, or answering new research questions with old data"*. Some of the information are in the form of statistical documents which contain information and others are in the form of public compilations. Secondary analysis can also define as *'an empirical exercise carried out on data that has already been gathered or compiled in some way'* (Dale et al. 1988). In contrast to primary research, secondary analysis focus on analyzing previously collected survey or other data which is originally collected by other researchers, organizations or government bodies. Empirical analysis of secondary data will be conducted through collected data with research questions in mind. Collected secondary data will be reassembled in new ways in order to answer specific research questions.

Use of secondary data saves time and money since the data already collected and ready to analyze. Researcher can focus on analysis of existing data instead of collecting the primary data from scratch thus avoid hurdles that are usually associated with primary data collection. Another advantage of using secondary data is the availability of high quality industry surveys. Data collection of industry surveys from professional services firms usually performed by professional researchers who specialize in certain areas and have several years of experience in surveying that particular area of research. Ease of availability of data combined with time saving and financial incentives makes industry surveys as a favorable source of data for this study. However, there are a couple of considerations in order to assure a high quality research. Kothari (2004) stated that the researcher must see certain characteristics such as reliability, suitability and adequacy of secondary data. Even though the data not primarily collected by the researcher, it is crucial to understand the data collection methods used in the primary instance. A thorough examination upon the source of original

research should be done and any reasons that may limit the usefulness of chosen data set should be aware of. Disadvantages of using secondary data include the poor validity, possibilities of subjective influence and lack of standardized format. Data collection methods should choose carefully as these factors detract from the accuracy and quality of research. With a careful consideration for the pros and cons of using primary and secondary data, this study will be based on the secondary data collected via exploratory literature search.

Brown and Suter (2012) define literature search as:

> *"A search of popular press (newspapers, magazines, etc.), trade literature, academic literature, or published statistics from research firms or governmental agencies for data or insight into the problem at hand."*

Data collection for this study employs to four stages:

- Define the research subject in terms of keywords
- Identify information sources
- Search previously identified information sources using keywords
- Download and archive relevant information

First stage of literature search is to define the research subject in terms of keywords. The purpose is to generate key terms or phrases which are both fully reflect the research subject and easy to enter into a database search engine. The research topic breaks down into concepts which are generally nouns rather than verbs or adjectives. And key components that make up the research topic as a whole are pulled out. On the second stage, available databases and resources are analyzed and suitable information sources are identified. Reliability of an information source is the most important criteria for identifying correct information sources for the specific research. After the information sources for the research

have been selected, the literature search process begins with databases using keywords, Boolean logic and limiters. Most databases provide a standard basic interface which allows to enter search terms and a variety of ways using Boolean operators. Once documents that might be useful for the research are located, they are downloaded and citations are also exported into bibliographic management software such as Endnote.

After literature search, collected information will be combined or reorganized in new ways to address research questions. Findings of empirical analysis will be presented in the next chapter.

3 Literature Review

This chapter intends to deliver the readers a message that Software as a Service (SaaS) model should be promoted and implemented from a strategic IT and business perspective. For this reason, existing literature related on the strategic IT management and economical impacts of SaaS model in business organizations are being reviewed. Reporting of the findings from literature review are expected to convince and provide justification for business organizations and managers to adopt SaaS as a more strategically favourable alternative for the traditional business-critical software systems. Ethnography for the literature review will be firstly introduced concept of strategic IT management. Then the conceptual background of cloud computing and SaaS model will be presented.

3.1 Strategic Alignment of IT

Role of IT in business organizations has changed dramatically in recent decades. Management of IT evolved from a traditional back-office support to an active role which creates efficiency in business operations and even expanded its horizon to a more strategic role of creating new business opportunities. Aligning IT and business strategies has become a critical and challenging issue for business and IT managers in modern business environments. With rapid changes in business models and technology innovation, business enterprises as well as managers who are responsible for strategic decisions required to anticipate those changes in order to deliver the successful implementation of business strategy.

Henderson and Venkatraman (1999) developed a model for conceptualizing and directing of strategic IT management. The “Strategic Alignment Model” defines four underlying domains as a fundamental of strategic choice in business organizations: business strategy, IT strategy, organizational infrastructure and processes, and IS infrastructure and processes.

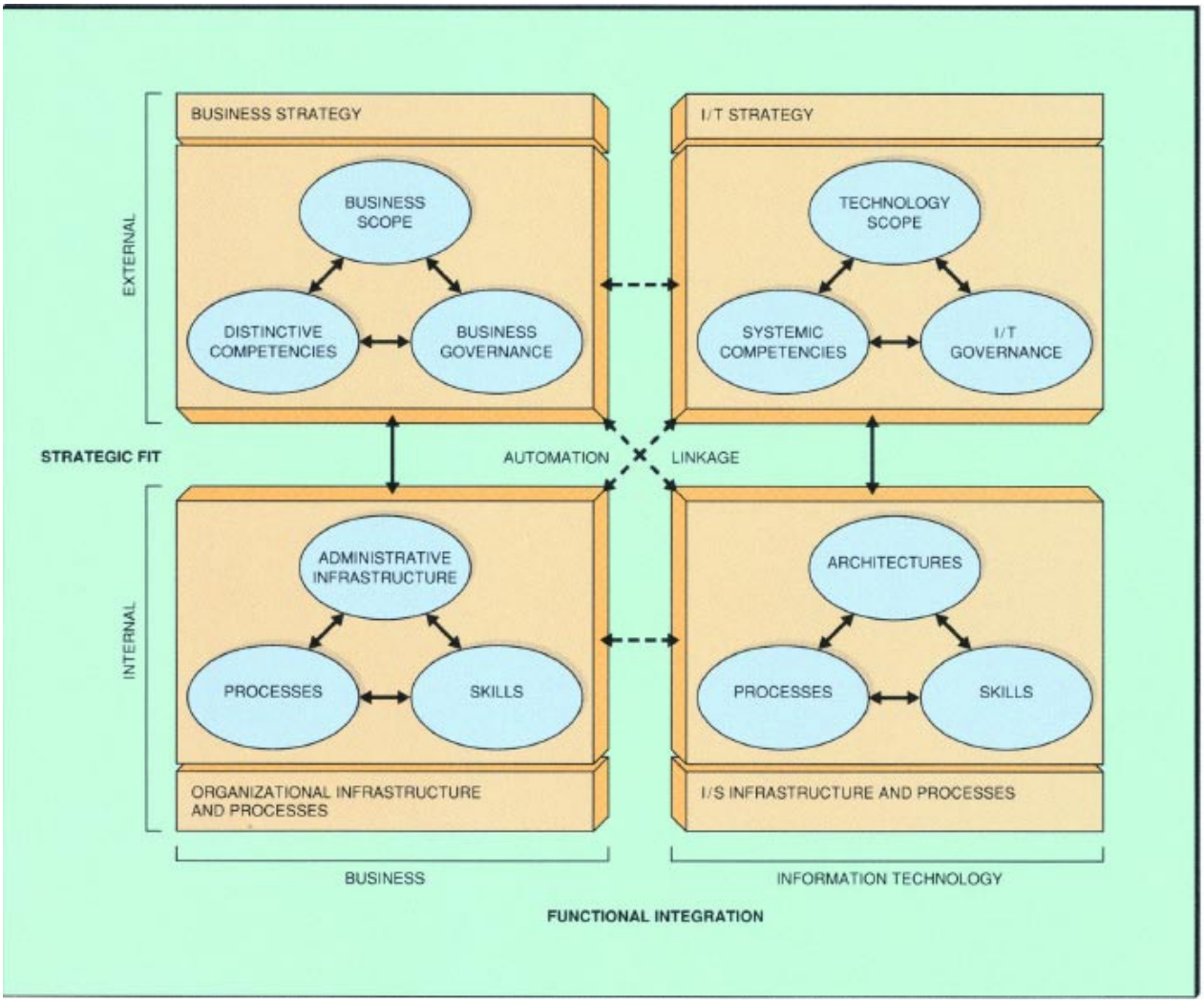

Fig 3: Strategic Alignment Model (Henderson and Venkatraman 1999)

Strategic Alignment Model define the integration between business and IT domains. "Strategic integration" bridges between business and IT strategies and is reflecting the external components. "Functional integration" links between organizational and IT infrastructure and processes reflecting internal components.

Henderson and Venkatraman (1999) also presented four dominant alignment perspectives: strategy execution, technology transformation, competitive potential and service level. When business strategy serves as a driving force, cross-dimension relationships between the strategy execution and technology transformation arise. When management explores the how IT can empower new or enhanced business strategies, cross-dimension relationships between

competitive potential and service level established. Henderson and Venkatraman (1999) derived individual models for each of four alignment perspectives. Figure 2 demonstrates the individual models for strategy execution, technology transformation, competitive potential and service level perspectives of strategic IT management.

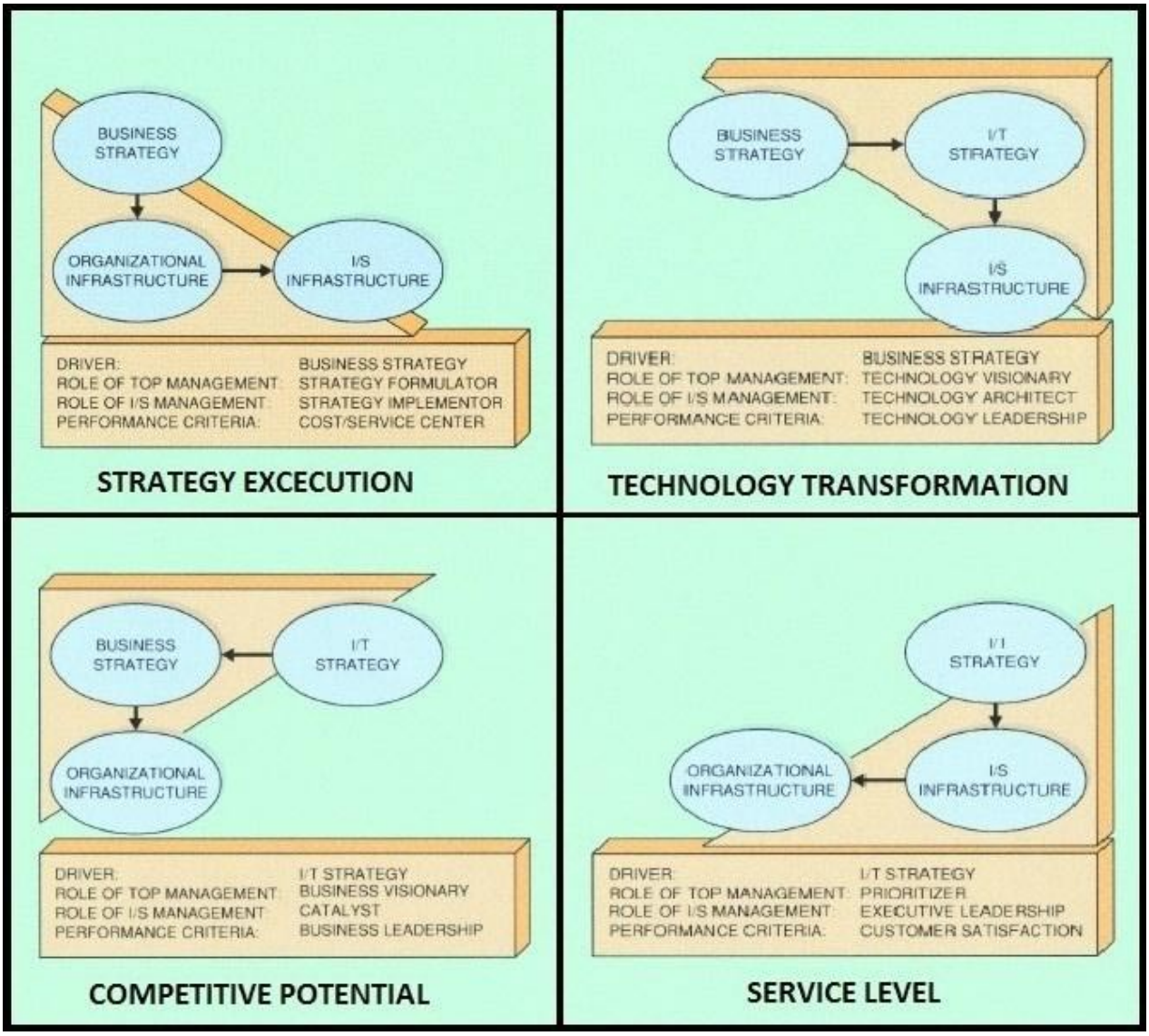

Fig 4: Four alignment perspectives (Henderson and Venkatraman 1999)

Henderson and Venkatraman (1999) argue that the four alignment perspectives that are driven by business and IT strategies are equally useful and powerful in considering the role of IT in organizational transformation. They argue that there is no magic bullet to formulate and

implement strategy because if there is a magic formula then all the companies will adopt it and it will not be a strategic. They argue managers not to consider the perspectives with business strategy or IT strategy as an initial point of strategic alignment but to consider these four dominant perspectives in alternative conceptual lenses and the managers are encouraged to make continuous adaptations of these conceptual models.

Hanschke (2010) highlighted the importance of strategic IT alignment in business enterprises. According to Hanschke (2010), "*the objective of planning IT strategically is to align it with overarching corporate goals and business requirements and make it agile enough to deal with constant change in the company and its environment*". Hanschke (2010) argue that IT can contribute in different ways to the current and future business models:

- Contribute to differentiation
- Faster than competitors
- Create easy access to the business organization for the customers
- Make customers loyal and dependent
- Efficiency in business workflows
- Saving the costs
- Agile in changing business models

Hanschke (2010) suggested that managers should consider following questions while considering the strategic positioning of IT:

> *"What contribution can IT bring to new business models?"*

"How can IT contribute to making the enterprise more agile?"

"How can IT raise the efficiency of business processes and deliver optimal support to the current business model?"

"What contribution can IT make to reducing business risks?" (Hanschke 2010)

In the following subtopics, we will discuss the current status of research and literature covering the cloud computing and Software as a Service (SaaS) model then the strategic benefits and limitations of SaaS in implementing IT strategy in business organizations.

3.2 Cloud Computing

The term "cloud computing" is a vague term which is defined by different stakeholders with different perspectives. IT professionals, IT service providers, business enterprises and managers define "cloud computing" with their own definitions. There is no universal definition for "cloud computing" nowadays. We are going to discuss and examine some available definitions in order to clarify what is "cloud computing". Generally "cloud computing" means accessing and storing data and software applications on the internet instead of local computers or enterprise network physically reside within the organization. Cloud computing doesn't need to run dedicated server hardware in residence and software applications can be accessed via internet, and also the data stored on the internet.

According to an article from McKinsey, cloud computing is "*the use of highly scaled, shared, and automated IT platforms*" (Kaplan et al. 2012). Cloud computing eliminate the hassles of implementing and managing hardware and software for business applications. Traditional business-critical software systems need a variety of hardware and software, and are very often expensive and need certain technical support. With cloud computing, a network of virtual servers are remotely hosted on the internet in order to provide a platform to run the software applications and to manage, process and store data. Cloud computing make it possible for a significant workload shift from computers within the local network of the organization to remote network of servers run by the cloud service providers so that reduce

the software and hardware requirements effectively.

National Institute of Standards and Technology (NIST) of U.S. Department of Commerce developed a definition for the term “cloud computing” and is also adopted by European Commission (European Commission 2012).

> “*Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.*” (Mell and Grance 2011)

The NIST (Mell and Grance 2011) defines five essential characteristics, three service models and four deployment models of cloud computing.

Five essential characteristics of cloud computing are:

- On-demand self-service

  A customer can unilaterally provision computing capabilities without human interaction with cloud service providers.

- Broad network access

  Computing capabilities can access over internet from different client platforms such as desktop computers, tablets, smart phones, etc.

- Resource pooling

  Cloud providers provide computing capabilities by a multi-tenant model run on

heterogeneous and dynamically assigned physical and virtual resources.

- Rapid elasticity

  Computing capabilities can be provisioned and released elastically in terms of quantity and time.

- Measured service

  Usage of computing resources such as storage, processing, bandwidth and active user accounts can be optimize and measure so that providing transparency for both cloud service provider and customer.

Three service models are:

- Software as a Service (SaaS)

  Software applications are running on a cloud infrastructure provided by the cloud service provider. Customers can access applications from several client devices through a web browser or a program interface. Underlying ICT infrastructure of the cloud does not control by customer but cloud provider.

- Platform as a Service (PaaS)

  Consumers are able to deploy and manage self-created or acquired applications on a platform provided by the cloud provider. Underlying IT infrastructure of the cloud does not control by customer but they have control over the deployed applications and are able to configure the settings for the application-hosting environment as well.

- Infrastructure as a Service (IaaS)

Cloud service providers provide customers a possibility to manage and control computing capabilities to provisioning the data processing, storage and networking. Not consumers but cloud service providers control and manage underlying cloud infrastructure. Consumers can control operating systems, storage, and deployed applications.

And four deployment models are:

- Private cloud

  Private cloud provisioned for an exclusive use of single organization involving multiple consumers. Cloud infrastructure own, manage and operate by the organization itself, third party cloud service providers or can be a combination of them, and can be exist on or off premises.

- Community cloud

  Community cloud provisioned for an exclusive use for the specific community of consumers from several organizations which are sharing the same interest. Cloud infrastructure own, manage and operate by one or more organizations in the community, third party cloud service providers or can be a combination of them, and can be exist on or off premises.

- Public cloud

  Public cloud provisioned for the open use of general public. Cloud infrastructure own, manage and operate by government, academic or business organization or can also be a combination of them, and exist on the premises of cloud service provider.

- Hybrid cloud

> Hybrid cloud infrastructure is a combination of private, community or public cloud. Composition can be of two or more cloud infrastructures that remain distinct entities but bound to standardize or proprietary technology which allows portability of data and applications.
>
> (Mell and Grance 2011)

As the purpose of this dissertation is to highlight the strategic benefits and limitations of SaaS service model in business organizations, we intend to exclude detail discussions about the characteristics and deployment models but focus on the service models of cloud computing more specifically SaaS.

3.3 Service Models in Cloud Computing

Cloud computing services can be classified as three different models:

- Software as a Service (SaaS)
- Platform as a Service (PaaS) and
- Infrastructure as a Service (IaaS)

These three models or layers accomplished by the end-user layer and covered the end-user perspectives of cloud computing services. Following diagram depicts the three different layers of service models in cloud computing.

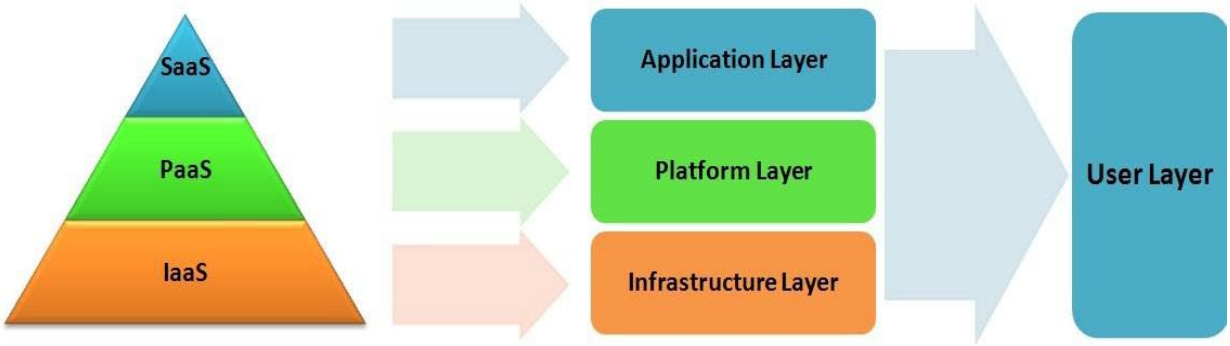

Fig 5: Cloud computing stack

As depicted in Fig 5, cloud computing stack provide services for infrastructure, platform and application layers which encapsulated to ultimately support the user layer. Software as a Service (SaaS) encapsulate the vertical stack of service propositions from the basic infrastructure layer (IaaS) to platform layer (PaaS) to application layer (SaaS). Each layer in cloud computing stack can be integrated to or disintegrated from peer layers.

U.S. National Institute of Standards and Technology (NIST) defines the service models of cloud computing as follows.

> *"**Software as a Service (SaaS)**. The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.*
>
> ***Platform as a Service (PaaS)**. The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has*

control over the deployed applications and possibly configuration settings for the application-hosting environment.

***Infrastructure as a Service (IaaS)**. The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).”* (Mell and Grance 2011)

Cloud computing service models can be illustrated as follows.

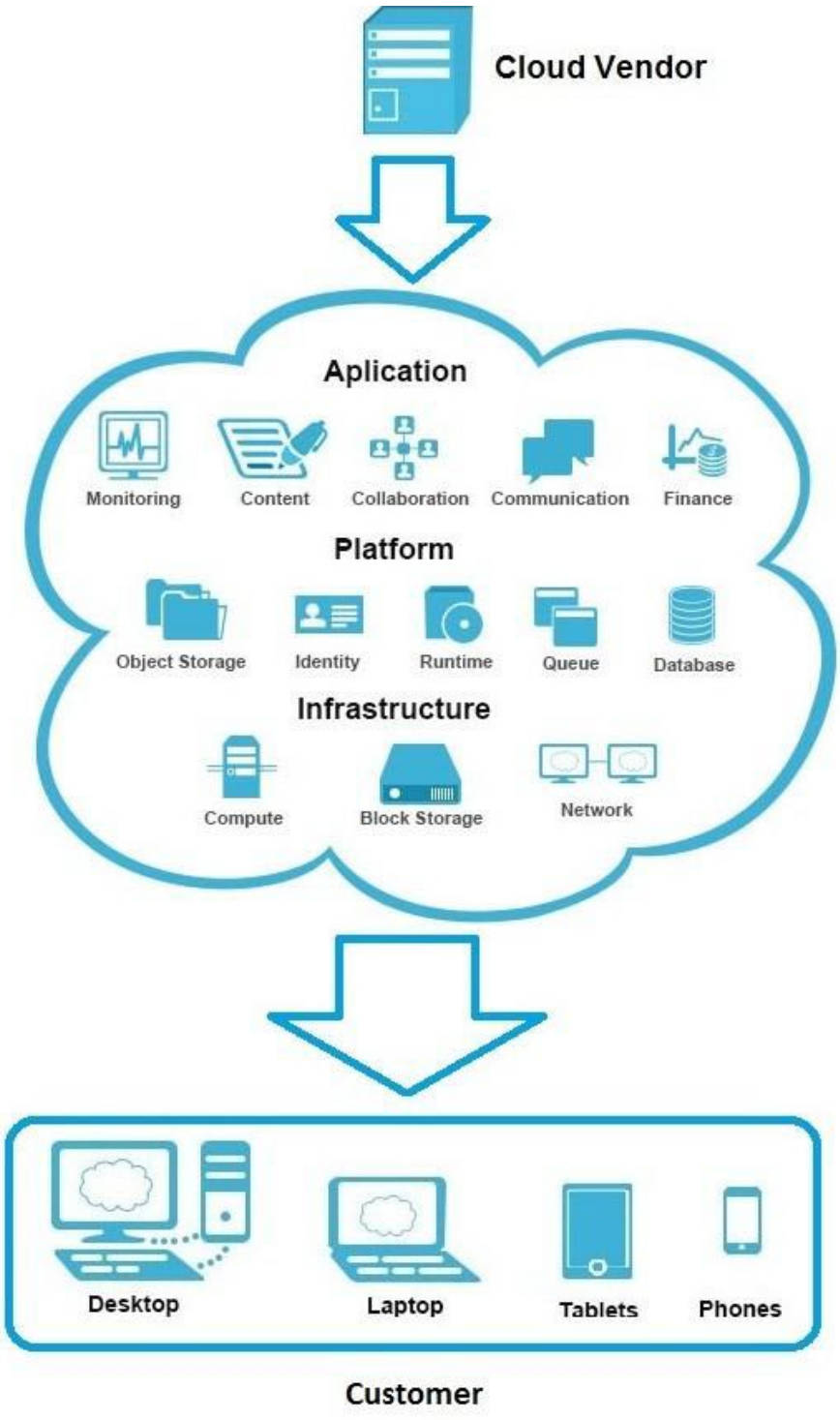

Fig 6: Cloud model

SaaS, PaaS and IaaS models deliver cloud computing capabilities to business enterprises depends on the business requirements of respective clients. Fig 7 presents different computing capabilities provided by SaaS, PaaS and IaaS compare to traditional on-premises

software applications as well as separation of responsibilities between cloud vendor and customer.

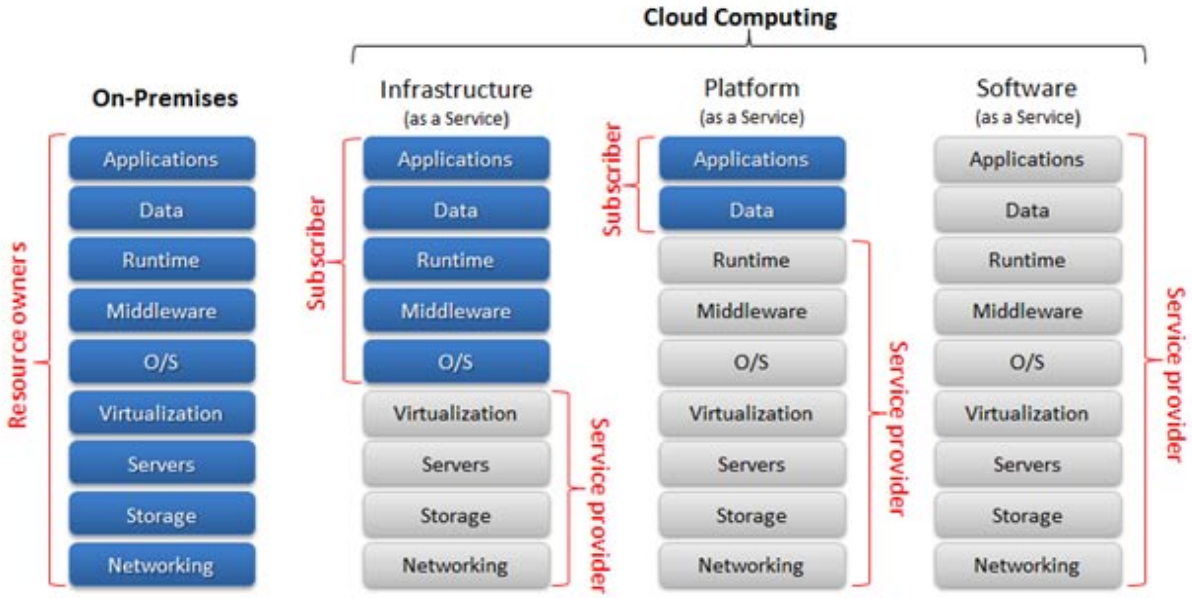

Fig 7: Separation of responsibilities (Chou 2010)

Another service model of cloud computing that worth discussion is UCSB-IBM cloud ontology developed by a collaboration of (University of California, Santa Barbara (UCSB) and IBM. UCSB-IBM cloud ontology presents a comparatively simple five layers model of cloud computing services delivered. Classification of the cloud computing service layers in this model drawn from the service composability principles of Service-Oriented Architecture (SOA).

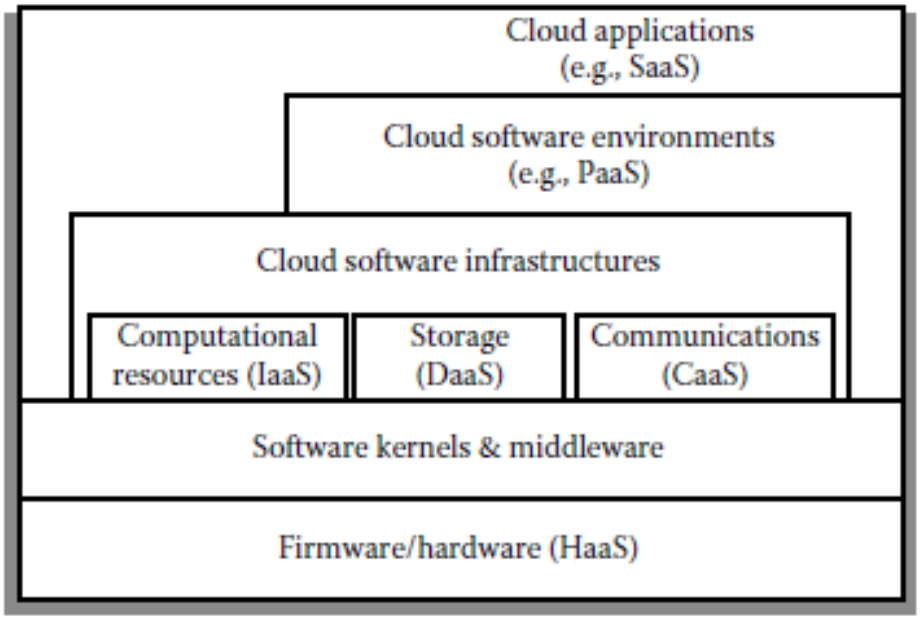

Fig 8: UCSB-IBM cloud computing ontology (Youseff et al. 2011)

As shown in Fig 8, UCSB-IBM cloud computing ontology composed of five interdependent and composite layers and there are three constituents within the cloud infrastructure layer. The ontology begins with a firmware or hardware layer as the foundation and leads to the delivery of cloud applications. Critical cloud computing service models Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) as well as more seldom used cloud computing services such as Communication as a Service (CaaS) and Data as a Service (DaaS) are delivered throughout the ontology.

In the following subtopics, we are going to discuss about the background literature of Software as a Service (SaaS) model and the strategic benefits and limitations of adopting and implementing this model in business organizations.

3.4 Software as a Service (SaaS)

3.4.1 History and Concept

Concept of SaaS dated back in 1990s with application service providers (ASPs) tried to develop new models of renting software applications over the internet rather than traditional

model of selling on-premise applications. Traditionally, deploying business information systems are a major taking. It can cost significant amount of time and large sum of money for enterprises whether the size of the organization is small or large. Enterprises need to seek advice from IT consultants and also need to hire IT professionals to customize and integrate with the current systems and data of the organization. Requirements of time frame, budget and human resources for the deployments of business-critical software application impose significant risk for the business organizations.

On-demand service delivery model of SaaS removes typical requirements related with traditional software delivery models. SaaS model gives the enterprises an alternative to access business-critical software applications built on a shared infrastructure over the internet by subscription. SaaS applications can be accessible anytime from any computer or any device with internet connection. SaaS became gradually popular in recent decade as it simplifies the software deployment process and reduces acquisition costs for business-critical software applications also known as business information systems.

3.4.2 SaaS Model

Software as a Service (SaaS) is a distribution model of software applications that are hosted and delivered over the internet by the cloud computing service providers also known as cloud vendors and are available for the customers to access and run for. It is a web-based service and users typically access from a “thin client” through a web browser or a graphical user interface (GUI). SaaS allows companies to obtain business applications at a typically low cost compare to traditional licensed applications specifically business-critical software systems. As the application software is hosting remotely over the internet cloud, customers do not need to invest in physical hardware infrastructure and removes the need to install, setup and maintain software applications. SaaS model refers software as a service contrast to the traditional software distribution models in which software refer as a product and are purchased for and installed on “thick client” computers.

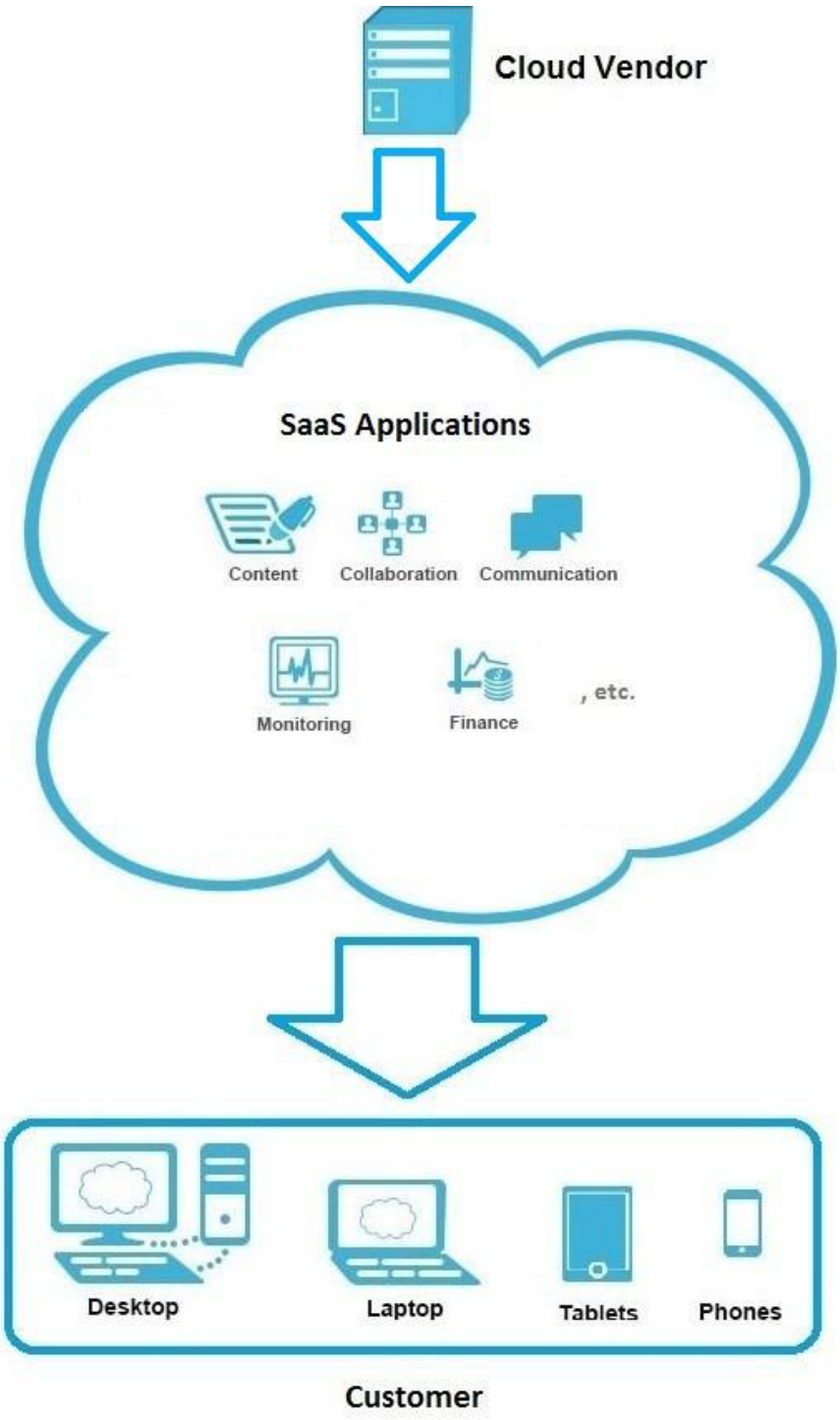

Fig 9: SaaS model

"With the SaaS model, software applications are deployed on vendors' premises prior to a client's adoption. Clients do not purchase software or infrastructure (e.g. hardware and OS) upfront, but pay for their access to the services over time." (Xin and Levina 2008)

Carraro and Chong (2006) categorized SaaS offers into *"Line-of-business services"* or *"Consumer-oriented services"* . *"Line-of-business services"* are the services offered to all sizes of business organizations and are very often large and customizable business information systems supporting the critical business processes such as sales, finances, customer relationship management, etc. *"Line-of-business services"* typically charge customers on a subscription-basis. *"Consumer-oriented services"* are the cloud computing services offered to general public. *"Consumer-oriented services"* can be sold to the customers on a subscription-basis but are very often delivered at no cost as the profit drawn from advertising. This study will be focused on business issues of line-of-business SaaS offerings i.e. strategic benefits and limitations of SaaS model around the context of the *"line-of-business services"*.

Liao and Tao (2008) stated that

> *"[...] the ownership of software shifts from the customer to SaaS providers; those responsibilities of technology infrastructure and management, and other areas (such as hardware and professional services) redistribute to the supplier"*.

They have also identified SaaS service modes in two different forms:

- *Provide services platform*

  Cloud service providers build SaaS platform to catalogue business applications where enterprises and independent software vendors (ISVs) can engaged in.

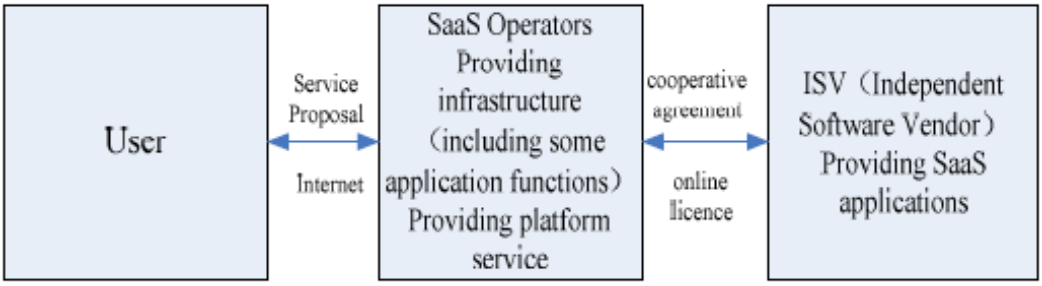

Fig 10: SaaS vendors providing services platform (Liao and Tao 2008)

- *Provide full services*

  Cloud service providers develop their own applications and provide all-in-one service of cloud computing infrastructure, professional SaaS applications and full range of related services.

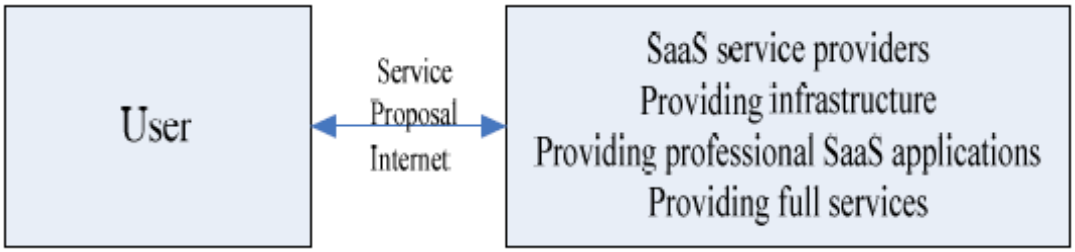

Fig 11: SaaS vendors providing full services (Liao and Tao 2008)

3.4.3 Definitions of SaaS

SaaS can be simply defined as *"software deployed as a hosted service and accessed over the Internet"* (Carraro and Chong 2006). In order to emphasize the definition of Software as a Service (SaaS) more clearly and specifically, again we would like to present the universally accepted definition developed by U.S National Institute of Standards and Technology (NIST).

> *"**Software as a Service (SaaS)**. The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings."* (Mell and Grance 2011)

SaaS applications are also known as on-demand software, hosted software or web-based software. Regardless of different names, all of SaaS applications hosted and run on the servers of cloud computing service providers and the providers manage the accessibility, performance and security of the applications. Gartner (2013) defines SaaS as a *"software that is owned, delivered and managed remotely by one or more providers."* SaaS can be identified as a one-to-many model where single cloud vendor delivers a hosted software application to multiple users. And another advantage of SaaS is pay-as-you-go subscription model. With pay-as-you-go subscription model, enterprises can avoid large initial investments when acquiring business-critical software applications. Enterprises can either choose to pay a monthly subscription fees or pay for the exact quantity of users and amount of consumed data. SaaS service providers usually offer flexible payment methods so that the customers can choose the payment methods which make most benefit for the business or the best to save the costs.

3.5 Business-level advantages of SaaS

Optimism for SaaS applications has been increased among the business enterprises in recent decade. SaaS Risk Survey conducted by Grant Thornton LLP in 2011 found that the majority of the respondents who are CEOs, C-suite executives, or board of directors at companies that have SaaS offerings bullish on SaaS (see Fig 10). *"That optimism appears to be well-grounded in light of several trends emerging over the past half-decade: the escalating prominence of the Internet as a primary (and secure) connectivity tool, the continuing pressure on businesses to do more with less, and the diminishing appetite among corporations for investing in technology that will rapidly become yesterday's news"* (Grant Thornton 2011). Sharon Mertz, research director at Gartner Inc mentioned that adoption of SaaS continues to grow and evolve regionally within the enterprise application markets after more than a decade of use (Gartner 2012). As several researches and industry forecasts clearly point out optimism among business enterprises regarding SaaS and a growth in SaaS adoption globally (see Grant Thornton 2011, Gartner 2012, McKinsey 2012, IBM 2014), it is critical to stress the strategic benefits of SaaS and the hidden pitfalls hamper the strategically successful adoption of SaaS.

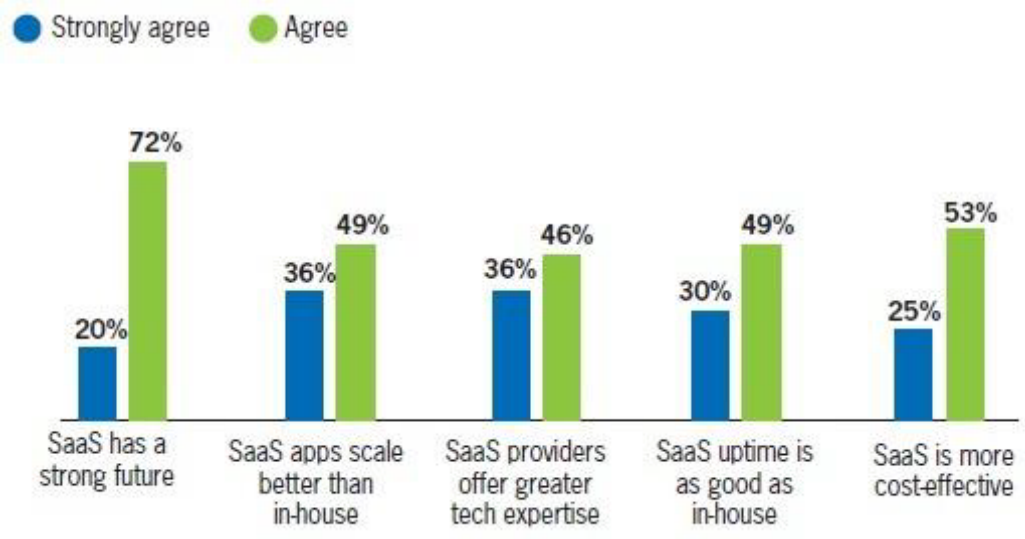

Fig 12: Bullish on SaaS (Nefdt et al. 2011)

First business-level advantage that differentiate SaaS from traditional software applications is its unique service delivery model. SaaS delivers software package as a service instead of a product. SaaS model allows application service providers (ASPs) deliver business-critical software applications hosted over the internet in a cloud computing environment. Customers can access the applications by paying monthly or annual fees to the cloud vendors. In most cases, pricing of subscription also involve pay-per-client and data consumption fees. SaaS model allows enterprises to reduce the costs of developing and maintaining in-house software applications as well as maintenance costs for third-party business information systems.

SaaS changes ownership of the traditional software delivery model. Ownership of the software application shifts from the customer to the service provider in SaaS model. IT infrasture and management are not controlled by the customer but a responsibility of service providers as part of service-level agreements (SLAs). SaaS model reduce the cost of software delivery by specializing and economy of scale. By delivering business-critical software applications through SaaS model, service providers are able to reduce the minimal cost of software distribution.

SaaS provides enterprises a variety of business-level advantages:

- Eliminates the costs
- Streamlines the business processes
- Increases flexibility
- Improves customer service
- Improves customization

Eliminates the costs:

SaaS allows business enterprises to save the costs in several ways. When a business enterprise purchase a traditional on-premise software, there are not only initial buying and licensing costs but also the costs for additional computer hardware, security and hiring IT professionals to provide required technical support as well as the costs for training and development of human resources. Such IT related costs can be reduced by acquiring SaaS applications. SaaS can reduce the cost in the area of software deployment and management as the software applications are installed and managed by the cloud service providers. Business enterprises only need to consider about the subscription fees of the application they are purchasing and there are no hidden or related costs related to licensing and technical support. SaaS applications are "multi-tenant" applications which means multiple users can share the single instance of hosted software so that cloud vendors can offer subscription levels at significantly lower rates than the traditional per-user licensing model.

Streamlines the business processes:

With SaaS, companies no longer need to spend their valuable time on managing and updating software applications as these issues are taking care by the cloud vendor so that time to market in the products and service development can be significantly reduced. Business information systems can be upgrade more aggressively in SaaS model without waiting for the

lengthy investment cycles. Documenting process can also streamlined by automating the processes. The most critical advantage of SaaS in streamlining business processes is "rapid elasticity". Computing power and storage requirements of business information systems can scale out in no time and upgrades can be rapidly released to scale in. Enterprises can purchase computing capabilities that are available for provisioning in any quantity at any time.

Increases flexibility:

Modern business environment is changing rapidly and it is vital for business organizations to cope with the shifting needs of the employees. As workers increasingly trying to balance the demands of work and family, there is a growing requirement for enterprises to offer alternative working patterns for their employees. Offering employees flexible working patterns better enables them to balance between work and family life. Employees can work off-site, usually at home, via SaaS applications providing that they have internet connection. More flexible working patterns greatly benefit the companies as remote working allows to cut the overhead costs such as office rental fees and companies can keep productive outside of traditional working hours. By incorporating SaaS model to flexible working model, companies can reduce overhead costs and improve performance as the employees are enable to manage their time more effectively and taking more responsibilities for themselves so that increasing their productivity.

Improves customer service:

In traditional businesses, companies engage with their customers through human interactions either face-to-face or over the phone. As more and more services became online in modern businesses, companies are losing the insight they would gain from staff talking to customers in person. SaaS applications specialized in CRM (such as Salesforce.com) allows the companies to achieve or develop tools to measure customer behavior on their products and services. With SaaS applications, companies can intervene human interactions or phone conversations to identify the customers who are ready to purchase or need help with the products or services offered. SaaS applications can also help business enterprises to evaluate

and understand customer behavior so that they can make conclusions of how the products or services need to improve.

Improves customization:

Another benefit of SaaS is the extensive flexibility and scalability. Cloud vendors with multitenant software architecture are able to customize their SaaS applications to meet individual and specific business requirements of the customers. Even when in the cases that the customers themselves are responsible for the customization of applications to align with their business model and processes, they can react quickly and effortlessly without relying on the specialized support from IT professionals. This allows business organizations a quicker adoption and more successful SaaS deployments. SaaS applications also provide application programming interface (APIs) via which they can integrate and sync with other software programs such as ERP and CRM application suites. Flexibility of SaaS applications demonstrates how SaaS is not only an option for IT department, but also an instrument geared for the successful implementation of business strategy in enterprises.

3.6 Considerations for adopting SaaS

Even though SaaS model became more mature and popular among the business enterprises, there are a number of considerations involve in purchasing SaaS. According to Hanschke (2010), planning of IT strategy should align with corporate goals and business requirements and agile enough to deal with constant changes in business environment. Ultimate goal of SaaS adoption is to propel business success and fulfill the requirements of business and IT strategies of the organization. A successful SaaS adoption involves a number of considerations which taken into account in order to respond strategic requirements. Avram (2013) stated that the barriers of cloud computing (which comprises IaaS, PaaS and SaaS service models) are security and privacy, connectivity and open access, reliability, and interoperability. Sääksjärvi et al. (2005) argue that there are three major risk sources from the customer perspective in adopting SaaS: *"less application tailoring and integration options, increased risk of losing business-critical data, and probable online service performance related problems."*

Major challenges for SaaS adoption can be boiled down into following considerations:

- Security and privacy considerations (Subashini and Kavitha 2010, Verma 2011, Avram 2013)

- Reliability and technical considerations (Godse and Mulik 2009, Carraro and Chong 2006, Verma 2011, Liao and Tao 2008)

- Financial considerations (Carraro and Chong 2006, Liao and Tao 2008, Verma 2011) and

- Legal considerations (Liao and Tao 2008, Verma 2011)

Security and privacy considerations

Since cloud computing service models are new trend, there is a great deal of uncertainty regarding security and privacy of data which makes it number one concern for the executives considering SaaS adoption. Majority of business organizations are still uncomfortable with SaaS model due to the obscurity about the way their data is stored and secured (Subashini and Kavitha 2010). Modern business organizations also facing numerous requirements and regulations to protect the privacy of the individual information of their clients. It is not clear that cloud computing models (including SaaS) can provide adequate protection of such information or whether business organizations found themselves breaching of some regulations unknowingly because of this new service model (Avram 2013).

Reliability and technical considerations

Godse and Mulik (2009) mentioned reliability as one of the factors to be considered for SaaS adoption. Reliability is the ability of a SaaS application to remain available for the users in real-time. Enterprise applications are vital for modern business organizations so that they must be reliable and available 24/7 in order to support business operations. As modern

business organizations compete globally in different geographic regions and time zones around the world, it is imperative to make sure that the business-critical information systems are up and running around the clock. Another factor to be considered in adopting SaaS is the *"type and amount of data that will be transmitted to and from the application on a regular basis"*(Carraro and Chong 2006). Speed of data transfer is also a factor that need to take account into consideration for SaaS applications. SaaS applications running on the internet cloud instead of local ethernet network so that the *"problem to log onto the site due to the heavy traffic or unavailability of site and the firewall not permitting integration with back end systems are some of the common bottlenecks faced by SaaS users"* (Verma 2011). Liao and Tao (2008) argue that enterprises should worry about corporate data especially financial data and customer information, private and commercial data network transmissions, malicious programs, unexpected natural disasters and other factors which cause the data lost and sabotage.

Financial considerations

A recent SaaS study by IBM (2014) highlighted how leading business organizations are leveraging SaaS deployments to unlock benefits such as reducing total cost of ownership (TCO). Even though cloud vendors advocating and promoting the low-cost bandwagon of SaaS, the broader picture is relatively murky. Carraro and Chong (2006) point out the factors such as the number of licensed users, the amount of custom configurations for deployment and integration with current systems and the requirements for data storage can affect the TCO of SaaS applications. Initial acquisition costs for SaaS applications are normally lower than that of traditional on-premise software applications however there is less certainty in terms of long-term cost structure.

Legal considerations

As SaaS applications host on the internet cloud, it is very likely that the cloud vendor is running application servers from different parts of the world. Regulatory and legal environments of vendor's country can significantly vary from that of buyer's country (Verma 2011). That might affect the application requirements hence limit the business performance

of buyer organization. Carraro and Chong (2006) claimed that technical and financial considerations can also involve legal ramifications such as whether the cloud vendors are able to meet the internal data security and data privacy requirements of the organizations in order to avoid legal exposure. Enterprises have legal obligations toward their customers and other parties therefore it is critical to ascertain that SaaS continue to support those obligations.

4 Empirical Analysis and Findings

This chapter intends to present the empirical analysis and findings of the data collected in order to answer the research questions previously mentioned in Chapter 1.

4.1 Strategic Benefits of SaaS

Strategic alignment of business and IT strategies are critical for achieving success in business. As previously discussed in literature review, IT strategy consists of IS and IT components. IS component defines the information systems requirements of an organization to support the overall business strategy. IT components define the vision of how information systems will be supported the strategic demands of an organization. IS and IT characteristics such as reliability, cost-performance levels and flexibility could attribute positively to business organizations to create new business strategies as well as support current business strategies (Henderson and Venkatraman 1993, Luftman 2000, Wilson 1989). A framework that might useful in this regard is Gartner's Pace-Layered Application Strategy which allows organizations to map and classify existing IT competencies, and develop a roadmap to deliver greater business value (Swanton 2011).

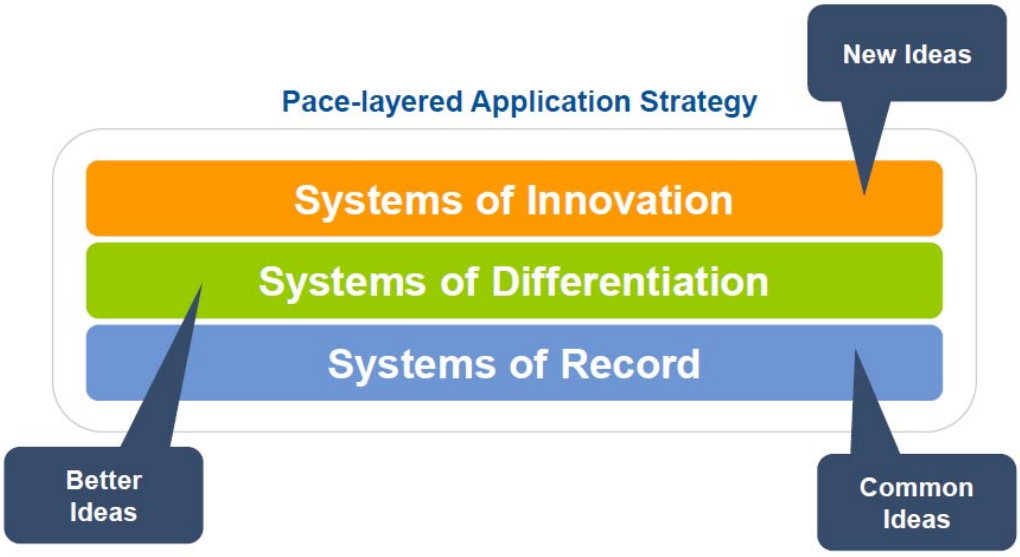

Fig 13: Gartner's Pace-Layered Application Strategy (Gaughan 2014)

Liebmann (2012) explained Gartner's Pace-Layered Application Strategy as follows:

> *"**Systems of Record** support standard, foundational business processes such as payroll and general ledger. The goal with these systems is to ensure reliability while driving down costs, since they don't provide any real competitive advantage.*
>
> ***Systems of Differentiation** support non-standard business processes that are core to a company's operations, such as customer experience management and product development -- but provide that support in a way that is substantially better than its competitors in order to gain incremental advantages in the marketplace.*
>
> ***Systems of Innovation** support new, experimental business initiatives intended to disrupt markets and establish true sustainable market leadership."*
>
> Systems of record are necessary for the daily operation of business processes, however they cannot offer real strategic value. Over the past decades, systems of record have matured to the point where there is only a little strategic advantage to having own unique capability for an enterprise (Hinchcliffe 2011). Most firms would go out of business without the data within and automated capabilities of their systems of record, but systems of record are increasingly becoming commoditized by SaaS and the cloud (Hinchcliffe 2011). SaaS solutions enable enterprises *"to develop new edge capabilities"* and it *"can provide innovative and business differentiating functions"* (Desisto 2011).

When exploring the strategic benefits of SaaS among enterprises, it is more compelling to focus on in considering whether SaaS support:

- Differentiation to advance competitors

- Innovation to gain market leadership

4.1.1 Differentiation through SaaS

Differentiation of enterprise applications presents the aspects of doing business activities differently from comparable firms as well as specifying the details of how different approach should be taken (Genovese 2012). Systems of differentiation enable for better product development as well as optimization of systems and processes. Systems of differentiation are the

> *"[...] business applications supporting processes and related data that are unique to each business, where the know-how makes a big difference for businesses to succeed in capturing new customers and retaining existing ones."* (Sage 2011)

Systems of differentiation are typically ERP developments which may comprise but not limited to the systems for customer service, R&D and product development processes. These systems traditionally deploy by on premises but some IT service providers started to deploy as SaaS applications in recent years. SaaS model offers enterprises a different way of implementing and managing the systems of differentiation which allows them to run business processes differently from competitors.

One of the features of SaaS distinguishing it from traditional on-premises software packages is its deployment model. With SaaS model, clients do not purchase software or infrastructure upfront. Instead they pay for the access to the services overtime. Since applications are already deployed on the SaaS vendors' sites, implementation cycle for enterprise applications is shortened (Xin and Levina 2008). That allows an enterprise to utilize business information systems in order to provide services to their customers and take response to fluid market conditions sooner than its competitors. So that they can acquire capabilities to do the business better than its competitors by providing faster services.

4.1.2 Innovation through SaaS

> *"SaaS-delivered solutions can provide access to innovation without the pain of traditional upgrade programs."* (Desisto 2012)

"Cloud computing can lower IT barriers to innovation" (Avram 2012). SaaS, which is the most adopted service delivery model of cloud computing solutions offer a way to develop new capabilities and provide innovative functions (Desisto 2011). Janssen and Joha (2011) stated that SaaS "*enabling innovation as depreciation of existing software hindered the buying of new software."* According to Malladi and Krishnan (2012), SaaS adoption can support IT-enabled innovation of the enterprises. Menken (2009) compare the benefits of software innovation through SaaS compared to traditional software applications. SaaS allows enterprises to access latest software versions sooner than traditional software applications. With traditional on-premise software applications, enterprises have to wait for the latest version of software package and updates to be released by the software vendors. It is not efficient for software vendors to respond every single customer requirements arose and release a new version. Instead, they release the updates periodically and new version of the software over a certain period of time. With SaaS, cloud vendors can *"immediately offer their updated software solutions to clients online in a cost-effective and efficient way"* (Menken 2009).

Software vendors nowadays are responsible for proactively managing their software solutions not only to react customer problems but also modifying the applications according to the ever-changing business requirements and requests of the customers. SaaS solutions enable capabilities to spend less business resources on creating new enterprise applications or modifying current applications in order to suit strategic requirements that are crucial to stay competitive in rapidly changing business environment. Hence enterprises could spend more time focused on business growth and innovation. Janssen and Joha (2011) argued that SaaS could provide benefits related to the *"development of software which could result in potential cost-savings and better cost control."* Minney (2012) stated that SaaS solutions *"enable multiple points of entry for different members of staff"* so that *"collaboration should be a breeze with the ability to define workflows and roles and deal with situations in real-time*

without having to go outside the system to communicate via email, chat or phone." This allows business organizations not only to outsource but also to crowdsource creative and innovative solutions for their products and services.

In the following sections, secondary survey data and existing literature related to the SaaS model will be intensively reviewed and analyzed in order to explore how strategic benefits and advantages of adopting SaaS in business organizations as well as finding key issues that need to be considered.

4.2 Findings from IBM Global SaaS Study

In 2014, IBM Center for Applied Insights published a global study of how SaaS is accelerating competitive differentiation and fueling powerful competitive advantage (IBM 2014). The study conducted to 879 decision makers in companies that have adopted SaaS. Respondents comprise 12 percent of C-level line-of-business executives, 10 percent of C-level IT executives, and the remainder of Vice Presidents, directors and managers. Respondents split roughly evenly between business and IT functions. Twenty percent of respondents work in the companies of more than 10,000 employees and 40 percent are in the companies of more than 2,500 employees.

In order to explore how SaaS helping enterprises gain competitive advantage more than simply reducing costs, the study segmented survey respondents into three groups (IBM 2014):

- *"**Pacesetters**, who have the highest level of SaaS adoption and are gaining competitive advantage through their broad efforts"*

- *"**Challengers**, who have adopted SaaS more narrowly but are gaining competitive advantage through the SaaS deployments they do have"*

- *"**Chasers**, who have been slower to adopt SaaS and gain competitive advantage through its use"*

Figure 14 illustrates the profiling of SaaS adopters among survey respondents. Horizontal axis represents the degree of agreement with a statement regarding achieving competitive advantage through SaaS. Vertical axis represents the numbers of application areas the company deploys as SaaS applications. Where the size of shaded bubbles shows the relative number of companies that fall at a specific deployment/competitive advantage intersection.

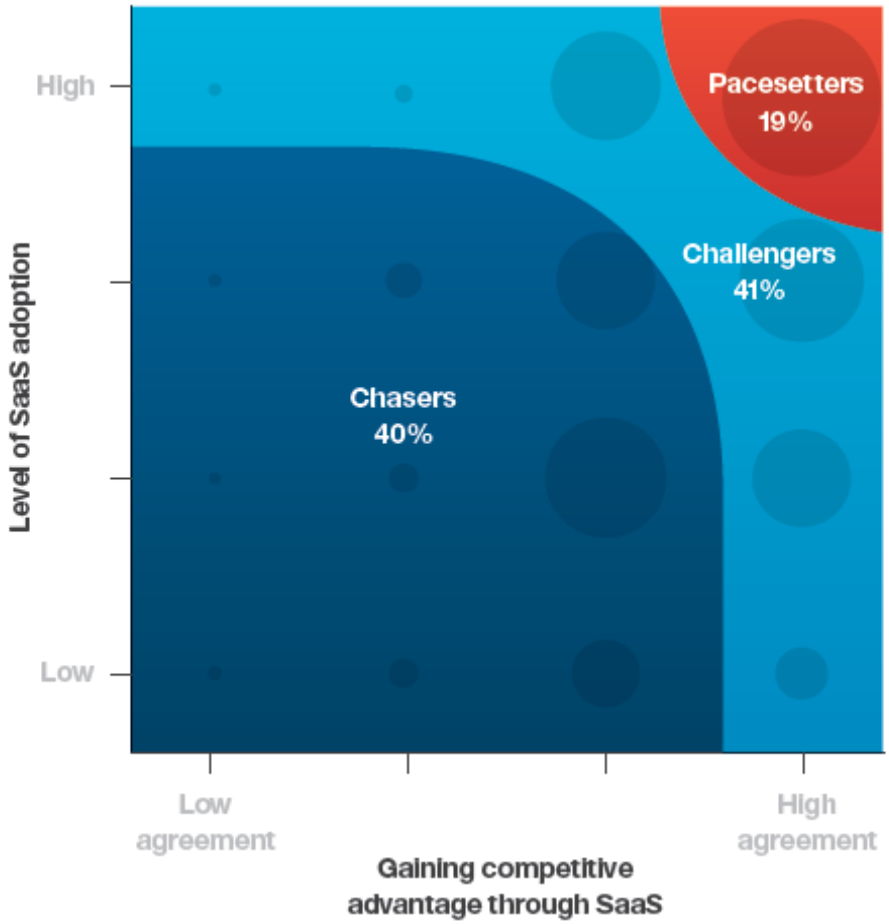

Fig 14: Profiling SaaS Adopters (IBM 2014)

Nineteen percent of the survey population are *"Pacesetters"* with the highest level of SaaS adoption and are gaining competitive advantages. *"Pacesetters"* motivated by the desire to use SaaS to pursue deeper collaboration, market agility and better decision making. On the other hand, *"Challengers" and "Chasers"* are lagging behind while they are primarily motivated by reducing total cost of ownership (TCO).

The study (IBM 2014) found that the enterprises who exhibit the highest level of SaaS adoption i.e. *"Pacesetters"* are gaining competitive advantage through their broad efforts. Majority of the *"Pacesetters"* reveal that SaaS helps them to unlock competitive advantage through deeper collaboration, market agility and better decision making. Deeper internal and external collaborations across the organizations and throughout ecosystems allow reduction in implementation time for projects. Sixty-one percent of *"Pacesetters"* say that SaaS boosts both internal and external collaborations. Market agility is another strategic benefit gained by adopting SaaS applications. Seventy-one percent of *"Pacesetters"* are employing SaaS to scale down their time to market and 68 percent use it to improve customer experience. It can be clearly seen that SaaS enables its top adopters to respond more effectively to dynamic challenges and fluid opportunities. SaaS also helps better decision making among top practitioners. Seventy-two percent of *"Pacesetters"* say that they use SaaS to leverage analytic and gain insights from large masses of data. SaaS enables *"Pacesetters"* to make faster and more precise decisions, and ultimately achieve competitive advantage by generating new insights from large data sets.

SaaS can provide entire enterprise a wide range of strategic benefits, not merely cost reductions but also nourishing deeper internal and external collaborations, clearing the way for better decision making, and enabling enterprises more customer-focused and agile in the competitive markets (IBM 2014). Competitive advantages of SaaS among *"Pacesetters"*, *"Challengers"* and *"Chasers"* can be seen in Figure 15.

SaaS and competitive advantage
(% achieving through SaaS)

		Chasers	Challengers	Pacesetters	% Pacesetters surpass Chasers
Enterprise efficiency	Increased self-service capability for applications	26%	36%	74%	+185%
	Optimized business processes and workflows	31%	41%	70%	+126%
	Improved application agility (flexibly deploy and implement solutions)	28%	41%	66%	+136%
Deeper collaboration	Increased collaboration across organization and ecosystem	34%	37%	61%	+79%
	Improved core business relationships	28%	44%	71%	+154%
Better decision making	Leveraged analytics across organization to turn big data into insights	34%	50%	72%	+112%
	Achieved better decision making	28%	41%	72%	+157%
Market agility	Increased innovation	29%	40%	66%	+128%
	Reduced time to market	30%	42%	71%	+137%
	Improved customer experience	30%	47%	68%	+127%
	Changed organization's business model	30%	44%	71%	+137%

Fig 15: SaaS and Competitive Advantage (IBM 2014)

Findings of the IBM global SaaS study (IBM 2014) clearly highlighted that SaaS helps enterprises with the highest level of SaaS adoption to have strategic advantages by providing differentiation in enterprise efficiency, deeper collaboration, better decision making and market agility. Moreover, 66 percent of *"Pacesetters"* use SaaS to increase innovation in delivering new or improved products into the market.

4.3 Advantages of adopting SaaS applications

Avram (2013) argued that SaaS deliver low-capital, fast-deployment option of software applications. In traditional software delivery models, licence purchasing and development cost are high. But in SaaS model, no large upfront investments on licence purchasing and software development are needed (Janssen and Joha 2011). *"Basic long-term vision of SaaS is centred around separating software possession, maintenance and ownership from its actual use"* (Janssen and Joha 2011). Pricing of SaaS applications usually based on subscription model in contrast to the on-time licensing model commonly used for on-premise software packages. Deploying traditional enterprise applications such as ERP and CRM can cost large sum of financial investment in upfront licensing cost and usually require IT professionals and

consultants to customize and integrate with the enterprise's other systems and data (Carraro and Chong 2006) . Enterprises can avoid this situation by deploying SaaS applications. Carraro and Chong (2006) stated that

> *"SaaS applications don't require the deployment of a large infrastructure at the client's location, which eliminates or drastically reduces the upfront commitment of resources. With no significant initial investment to amortize, an enterprise that deploys a SaaS application that turns out to produce disappointing results can walk away and pursue a different direction, without having to abandon an expensive on-premise infrastructure."*

Janssen and Joha (2011) compared the strategic and organizational benefits as well as disadvantages and risks of SaaS.

SaaS benefits	SaaS disadvantages and risks
Strategic and organizational	
• No installation and maintenance of software • No software expertise necessary • Focus on core business • Sharing of software installation and enrolment risks with SaaS providers • No need for human resource management of IT staff • Solving scarcity of IT staff • Improved time-to-market • Opening up new software applications otherwise out-of-reach and enabling innovation	• Need for contractual expertise • Reliability and long term sustainability of SaaS providers • Lack of technical expertise and experience • Difficulty to switch from provider • Risk of lock-in • Less customization opportunities • Integration of software from various SaaS providers. • Lack of innovation and no grip on further development and standardization

Table 1: Strategic and organizational benefits, disadvantages and risks of SaaS (Janssen and Joha 2011)

Janssen and Joha (2011) also compared the economical benefits versus disadvantages and risks of SaaS.

SaaS benefits	SaaS disadvantages and risks
Economic	
• Access to software without needing upfront investments • Economies of scale by spreading the costs of innovative solutions over many customers • Less direct costs • Control and predictability of IT costs	• In the long term higher indirect costs by additional management, control and security efforts • Dependency on SaaS provider resulting in higher (transition) costs

Table 2: Economic benefits, disadvantages and risks of SaaS
(Janssen and Joha 2011)

Kaplan (2007) compared SaaS applications with traditional software systems and argued that SaaS enables the organizations of all sizes to test and adopt new applications much more faster than they can do with legacy software. SaaS allows enterprises to elicit productivity from their increasingly dispersed workers and business partners given that the new applications are used for faster handling of customer service, improved collaboration among team members and quicker time to market. SaaS can diminish the hassles of deploying and maintaining common business applications and convert capital expenditures into variable business expenses. Kaplan (2007) stated that "*SaaS can place the burden for day-to-day application availability and performance on the application provider rather than on the in-house staff, and can free IT/network professionals to focus on more strategic initiatives.*"

Next section will further explore the key issues that need to be considered in SaaS adoption.

4.4 Key issues and considerations for SaaS adoption

4.4.1 Benefits and risks issues for SaaS customers

Sääksjärvi et. al (2005) identified the benefits and risks for the SaaS providers and customers in their research paper *"Evaluating the software as a service business model: From CPU time-sharing to online innovation sharing"*. The researchers reviewed and analyzed recent literature on the SaaS model from several different perspectives and listed their arguments accordingly. Most significant benefits of SaaS model which were repeatedly presented in almost every article the authors have analyzed are:

- Enables the customer to focus more on core competencies
- Easier and/or less costly access to the required technical expertise
- Shorter system implementation time
- Enables a wider and more flexible array of payment methods such as predictable and/or lower costs
- Easier software version management for the customer such as free upgrades and no technology obsolescence
- Enables cloud vendor to aggregate applications from several sources and build a complete service offering

Sääksjärvi et. al (2005) also identified risks issues for the customers that are involved in SaaS adoption:

Less tailoring and integration options available for the customer

- Increased risk of losing business-critical data or exposing it to third parties
- Considerations for the availability, reliability and performance-related issues depending on the technological solution of SaaS service provider

Occurrences of the benefits and risks issues for the SaaS customers in the articles that Sääksjärvi et. al (2005) reviewed can be seen in Table 3 and 4 respectively.

ID	Description	Cher-ry tree 2000	SIIA 2001	Hoch et al. 2001	Mizo-ras et al. 2003	Ekana-yaka et al. 2003	Walsh 2003	Occur-rence of the benefit
CB01	SaaS enables the customer to focus more on core competencies	X	X	X	X	X	X	6
CB02	SaaS makes it easier and/or less costly to get access to required technical expertise	X	X	X		X	X	5
CB03	The system implementation time is shorter with SaaS	X	X	X	X	X		5
CB04	SaaS enables a wider and more flexible array of payment methods (predictable and/or lower costs)	X	X	X		X	X	5
CB05	SaaS makes version management easier for the customer (free upgrades, no technology obsolescence etc.)	X	X	X		X	X	5
CB06	SaaS provider aggregates software applications from several sources and builds a complete service offering	X	X	X		X	X	5
CB07	SaaS enables the customer to get access to "best-of-breed" applications that would be too expensive to buy	X	X	X		X		4
CB08	SaaS makes it possible to access the software independently of location and time	X		X	X		X	4
CB09	The initial/investments and costs are much lower in SaaS	X		X	X		X	4
CB10	With SaaS, the customer can get access to a superior IT infrastructure regarding reliability, security and scalability		X			X	X	3
CB11	SaaS broadens the selection of potential applications available to the customer	X	X				X	3
CB12	SaaS enhances the available customization options of applications to the customer	X	X					
	Number of customer benefit issues in each article	11	10	9	4	8	9	

Table 3: Occurrence of the benefit issues for the customer in the articles reviewed (Sääksjärvi et. al 2005)

ID	Description	Cher-ry tree 2000	SIIA 2001	Hoch et al. 2001	Mizo-ras et al. 2003	Ekana-yaka et al. 2003	Walsh 2003	Occur-rence of the risk
CD01	There are less tailoring and integration options available for the customer	X		X	X	X		4
CD02	SaaS increases the risk of losing business-critical data or exposing it to third parties	X		X		X		3
CD03	Availability, reliability and performance-related issues are to be expected, depending on the technological solution of the SaaS provider	X				X	X	3
CD04	In exchange for the lower price, the customer is typically bound with a long-term contract (switching costs)	X		X				2
	Number of risk issues for the customer in each article	4	0	3	1	3	1	

Table 4: Occurrence of the risks issues for the customer in the articles reviewed (Sääksjärvi et. al 2005)

4.4.2 Considerations for SaaS adoption (The NIST Report)

U.S National Institute of Standards and Technology (NIST) published a report of synopsis and recommendations for cloud computing (Badger et al. 2012). The report suggested the recommendations for cloud computing environments including SaaS. The purpose of the recommendations are to evaluate whether SaaS model can satisfy particular reliability, compliance, or security requirements of the organizations.

> *"Compared with traditional computing and software distribution solutions, SaaS clouds provide scalability and also shift significant burdens from consumers to providers, resulting in a number of opportunities for greater efficiency and, in some cases, performance,"* the NIST report claimed. (Badger et al. 2012)

According to NIST report, the key benefits of SaaS are:

- ***Very modest software tool footprint*:** Deployment of SaaS applications increasingly convenient and efficient with little or no client-side software needed. SaaS applications can be accessed without waiting for complex installation procedures and have very small footprints on client computers. So that the risk of configuration interference between applications on client computers is reduced. Software distribution costs fundamentally reduced hence pave the way for economical development and deployment of software features.

- ***Efficient use of software licenses*:** SaaS applications can dramatically reduce license-management overheads. SaaS model allows enterprises to employ a single license on multiple computers at different times rather than having to purchase extra licenses for separate computers.

- ***Centralized management and data*:** Majority of data managed by SaaS applications locate on the servers of the cloud provider. Even though the SaaS provider may store this data in a decentralized manner for redundancy and reliability, it is centralized from the consumers' point of view. Professional management, security and

catastrophe protection of the data provided by the SaaS provider. And the data is available on demand to the enterprises that purchased SaaS, "*providing greater convenience and reduced risk of data loss or theft"*. According to the NIST, "*this logical centralization of data has important implications for consumers"*.

- ***Platform responsibilities managed by providers*:** With SaaS model, management of data infrastructure and operational issues for the enterprise applications are the responsibilities of the cloud service provider. Enterprises can avoid hassles for choosing the operating system, hardware devices, application configurations or software library versions underlie a SaaS application. All the system upgrades occur on the cloud provider side so that SaaS consumers can get the benefits of upgrades without any headaches. Enterprises are not required to maintain on premises IT support as the SaaS provider have an obligation to perform field services that guard against known exploits at the application level.

- ***Savings in up-front costs*:** SaaS applications allow enterprises to get started without any up-front costs for hardware acquisition and installation. Furthermore, SaaS providers tend to provision computing resources at scale and more efficiently than individual enterprises, which may reduce ongoing costs for the enterprises which assuming a competitive marketplace.

4.4.3 Issues and concerns for SaaS adoption (The Correlsense Report)

Despite several strategic benefits of adopting SaaS model in business organizations, there are also critical issues and concerns around SaaS. Correlsense (2012) suggested key considerations enterprise customers need to take into account before moving ahead with new or expanded SaaS deployments:

- ***See the Big Picture*:** As new areas of IT being effected as SaaS deployments get larger, project managers required to set back and consider all organizational implications that bordered SaaS implementations. Following critical steps are

suggested to take in order to see the bigger picture of SaaS implementations in enterprises:

- *Defining project requirements*
- *Aligning functionality with requirements*
- *Addressing data security needs*
- *Identifying and facilitating stakeholder buy in*
- *Bridging functionality gaps with add-ons*

Management challenge for SaaS is two-fold:

- To orchestrate the SaaS implementation to fully meet functional requirements of todays' competitive marketplace
- To handle change management and essentially making the project future-proof

- ***Plan Ahead for All Major Needs*:** Enterprises will need to be addressed new requirements that may not have been part of initial SaaS projects may not be covered by the core SaaS applications. IT and business teams should carefully consider specific requirements of their organization in the following areas to avoid project derailment:
  - *Compliance* - Enterprises need to comply with government regulations and mandates

- *Business Intelligence* - Enterprises need to identify, extract and analyze business data with third-party business intelligence tools if these tools are not supported by the standard functions of SaaS application

- *Security* - Since data and other intellectual property assets are stored in the provider's side in SaaS model, it is critical to meet security requirements for the functions such as cloud identity and access management.

- *Integration* - Enterprises should understand their data and systems integration needs in advance to avoid problems. And they should carefully assess the capabilities of the SaaS provider in this area.

- ***Plan for Application Support*:** When SaaS users experiencing problems such as the application is running slowly or is unavailable, enterprises need to provide users with easy and straightforward directions to follow. Support teams require the tools that enable them to quickly and accurately identify the problems and take actions to remediate.

- ***Tools for Measuring Application Performance*:** IT and business teams of the enterprises need tools for measuring performance characteristics and can answer questions related to the end users. Additionally, they need "*quickly accessible information for every single user, location and type of activity associated with the application"*.

- ***Evaluating SLAs for SaaS*:** Service level agreements (SLAs) traditionally measured by system performance based on the uptime of the application. However, SLAs structured around uptime cannot guarantee the efficiency of SaaS applications. "*Many customers have experienced situations in which the hosted application was up and running normally in the provider's environment, but it was running slowly or not responding at all on the customer's side"*. Enterprises should pay more attention to response times rather than uptime in negotiating SLAs for SaaS deals. Enterprises

might want to assure that there are certain quality measurement tools to make a response time-based SLA actionable.

- *Need for Unified Tools for SaaS and On-Premise Monitoring*: Enterprises increasingly operate hybrid environments in which hosted and on-premise applications are running together (integrated or parallel). It is important to establish a common, unified view of application performance and response times in these hybrid environments. Ideal situation is to have a unified tool that enables monitoring, reporting and alerting on the performance of all applications, regardless of whether they are on-premise or hosted in the cloud.

5 Conclusions

5.1 Major findings and interpretations

The purpose of this study is to provide a strategic view for SaaS adoption from the enterprise perspective and highlighting the competitive advantages of SaaS model over traditional on-premises applications. The study explore the strategic values and benefits as well as risks and considerations for adopting SaaS model in business organizations.

Software as a Service (SaaS) increasingly drawing interest from the business organizations across the world. Enterprises of all sizes looking forward to create greater business value through SaaS model not merely in cost saving but for acquiring strategic advantages in order to position as a front runner in highly competitive modern business environment. Several SaaS providers claim that the broader usage of SaaS for business-critical applications across the organization allows the enterprises to increase speed, agility and potential cost savings as well as fostering growth, innovation and improve competitive advantage. However, business and IT executives need to take a strategic approach in order to realize the real potential of SaaS regardless of all optimism and promises from the SaaS providers who actively promoting SaaS bandwagon.

SaaS helps business organizations to achieve competitive advantages beyond simply cost savings. SaaS model enables enterprises to gain competitive advantage by improving enterprise efficiency in deeper collaboration, better decision making and market agility. However, only the enterprises who have the highest level of SaaS adoption are gaining the most competitive advantages through SaaS. For the organizations who adopted SaaS more limitedly or slower to adopt SaaS, the strategic benefits of SaaS are less significant.

The study also found that SaaS model have several advantages over traditional on-premises applications in terms of lower initial investments and costs, shorter implementation and configuration times, easier software version management, and possibility to access the software independently of location and time. All these factors provide optimal conditions for the competitive advantage of business organizations by providing potential cost savings,

increasing flexibility in working arrangements, improving customer service and streamlining business processes. However, more importantly, real competitive advantages came from creating differentiation and innovation through SaaS applications. The study found that SaaS enables business organizations to differentiate themselves from competitors and staying innovative. The findings of the study revealed that SaaS brings several benefits in the aspect of strategy execution, technology transformation, competitive potential and service level.

Having said that SaaS delivers strategic benefits for the business organizations, however, there are several considerations and risks issues that should be taken into account before adopting SaaS model. Enterprises need to see the bigger picture of project, functionality and data security requirements as well as assess the management challenges to orchestrate SaaS implementation and to handle change management for future projects. It is crucial to address major requirements for legal compliances, business intelligence, security and integration issues before implementing SaaS applications. Enterprises should also prepare for the application support for end users. Since modern enterprises operate hybrid system environments, it is a priority to acquire suitable tools for measuring application performance of both SaaS and on-premise applications on a single, unified platform. One consideration that should taken into account is the evaluation of service level agreements (SLAs). Enterprises need to be assured that there are certain quality measurement tools to make a response time-based SLA actionable since SLAs structured around uptime cannot guarantee the efficiency of SaaS applications.

5.2 Limitations and future research

Although the findings demonstrate strategic benefits, risk issues and considerations for SaaS model, there are several limitations for this study. Because of the limited time frame, this study couldn't collect primary quantitative data and have to entirely rely on the secondary literature and survey data. First limitation is the insufficiency of resources which are explicitly addressing the strategic benefits of the SaaS model. Integrated literature review of this study found that the majority of the SaaS studies focus on technical issues. Even though there are some studies focus on economic benefits of SaaS model, those studies mainly conducted from the service provider point of view. Very few of SaaS studies are from the

perspective of enterprise consumers. Furthermore, these studies focus on customer perception and bullish instead of the real strategic benefits of adopting SaaS model. An analysis for the real economic outcomes of adopting SaaS model in enterprises would be one of the possible future research interests. Second limitation is the limited availability of independent studies for the strategic issues of SaaS model. Despite several independent studies related to the technical issues of SaaS model, most of the studies for the economic benefits and strategic values of SaaS model conducted by cloud service providers themselves or IT consultancy firms. These studies may have biases towards the positive side of SaaS when choosing the samples and making generalizations. It is important to take necessary precautions to avoid imposing those biases while collecting and analyzing the secondary data. Thirdly, there are insufficient longitudinal studies regarding the long term effect of SaaS model on enterprises. Since SaaS model is relatively new trend compare to traditional on-premise models, it is recommended that further longitudinal studies for the long time strategic and economic effects of SaaS in enterprises should be conducted.

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Appendix A: Query terms and phrases

Query terms and phrases that used to search the topic index of available major databases provided by SDI - Documentation and Information Services of the Faculty of Engineering of the University of Porto (FEUP) using MetaLib search system are:

SaaS

Software-as-a-Service

Cloud computing

SaaS adoption

SaaS challenges

SaaS considerations

SaaS differentiation

SaaS in business

SaaS in companies

SaaS in enterprises

SaaS innovation

SaaS risks

SaaS strategy

SaaS values

SaaS competitive advantages

Strategic IT management

SaaS strategic benefits

Cloud computing and SaaS

Software as a Service

Appendix B: Databases used for integrated literature search

Major databases used for integrated literature search are:

Academic Search Complete

Compendex

ERIC

Inspec

SCOPUS

Web of Science

Appendix C: Summary of integrative literature review

No.	Author	Year	Title	Literature type	Relevence				Rating
					Saas	Cloud computing	IT strategy	Business strategy	
1	IBM	2014	Champions of Software as a Service: How SaaS is fueling powerful competitive advantage	Journal article	✓	✓	✓	✓	4
2	Avram, M	2013	Advantages and challenges of adopting cloud computing from an enterprise perspective	Journal article	✓	✓	✓	✓	4
3	Badger, L., Grance, T., Patt-Corner, R., & Voas, J.	2012	Cloud Computing Synopsis and Recommendations: Recommendations of the National Institute of Standards and Technology	Journal article	✓	✓	✓	✓	4
4	Desisto, R.	2012	Agenda for Software as a Service	Journal article	✓	✓	✓	✓	4
5	European Commission	2012	Unleashing the Potential of Cloud Computing in Europe	Report	✓	✓	✓	✓	4
6	Gaughan, Dennis	2014	Best Practices for Implementing a Pace-Layered Application Strategy	Journal article	✓	✓	✓		3
7	Gartner	2012	Forecast: Software as a Service, All Regions, 2010-2015	Journal article	✓		✓	✓	3
8	Genovese, Y.	2012	Accelerating Innovation by Adopting a Pace-Layered Application Strategy	Journal article		✓	✓	✓	3
9	Kaplan, J., Rezek, C. and Sprague, K.	2012	Protecting information in the cloud	Journal article	✓		✓	✓	3
10	Malladi, S., & Krishnan, M.	2012	Does Software-as-a-Service (SaaS) has a role in IT-enabled Innovation? - An Empirical Analysis	Journal article		✓	✓	✓	3
11	Correlsense	2012	Innovative Strategies for SaaS Application Performance Management	Report	✓		✓	✓	3
12	Liebmann, L.	2012	SaaS's Strategic Role in the Enterprise	Journal article	✓		✓	✓	3
13	McKinsey	2012	Where the cloud is likely to grow	Journal article	✓		✓		3
14	Minney, R.	2012	SaaS is Still the Smart Choice for Business	Journal article	✓		✓	✓	3
15	Desisto, R.	2011	The Future of Cloud Business Applications	Journal article		✓	✓	✓	3
16	Hinchcliffe, D.	2011	Moving Beyond Systems of Record to Systems of Engagement	Survey	✓		✓	✓	3
17	Janssen, M., & Joha, A.	2011	Challenges for adopting cloud-based software as a service (SaaS) in the public sector.	Report	✓		✓	✓	3
18	Nefdt, R., Miller, D., Spivack, J. and McGee, S.	2011	Issues and trends: Assessing and managing SaaS risk	Survey		✓	✓	✓	3
19	Verma, G.	2011	Software as a Service	Journal article		✓		✓	2
20	Youseff, L., Da Silver, D., Butrico, M. and Appavoo, J.	2011	Understanding the Cloud Computing Landscape	Journal article			✓	✓	2

Appendix C: Summary of integrative literature review (continued)

No.	Author	Year	Title	Literature type	Relevence				Rating
					Saas	Cloud computing	IT strategy	Business strategy	
21	Grant Thornton	2011	Issues and trends: Assessing and managing SaaS risk	Journal article			✓	✓	2
22	Sage	2011	ERP Modernization.	Journal article			✓	✓	2
23	Swanton, Bill	2011	Pace-Layered Application Strategy for Governance and Change Management	Journal article			✓	✓	2
24	Mell, P. and Grance, T.	2011	The NIST Definition of Cloud Computing	Journal article		✓	✓		2
25	Hanschke, I.	2010	Strategic IT Management	Journal article			✓	✓	2
26	Subashini, S. and Kavitha, V.	2010	A survey on security issues in service delivery models of cloud computing	Journal article	✓		✓		2
27	Chou, Y.	2010	Cloud Computing Primer for IT Pros	Journal article		✓	✓		2
28	Godse, M. and Mulik, S.	2009	An approach for selecting software-as-a-service (SaaS) product	Journal article	✓		✓		2
29	Menken, I.	2009	Cloud Computing Specialist Certification Kit – Software as a Service & Web Applications	Journal article			✓	✓	2
30	Liao H. and Tao C.	2008	An Anatomy to SaaS Business Mode Based on Internet	Report	✓		✓		2
31	Xin, M. and Levina N.	2008	Software-as-a-Service Model: Elaborating Client-side Adoption Factors	Online article		✓	✓		2
32	Kaplan, J. M.	2007	Saas: Friend or foe? Business Communications Review	Online article			✓	✓	2
33	Carraro G. and Chong F.	2006	Software as a Service (SaaS): An Enterprise Perspective	Online article			✓	✓	2
34	Sääksjärvi, M., Aki L., and Henry N.	2005	Evaluating the software as a service business model: From CPU time-sharing to online innovation sharing	Book	✓	✓			2
35	Luftman, J. N.	2000	Assessing Business-IT Alignment Maturity	Online article	✓			✓	2
36	Henderson, J. C. and Venkatraman, N.	1999	Strategic Alignment: Leveraging information technology for transforming organizations	Journal article			✓		1
37	Wilson, T. D.	1989	The implementation of information system strategies in UKcompanies: Aims and barriers to success	Journal article	✓				1

Appendix D: Companies mentioned

Companies mentioned in this dissertation are:

Correlsense (www.correlsense.com)

Gartner (www.gartner.com)

Grant Thornton (www.grantthornton.com)

IBM (www.ibm.com)

KPMG (www.kpmg.com)

McKinsey (www.mckinsey.com)

Sage (www.sage.com)

Salesforce.com (www.salesforce.com)