The Impact of Information Technology (IT) Risk Management on Strategic Agility and Organizational Performance: A Study on Small and Medium-Sized Enterprises (SMEs) in Penang, Malaysia

BY
SIM POO BENG

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ABBREVIATION

Abbreviation	Description
AEC	ASEAN Economic Community
AVE	Average Variance Extracted
BSC	Balanced Scorecard
CR	Composite Reliability
EU	Environmental Uncertainty
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GOF	Goodness Of Fit
ICT	Information and Communications Technology
IS	Information System
IT	Information Technology
ITRM	Information Technology Risk Management
MITI	Ministry Of International Trade And Industry
NSDC	National SME Development Council
OP	Organizational Performance
PLS	Partial Least Squares
RBV	Resource Based View
RFID	Radio Frequency Identification
ROI	Return On Investment
SA	Strategic Agility
SEM	Structured Equation Modelling
SME	Small And Medium-Sized Enterprise
SME Corp	Small And Medium-Sized Enterprise Corporation
TOE	Technology-Organization-Environment

ABSTRAK

Tujuan kajian ini adalah untuk mengkaji kesan teknologi maklumat pengurusan risiko dalam meramalkan prestasi organisasi. Di samping itu, ketangkasan strategik telah diterokai sebagai faktor mediasi dan ketidakpastian alam sekitar sebagai faktor sederhana dalam kajian ini. Kajian itu dijalankan di kalangan 163 perusahaan kecil dan sederhana (PKS) di negeri Pulau Pinang, Malaysia. Pada dasarnya, kajian ini telah membina satu rangka kerja berdasarkan teori pandangan berasaskan sumber. Data yang diperolehi dianalisis dengan menggunakan perisian SPSS dan SmartPLS alat statistik. Hasilnya membuktikan bahawa teknologi maklumat pengurusan risiko telah signifikan dengan prestasi organisasi. Selain itu, moderator, ketidakpastian persekitaran dibenarkan mempunyai hubungan yang signifikan antara teknologi maklumat pengurusan risiko dan prestasi organisasi. Demikian pula, ketidakpastian alam sekitar juga telah mendapati bahawa mempunyai kesan antara hubungan ketangkasan strategik dan prestasi organisasi yang sederhana. Akhir sekali, ketangkasan strategik dibenarkan mempunyai hubungan yang signifikan antara teknologi maklumat pengurusan risiko dan prestasi organisasi. Setiap PKS bergantung kepada IT dalam persekitaran perniagaan yang mencabar sebagai aset IT dapat meningkatkan produktiviti dan kecekapan operasi . Oleh itu , pengurusan risiko IT memainkan peranan penting dalam melindungi aset IT dari ancaman dalam dan luar. Kesimpulannya, adalah penting untuk perniagaan kecil dan sederhana (PKS) untuk memahami kepentingan teknologi maklumat pengurusan risiko yang akan mengubah mereka, dan akhirnya menjadikan mereka lebih berdaya saing dan berjaya dalam industri ini.

ABSTRACT

Purpose of this research is to investigate the effect of information technology (IT) risk management in predicting organizational performance. In addition, strategic agility had been explored as a mediating factor and environmental uncertainty as a moderating factor in this research. The survey was conducted among 163 small and medium-sized enterprises (SMEs) in the State of Penang, Malaysia. In essence, this research had built a framework based on resource based view theory. The collected data was analyzed by using SPSS and SmartPLS statistical tool. The result proved that information technology (IT) risk management was significantly related with organizational performance. Moreover, the moderator, environmental uncertainty was justified has significant relationship between information technology (IT) risk management and organizational performance. Similarly, environmental uncertainty was also found that had moderating effect between the relationship of strategic agility and organizational performance. Lastly, strategic agility was justified has significant relationship between information technology (IT) risk management and organizational performance. Every SME depend on IT in the fast changing business environment as IT assets are able to increase their productivity and operational efficiency. Hence, IT risk management play a major role in protecting the IT assets from any internal or external threats. In summary, it is crucial for small and medium-sized enterprises (SMEs) to understand the importance of information technology (IT) risk management that would transform them, and eventually make them more competitive and successful in the industry.

CHAPTER 1

INTRODUCTION

1.1 Introduction

In Penang, there were two foremost changes of economy for the five decades. Prior to 1960s, trade is the major contribution to Penang's economy. In addition, the status of free port had made it become a significant commerce and trade centre in the Northern Region of Malaysia, Indonesia, Brunei, South Thailand and India (Chin, 2006). The first industrial estate in Penang was established in Prai and Mak Mandin in the early of 1960s by the Chief Minister, Wong Pow Nee (1957 until 1969). Despite employment and productivity were increased, it was insufficient to offer a sufficient amount of jobs to Penang labor force that was mainly involved in trading (Tang, 1993). According to Penang Development Corporation (1990), unemployment rate had hit 14.5 percent by the end of 1960s. In contrast, unemployment rate for the nation was only 7.3 percent.

In year 1969, under the leadership of Dr Lim Chong Eu, Penang was transformed to industrialization which was the crucial for its' economy growth. In 1971, Sungai Keluang in Bayan Lepas, Penang was introduced as the Malaysia's first Free Trade Zone (Ismail, 1981). Industrialization policy that implemented in Penang had attracted Foreign Direct Investment (FDI), increased employment opportunities, opened an opportunities to the local entrepreneurs such as small and medium-sized enterprises (SMEs). In the mid of 1990s, SMEs mushroomed and economy of Penang was at peak level. Nevertheless,

economy of the whole Malaysia was affected due to the Asian Economy Crisis in third quarter of 1997. Almost entire sectors in Malaysia were affected by the crisis.

The Malaysia government had implemented several measures to respond to the economy crisis. They had introduced capital control method to fight against economy crisis. It is a good way to monitor the flowing of money in and out of Malaysia. Implementation of capital control had brought stability to the entire Malaysia economy (Sam, 2012). Until present, Malaysia still emphasizes the development of SMEs as they are important to the economy growth of the country. SMEs are the backbone of manufacturing industry in Penang.

There are more to be done to develop and grow the SMEs sector, in order to make them to turn out to be world-class players. According to Heng Tuck Lee, who is the President of Penang Free Trade Zone Companies Association, advised the government to provide more fund allocation to the SMEs sector, to enable the SMEs to build up their technological competencies and to strengthen their own products. Traditionally, SMEs are involved in low value-added activities such as sub-contractors or engaged in supporting industries. As a result, their contribution to GDP is relatively low as compared to SMEs in other developed countries. The national President of SME Association of Malaysia, Teh Kee Sin claimed that there are plenty of SMEs are unaware of the Asean Economic Community (AEC). It is a big problem to the SMEs as upon taken place of AEC, markets will be released and meantime, other competitors will make their entry into the market as well. If the local SMEs are not well-prepared, they might be wiped out from the market (Tang, 2014).

A recent study on the SMEs sector in Penang shows that manufacturing related SMEs account for 88 percent of total establishment, total employment at 26 percent and gross output value is 15 percent (investPenang, 2012). Penang State Government is promoting SMEs aggressively and to develop the growth of SMEs in order to secure economy growth of the state. Based on higher operational cost and the recent government's fiscal consolidation, SMEs are still optimistic towards their business outlooks in 2014. Reason behind is mainly due to better worldwide market condition and the resilient domestic economy. The improving of worldwide economic landscape is anticipated to make a positive contribution in external demand for the entire nation. In a recent survey conducted by United Overseas Bank (Malaysia) Berhad, there were 72% SMEs owners enjoyed positive growth in revenue in 2013, which was mainly contributed by domestic economy (Levina, 2014). There are more than 56% SME owners were confident towards their business prospects for next three consecutive years, 42% SME owners were neutral, whereas the remaining 2% were negative towards their business prospects in the future. Therefore, growth of the nation's Gross Domestic Product (GDP) is expected to be strengthened to 5.2% in 2014.

Despite SMEs sector is a crucial component in the economy, still there are many SMEs are unable to sustain their business in the long run. Ultimately, the SMEs encounter plenty of problems and they fail to survive in the market (Wong, 2013). There are researchers suggested that strategic information system has positive connection with performance of organization (Kakoli, 1999). Increasing of reliance on IT to secure strategic benefits for the organization is subject to different kinds of IT risks. Hence, IT

risk management is important and it serves as a disaster improvement planning to reduce the losses which has direct negative impacts towards organizational performance.

The agility concept has emerged to address how organizations can operate and nurture in the turbulence environment. This concept is targeted to support the organizations to be more proactive and think forward in the business plans and processes in the industry (Hossam, 2011). Strategic agility gives a direction to organizations to improve their business activities. It also assists the organizations to formulate business strategy and ultimately, it increases performance of the organizations. Therefore, strategic agility is crucial towards the development and growth of resilient SME sector.

Therefore, this research is to investigate the impact of information technology (IT) risk management on strategic agility and organizational performance among SMEs in Penang, Malaysia.

1.2 Definitions of SMEs in Malaysia

Small and medium-sized enterprises (SMEs) have been recognized as being increasingly important to the growth of the economy and represent an important pillar for nation's economy development (Ali & Nelson, 2006; Dhesi, 2011a; Shanker C, 2010). The definitions as well as the criteria used to clarify SMEs have excessively changed over the years reflecting the importance of SMEs in Malaysia. Definitions of SMEs found in Malaysia are mainly based on fixed quantitative criteria such as number of employees, amount of capital, amount of assets and sales turnover. According to SME Corporation Malaysia, the new SMEs definitions was endorsed and redefined in July 2013 as follows:

1. A small-sized firm as “a firm with less than 75 full-time employees, and with an annual turnover of not more than RM15 million”.

2. A medium-sized firm as “a firm with between 75 and 200 employees, and with an annual turnover of between RM15 million and RM50 million”.

Ministry of International Trade and Industry (MITI) revealed that this new definition is better reflecting the importance of the SMEs because supporting SMEs in major industries. Later, the National SME Development Council has approved the common definitions of SMEs across economic sectors and financial institutions for adoption by all Government Ministries and Agencies involved in SMEs development on 9 June 2005.

Enterprise will be classified as SMEs if the firm meets either the specified number of employees or annual sales turnover definition as shown in the table 1.

	Micro Enterprise	**Small Enterprise**	**Medium Enterprise**
Service, Primary Agriculture and Information & Communication Technology (ICT)	Sales turnover of less than RM300,000 or full time employees less than 5	Sales turnover between RM300,000 and less than RM3 million or full time employees between 5 and 30	Sales turnover between RM3 million and RM20 million or full time employees between 30 and 75

Manufacturing, Manufacturing-Related Serviced and Agro-based Industries	Sales turnover of less than RM300,000 or full time employees less than 5	Sales turnover between RM300,000 and less than RM15 million or full time employees between 5 and 75	Sales turnover between RM15 million and RM50 million or full time employees between 75 and 200

Table 1: Definitions of SMEs

Classification of sectors is to ensure the similarity of data from different sources which is deemed comparable and to assist on the data harmonization among the providers of SMEs statistics. The classification is as below:

- Services – It relates to all kind of services, comprises of business, hotels and restaurants, distributive trade, ICT services, entertainment, private health and education, manufacturing-related services (Research & Development), financial intermediation, warehousing, logistics and so forth.

- Manufacturing – It relates to physical transformation or conversion of raw materials of components into finished goods or new products.

The National SME Development Council (NSDC) was established in June 2004, representing the government's high attention and commitment in promoting SMEs development. According to SME Corporation Malaysia, NSDC has instituted guidelines for development of SMEs as below:

- SMEs to higher the productivity via using modern management and technology to increase their competitiveness in export market.

- SMEs to complement and to support the heavy industry, large scale industry and modern industry via industrial linkages system.

- SMEs to assist on economy balancing by make use of the modern technology and to assist on a fair distribution of income. SMEs are to provide high quality and value-added products and services in the domestic and export market, which has a significant contribution to the Gross Domestic Product (GDP).

Due to unanticipated business environment, SMEs are facing great challenges to survive in the industry. With this regard, SMEs have to make use of IT in order to counter back the uncertainties. IT is an important weapon for the SMEs to sustain and make succeed in the business. Hence, IT assets such as networking, hardware and software are the key resources for the SMEs. Moreover, SMEs have to be well-prepared towards the threats derived from the uncertain environment. They have to possess their capabilities and resources so that they are able to identify the threats and respond to the threats effectively. To become more competitive, SMEs have to be agile in the aspect of business strategies and processes to allow them to attain competitive advantage in the business world. In view of the importance of IT assets towards SMEs' performance, IT risk management is an essential component for them to sustain and improve further their business performance. It serves as a tool to protect IT assets from any internal or external threats which could harm the business operations of the SMEs.

1.3 Problem Statement

SMEs sector is the main contributor to the nation's Gross Domestic Product (GDP), they are the building blocks for the nation's economies. Despite SMEs is an important sector in the nation, many of the SMEs are fail to sustain their business performance over the long run. In the end, the SMEs are unable to survive and make succeed in the industry. Nowadays, due to massive changes in the world economy, SMEs are encountering new challenges, such as economic downturn, stiff competition, technological changes, and instability of demand and so on and so forth. The challenges have created a great burden and trouble to the SMEs.

According to SME Corp. Malaysia, performance of SMEs in the nation remains encouraging as the Gross Domestic Product (GDP) growth of SMEs has slightly picking up to 6.3% in 2013 as compared to 6.0% in 2012 and 7.0% in 2011. Based on the key statistics prepared by SMEs by Department of Statistics of Malaysia, revealed that Gross Domestic Product (GDP) growth of SMEs for the past 10 years, the highest growth is recorded high at 10.0% in 2007. Growth rate of SMEs employment and productivity of labor recorded an encouraging performance as compared to overall growth of total employment and productivity of labor. It grows by 6.3% (growth of total employment was 5.9%), whereas productivity of labor was recorded a declining rate by 0.1% (overall labor productivity was declined by 1.1%) in 2013. The outpacing economic sector is the services sector, construction sector and mining sectors. Gross Domestic Product (GDP) growth of SMEs was entirely supported by strong domestic demand, which is led by investment and consumption activities. According to SME Corp. Malaysia, growth of SMEs is anticipated to sustain at 5.5% - 6.5% in 2015.

In many other developed countries, SMEs make a great contribution to the Gross Domestic Product (GDP) which is ranging between 40% and 60% and creation of employment of 60%. However, SMEs sector in Malaysia has yet to reach the level. According to the Deputy Prime Minister Tan Sri Muhyiddin Yassin, SMEs has contributed 31% to the overall Gross Domestic Product (GDP) and 59% employment by key economic activities. SMEs sector still have to catch up in order to help the nation to achieve a developed nation by 2020 (Chermaine, 2013). Government has realized and recognized the importance of SMEs, they have been giving every effort to ascertain the SMEs sector able to flourish continuously in Malaysia. To accomplish this, government has allocated funds to assist the SMEs to finance their working capital, such as investing in IT to further enhance their business strategies and processes. SMEs are become IT dependents and by using of technology, SMEs are able to increase their business performance.

Based on the recent Budget 2014, Malaysia government has proposed the implementation of SME Investment Partner in order to accelerate the participation of SMEs in economic activity. The targeted SMEs contribution to GDP is 41% by year 2020. Under this program, SMEs will be provided financing assistance in form of equity, loans or both. An initial fund totalling RM375 million will be provided for a period of five years. In addition, allocation of RM80 million for Automation and Modernization of SMEs will be given in order to assist the SMEs to increase use of new technology, innovation and automation in the development of their business. Increasing of Bumiputera SMEs is also an initiative of government to increase the participation of Bumiputera entrepreneurs to contribute towards economy activity in the nation.

Altogether, there are 13 specific programs for SMEs development with total funding of RM2.6 billion which cover a vast spectrum of beneficiaries and targeting to promote high growth and innovative organizations, increasing productivity and business formation, as well as overall conductive entrepreneurship ecosystems (Sharifah, 2014).

Performance of SMEs is significantly affected by the challenges, which are the unforeseen events in the business environment. To counter back the unanticipated events, SMEs have to leverage on IT in order to sustain their business performance. IT is a tool that can provides significant impact towards organizational performance. Therefore, SMEs are high IT dependents and they have been investing massive amount of money in IT so that they are able to achieve competitive advantage and increase their business performance. Highly use of IT is subject to various IT risks and thus, IT risk management is an essential component in sustaining and improving organizational performance of the SMEs. Objective of IT risk management is to protect and to secured IT assets, such as software, hardware, data and facilities from the internal and external threats. It is a tool to mitigate the losses by implementing the combination of protection measures (Rainer, 1991).

Moreover, SMEs must well-equipped with unexpected thinking towards awareness of threats in the uncertain environment. They have to possess their own capabilities and resources in order to identify and respond to the threats effectively. Their business strategies and processes have to be agile to enable them to achieve competitive advantage. Strategic agility is able to renew and transform the SMEs without losing their momentum (Akanbi, 2012). Strategic agility can help the organizations to introduce and produce the right services and products at the right time, at the right place, at the right

price for the right consumers. SMEs that are agile are able to contribute enormously towards the achievement of developnment goals by making their contribution to the economic growth. Organizations have to be more proactive and they must react accurately to the opportunities and challenges derived from the business pressures, so that they are able to survive and to achieve competitive advantage over other competitors in the industry.

The challenge of IT risk management on strategic agility and organization's performance is getting intense to the SMEs in the country. It also presents a new challenge to the SMEs of an in-depth understanding the complex relationship of strategic agility and organization's performance. In this regard, it is a timely and imperative to conduct this study in the SMEs sector, in view of the fact that SMEs' have significant contribution to the growth of the economic.

Hence, this research investigates the impact of information technology (IT) risk management on strategic agility and organizational performance among SMEs in Penang, Malaysia.

1.4 Research Objectives

This study is intended to explore the impact of information technology (IT) risk management on strategic agility and performance of SMEs in Penang, Malaysia. Meanwhile, this research is attempting to accomplish the following objectives:

a. To examine the relationship between information technology (IT) risk management and organizational performance among small and medium-sized enterprises (SMEs) in Penang.

b. To examine the relationship between information technology (IT) risk management and strategic agility among small and medium-sized enterprises (SMEs) in Penang.

c. To examine the relationship between strategic agility and organizational performance among small and medium-sized enterprises (SMEs) in Penang.

d. To examine the moderating effect of environmental uncertainty on the relationship between information technology (IT) risk management and organizational performance among small and medium-sized enterprises (SMEs) in Penang.

e. To examine the moderating effect of environmental uncertainty on the relationship between strategic agility and organizational performance among small and medium-sized enterprises (SMEs) in Penang.

f. To examine the mediating effect of strategic agility on the relationship between information technology (IT) risk management and organizational performance among small and medium-sized enterprises (SMEs) in Penang.

1.5 Research Questions

In attempting to accomplish the above objectives, the questions in this study comprises of the followings:

a. Does information technology (IT) risk management affect organizational performance among small and medium-sized enterprises (SMEs) in Penang?

b. Does information technology (IT) risk management affect strategy agility among small and medium-sized enterprises (SMEs) in Penang?

c. Does strategic agility affect organizational performance among small and medium-sized enterprises (SMEs) in Penang?

d. Does environmental uncertainty moderate the relationship between information technology (IT) risk management and organizational performance among small and medium-sized enterprises (SMEs) in Penang?

e. Does environmental uncertainty moderate the relationship between strategic agility and organizational performance among small and medium-sized enterprises (SMEs) in Penang?

f. Does strategic agility mediate the relationship between information technology (IT) risk management and organizational performance among small and medium-sized enterprises (SMEs) in Penang?

1.6 Scope of the Study

The companies covered in this research are SMEs in the Penang, Malaysia. The unit of analysis in this study is SMEs from different industries in Penang, Malaysia. Purpose of the study is to investigate the extent of relationship between information

technology (IT) risk management and strategy agility towards organizational performance for SMEs in Penang, Malaysia.

1.7 Significance of the Study

Building a group of unique and competitive SMEs in Malaysia is imperative towards the achievement of the sustainability of the country economic growth. SMEs are able to offer a great foundation for Malaysia's development. According to Ahmad (1999), the greatness contribution of SMEs to employment generation is an ordinary phenomenon in every developing countries, which is 70% to 95% for Africa and 40% to 70% for Asia-Pacific countries. There were studies showed that SMEs have encountered with significant changes of structure, such as market penetration, degree of capitalization and product composition so that they are able to align with the technology changes, market access and market demand derived from market liberalization and globalization (Ahmed, 2001; ADB, 2001; USAID, 2001).

According to Rainer (1991) and Vitale (1986), information technology (IT) risk management is a crucial matter in an organization, but most of them do not equip with a up-to-date and tested risk management method in the organization. Recent years, many organizations are technology-dependent and they are now more vulnerable to the treats of IT risk. Therefore, this requires the organizations to analze the risk correctly, establish level of the risk and subsequently take correct actions wisely. IT managers have to figure out the value of the IT assets thoroughly, identify different level of IT risk, as well as the vulnerability of the IT assets towards these risks. Understanding of entire impact of IT

risk on the organization will give an insight to the management for wise and prudent decision in the process of IT risk management.

This research is deemed interest in SMEs industry in sustaining and further increasing the organizational performance of the SMEs. SMEs have spent countless of time and amount of money to pursue their strategy by focusing on the IT risk management. Flexibility or aligility of organization's strategy has become crucial in the SMEs industry, which means that the ability of the organization to sense environmental change and to respond readily in the industry.

Lastly, this research will offer a clear picture for the organizations to recognise the impact of IT risk management on strategic agility and the organizations' performance in the SMEs industry. Therefore, the outperform SMEs will have better competitive advantage in sustaining customer base over other competitors.

1.8 Definition of Key Terms

The following are definitions to explain the key terms used in this research.

Small and Medium Enterprises (SMEs) refers to those companies with annual sales turnover not more than RM50 million or full time employees not more than 200 (SME Corporation Malaysia, 2013).

Information Technology (IT) risk management is a component of enterprise risk management system. There are four elements of risk management i.e. risk identification, risk analysis, risk-reducing measures and risk monitoring (Rainer, 1991; Eloff, 1993; Epich, 1994; Lightle, 1992; Loch, 1992; Vitale, 1986).

Strategy agility sometimes refers to strategic agility. It is about the ability of organization to keep pace due to dynamic change of market, expansion of manufacturing globally, and outsourcing of business processes. It also relates to the ability of the organization to take advantage of the changes to achieve and sustain competitive advantage (Hitt, 1998; Hitt M. B., 1998; Lau, 1996; Lee, 2001; Sanchez, 1995; Skordoulis, 2004).

Organizational Performance may refers to variuos type of outcomes, such as product market (market share, sales , etc), financial performance (profit, return on investment, return on assets) and shareholders' returm (total shareholders' return, economic value added, etc) (Richard, 2009)

1.9 Organization of Report

Chapter 1 presents background of the study, problem statement, research objectives, research questions, scope of study, significance of study and definition of key terms. Chapter 2 discusses literature review related to this study, in particular of the information technology (IT) risk management, strategic agility and organizational performance. This chapter also covers theoretical framework and hypotheses development as well. Chapter 3 focuses on the design of the study and methodology procedures. Chapter 4 discusses the finding which is derived from the tested research hypotheses. Chapter 5 presents the findings and the implication of the study for the managerial and theoretical perspectives. Limitations of this study, proposed suggestion for future study and conclusion have been discussed in this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Most previous research study on the challenges and determinants of SMEs business success has been conducted in Malaysia. Study on the impact of information technology (IT) risk management on strategic agility, environmental uncertainty and organizational performance in Malaysia is still lacking. This chapter reviews findings and facts from previous studies and reports which are most relevant to this study. This chapter shows the theoretical framework and hypotheses that look for the answer the research questions that stated in chapter 1. Subsequently, resource based view theory to explain the entire theoretical framework also included in this chapter. There are hypotheses to address the issues in Information Technology (IT) risk management, strategy agility, environmental uncertainty that affect performance of organization.

2.2 Related Theory

A theory is to be discussed to address the entire theoretical framework in this research. Based on the framework, resource based view theory is to be used in this research.

2.3 Resource Based View Theory

The conceptual model in this study has been developed according to resource based view theory. It is a model to illustrate how organizations compete, which is exclusive to the aspect of strategic management. This theory is to study on organizations' capabilities and resources that can impact on their business performance (Godfrey, 1995; Barnett, 1994; Henderson, 1994). A resource is relates to an input or asset to production that owned, controlled and can be assessed by an organization (tangile and intangible assets). Whereas organizational capability is relates to an organization's ability towards performing set of jobs by utilizing resources of the organization, in order to achieve a certain result that benefit the organization. According to Winter (2000), operational capability is about a collection of routines (or high level of routine) that integrates organizations' decision to produce significant outcome.

According to Barney (1991) study, organizational resources has been greated influenced by resource based view. There are many studies relate resource based view as the core framework in strategy literature (Newbert, 2007). Therefore, these resources can be treated as the heart of the resource based view (Eisenhardt, 2000). In Barney's research, he has addressed resources enable organizations to get and sustain competitive advantage are resource heterogeneously and resource immobility. Heterogeneity of resources and capability of an organization is one of the basis of resource based view theory. With proper understanding of the heterogeneity of resources and capability is a benefit to the organizations to look for ways to achieve competitive advantage (Peteraf, 1993; Hoopes, 2003). The capability of lifecycle offers a manner of thinking pertaining to the evolution of capability and also a dynamic or active approach to resource based

view theory. Dynamic capability is viewed as ability of organizations to build, reconfigure and integrate their internal cum external competency to deal with the changing environment rapidly. According to Teece (1997), dynamic capability does not has direct impact on the output of organizations, but it contributes indirectly towards to their output via the impact on the operational capability. According to Constance and Margaret (2003), competitive advantage and competitive disadvantage can be derived over some period of time and may also change over the time. Hence, resources based review must be included the evolution of the time towards the resources and capability of the organizations.

Information technology (IT) can be considered as a valuable and important resource that able to improve profits of organization (Ravichandran, 2005) in view of the integrated information technology capabilities that able to provide high skilled staffs, flexibility in information technology and constructive information that hardly copied by their competitors. Meanwhile, there are still many researchers study on the relationship between information technology (IT) which is based on resource based view and performance of organization (Anand, 2013; Jiao, 2008; Liu, 2013). All the studies have constructed theoretical framework according to the resource base view to examine organizational performance.

In addition, there are discussions on resource based view theory in environmental uncertainty. According to Wu (2010), resource based view is applicable to environmental uncertainty by looking at companies in Taiwan. He also claimed that resource based view is able to affect the achievement of competitive advantage with valuable, non-substitutable and rare resources effectively in organization. Mao, Liu and Zhang (2013)

argued that resource based view conjectures capability of information technology (IT) is able to improve performance via agility. Moreover, Richey (2010) suggested that collaboration of capacity is related to resource based view theory and it is able to bring advantages to the organization. This is because collaboration of capacity is valuable, non-substitutable and hardly to copy by other competitors. Organizations that own valuable, non-substitutable and rare resources is able to enjoy competitive advantage and further improve their organizational performance.

There are also many studies examine the importance of dynamic capability towards achievement of competitive advantage under environmental uncertainty (El Saw, 2008; Newbert, 2007; Wu, 2010; Wu, 2007). According to Wu (2010), organizations' dynamic capability has direct impact on the competitive advantage and environmental uncertainty in Taiwan. Those organizations that have dynamic capability are able to enjoy competitive advantage even at a high environmental uncertainty. Beside that, there were previous researchers who constructed framework according to the view of dynamic capability to assess capability of information technology (IT) affects strategy agility and subsequently enhance organizational performance (Agarwal, 2009; Dunlop-Hinkler, 2011). Mavengere (2013) has applied dynamic capability in developing strategy agility to assess how organization make use of information technology and meantime, to apply organizations' strategy into the environmental to compete and survive in the market.

2.4 Information Technology (IT) Risk Management

Organizations' expenses on information technology (IT) have increased rapidly as they are heavily technology dependent, ranging from technologies used to prepare documentation and transportation goods to other technologies that embodied into the products (Sharon, 1996). IT consists of the information system and computer technologies. The former can be includes related information which business processes and functions depends on, whereas the latter is software and hardware that support the storage, processing and distribution of data and information.

IT plays an important role in organization, hence IT personnel have to identify and deal with the risks to IT data and systems, by reducing or managing those risks, as well as to develop a plan in case of IT crisis. IT risk comprises of software and hardware failure, spam, viruses, human errors, as well as other natural disasters such as floods, fires or cyclones (Queensland Government, 2014). According to Kakoli, Peter, and Kathleen (1999), there are 4 major components of IT risk management: risk identification, risk analysis, risk-reducing measures and risk monitoring. IT risk management focuses on the linkage of the 4 major components, allowing IT personnel to understand and identify a course of action in each steps.

2.4.1 Risk Identification

IT risk management begins with risk identification which allows organization to establish possible impact from the internal, as well as external threats towards the whole

IT environment in the organization. IT environment comprises of 3 levels: application level, organizational level and inter-organizational level (Kakoli, 1999).

2.4.1.1 Application Level

The application level is dealing with technical risks or failure of IT implementation. This type of risk can be caused by internal or external sources. Internal threats are derived from authorised or non authorised access which leads to abusement of the system. Whereas external threats are such as computer viruses, hackers, natural disaster and acts of their competitors. All this threats are able to affect severely on the IT assets. Loch (1992) claimed that employees' actions and IS managers are the greatest risk at the application level.

2.4.1.2 Organizational Level

At this level, it focuses on the impact of IT risk to all functional areas in the organizations, instead of isolated application. IT impact has positive relationship to the turnover of inventory, quality of product and utilization of capacity at this level. Increasing of IT-dependent to secure strategic benefits to the organizations can also bring different type of risks to the organization. Kakoli (1999) revealed that those initially success of information system could also bring to organizations' failure eventually. Organizations that invest greatly in IT have to do so continuously to make their business viable. This is because when the organizations fail to do so, they may turn into vulnerable to other competitors that equipped with many resources.

Kakoli (1999) recognized 3 types of organizational risks: sustainable risk, data security risk and legal risk. Sustainability risk is about the risk that generated from the sustainability of the organizations' competitive advantage by using IT in a long run basis. Data security risk is derived from the strategic usage of data in the organizations. They have to bear huge losses from the destruction of data. Whereas legal risk is about the possibility of violation of customers' right, as well as competitors' right by using IT applications.

2.4.1.3 Inter-Organizational Level

At this level, it focuses on the risk derived from the network environment that organizations operate in. The greatest use of IT entail huge networks that exceed organizational boundaries. Growth in the inter-organizational system has resulted increased of flexibility, productivity and competitiveness. IT plays a crucial role in improving inter-organizations relationship. However, IT still brings risk to organizations. According to Kakoli (1999), some of the greatest risks contributed by networked environment: weak and ineffective of controls, computer hackers and natural disasters.

2.4.2 Risk Analysis

There are few methodologies to figure out the extent of IT losses, such as qualitative and quantitative analysis. Qualitative analysis apply descriptive of variables to analyze IT risk. It can be in the form of survey, questionnaires, scenario analysis. Quantitative analysis is based on the expected value of analysis, such as assigning certain

amount of value to each type of risks by applying probability theory. Rainer (1991) has recommended both qualitative and quantitative analysis to risk analysis. Combination of both analysis is more effective compare to any one method due to its' nature of flexibility in taking into the consideration of variety IT assets. March and Shapira (1987) argued that there are plenty of organizations are depend on their managers' attitute and perception towards the risks when conducting risk analysis. The managers' risk perception is actually differ from the theoretical of risk concept, which could impact the outcome of the analysis.

2.4.3 Risk Reducing Measures

William (2003) highlighted the essential of disaster recovery plan by gaining attention on the positive correlation between the existence of a recovery plan and the likelihood of an organization to fully recover from disaster. Disaster recovery plan is able to assist organization from huge business losses. Risk of data security may derived from unauthorized or authorized access to IT assets of the organization. According to Bidgoli and Azarmsa (1989), by introducing password and access code, prepare backup files can improve data security of organizations. Fried (1993) also claimed that data encryption is also another method of effective security in organization. Prevention of viruses infection of computers can be conducted via back-up technique, using passwords, proper education to employees, security policies, virus scanning software and strict audit procedures.