

**Organization Determinants of Incremental and Radical  
Innovations in Industries Operating  
In Malaysia**

**By  
Gunaselan S/O Letchemenan**

Research report submitted in partial fulfillment of the requirements for the  
degree of Master of Business Administration

April 2006

*Dedication*

*.....to my wife*

## **ACKNOWLEDGEMENT**

I wish to express my heartfelt appreciation to my supervisor, Associate Professor T. Ramayah for his guidance and encouragement throughout the research and thesis write up. I also wish to accord my appreciation to MBA classmates and friends who had so kindly responded to this survey. My sincere thanks to all the lectures in the MBA program as well.

## TABLE OF CONTENTS

	<u>Page</u>
TITLE	i
DEDICATION	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
ABSTRAK	ix
ABSTRACT	x
<b>Chapter 1: INTRODUCTION</b>	
1.1 Introduction	1
1.2 Background	3
1.3 Problem Statement	5
1.4 Research Objective	5
1.5 Research Questions	6
1.6 Definition of Key Terms	6
1.7 Significance of the Study	8
1.8 Organizations of Remaining Chapters	9
<b>Chapter 2: LITERATURE REVIEW</b>	
2.1 Introduction	10
2.2 Product & Process Innovation	11
2.2.1 <i>Radical Innovation</i>	11
2.2.2 <i>Incremental Innovation</i>	11
2.2.3 <i>Market Breakthrough</i>	12
2.2.4 <i>Technology Breakthrough</i>	12
2.2.5 <i>S-Curve</i>	13
2.3 The Relationship between Organization Factors and Innovation	14
2.4 Research Theoretical Framework	16
2.5 Research Hypotheses	17
2.5.1 <i>Communication Responsiveness</i>	17
2.5.2 <i>Organization Link</i>	18
2.5.3 <i>Openness to Change</i>	19
2.5.4 <i>Past Innovation</i>	20
2.5.5 <i>Project Champion</i>	21

2.5.6	<i>Market Orientation</i>	22
2.5.7	<i>Organization Demographics</i>	22
<b>Chapter 3:</b>	<b>RESEARCH METHODOLOGY</b>	
3.1	Introduction	25
3.2	Research Design and Procedure	25
3.2.1	<i>Nature of Study</i>	25
3.2.2	<i>Unit of Analysis</i>	25
3.3.3	<i>Research Site</i>	26
3.3	Population and Sampling Method	26
3.4	Variables and Measurement	27
3.4.1	<i>Dependent Variable</i>	27
3.4.1.1	<i>Innovation Measure</i>	27
3.4.2	<i>Independent Variable</i>	27
3.4.2.1	<i>Communication Responsiveness</i>	27
3.4.2.2	<i>Organizational Link</i>	28
3.4.2.3	<i>Openness to Change</i>	28
3.4.2.4	<i>Past Innovation</i>	28
3.4.2.5	<i>Project Champion</i>	29
3.4.2.6	<i>Market Orientation</i>	29
3.5	Data Collection Method	29
3.6	Design of Questionnaire	29
3.7	Method of Analysis	30
3.7.1	<i>Reliability</i>	30
3.7.2	<i>Descriptive Statistics</i>	30
3.7.3	<i>Regression Analysis</i>	31
<b>Chapter 4:</b>	<b>ANALYSIS AND RESULT</b>	
4.1	Introduction	32
4.2	Respondents Profile	32
4.3	Goodness of Measures	33
4.3.1	<i>Factor Analysis</i>	33
4.3.2	<i>Reliability Analysis</i>	35
4.4	Descriptive Analysis	36
4.5	Hypotheses Testing	37
4.5.1	<i>Multiple Regression</i>	37
	<i>(Organization Factors – Incremental Innovation)</i>	
4.5.2	<i>Multiple Regression</i>	40
	<i>(Organization Factors – Radical Innovation)</i>	
4.6	Summary of Hypotheses Result	41

<b>Chapter 5: DISCUSSION AND CONCLUSIONS</b>	
5.1 Introduction	44
5.2 Recapitulation	44
5.3 Discussion of Research Findings	45
5.3.1 <i>Determinants of Incremental Innovation</i>	45
5.3.2 <i>Determinants of Radical Innovation</i>	49
5.4 Implication of Findings	49
5.5 Limitation of This Study	51
5.6 Suggestion for Future Research	51
5.7 Conclusion	52
BIBLIOGRAPHY	53
APPENDIX A	58
APPENDIX B	64
APPENDIX C	66
APPENDIX D	72
APPENDIX E	81
APPENDIX F	82
APPENDIX G	85

## LIST OF TABLES

		<b>Page</b>
Table 1.0	Malaysia's Innovative Companies by Industries	4
Table 2.0	Types of Innovations	12
Table 4.0	Respondents Profile	33
Table 4.1	Factor Analysis Result	34
Table 4.2	Cronbach's Alpha Value	35
Table 4.3	Summaries of Descriptive Statistics	37
Table 4.4	Result of Multiple Regression (Organization factors – Incremental Innovation)	39
Table 4.5	Result of Multiple Regression (Organization factors – Radical Innovation)	41
Table 4.6	Results of the Tested Hypotheses	42

## LIST OF FIGURES

		<b>Page</b>
Figure 2.0	A Dynamic View of Innovation (S-Curve)	13
Figure 2.1	Innovation Framework	15
Figure 2.2	Theoretical Framework of Organizational Factors Influencing Innovation in Industries	16



## ABSTRAK

Perubahan secara mendadak dalam teknologi, perubahan undang-undang dan penambahan permintaan pengguna untuk produk yang berharga rendah tetapi berkualiti tinggi, rekacipta produk yang bermutu dan perkhidmatan yang cemerlang telah membentuk dunia perniagaan yang lebih kreatif. Satu cara untuk industri mengikut trend ini adalah dengan inovasi. Inovasi merupakan salah satu alat penting dalam kemajuan strategi industri. Kajian ini adalah mengenai kesan faktor organisasi terhadap inovasi pertambahan dan inovasi radikal. Faktor organisasi dibahagikan kepada kebolehan organisasi dan demografi organisasi. Model kajian ini diadaptasikan dan diubahsuai daripada kajian Vincent, Bharadwaj, dan Challagalla (2003). Populasi kajian ini dijalankan berdasarkan industri yang membuat kajian penyelidikan dan pembangunan atau bahagian kejuruteraan industri di Kawasan Utara Semenanjung Malaysia. Kajian ini menunjukkan bahawa kebolehan organisasi dan demografi organisasi adalah penting dan mempunyai hubungan positif terhadap inovasi pertambahan. Variasi inovasi radikal dalam kajian ini didapati kurang penting. Ini adalah disebabkan oleh industri yang menggunakan inovasi radikal adalah sangat kurang di Kawasan Utara Semenanjung Malaysia. Kebanyakan industri lebih berminat menggunakan inovasi pertambahan kerana ia meminimumkan kos dan risiko dalam industri. Melalui kajian ini, beberapa cadangan meningkatkan pengurusan secara am dapat disyorkan untuk menambahbaikkan bahagian penyelidikan dan pembangunan atau bahagian kejuruteraan dalam organisasi supaya organisasi mengeluarkan produk atau proses inovasi yang bermutu.

## **ABSTRACT**

Rapid changes in technology, regulatory change and increase in customers demand not just for lower product price but for high quality, good product design and better services have shaped the business world to be more creative. The only way for industries to keep with this trend is by innovation. Innovation is considered as one of a survival tool and a vital ingredient for strategic success. The study examined the impact of organizational factors on incremental innovation and radical innovation. An organization factor consists of organization capabilities and organization demographic. The model for this study was adopted and modified from Vincent, Bharadwaj, and Challagalla (2003). The population for the study was companies with R&D or engineering departments in the Northern Region of Peninsular Malaysia. The research findings show that organization capabilities and organization demographic is significant and has a positive relationship with incremental innovation. As for the radical innovation, all the variables are found to be not significant. This is mainly due to minimum number of companies in Northern Region of Peninsular Malaysia practicing radical innovation. Majority of the manufacturing companies prefers to practice incremental innovation, as this type of innovation will have minimum impact on cost and risk. The findings suggest several general managerial implications to improve the R&D or engineering department in the organization for better product or process innovation.

# CHAPTER 1

## INTRODUCTION

### **1.1 Introduction**

In this competitive business world, industries operating with traditional business strategies or products can no longer continue to gain higher global market share. Rapid changes in technology, regulatory and increases in customer demand not just for low price but for high quality, good product design and better services have shaped the business world to be more creative. This new trend has become a threat for both existing and new industries. In order to survive in a competitive business world, it is a must for these industries to continue strengthen their skills and business strategies. The formula, which had guaranteed success, is no longer valid. Industries must learn and adapt to this new environment (O'Hare, 1988).

To strengthen business activities in a developing economy, industries have to focus on the quality of its knowledge intensive activities. Transformation of this knowledge into products and services can only be realized through innovation. Innovation has become a survival tool and is a vital ingredient for the success of many industries. As such, industries need an environment that supports innovation and professional innovation management to be successful.

Organization and even nation to stay competitive in the dynamic and global business environment, there is a need to constantly support innovation and stay ahead in the business world. Constant innovation activities can only be achieved with good business strategies by developing new products or restructure existing products according to customer's needs and requirements.

Managing the innovation activities is another factor that needs a special attention from the organization. This includes, the cost to develop the product must be competitive to the global market. Expensive innovative products will have less opportunity to succeed in the global market, where the possibilities for a competitor to imitate or reinvent those products and produce with lower cost are very high. To manage this, organization may have to exercise their research and development (R&D) activities in the countries where expected expertise and knowledge workers are widely available and divert the production location into other countries with cheaper labour cost.

On the other hand, innovation management also includes of how to develop employees with innovative thinking. Only with innovative employees, new ideas can be translated and converted into reality. Organization must facilitate activities that enable it to create innovative employees. Successful innovators are those who can invent new products or restructure existing product or process to deliver greater value to customer according to their needs and requirement.

Recognizing innovation as an important factor to bring success to the business. Any organization that meets these challenges will make a change in the industries growth. Thus, adopting innovation activities and practices that translated into action will drive the business to success.

## **1.2 Background**

Malaysia as a developing country needs efforts to be geared towards transforming its culture into the culture of innovation. Small and Medium Enterprises (SMEs) are urged to gear up for the future and to invest in research and development, technology, people and process that enable innovation. This is to ensure continuous development of new product and services that could compete in the global market. To bring forth that innovative spirit, one must go beyond education to change values, attitudes, mindset and culture (The Sun, 2005).

Manufacturing sector is one of the important contributors to Malaysia's economic growth. The challenge now is how to maintain its competitiveness in a global trade market environment that will continue to become increasingly competitive. Based on the National Survey of Innovation (2000-2001), conducted by the Malaysian Science and Technology Information Centre (MASTIC) and Ministry Of Science, Technology and Environment, it was noted that, among the 263 companies that reported to contribute to innovation activities in Malaysia, food products and beverages sectors were found to be the largest contributors of innovations among the innovating companies (13%). This followed by companies such as publishing, printing and reproduction of recorded media (11%), wearing apparel (11%), fabricated metal products (11%) and rubber & plastic products (8%). Table 1.0 shows the Malaysian manufacturing sectors' distribution of 263 innovating companies by industries.

In terms of geographical distribution of innovating industries in Malaysia, Selangor are found to have the largest number of innovating industries (130) located. This followed by Kuala Lumpur (68), Penang (20) and Johor (11).

Table 1.0  
*Malaysia's Innovative Companies by Industries*

Malaysian Innovation Companies By Industries	Percentage
Food Products and Beverages	13 %
Publishing, Printing and Reproduction of Recorded Media	11 %
Wearing Apparel; Dressing and Dyeing of Fur	11 %
Fabricated Metal Products	11 %
Rubber and Plastic Products	8 %
Chemicals and Chemical Products	5 %
Other Non-Metallic Mineral Products	5 %
Furniture Manufacturing	5 %
Electrical Machinery and Apparatus	5 %
Others	26 %
Total	100 %

Source: National Survey of Innovation, 2000-2001

Comparison between innovation in Malaysia's manufacturing sectors and other countries indicates that, the innovation activity in Malaysia is slightly lower compared to other developed countries. Statistics compiled by the National Survey of Innovation (2000-2001) have indicated that, Portugal (26%) and Spain (29%) have a lower innovation ratio compared with Malaysia (35%). Country that is comparable with Malaysia is Finland (36%) and Belgium (34%). Other European countries are reported to have higher innovation activity than Malaysia (National Survey of Innovation, 2000-2001).

Overall, the level of innovation and pattern in Malaysian manufacturing sectors is far lower compared to other countries. This lower level of innovation will influence the growth and sales performance of the manufacturing firms. In order to stay competitive, Malaysian manufacturing sectors must increase expenditure in innovation activities and facilitate the employees to create value for innovation.

### **1.3 Problem Statement**

In a globalize business world, innovation has become a vital component for organization to stay ahead in the competition. It is considered as the only survival tool that the organization must adopt to change its business strategies. Organizations that fail to adopt these changes will find it difficult to continue sustaining in the marketplace. According to Lee (2004), to date there are only summarized statistics report that is published by The Ministry of Science, Technology and the Environment (MOSTE) on the national survey of innovation in Malaysia. No further analysis has been carried out on data gathered from these surveys.

In view of the importance of innovation as a survival mechanism for industries, it is surprising that there are very few research studies examining its importance in the Malaysia manufacturing environment. Therefore, the focus of this research is to investigate what are the organizations' factors that influence innovation in industries.

### **1.4 Research Objective**

The objective of this study is to determine what are the organizations' factors that influence innovation in the manufacturing industries. Two main organizational factors that are included in these studies are organization capabilities and organization demographic. The findings from this study will be useful for the industries as a whole to design strategies into strengthening their engineering or research & development department (R&D) by increasing the technology innovation capabilities and designing more advance and attractive products according to market needs and requirements.

## **1.5 Research Questions**

The research questions to be address is as follows.

- (i) What are the organizational capabilities factors that influence the innovation in industries?
- (ii) What are the organizational demographic factors that influence the innovation in industries?

## **1.6 Definition of Key Terms**

Key terms used through out this research are defined below for reference:

*Innovation – Innovation is the practical realization of a unique idea. It is refers to creation, development and implementation of a new product, process or service, with the intention of improving efficiency and competitive advantage. In manufacturing industries, innovation is often viewed at a product or process level. Product innovation is a good or service, which is new or significantly improved and delivered to market according to customers needs. Process innovation improves efficiency and effectiveness (Lee, 2004, working paper).*

*Technology Innovation – Technology innovation focuses on strategic investment and development on technical areas according to market needs and requirements. It directs research and development (R&D) to the creation of advanced science and technology (Lee, 2004, working paper).*



Communication Responsiveness – *Communication responsiveness is defined as ease of communication among departments to facilitate dissemination and exchange of information throughout the organization (Vincent, Bharadwaj & Challagalla, 2003).*

Organizational Link - *Organization link is defined as a relationship between firms through collaborative or subcontractor linkage (Vincent, Bharadwaj & Challagalla, 2003).*

Openness To change - *Openness to change is defined as a favorable attitude towards change that provides organization with a culture open to innovation (Vincent, Bharadwaj & Challagalla, 2003).*

Past Innovation - *Past innovation is defined as a previous successful product or process innovation (Vincent, Bharadwaj & Challagalla, 2003).*

Project Champion – *Project champion is defined as an individual who support and drive a project forward and is crucial to its success. Part of the responsibility is to assist and mentor the team and navigate any roadblocks to keep the project on track. A champion is also act as a hub for all communication related to the project (Vincent, Bharadwaj & Challagalla, 2003).*

Market Orientation – *Product designed base on consumer's needs and requirements (Vincent, Bharadwaj & Challagalla, 2003).*

## **1.7 Significance of the Study**

As stated earlier, in a competitive business world, innovation can be considered as one of a survival tool for any industry. Generally, technology innovations have changed the international trade market, industries business structure, survival and growth of new and existing industries. These changes in market structure and technology innovation have a very high impact on high-tech industries such as Information Technology (IT), engineering, infotainment and multimedia. In line with this, for firms and industries to stay competitive in the dynamic and global environment, there is a need to constantly develop innovation activities and stay ahead in the business world.

In order to maintain the constant innovation, industries need to facilitate sufficient opportunities for their technical and manufacturing staff to enhance innovation activities. Organizational factor are found to have an important role in creation of innovative employees.

Most of the studies on innovation influences were conducted in western organization contexts. The findings of those studies may not be applicable to Malaysian's organizational contexts, mainly due to huge differences in culture and economic environment. There are very limited researches on innovation influences, which were conducted in Malaysia. The findings obtained from these researches will be useful for local manufacturing industries to enhance their innovation activities more effectively.

## **1.8 Organization of Remaining Chapters**

This study is conducted to determine innovation activities in industries that are influenced by organizational factors. The explanations are based on organizational demographic and organization capabilities. Chapter 2 will present an overview of literature review, in particular on the background theories of product and process innovation. The formulation of theoretical framework and hypothesis development will be present as well. Chapters 3 will describe the research methodology of the study and the results of the statistical analyses will be present in chapter 4. Chapter 5 will be present the implication of the result and suggestion for future research.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In order to improve business performance and stay ahead with competitors, industries or firms tend to adopt innovation activities into their organization. Such activities should not be focused only on product improvement or minor modifications to existing product, as what many of the organization are practicing currently. The focus and challenges for these industries and firms are to produce new ideas and develop new product into the market and generate substantial profit (Kuczarski, 1990). The key of innovation for industries is to explore and discover new ways in delivering more product variety with better performance in the market (Tsai, 2001).

Innovation is conventionally defined as a transformation process in which the knowledge from various activities such as R&D, suppliers and customers are converted into a new or modified product or process. An essential element for innovation is its application in a successful and organized way. Thus, innovation occurs when new ideas, goods or services are put into practices and not when the idea is generated or introduced. Innovation is closely linked to creativity and the creation of new ideas with useful information and turning them into a reality through invention and new product development (Thiruchelvam, 2004; Damanpour, 1987). Innovation is an introduction of a new idea into a marketplace in the form of a new product or service. This product innovation is closely related to customer needs and demand in a globalize world (Khan & Manopichetwattana, 1989; Hurley & Hult, 1998; Zmud, 1984).

Innovation is also about creation of values and increasing business efficiency. Industries and firms may introduce a new product that is superior to its existing product in term of its quality, reliability, ease of use, environmental protection and lower cost. Adoption of innovation in an organization is also closely related with the aim of improving the organizations efficiency, effectiveness and competitiveness (Lukas & Ferrell, 2000).

## **2.2 Product & Process Innovation**

Product or Process innovation consists of four characteristics such as incremental innovation, radical innovation, market breakthroughs and technological breakthroughs. It is important to distinguish between the types of innovation, especially the most critical distinction between radical innovation and incremental innovation (Chandy & Tellis, 1998).

### ***2.2.1 Radical Innovation***

Radical innovations involve substantially a new technology that creates a dramatic change in products or process. This type of innovation is capable of transforming the existing markets or industries into a new structure, or into creating a new one.

### ***2.2.2 Incremental Innovation***

Incremental innovation involves relatively minor change in product or process technology and provides relatively low value to customer benefit. Improvements in incremental innovation is said to be continuous, and these represent one of the few areas in product or process innovation where future improvements can be expected. Due to this

minor changes, incremental innovation cause relatively low disruption in the existing product in the market.

### ***2.2.3 Market Breakthrough***

Market breakthrough innovations are based on core technology that is similar to the existing product but will provide substantially higher benefit to the customer (Chandy & Tellis, 1998). For example, ASTRO provide more number of channels to be transmitted to customers by using the existing transmitting technology.

### ***2.2.4 Technology Breakthrough***

Technology breakthrough is the means of adopting substantially new technology than existing products. This type of innovation normally operates with high risk and higher cost. Table 2.0 shows the comparison between types of product innovation and the level of technology involved (Chandy & Tellis, 1998; Dewar & Dutton, 1986).

Table 2.0  
*Types of Innovations*

		<i>Customer Need Fulfillment Per Dollar</i>	
		Low	High
<i>Newness of Technology</i>	Low	Incremental innovation	Market breakthrough
	High	Technology breakthrough	Radical innovation

Source: Chandy and Tellis, 1998

### 2.2.5 S-Curve

The benefit for customers (on a per dollar basic) based on the four types of innovation can be describe by using S-curve as shown in figure 2.0 below.

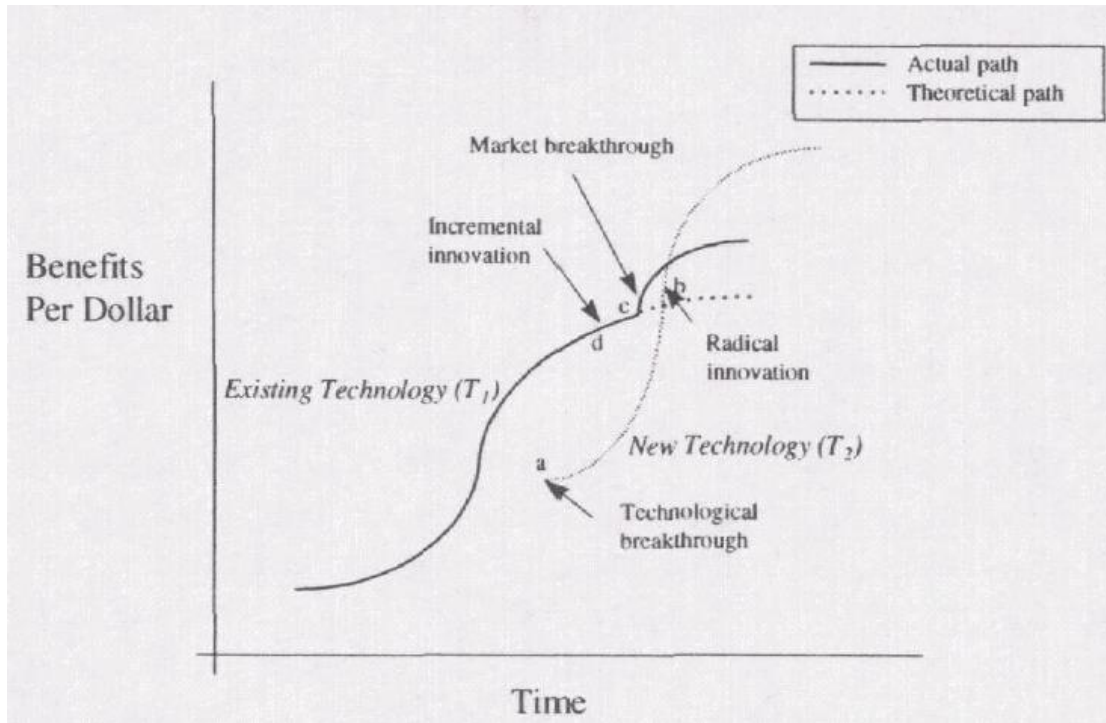


Figure 2.0: A Dynamic View of Innovation (S-Curve)

Source: Chandy and Tellis, 1998

Product with existing technology ( $T_1$ ), initially provides benefits to customer as the technology is still new in the market and it will gradually decreases as the technology matures. Introducing market breakthrough innovation can further increase the customer benefit.

As for the product with new technology ( $T_2$ ), initial customer benefits will be inferior to existing technology ( $T_1$ ). The turning point for a new technology to increase its customer benefit is by introducing radical innovation.

### **2.3 The Relationship between Organization Factors and Innovation**

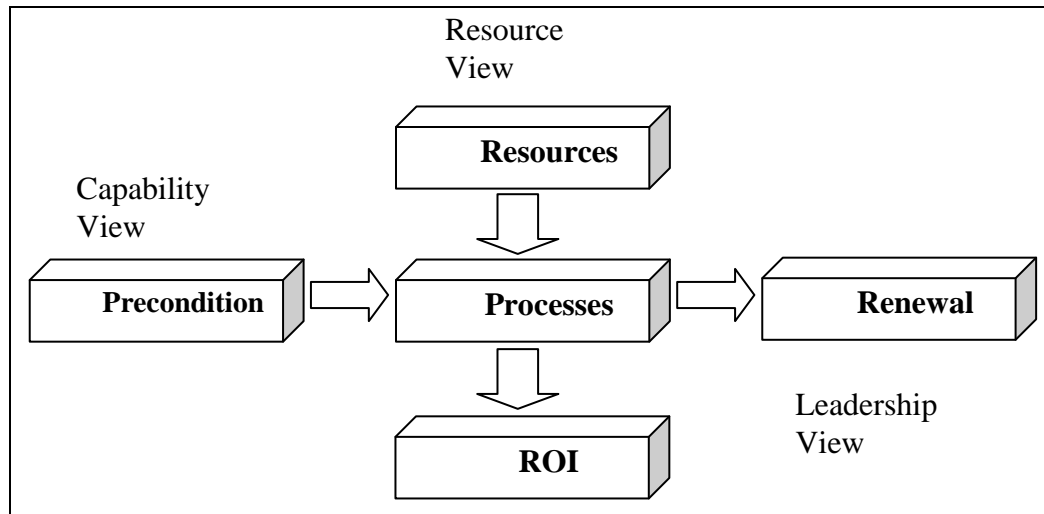
It has been recognized that innovation activity is essential for industries in order to increase sales, profit and to continue existing in a global market. The challenges for these industries, is to develop a strategic management approach for a successful innovation activities. According to Sivadas and Dwyer (2000), not all industries that venture into innovation activity such as new product development have shown a successful growth record. There are many proven records indicating that industries introducing new products into the marketplace each year have failed, causing considerable financial loss in the industry. According to authors research, cooperate competency is found to be an important contributor to a new product development success. Therefore, it is expected that organizational factors is one of the key drivers of innovation.

There is a lot of research that has been done on the influence of organizational factors in adopting of innovation. At the organization level, organization policy and organization control were reported to effect innovation (Cardinal, 2001; Ettlíe, 1986; Kimbely & Evanisko, 1981). From the meta-analysis research on organizational innovation conducted by Vincent, Bharadwaj and Challagalla (2003), it was observed that the characteristics of the organization capabilities, organization structure, organization demographic and environment factor have shows to have influence on innovation.

Organization capabilities are considered as an important factor for innovation measurements (Muller, Valikangas, & Merlyn, 2005; Foss, 1997). The theory underlying in this study is based on the innovation framework as suggested by Muller, Valikangas,



and Merlyn (2005). The author has developed a framework (figure 2.1) that enables managers to customize to trace and monitor the success of innovation in the firm.



*Figure 2.1:* Innovation Framework

Source: Muller, Valikangas, and Merlyn, 2005

According to the author, capabilities view is considered as a precondition for innovation. Firm's capabilities view is assessing its competencies, culture and innovation resources for new projects. Input for capability view is company skill, tools, culture and values that enhances to innovation. The output of capabilities view is the numbers of new projects, numbers of new market entered and numbers of new competencies achieved.

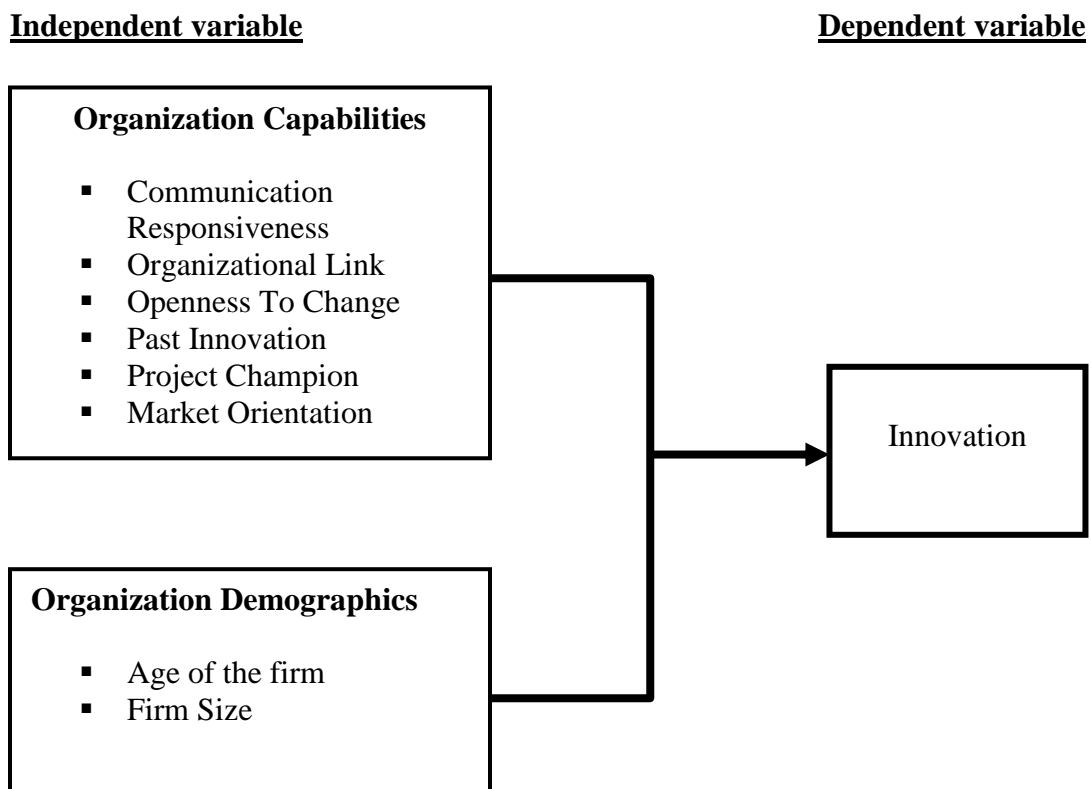
Resources view is important for the firms to balance between the investment in the existing project and new project. Some of the resources inputs are capital, labor and time. The output for resources view is the return of investment (ROI).

According to the framework, processes are placed as a gateway between resources view and capabilities view. Processes are measured by number of idea submitted by employees and the ratio of successful ideas.

Considering the importance of capabilities view in measuring innovation, in this research, organization capabilities factors will be further researched.

## 2.4 Research Theoretical Framework

The theoretical framework for this research is based on the Innovation Conceptual Framework as suggested by Vincent, Bharadwaj and Challagalla (2003), in the Meta Analysis research on Determinants and Consequences of Organization Innovation. To fit the research objective, the framework is adopted with some changes. This study measures the individual's perception of innovation activities in industries. The framework for this study is as shown in Figure 2.2 below.



*Figure 2.2:* Theoretical Framework of Organizational Factors Influencing Innovation in Industries

The Organizational factor as an independent variable in this study is Organization Capabilities and Organization Demographics. Organization Capabilities factor is represented by communication responsiveness, organization link, openness to change, past innovation, project champion and market orientation. Whereas for the Organization Demographics, factors that will be used in this study are age of firm and firm size. These two characteristics are used to test the relationships of incremental and radical innovation success.

The respondents chosen for this study are those manufacturing firms that are practicing product, process, service or administrative innovation. The reason for choosing more than one innovation activity is to get more respondents.

## **2.5 Research Hypotheses**

### ***2.5.1 Communication Responsiveness***

The firm's development and implementation of new technology has been facilitated by communication responsiveness between the firm and its environment at each stage of the process of innovation. Through discussion and information flow from external source, information exchange and diversity of ideas are generated within the firm (Utterback, 1971; Ahuja, 2000). E-business is one of the examples as a tool for effective external communication. This method of communication would improve firms' innovation operational efficiency and technology opportunism (Srinivasan, Lilien, & Rangaswamy, 2002). Innovation creation and implementation can be achieved through the quality of interpersonal communication (Becker & Whisler, 1967). The development team can acquire a wide variety of diverse ideas and as a result can enhance the new product

development activities with successful result (Sethi, Smith, & Park, 2001; Hurley & Hult, 1998).

As such, the communication level should not be limited to the firms development teams only, but also should exposure to the customers need and wants (Lukas & Ferrell, 2000). This discussion has suggests a linear relationship between communication responsiveness and innovativeness.

Therefore, the following hypothesis is proposed:

*H<sub>1a</sub>: Communication responsiveness has a positive effect on extent of incremental innovation in an industry.*

*H<sub>1b</sub>: Communication responsiveness has a positive effect on extent of radical innovation in an industry.*

### **2.5.2 Organizational Link**

Organization that creates good network links with external environment can further enhance the innovation capabilities by providing opportunities for joint learning, transfer of technical knowledge, resources exchange and information about trends that are present in the business environment (Vincent, Bharadwaj & Challagalla, 2003; Shan, Walker, & Kogut, 1994; Kimberly & Evanisko, 1981; Majumdar & Venkataraman, 1998). One of the ways to create a strategic network is by interorganizational or collaborative links. Goes and Park (1997) observed that multiple networks and practicing higher levels of resources exchanges were adapted by service industries to improve their service innovation.

Powell, Koput, and Smith-Doerr (1996), argued that the initial collaboration relationship would trigger the development of managing technique and managing networks. The main driver for the firms to join together is the efforts to keep the high-speed technology learning through diversity and real experience. A research on different elements of network structure and innovation output conducted by Ahuja (2000) has indicated that; direct link with other firms will increase the knowledge sharing. At the same time firms should also control the network knowledge flow to avoid any sharing of information with their competitors, which will eventually affect their core competence. Thus, employees will gain additional technical knowledge when the organization practices good network links with others.

Therefore, the following hypothesis is proposed:

*H<sub>2a</sub>: Organizational link has a positive effect on creation of technical knowledge for incremental innovation.*

*H<sub>2b</sub>: Organizational link has a positive effect on creation of technical knowledge for radical innovation.*

### ***2.5.3 Openness to Change***

Organizations willingness to change provides a culture that is open to innovation. The key predictor for an organization to adopt the radical product innovation is when the organization creates a situation of willingness to change. This will be realized when the organization provides flexibilities to their managers in decision making process on new

product development in order to compete with the external competitors and other managers within the firm. Past research have highlighted that, top management can provide a stronger force within the organization in the process of decision making towards practicing radical product innovation. Firms that are focusing on the future markets more than on the current markets are said to be practicing the willingness to change (Chandy & Tellis, 1998; Dewar & Dutton, 1986; Meyer & Goes, 1988; Zmud, 1984). Firms that are practicing an aggressive technology policy change related to the current trend will also likely to promote towards innovation activities (Ettlie, 1983).

Thus, the following hypothesis is proposed:

*H<sub>3a</sub>: Organizational openness to change has a positive effect on incremental innovation.*

*H<sub>3b</sub>: Organizational openness to change has a positive effect on radial innovation.*

#### **2.5.4 Past Innovation**

Generally, organizations that have been successful in the past innovation are more likely to innovate in the future. One of the reasons is successful innovation will generate a substantial profit margin and have gathered useful technology knowledge and information flow for the organization to continue with the new innovation activities. Most likely, organization that is new in the innovation activities with a successful past results will practice incremental innovation in order to reduce risk (Ahuja & Lampert, 2001; Chandy & Tellis, 1998).

Therefore, the following hypothesis is proposed:

*H<sub>4a</sub>: Past Innovation has a positive effect on extent of incremental innovation.*

*H<sub>4b</sub>: Past Innovation has a positive effect on extent of radical innovation.*

### **2.5.5 Project Champion**

Project champion is assigned to support and drive a project according to the project schedule and to meet the final goal of the project. The project champion is generally a person who assists and mentors the team, and navigates any roadblocks to keep the project on track. According to Chandy and Tellis (1998), champion in an innovation firm refers to the employees who advocate new product ideas that affect the activity of the organization. Firms with effective project champion roles are more willing to innovate than other firm. Prior research has studied the influences of individual project champion (e.g., Ibarra, 1993; Kimberly & Evanisko, 1981; Howell & Higgins, 1990) and the influences in the process innovation in the organization (e.g., Ettl, Bridges, & O'Keefe, 1984).

Overall, project champion in an organization has the influence on the level of innovation activity. In this study, the project champion influence is focused in an industry rather than on the individual traits.

Thus, the following hypothesis is proposed:

*H<sub>5a</sub>: Project champion has a positive effect on incremental innovation.*

*H<sub>5b</sub>: Project champion has a positive effect on radical innovation.*

### ***2.5.6 Market Orientation***

In order to stimulate innovation ideas, organizations tend to be market oriented to increase ideas and processing information related to customers' preference and needs. Lukas and Ferrell (2000) identified that in order to be customer oriented as a source of information for new product development. It is important to identify the focus group with good information on latest technology trend. This is because, if the customers are not well informed of the advances and changes in technology, most likely the ideas contributed is within their bounded context and will not help in the business development. As for this study, the selective respondents will be from groups that are exposed on technological changes and information on the latest market trends.

Therefore, the following hypothesis is proposed:

*H<sub>6a</sub>: Market orientation has a positive effect on incremental innovation in an industry.*

*H<sub>6b</sub>: Market orientation has a positive effect on radical innovation in an industry.*

### ***2.5.7 Organization Demographics***

The growing research on the organizational determinants of technology innovation has some relation towards an older organization and firm size. Sorenson and Stuart (2000) argued that, older firms are more rigid to produce and implement new product innovation. This is mainly due to lower risk and impact on their technology changes



when compared to younger firms. As for the size of the firms the author has discovered that, large firms have recorded higher patent rate when compared to the smaller ones.

Older organization is referred to be operating with longer top management tenure. Boeker (1997) reported that performance of the top management such as chief executives and managers would decline as they worked longer in an organization. This is mainly due to reluctance to change to new strategies towards radical innovation. However the research on firm size indicates a positive effect on the context of strategic change.

Few researches have highlighted that younger firms tend to have less willingness towards any changes on innovations that might interrupt their current means of conducting business. In the context of strategic innovation, many researches have concluded that the older the organization is, the higher innovation activities that will be carried out to improve the business performance. Older organization will have bigger surplus and stronger financial background that can provide larger resources for new product innovation. They also can demonstrate high potential for survival that allows organization the ability to pursue radical innovation (Keister, 2002; Goes & Park, 1997; Shan, Walker, & Kogut, 1994; Srinivasan, Lilien, & Rangaswamy, 2002; Ahuja, 2000; Powel, Koput, & Smith-Doerr, 1996; Baker & Cullen, 1993; Lazonick, 2004).

From this discussion, it is known that the age and size of the firms have a direct relationship with innovativeness.

Thus, the following hypothesis is proposed:

*H<sub>7a</sub>: Age of the firm has a positive effect on incremental innovation.*

*H<sub>7b</sub>: Age of the firm has a positive effect on radical innovation.*

*H<sub>8a</sub>: Firms size has a positive effect on incremental innovation.*

*H<sub>8b</sub>: Firms size has a positive effect on radical innovation.*

The hypothesis generated will be tested on the dependent variable. Research methodology of the study will be present in chapter 3.