



ORGANIZATIONAL LEARNING, INNOVATION  
AND ORGANIZATIONAL PERFORMANCE:  
AN EMPIRICAL STUDY OF SMALL AND MEDIUM-  
SIZED FIRMS IN THE ICT INDUSTRY IN  
MALAYSIA

BY

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## ABSTRACT

With the emergence of information and knowledge-based economy, the competitive power of many companies lies in their ability to develop and improve organizational skills and capabilities. Substantial research on the importance of strategic resources as source of competitive advantage has mainly focused on developed economies covering large corporations across different industries. The results of these studies may not hold for developing nations and in particular, small and medium sized enterprises (SMEs) because of the differences in resources and human capital. To address this gap, this research therefore, builds on theories of resource-based, organizational learning (OL) and innovation to examine the strategic links between OL, innovation and organizational performance (OP) in the SMEs. The study was conducted in a Malaysian context from a sample of 450 SMEs which have attained the Malaysian Super Corridor (MSC) status. Four main hypotheses were formulated and tested using structural equation modeling techniques with Analysis of Moment Structure (AMOS Version 18.0) and multiple regression analysis with Statistical Package for Social Science (SPSS Version 17.0). Analysis of the data provided support for all the four hypotheses, and the following findings are established: (i) positive relation between OL and innovation; (ii) positive relation between innovation and OP; (iii) positive relation between OL and OP; and (iv) the mediating effect of innovation between OL and OP. Several implications for theory, management and policy are discussed in light of the findings of the study. The use of single-informant method, cross-sectional research design and focus on a particular industry are some of the constraints of this study. Future research may therefore incorporate multiple response method, longitudinal design and cover samples across different industries.

## ملخص البحث

مع ظهور المعلومات والاقتصاد القائم على المعرفة، فإن القوة التنافسية للعديد من الشركات قائمة على تطوير وتحسين المهارات والقدرات التنظيمية. وقد ركزت معظم البحوث السابقة حول أهمية تطوير الموارد الاستراتيجية على الدول المتقدمة والشركات الضخمة في مختلف الصناعات. وعليه فإن نتائج هذه الدراسات لا تنطبق في الدول النامية والمؤسسات الصغيرة والمتوسطة الحجم وذلك بسبب الاختلاف في الموارد ورأس المال البشري. لمعالجة هذه الفجوة، يهدف هذا البحث المبني على نظريات التعلم القائمة على الموارد الطبيعية والتنظيمية والابتكار إلى دراسة العلاقات الاستراتيجية بين التعلم التنظيمي والابتكار والأداء في المؤسسات الصغيرة والمتوسطة. وقد أجريت هذه الدراسة على 450 مؤسسة ماليزية في قطاع تقنية المعلومات والاتصالات. وضع الباحث أربع فرضيات رئيسية وتم اختبارها باستخدام تقنيات النمذجة الهيكلية (Structural Equation Modeling) عن طريق تحليل الهيكل التنظيمي (AMOS)، واستخدام تحليل الانحدار المتعدد Linear regression عن طريق SPSS. أظهرت التحاليل للبيانات دعم لجميع الفرضيات الأربع، وتم الوصول إلى النتائج التالية: (أ) العلاقة الإيجابية بين التعلم التنظيمي والابتكار (ب) العلاقة الإيجابية بين الابتكار والأداء، (ج) العلاقة الإيجابية بين التعلم التنظيمي والأداء و (د) دور الابتكار في التوسط بين التعلم التنظيمي والأداء. وتم مناقشة ما يترتب على هذه النتائج في مجال الإدارة والتنظيم والسياسة العامة. ومن الملاحظات على هذه الدراسة: الاعتماد على التقرير الذاتي والتركيز على صناعة معينة وهي تقنية المعلومات والاتصالات. ويمكن للبحوث المستقبلية دفع هذه الملاحظات باستخدام طرق أخرى، وأخذ العينات من مختلف القطاعات.

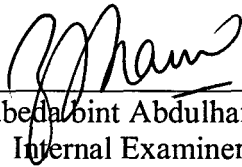
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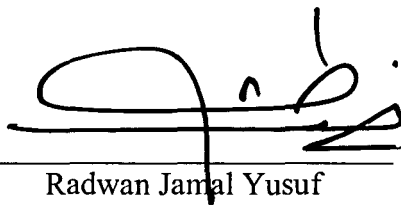


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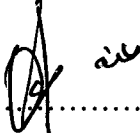
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## DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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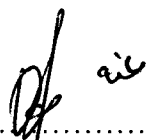
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# **CHAPTER ONE**

## **INTRODUCTION AND OVERVIEW**

### **1.1 INTRODUCTION**

The first chapter introduces the research agenda and specifies the research problem and aims of the study. Following the background in section 1.2, the next sections proceed to specifying the research problem, research questions and research objectives. After this, the scope of the research and its significance are identified. The introduction also provides a glimpse of the research setting and context, which followed by definition of key terms used in the study. Thesis structure is presented prior to summarizing the chapter.

### **1.2 BACKGROUND OF THE STUDY**

Organizations are in a continuous process of searching for strategies that would provide them with a competitive advantage. Efficiency in stable environments is achieved through standardized routines, division of labor and management control (Grant, 2005, 2010). However, recent changes in the business environment have compelled firms to search for new strategies for competitive edge as the conventional strategies have become obsolete (Chirico & Salvato, 2008). Economic globalization, which refers to integration of operations and markets in a borderless economic space (Johnson & Turner, 2003), and advances in information and communication technology are among the central environmental forces faced by contemporary organizations (Griffin & Moorhead, 2007; Hanna, 2010; Roy, 2005).

In order to cope with the current external opportunities and threats, organizations have to learn, that is, acquire new knowledge and skills that will improve their current and future performance (Child, Faulkner, & Tallman, 2005; DiBella, 1998; Ortenblad, 2001; Schein, 1993; Weiss, 1998). According to De Geus (1988: 70), “the only competitive advantage the company of the future will have is the ability of its managers to learn faster than the competitors.” Many other researchers suggest that the effective strategy for sustaining and improving a firm’s competitive edge and performance is organizational learning (OL) (e.g. Mavondo, Chimhanzi, & Stewart, 2005; Senge, 1990; Sinkula, Baker, & Noordewier, 1997).

Scholars such as Baker and Sinkula (1999), Huber (1998), Keiser and Koch (2008), and Nonaka (1994) also attest that the new knowledge and skills obtained through learning enhances firm’s innovative capabilities thus improving the level of firms’ competitiveness and performance. Research shows that innovation is linked to the concepts of generation, acceptance, and implementation of new ideas, processes, products and services (Damanpour, 1991; Drucker, 2002), and is determined by the firm’s OL (Baker & Sinkula, 1999; Calantone, Cavusgil, & Zhao, 2002). Research by scholars such as Baker and Sinkula (1999), Bates and Khasawneh (2005) and Huber (1998) also indicates that the effect of OL on firm performance is likely to be both direct and indirect because the creation of innovative culture through OL allows firms to achieve a better competitive position and above-average performance.

Due to the growing interest in OL as an effective strategy for firm performance, the present research investigates the relationships between OL, innovation and organizational performance (OP) in small and medium enterprises (SMEs). The reason for choosing SMEs is that they play an integral role in the overall well-being of a country’s economy both in developed and developing communities

(Demediuk, 2005; Turner, Ledwith & Kelly, 2010). Through flexibility, which allows them to quickly adapt to changing market conditions, SMEs also generate employment, help diversify economic activities, and contribute significantly to export and trade (Kamel, 2010; Organization for Economic Cooperation and Development [OECD], 2010).

The study's conceptual framework hypothesizes that a firm's level of OL contributes to its innovation, which in turn influences the firm's OP. It is also hypothesized that the OL directly affects performance. An integrative model of OL, OI and OP, which is based on prior literature, serves as the conceptual framework for the study.

### **1.3 PROBLEM STATEMENT**

Since the beginning of the third millennium, the rules of doing business have greatly been influenced by globalization, innovation, and technology (Griffin & Moorhead, 2007; Kiggundu, 2002; Rainey, 2006). In order to successfully face the challenges of changing business environment, organizations need to focus on their core capabilities that would provide them with an advantage over their competitors (Drejer, 2002; Leonard-Barton, 1992; Nordin, 2008).

The increasing domestic and global competition in product markets is forcing the prices down while driving up the requirements for quality and innovation (Abonyi, 2007). This increasing competition creates a difficult competitive environment for enterprises that do not comply with the changing rules of business. The challenges faced by SMEs while competing in domestic or even global markets are compounded by their size and limited resources as opposed to the well established corporations which enjoy advantages of economies of scale (Audretsch, 2009).

In the Malaysian context, SMEs are faced with challenges such as limited adoption of technology, lack of skilled expertise, and competition from large corporations and globalization (Ahmad, Abdul Rani & Kassim, 2010; Saleh & Ndubisi, 2006).

In the face of these challenges confronting the SMEs, it is argued that one of the critical ways to achieve a competitive edge is through an efficient and systematic management of knowledge, which has become a strategic asset (Bollinger & Smith, 2001; Grant, 1996a; Ward & Wooller, 2010). If learning at organizational level, is not the only sustainable competitive advantage (De Geus, 1988; Hatch & Dyer, 2004; Pietersen, 2010; Probst & Buchel, 1997; Stata, 1989), it can be considered as one of the most important factors in competitiveness (Karlsson, Flensburg & Hørtte, 2004; Rugman & Cruz, 1991; Wright, Suh & Legget, 2009). Survival in today's competitive business world is limited to organizations that are able to respond to market signals and that can quickly and efficiently exceed customer expectations (Caloghirou, Protoyerou, Spanos & Papagiannakis, 2004; Porter, 1985).

OL is believed to highly influence innovation, which in turn helps organizations withstand increased competition in the industry. OL is also argued to help firms in formulating appropriate responses to challenges in the market and industry environment (Baker & Sinkula, 1999; García-Morales, Matías-Reche, & Hurtado-Torres, 2008; Jiménez-Jimenez, Sanz Valle & Hernandez-Espallardo, 2008).

Because of paucity of research in SMEs especially in developing nations, the problem which this research aims to resolve is whether the implementation of OL and innovation in SMEs will significantly lead to improvement in OP. The research also seeks to examine whether the influence of OL on OP can be mediated by innovation

especially in a technology-driven industry. The industry has been chosen for its role in improving productivity and economic growth of Malaysia (Kurihara, 2008).

#### **1.4 SCOPE OF THE RESEARCH**

This research focuses on studying OL, innovation and performance in small and medium sized ICT firms in Malaysia. The unit of analysis is individual businesses representing SMEs. According to Small and Medium Enterprise Corporation Malaysia (SME Corp. Malaysia), SME in the services and ICT sectors are enterprises with full-time employees not exceeding 50 or with annual sales turnover not exceeding RM 5 million (Harvie & Lee, 2008; SME Corp. Malaysia, 2010).

#### **1.5 RESEARCH QUESTIONS**

Four key questions represent the main areas to be investigated in this study. According to Creswell (1994) and Jones (1998), limiting the study to four research questions allows a narrow focus, and does not lead to overly constraining the research. The main research questions are:

- i. What is the influence of OL on innovation for SMEs in the ICT sector?
- ii. What is the influence of innovation on OP of SMEs in the ICT sector?
- iii. What is the influence of OL on OP of SMEs in the ICT industry?
- iv. Will innovation mediate the effect of OL on OP of SMEs in the ICT industry?

All the four research questions implicitly contain subquestions (Creswell, 1994; Miller & Yang, 2007), but are not included to avoid question proliferation, which diminishes the flexibility of the research (Jones, 1998). For instance, a subquestion for Question 1 could be, “what is the extent of OL in Malaysian SMEs in the ICT sector”

For Question 2, the subquestion could be, “to what extent are ICT-based firms innovative?” For Question 3, the subquestion could be, “to what level does commitment to learning influence OP?”

## **1.6 RESEARCH OBJECTIVES**

This study investigates the relationship between OL, innovation and OP of the Malaysian SMEs in ICT sector. It aims at advancing empirical research on OL by examining its impact on innovation and OP. The specific objectives of the present research are:

- i. To examine the influence of OL on OI for SMEs in the ICT sector.
- ii. To examine the influence of OI on OP for SMEs in the ICT sector.
- iii. To investigate the influence of OL on OP for SMEs in the ICT sector.
- iv. To examine whether the OL-OP relationship is mediated by innovation.

## **1.7 SIGNIFICANCE OF THE RESEARCH**

This study advances and validates the underlying theories of organization (e.g. the resource-based theory and OL theories) through examination of the links between OL, OI and OP. A conceptual model is developed and tested statistically and the resulting findings compared with the leading empirical studies in the same domain. Also, given the increasing number of countries in Asia and Africa that exhibit similar market conditions with Malaysia and share similar structures and strategies, the current study might be relevant as a benchmark for future replication studies.

From practical point of view, managers will be provided with suggestions and insights of how to develop learning-oriented and innovative organizations, which are significant for enhancing employee commitment and performance. In addition, by

empirically testing the links between OL and innovation, managers will be encouraged to apply either both or one of them according to the needs and cost-benefit analysis.

## **1.8 THE RESEARCH SETTING**

This research is motivated by a gap in the literature on understanding the interrelationships among OL, OI and OP in the SME context. It is noted that majority of the conceptual and empirical studies in the literature focus on large and established corporations (e.g. Domivski & Skerlavaj, 2009; Jashapara, 2003; Lopez et al., 2005), and little attention has been given to SMEs.

For example, Chaston, Badger, Sadler-Smith and Mangles (2001) argue that OL is one of the neglected areas of small firm research. This implies that our knowledge of the interaction between OL and the entrepreneurship process is limited (Deakins, 1998). Thus, by acknowledging the significant contribution of SMEs to the community, it is highly important to understand the SMEs specificity of OL processes in relation to their innovation.

The rationale for selecting ICT sector, which encompasses the hardware, software, services and telecommunications clusters, is that the sector accounted for about 9.8 per cent of Malaysia's total gross domestic product (GDP) in 2009 (Kumar, 2010). The contribution of the ICT industry to GDP is targeted to increase to 10.2 % by 2015 (Kumar, 2010). The Malaysian ICT industry is demonstrating high growth rates and emerging as a strong contributor to the country's employment and economic growth (Hamzah & Isa, 2010).

Another justification for the choice of ICT sector is that ICT-related industries are becoming a niche area for investment and growth. The rapid technological change has led to a surge in the use of digital technologies (Komninios, 2008) thus leading to

the liberalization of the telecommunication industry and fast growth of the internet economy (Charles & Furar, 1998). This accelerated rate of ICT diffusion and growth encourages both local and foreign firms to invest in the ICT-related technologies (Mudd, 2007).

The rationale for choosing Malaysia for conducting this research is that the country is one of the fastest developing nations in terms of economic and technological developments (Munoz, 2010). It has made great strides in improving its peoples' quality of life through the advancement of its infrastructure and industries. Furthermore, the Malaysian government has strengthened the role of ICT in national economic development (Akhtar & Arinto, 2009). It has set up various institutes and developed several economic plans aimed to provide stronger platform for the country's transition towards a knowledge-based economy (Akhtar & Arinto, 2009). For example, in the Ninth Malaysian Plan (2006-2010), the focus was on advancements in the global digital environment and promoting wider ICT usage in all aspects of life (Akhtar & Arinto, 2009). An overview of the Malaysia's ICT environment is provided below:

### **1.8.1 Overview of Malaysia's ICT Environment**

The Malaysian National ICT Agenda defines ICT as both production sector and an enabler in its growth development strategy and in moving the country into knowledge society and knowledge economy. In the Eighth Malaysian Plan, ICT was considered a key strategic driver to support and contribute directly to the growth of the economy and to enhance the quality of life of the population (The Economic Planning Unit [EPU], 2006). Similarly, in the Ninth Malaysian Plan, ICT was regarded a key determinant in the development process to move the economy up the value chain

(EPU, 2006). Since then, various ICT strategies have been developed in order for the Malaysian economy to become more competitive in the globalized market.

Government spending on ICT has continued to grow annually over the past decade. Figure 2.3 depicts that, in 2006, ICT spending accounted for 10.7 percent of the national GDP. Following the 2008 financial crisis which affected the ASEAN region, the spending plummeted to 9.8 percent of the GDP. After the recovery, the spending increased again such that by 2010, the ICT expenditure accounted for 10.2 percent of GDP, equivalent to RM 5.80 billion (Figure 1.1).

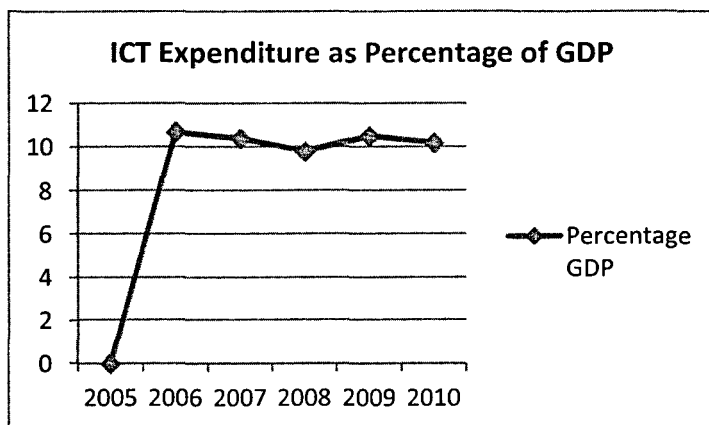


Figure 1.1: Government ICT Spending (%GDP)

ICT expenditures include computer hardware (computers, storage devices, printers, and other peripherals); computer software (operating systems, programming tools, utilities, applications, and internal software development); computer services (information technology consulting, computer and network systems integration, web hosting, data processing services, and other services); communications services (voice and data communications services) and wired and wireless communications equipment.

The World Economic Forum uses the network readiness index (NRI) to assess the degree of preparation of a nation or community to participate in and benefit from ICT (Dutta & Jain, 2004). According to the Forum's report, Singapore is the most networked nation in Asia, and second in the world after Sweden. Meanwhile, Malaysia ranked first among upper-middle income group of countries, and sixth in the Asian region. The country's score increased from 4.65 in 2010 to 4.74 in 2011 (Table 1.1).

Table 1.1  
Malaysian Ranking and Score of NRI (World Economic Forum, 2011)

Rank in Asia	Country	Score 2011	Score 2010	Global Rank
1	Singapore	5.60	5.60	2
2	Taiwan	5.30	5.20	6
3	South Korea	5.19	5.14	10
4	Hong Kong	5.19	5.33	12
5	Japan	4.95	4.89	19
6	Malaysia	4.74	4.65	28
7	China	4.35	4.31	36
8	India	4.03	4.09	48
9	Indonesia	3.92	3.72	53
10	Vietnam	3.90	3.87	55

The Multimedia Super Corridor (MSC) is Malaysia's most prominent initiative for the global ICT industry (Figure 1.1). The corridor, incepted in 1996, hosts more than 1000 foreign and local companies focused on computer hardware, software and communications products (Turpin & Krishna, 2007). The MSC is also an ideal growth environment for Malaysian SMEs to transform into world-class firms (Ronchi, 2009; Turpin & Krishna, 2007).

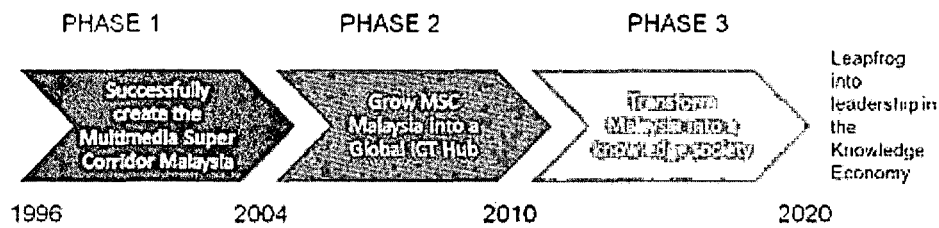


Figure 1.2: Roadmap for Malaysia's Vision 2020 (Source: Ronchi, 2009).

As a key ICT policy, Malaysia privatized its communications and broadcasting industries in the late 1980s with the aim of increasing the sectors' competitive position (Akhtar & Arinto, 2009; Abu Hassan & Hasim, 2007). Furthermore, in 1994, the country set up the National IT Council to take charge of policy formulation, technology assessment and industry promotion. Several legal Acts such the Communications and Multimedia Act 1998 have also been drafted to regulate the increasing technological environment in the country.

## 1.9 DEFINITION OF KEY TERMS

In the context of this research, the following specific definitions are provided to gain a better understanding of the key terms used throughout the study.

*Resource-based view* (RBV) is a theory of firm structure and behavior that attempts to explain and predict why firms are able to establish positions of competitive advantage and in so doing earn superior returns (Grant, 1996b). Under this theory, *resources* are defined as those strategic assets (tangible or intangible) that are owned or controlled by the firm (Amit & Schoemaker, 1993). The ability of a firm to efficiently and effectively combine a set of resources to gain an advantage over competitors is termed as *capability* (Dutta, Narasimhan & Rajiv, 2005; Prahalad & Hamel, 1990).

*Learning* is defined as “a process by which skills, knowledge, habit, and attitudes are acquired and altered in such a way that behavior is modified” (Gibb, 1997: 15). *Organizational learning* is the development of new knowledge, understanding or skills that become embedded in the organization’s shared mental models and have the potential to influence behavior in ways that can lead to enhanced performance (Cook, Staniforth, & Stewart, 1997; Jones, 2007; Smith, 2006).

*Innovation* is the generation and implementation of something new – idea, product, process or service. For the purpose of this research, *innovation* refers to the tendency of an organization to develop both technological and administrative innovations (Damanpour, 1991). Whereas technological innovation involves developing new product, process or service; administrative innovation encompasses new procedures, policies and organizational forms (Dewar & Dutton, 1986; Tushman & Nadler, 1986).

*Organizational Performance* is operationally defined as financial and non-financial measures. Financial measures are captured by return on assets (ROA), sales growth, and profitability while non-financial measures include customer growth, employee satisfaction, and quality in products and services.

## **1.10 STRUCTURE OF THE RESEARCH**

This research comprises of seven chapters (including the present one), which are organized as follows: The present chapter provides the introduction and overview of the study including the research problem, study objectives, research questions, contributions and justification.

Chapter two is a review of literature that led to the current problem under study. This chapter presents the main theoretical foundations on which the research is

founded, and discusses the main concepts related to the topic of study. This is followed by an examination of the major empirical studies related to OL, innovation and performance.

Chapter three outlines the conceptual framework of the study with the development of research hypotheses. The research framework is derived from a comprehensive review of the literature and the theoretical and conceptual background.

Chapter four of the study covers the research design and methodology. It includes the research framework, hypotheses, and operationalization of the research constructs. It also mentions the data source and data collection procedures.

In Chapter five, the results of statistical analyses are reported, followed by chapter six which presents the discussion and interpretation of the results. Chapter six also summarizes the main findings, and provides implications of the study. It also mentions the limitations and avenues for future research.

## **1.11 CHAPTER SUMMARY**

This chapter lays the foundation for this thesis, which is related to the examination of the linkages among OL, I and OP. It identifies the research problem and research questions and specifies the objectives and significance of the research. The chapter also provides the rationale and justification for the research. Finally, the structure of the research is presented and will be disseminated in the subsequent chapters.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This chapter reviews the relevant literature to develop a research framework and hypotheses which will address the research questions raised in the first chapter. The present chapter consists of four sections including this introduction. Accordingly, section 2.2 discusses the theoretical and conceptual background which forms the foundation of the research. Specifically, the section looks at definition, perspectives and types of OL and innovation as discussed in the management and organizational literature. Section 2.3 provides a review of the relevant empirical studies on OL, innovation and OP. Consequently, the gaps in the literature are identified in section 2.4 based on the analysis of the literature. The chapter concludes with a summary in section 2.5.

#### **2.2 THEORETICAL AND CONCEPTUAL BACKGROUND**

This section establishes the theoretical background in which the forthcoming discussion and analysis is based. Specifically, the section presents and discusses the RBV of the firm and its relation to the concepts of organizational resources and capabilities.

##### **2.2.1 The Resource-Based View**

The RBV is considered an influential theoretical analysis for understanding and explaining how firms achieve and sustain competitive advantage (Eisenhardt & Martin, 2000; Peteraf, 1993; Sirmon, Hitt, Ireland, & Gilbert, 2011). The RBV is a

theory of firm structure and behavior that attempts to explain and predict why firms are able to establish positions of competitive advantage and in so doing earn superior returns (Grant, 1996b). In this theory, a firm is viewed as a bundle of resources which yield capabilities that may be potent source of competitive strength (Amit & Schoemaker, 1993; Barney, 1991; Grant, 1991; Horn, 2004; Wernerfelt, 1984). The theory proposes that resources are the key determinants of firm performance, and they must be valuable, rare and costly to imitate (Barney, 1991; Gottschalk, 2004; Priem & Butler, 2001).

The RBV emphasizes that a firm should adopt an inside-out approach, that is, its starting point is the firm's internal environment (Barney, 1991; Connell & Voola, 2010; Gruning & Kuhn, 2006; Henry, 2008). This is contrasted with the market-based view (MBV), which takes the external environment as its starting point or the outside-in approach (Grant, 1991; 1996a; Gruning & Kuhn, 2006; Kotler, Berger & Bickhoff, 2011). This means, in the RBV, the resources (and capabilities) form the foundation of distinctive strategies that enable firms to respond to the demands of markets in different ways, thus leading to competitive advantage (Barney, 2001; Collis & Montgomery, 1995; Grant, 1991; Kraaijenbrink, Spender, & Groen, 2010; Newbert, 2008).

The theoretical foundation of RBV builds on the seminal work of Penrose (1959; 1995), who considered a firm as a combination of resources configured in a way that contributes to firm-specific advantage. Penrose was therefore opposed to the concepts of neoclassical theory, which envisaged the firm as an economic unit of production (Barca, 2003). The idea provided by Penrose formed the basis for later works by Wernerfelt (1984), Rumelt (1984), Barney (1986, 1991), and Peteraf (1993).

Wernerfelt (1984) applied Porter's (1980) competitive forces model on resources instead of products. His logic was that if resources are not secured, products will become imitable. He thus proposed the term "resource-position barrier" as analogue to Porter's "entry barrier". His definition of resource is "anything which could be thought of as strength or weakness of a given firm" (Wernerfelt, 1984: 173). His proposition is that firms should develop a unique position barrier that could not be imitated by other firms.

While Wernerfelt (1984) focused on firm performance differences in terms of resources that a firm controls, Rumelt (1984) explored the rent generating and appropriating characteristics of the firm (Barney & Clark, 2007). Rumelt (1984; 1997) views firms as a bundle of productive resources whose economic value varies according to the context in which they are applied. He also proposes that the imitability of these resources depends on the extent to which they are protected from 'isolating mechanisms'— a term which he coined to describe ways to prevent imitation and to make competitive positions stable and defensible (Barney & Clark, 2007; Rumelt, Schendel & Teece, 1994).

Similar to Wernerfelt, Barney (1986) also proposed that superior firm performance can be based on the resources that the firm owns. According to Barney (1989), one way of acquiring a unique resource is through 'strategic factor market', which Barney defines as "a market where the resources necessary to acquire a strategy are acquired (1989: 1231)." This means in order for a firm to achieve a competitive advantage, it has to outperform its rivals on the resource market by applying superior resource-picking skill (Sanchez & Heene, 2005). This is achieved by systematically developing more accurate expectations about the future value of resources than other players in the market (Barney, 1997; Barney & Clark, 2007).

Barney (1991) also proposes that in order for a resource to provide a competitive advantage, it must fulfill four criteria: value, rarity; imitability, and non-substitutability. Barney (1997, 2002) later revised his four-criteria framework abbreviated as VRIN by replacing the non-substitutability dimension with organizational embeddedness, which means that the firm must be organized to exploit its resources and capabilities. This is because the notion of non-substitutability was eventually realized to be subsumed conceptually in the criterion of imperfect imitability (Sanchez, 2008).

Another important contribution to the RBV comes from Peteraf (1993). Drawing on microeconomic price theory, Peteraf's (1993) model stems from individual resources rather than strategies (Foss, 2006; Foss & Robertson, 2000). Based on Peteraf's assumption that resources are heterogeneous among firms, the author suggests a differential level of efficiency where firms which are equipped with superior resources are able to produce more economically allowing them to earn rents. On the contrary, firms with limited resources will only be able to break-even. Based on this analysis, Peteraf (1993) suggests four conditions which are necessary for a firm to achieve competitive advantage. These are: resource heterogeneity, ex post limits to competition, imperfect factor mobility, and ex ante limits to competition. She explains that resource heterogeneity implies that any combination of resources is strategic as long as it leads to above-normal returns; imperfect mobility allows the resources to be inimitable by competitors; ex post limits to competition are the forces which limit competition after a firm has gained a competitive advantage; and ex ante limits keep costs from offsetting the rents (Peteraf, 1993: 182-185).

Despite several criticisms, the RBV has gained a massive influence in the management and organization literature because its focus on firm level determinants

of company performance is widely regarded as a key advantage (Kraaijenbrink et al., 2010; Mahoney & Pandian, 1992; Ndofor & Simon, 2011; Peng, 2001). The RBT emphasizes the importance of the intangible resources and capabilities of the firm in the context of the competitive environment (Abubakar & Ahmad, 2010; Bharadwaj & Varadarajan, 2004; Ray, Barney & Muhanna, 2004). Thus, firms which devote their internal strengths to exploit the existing opportunities of the environment while neutralizing threats are more likely to achieve a competitive advantage than those which do not (Ray et al., 2004).

The capability-based perspective extends the RBV by emphasizing building and accumulating resources better and faster than competitors. This view is popularized by Prahalad and Hamel (1990) who suggest that an organization is a learning or 'smart' organization that builds and deploys assets, capabilities and skills for the purpose of achieving strategic goals. Capabilities, which are a subset of firm resources, comprise of a combination of intangible assets, knowledge, skills, processes, technologies, and values (Birchall & Tovstiga, 2005; Tovstiga, 2010).

Prahalad and Hamel (1994) coined the term 'core competence' to refer to those capabilities that are fundamental to a firm's performance and strategy. According to these authors, a core competence must (i) make a disproportionate contribution to perceived customer value; (ii) be competitively unique; and (iii) extendable, that is, it should be possible to derive a new array of products and services from the competency. This definition of core competence points to the main contribution of Hamel and Prahalad to strategic management field (Drejer, 2002). A summary of the key contributions of the early researchers to the RBV is given in Table 2.1.

Stemming from a capability view of the resource-based theory, this thesis will focus on two important organizational capabilities namely OL and innovation as discussed in the subsequent sections.

Table 2.1  
Key Contributions to the Resource Based View

Author	Contribution to RBV
Penrose (1959)	Firm is viewed as bundle of resources; firm's growth is based on the effective use of resources and limited by managerial resources; entrepreneurship exercised by team, emphasizes alertness as well as judgment; services rather than resources are stressed
Wernerfelt (1984)	Competition for resources among firms based on their resource profiles could have important implications for the ability of firms to gain advantages in implementing product strategies
Rumelt (1984)	Defines firms as bundle of productive resources and suggests that the economic value of these resources will vary depending on the context on which they are used; suggests that the imitability of these resources depends on the extent to which they are guarded against 'isolating mechanisms' — a term which he coined to describe ways to prevent imitation and to make competitive positions stable and defensible
Peteraf (1993)	Suggests a differential level of efficiency where firms which are equipped with superior resources are able to produce more economically allowing them to earn rents; suggests four conditions which are necessary for a firm to achieve competitive advantage. These are: resource heterogeneity, ex post limits to competition, imperfect factor mobility, and ex ante limits to competition.

## 2.2.2 Organizational Learning

This section presents a theoretical and conceptual framework of OL. It covers the definition of the concept, perspectives, types and levels of learning. Finally, OL in the SME context is briefly discussed.

### 2.2.2.1 Definition of Organizational Learning

Traditionally, learning is understood as a process through which an individual acquires knowledge, skills, attitudes and opinions (Illeris, 2004, 2011; Pauleen & Gorman, 2011). Argyris and Schön (1978: 2) define learning as “the way errors are

detected and corrected, especially errors that are complex and potentially embarrassing and threatening.”

From a psychological perspective, learning is defined as a “process by which relatively permanent changes occur in behavioral potential as a result of experience” (Anderson, 1995: 4). Gibb (1997: 15) offers a comprehensive definition of learning as “a process by which skills, knowledge, habit, and attitudes are acquired and altered in such a way that behavior is modified.” This definition indicates that learning is only achieved when it leads to some intention to behave in a modified way (Sullivan, 2000).

Kim (1993) distinguishes between two aspects of learning: the acquisition of skill or know-how, which implies the physical ability to produce some action; and the acquisition of know-why, which implies the ability to articulate the conceptual understanding of an experience. He labeled the first form of learning involving the ‘know-how’ as operational learning, and the second aspect of learning involving the ‘know-why’ as conceptual learning.

As a capability, learning is a multidimensional construct that involves knowledge processing for change and improvement (Jerez Gomez, Cespedes-Lorente & Valle-Cabrera, 2005). Based on this, it is proposed that an account of the organizational capability to learn can be made by means of two dimensions: what is learned (knowledge) and how it is learned (learning process) (Lopez, Peon & Ordas, 2005).

The term “organizational learning” implies more than just the acquisition of knowledge by individuals (Fiol & Lyles, 1985; Huysman, 1999; Mahler & Casamayou, 2009). The management literature however, does not provide a unified definition of OL that commands widespread support (Garvin, 1993; Lipshitz, Popper,

& Friedman, 2007). A selection of these diverse definitions of OL is provided in Table 2.2.

According to Tsang (1997), there are three elements associated with the definition of OL: change in cognition (knowledge), change in potential behavior, and change in actual behavior. He further mentions that most definitions of OL can be represented by either involving cognitive and potential behavioral change or the one involving cognitive and actual behavioral change.

Table 2.2  
Selected Definitions of OL

Source	Definition
Argyris and Schön (1978: 2)	“the way errors are detected and corrected”
Cangelosi & Dill, (1965: 200)	‘a series of interaction between adaptation at the individual or sub-group level and adaptation at organizational level’
March & Olsen (1975: 168)	‘organizations and the people in them learning from their experience. They act, observe consequences of their action, make inferences about those consequences, and draw implications for future action.’
Fiol & Lyles (1985: 303)	‘the process of improving actions through better knowledge and understanding.’
Gibb (1997: 15)	“a process by which skills, knowledge, habit, and attitudes are acquired and altered in such a way that behavior is modified”
Senge (1990: 6)	“a continuous testing of experience and its transformation into knowledge available to whole organization and relevant to their mission.”
Nicolini & Meznar (1995: 727)	“a social construction which transforms acquired cognition into accountable abstract knowledge.”
Schwandt & Marquardt (2000: 8)	“a system of actions, actors, symbols and processes that enables an organization to transform information into valued knowledge which in turn increases its long-run adaptive capacity.”
Swart, Mann, Brown, & Price, (2005: 46)	“a process through which an entity employs enabling abilities to create permanent cognitive and behavioral change within a system. The changed behavior or cognitive needs to be embedded in the fabric of the organization and be evident in the organizational memory.”

Source	Definition
Argyris and Schön (1978: 2)	“the way errors are detected and corrected”
Armitage & Plummer (2010: 206)	“the process by which individual or action group learning outcomes are stored in, and brought forth from, organizational memory including the practices, procedures, plans, conventions, strategies and cultures of the organization.”

An example of the former category is represented by the definition by Swat et al. (2005), while the latter category of the definition is represented by the definition provided by Fiol and Lyles (1985).

For purpose of this study, the working definition of OL is the development of new knowledge, understanding or skills that become embedded in the organization’s shared mental models and have the potential to influence behavior in ways that can lead to enhanced performance (Cook, Staniforth, & Stewart, 1997; Jones, 2007; Smith, 2006). This definition implies that for OL to occur some type of behavioral change is required (Fiol & Lyles, 1985; Hellriegel, & Slocum, 2007). The definition also indicates that OL takes place through shared insights, organizational routines and even memory (Garvin, 2000; Gilley & Gilley, 2003; Stata, 1989).

#### ***2.2.2.2 Perspectives on OL***

The review of the literature on OL indicates that there are distinct perspectives on OL that differ in respect to certain basic assumptions. These assumptions include rationality, the nature of the organization and its environment. It is also based on the nature of reality whether objective reality or subjective construction of reality, and on the emphasis on certain aspects of OL such as the cognitive, the culture or the action perspective (Pawlowsky, 2001).

Shrivastava (1983) is considered the first author to systematically distinguish the perspectives of OL (Pawlowsky, 2001). His typology of OL systems was a first step in developing accurate descriptions of OL situations in organizations (Nielson, 1997). Capitalizing on the early work of Cyert and March (1963), Shrivastava classifies OL as (i) adaption, (ii) assumption sharing (iii) developing knowledge of action-outcome relationships, and (iv) institutionalized experience. Adaptation and action-oriented perspectives are rooted in sociological theories of knowledge (Pawlowsky, 2001). They appear to be incremental based on experience, and with a clear focus as to why OL is taking place (Blackman & Henderson, 2005). Assumptions are mental models built up by individuals while institutionalized experience is a combination of frameworks which make up the knowledge gained by repeatedly practicing the same skills (Blackman & Henderson, 2005).

Thus, according to Shrivastava (1983), for OL to be successful, there should be a focus on institutionalized experience and shared assumptions. This would reflect the focus on on-going continual development as well as the need to share both mental models and visions in order to ensure the organization is moving in the right direction (Blackman & Henderson, 2005). A summary of the four approaches proposed by Shrivastava (1983) is provided in Table 2.3.

Table 2.3  
Shrivastava's (1983) Perspectives on OL

OL Perspective	Core Ideas
Adaptive learning	Organizations adapt to changes in the environment by readjusting their goals, attention rules and search rules
Assumption sharing	Organizational theories-in-use result from shared assumptions. Learning involves changes in these theories.
Development of knowledge base	Learning is the process by which knowledge about action-outcome relations is developed.
Institutionalized experience effects	Learning curve effect extended to managerial decision making

Another perspective of understanding OL is proposed by Daft and Huber (1987). According to these authors, OL is viewed from two basic perspectives: the systems-structural perspective and the interpretive perspective. Their constructs were primarily concerned with the acquisition, distribution and interpretation of information from the environment (Ford & dt Ogilvie, 1996; Huber, 1991; Spender, 1996). The systems-structural perspective focuses on the process of learning while the interpretive perspective centers on a deeper reason for information exchange. Information in the interpretive perspective is considered as having utility, and can therefore, change the understanding about the external world.

Edmondson and Moingeon (1998) distinguish four approaches of OL research as presented in Table 2.4. The first quadrant represents the “residues” Approach. Here, lessons of the past are embodied in current routines. “Communities” in the second quadrant represent organizations as collections of individuals who can learn and develop. In the third quadrant, “participation” involves organizational improvement gained through intelligent activity of individuals. In this approach, OL is viewed as an outgrowth of policies that engage individuals in contributing to the organization.

Table 2.4  
Edmondson and Moingeon's (1998: 23) Approach on OL

		PRIMARY UNIT OF ANALYSIS	
		<i>Organization</i>	<i>Individual</i>
RESEARCH GOAL	<i>Descriptive research</i>	<p><b>Residues</b> (1) organizations as residues of past learning  (e.g. Levitt and March, 1988)</p>	<p><b>Communities</b> (2) organizations as collections of individuals who can learn and develop  (e.g. Pedler et al., 1990)</p>
	<i>Intervention research</i>	<p><b>Participation</b> (3) organizational improvement gained through intelligent activity of individual members  (e.g. Hayes et al., 1988)</p>	<p><b>Accountability</b> (4) organizational improvement gained through developing individuals' mental models  (e.g. Senge, 1990; Argyris, 1993)</p>

In the fourth quadrant, “accountability” represents organizational improvement gained through developing individuals mental models. In this approach, effectiveness depends upon properties of individual mental models.

DiBella’s and Nevis (1998) classify the OL literature into three categories: the normative, the developmental and the capability perspectives. In the normative perspective, OL is presumed as a collective activity, and it occurs only under certain conditions or circumstances (Lee & Gandolfi, 2007; Massingham & Diment, 2009).

In the developmental perspective, the learning organization is a stage in the development of a maturing organization. The development phase of the organization determines its learning styles and character. Learning in this stage can be proactive or anticipative, and is usually based on interpretive and re-interpretive experience (Newman, 2001).

The capability perspective identifies that organizations develop and learn as they mature, taking into account the individual nature of each organization. Consequently, each organization identifies the appropriate tools that would enhance learning in that organization (Bencivenga, 1995). This perspective adopts the view that OL is the product of an ongoing process of learning and cultural development through problem solving (Newman, 2001).

Most recently, Pawlowsky (2001) proposed five clusters of theories of OL: the organizational decision-making and adaptation perspective; the ‘system-theory’ perspective, the cognitive and knowledge perspective, the cultural perspective, and the action-learning perspective.

Under the decision-making perspective, decision variables determine what organizations learn through organizational memory (organization’s standard operating procedures). By learning new combinations of external disturbances and internal

decision rules, the organization increases its adaptability to various environmental situations.

Systems perspective goes beyond the decision-making perspective and integrates the value and belief perspective. In this view of OL, cognitive systems are the basic concepts applied at individual and collective levels. It is based on the assumption that human action and human learning could be placed in the broader context of knowing (Argyris & Schon, 1978; Patriotta, 2007).

The cultural perspective of OL focuses on the collective learning of the organization instead of the cognitive approach of learning by individual entity. From this dimension, OL refers to “the capacity of an organization to learn how to do what it does, where what it learns is possessed not by individual members of the organization but by the aggregate itself” (Cook & Yanow, 1993: 378). The implications of such an approach to learning are that:

Knowledge is held by organizational members together as a group, meaning that learning is relational and social, always rooted in a context of interaction, in addition to whatever individual cognition is entailed. Learning is situated in the context of ongoing work-related practices, and it is mediated by the artifacts central to those practices: not only language and acts, but physical objects as well. (Yanow, 1999: 3)

Action-learning perspective is based on the notion that learning occurs through acting (McLaughlin & Thorpe, 1993). Action-learning involves using acquired knowledge and implementing it to solve real problems. As a systematic process, it is considered a viable tool that enables both individuals and organizations to respond more effectively to problems and change (Marquardt, 2011).

These perspectives of OL, summarized in Table 2.5, have several implications for the management of OL. Pawlowsky (2001) contends that all approaches on OL attempt to address the problem of transferring learning from the individual to a group

or to an organizational level (Pawlowsky). The theoretical approaches also suggest an integration of cognitive, cultural and action related aspects into the approaches of OL. Thus, the approaches set a scene for the development of an integrative model of OL.

Table 2.5  
Summary of Perspectives on OL

<b>Authors</b>	<b>OL Framework</b>
Shrivastava (1983)	Adaptive learning Assumption learning Development of knowledge base Institutionalized experience effects
Daft and Huber (1987) Huber (1991)	Systems structural perspective Interpretive perspective
Edmondson and Moingeon (1998)	Residues Communities Participation Accountability
DiBella's and Nevis (1998)	Normative Developmental Capability
Pawlowsky (2001)	Organizational decision-making and adaptation System-theory Cognitive and knowledge Cultural Action-learning

The perspective of OL adopted in this study is the cultural perspective which focuses on the collective learning of the organization. This perspective of OL, as noted by Weick and Westley (1996: 442), allows researchers to focus less on cognition and what goes on in individual minds, and more on what goes on in the practices of groups. This perspective of OL also distinguishes learning from error-correction, adaptation to environmental changes and other systems-theory-infused metaphors of learning (Yanow, 2000: 256).

### *2.2.2.3 Levels and Stages of OL*

The term “level” is defined by Miller (1978: 25) as “a hierarchical relationship among things.” In organizations, hierarchy implies that organizations contain multiple groups and the groups contain multiple individuals. The nature and attributes of their constituent units differentiate one from the other (Rousseau, 1985). OL carries multilevel meaning that comprises learning at individual, group and organizational levels (Bontis, Crossan & Hulland, 2002; Castaneda & Rios, 2007; Crossan, Lane & White, 1999; Maier, Prange & Rosenstiel, 2001).

Learning at the individual level is based on the assumption that organizations learn through the learning of its individual members (Kim, 1993; Senge, 1990; Simon, 1991), and by ingesting new members who have knowledge not previously existing in the organization (Simon, 1991). Dogson (1993: 378) asserts that “organizational learning is a metaphor for individual learning, and the contextual and internal stimuli to learning in people.”

At group level, learning is seen as an extension to individual level and emphasizes the importance of information sharing and development of common meaning (Heidmann, 2008). Edmondson (2002: 144) notes that “group-level perspective on OL emphasizes interpersonal perceptions and behaviors. Its lens is squarely focused on interactions among a small number of individuals and how these enhance or inhibit the process of building new knowledge and initiating new action.”

Learning at organizational level does not simply refer to the aggregation of individual learning outcomes (Fiol & Lyles, 1985). It rather emerges from the frequent interactions and communications among knowledgeable individuals within a group, a team or a community (Amin & Cohendet, 2004). A more detailed explanation on this is given by Hedberg (1981: 3):

Although OL occurs through individuals, it would be a mistake to conclude that OL is nothing but the cumulative result of their members' learning. Organizations do not have brains, but they have cognitive systems and memories. As individuals develop their personalities, personal habits, and beliefs over time, organizations develop world views and ideologies. Members come and go, and leadership changes, but organizations' memories preserve certain behaviors, mental maps, norms, and values over time.

Thus, unlike individuals, organizations develop and maintain learning systems that influence their immediate members, and later on transmitted to others by way of organization histories and norms (Lawrence & Dyer, 1983; Martin, 1982).

OL equips organizations with the ability to better understand the environmental challenges and to respond to these challenges using appropriate strategies (Daft & Weick, 1984; Donaldson & Lorsch, 1983). It results in associations, cognitive systems, and memories that are developed and shared by members of the organization. A summary of the three levels of learning and their main contents is provided in Table 2.6.

Table 2.6  
Summary of Levels of OL (Miner & Mezias, 1996: 91)

Level of Learning	Contents	Key Learning Processes
Individual	Acquisition of new skills, norms and values; effects of experience and ambiguity; individual interpretation	<i>Trial-and-error learning:</i> Repetition of successful routines, behavior and competencies, standard operating procedures
Group	Performance feedback, shared understanding, coordinated behavior	<i>Inferential learning:</i> Informed observation, active experimentation, interpretation and information acquisition
Organizational	Aspiration level, intraplant and interplant learning, organizational information processing	<i>Vicarious Learning:</i> Observation and copying of successful learning routines, deduction from outcomes.

Several models of OL have been proposed to examine the relationship between the three levels of learning: individual, group and organizational. Table 2.7 summarizes these models which show that knowledge generated by individuals is shared and interpreted in a group, while some of it becomes institutionalized as organizational routines or structures (Matsuo, 2005).

From Table 2.7, Nevis et al.'s (1995) model of explaining learning stages at different levels is based on the framework proposed by Huber (1991) but without considering organizational memory. Crossan et al. (1999) divide the knowledge acquisition stage into two parts. The first part, 'intuiting', refers to "the preconscious recognition of the pattern and/or possibilities inherent in a personal stream of experience" (1999: 525), and occurs at individual level. The second part, interpretation, occurs at individual and group level, and is defined as "the explaining through words and/or actions, of an insight or idea to one's self and to others" (1999: 525).

Table 2.7  
Models of OL (Matsuo, 2005: 31)

Levels of learning	Models of learning stages			
	Individual	Knowledge acquisition	Knowledge acquisition	Intuiting
Group	Information distribution	Knowledge sharing	Interpreting	Individual mental model
	Information interpretation		Integrating	
Organizational	Organizational memory	Knowledge utilization	Institutionalizing	Shared mental model
Researcher(s)	Huber (1991)	Nevis et al. (1995)	Crossan et al. (1999)	Kim (1993)

#### 2.2.2.4 Typology of OL

The conceptual literature on OL distinguishes between certain types of learning based on certain unique characteristics that are found in each type of learning. There is no unified method of categorizing the types of learning that exist in the literature (Dierkes, Marz, & Teele, 2003), and most of the authors base their classification on Bateson's (1972) classical work on OL typology (Jacobs, 2003; Pawlowsky, 2001).

Bateson (1972) identifies three types of learning: Type I, Type II and Type III learning. Table 2.8 summarizes the content of each classification. His classification is guided by the theory of logical types, "a theory based on formal logic, which postulates a discrete division or discontinuity between type and its larger size" (Crookall, & Saunders, 1989: 142; Roach & Bednar, 1997).

Table 2.8  
Bateson's (1972) Typology of Learning

Type of Learning	Characteristic
Type I	<i>change in specificity</i> of response by correction of errors of choice within a set of alternatives.
Type II	<i>change in the process of Learning I</i> , e.g., a corrective change in the set of alternatives from which choice is made, or it is a change in how the sequence of experience is punctuated.
Type III	<i>change in the process of Learning II</i> , e.g., a corrective change in the system of sets of alternatives from which choice is made.

Argyris and Schon (1978) and Argyris (1992) distinguish between three types of learning: single-loop, double-loop and deuterio-learning. According to these authors, single-loop learning is based on a process of error detection and correction. It does not lead to alteration of existing organizational policies and norms (Mothe & Forey, 2001; Chiva, Grandio & Alegre, 2010). This kind of learning is routine and

based on embedded assumptions which need not to be challenged if they are working properly (Gold, Thorpe & Mumford, 2010).

Double-loop learning occurs “when error is detected and corrected in ways that involve the modification of an organization’s underlying norms, policies and objectives” (Argyris & Schon, 1978: 3). When the learning systems and practices in the previous two types of learning are also questioned as part of error detection and correction, it is known as deuterio-learning (Argyris & Schon, 1978). This kind of learning therefore, involves “questioning and adjusting the organizational paradigms, values and purposes that motivate and inspire work” (Mitleton-Kelly & Ramalingam, 2011: 354). Table 2.9 summarizes the three learning types proposed by Argyris and Schon (1978).

Several weaknesses have been identified in the previous classification of learning types. For instance, Dierkes et al. (2003) argue that in practice, it is not always easy to distinguish the three types of learning as they depend largely on the subjective interpretation of a particular organizational event.

Another weakness is that the classification too narrowly on problem detection and correction. By doing so, it neglects other important stimuli of learning such as opportunities, creative initiatives and acquisition of new knowledge (Dierkes, 2003; Nonaka & Tekeuchi, 1995; Lumpkin & Lichtenstein, 2005).

Table 2.9  
Summary of Argyris and Schon's (1978) Typology of OL

Type of Learning	Core Idea
Single loop	<i>Paradigm-consistent thinking</i> : Doing things better within current dominant paradigm (understanding and knowledge) Most likely outcome: <i>incremental change</i>
Double loop	<i>Paradigm-challenging thinking</i> : Critical alterations to the dominant paradigm Most likely outcome: <i>step change</i>
Deutero-	Doing things differently by creating new paradigm through new mental models Most likely outcome: <i>radical change</i>

From a cognitive approach, Fiol and Lyles (1985) differentiate between lower-level and higher-level learning. Lower-level learning is a focused learning that may be mere repetition of past behaviors and adjustments in part of what the organization does (Chiva et al., 2010; Tell, 2008). This type of learning leads to the development of some basic associations of behavior and outcomes that are often short-term oriented, and take place in organizational contexts (Fiol & Lyles).

Higher-level learning on the other hand is “related to the development of complex rules and associations regarding new actions” (Fiol & Lyles, 1985: 810). At this level, the central norms, frames of reference and assumptions are changed (Coggshall, 2004; Fiol & Lyles, 1985). Describing this level of learning, Fiol and Lyles (1998: 808) explain:

The associations that result from higher-level learning have long term effects and impacts on the organization as a whole. This type of learning occurs through the use of heuristics, skill development, and insights. It therefore is a more cognitive process than is lower-level learning, which often is the result of repetitive behavior.

Another OL typology comes from Senge (1990) who differentiates between adaptive and generative learning. The former category compares with Fiol and Lyles’s (1998) lower-level learning as well as Argyris and Schon’s (1978) single-loop learning. Generative learning corresponds to Argyris and Schon’s (1978) double-loop

learning as well as Fiol and Lyles's (1998) higher-level learning. It emphasizes the use of feedback from past actions to create a transformational change that challenges the prevailing status of the organizations (Kransdorff, 2006; Wickramasinghe & Lubitz, 2007).

Generative learning encourages changes in values and beliefs that motivate goals, strategies and policies (Rahim, 2001). It is concerned with continuous experimentation and feedback in an ongoing assessment of the ways in which organizations solve their problems (Wickramasinghe & Lubitz, 2007). In this type of learning, questions are not only focused on objective problems of the organizations, but also the reasons why these problems occur (Argyris, 1994).

Adaptive learning and generative learning are complementary processes (Bessant, 2005). While adaptive learning takes a reactive approach to dynamic environment, generative learning takes a proactive strategy, and therefore enhances the ability of firms to create (Senge, 1990). Using generative learning, firms discover new customers and markets to serve (Al-Shammari, 2009).

In applying learning theories and concepts to SMEs, it is argued that the experience, personality and goals of the entrepreneurs and owner-managers greatly influence the learning process (Caird, 1993; Dalley & Hamilton, 2000). Table 2.10 summarizes the main types of learning in the literature.

Table 2.10  
Summary of OL Typologies (Pawlowsky, 2001)

Authors	Learning Types		
	Type 1	Type 2	Type 3
Bateson (1972)	Learning 0 and Learning 1	Learning II	Learning III
Argyris & Schön (1978)	Single loop	Double loop	Deutero-learning
Hedberg (1981)	Assumption	Turn-over	Turnaround
Shrivastava (1983)	Adaptive	Assumption	Development of knowledge base
Fiol & Lyles (1985)	Lower level	Higher level	
Lundberg (1989)	Learning as organizational change	Learning as organizational development	Learning as organizational transformation
Senge (1990)	Adaptive learning	Generative learning	

### 2.2.3 Innovation

This section provides a theoretical and conceptual background to innovation. It includes definition of innovation, theoretical perspectives and types of innovation. Finally, implementation of innovation in small and medium-sized firms is discussed.

#### 2.2.3.1 Defining Innovation

The management literature has created a plethora of definitions of innovations, and different criteria have been used to describe innovation. While there is no consensus on what exactly constitutes innovation, the scientific discussion is still far from reaching common agreement on the notion of innovation (Berchicci, 2009; Braun, & Herstatt, 2009; Herzog, 2008). A list of selected definitions and descriptions of innovation is presented in Table 2.11.

Table 2.11  
Selected Definitions of Innovation

Author	Definition of innovation
Schumpeter (1934: 7)	"setting up of a new production function" "the commercial or industrial application of something new – a new product, process or method of production."
Thompson (1965: 36)	"generation, acceptance and implementation of new ideas, processes, products or services"
Zaltman et al. (1973: 10)	"any idea, practice or material artifact perceived new by the relevant unit of adoption"
Drucker (1985: 87)	"the art that endows resources with a new capacity to create wealth"
Van De Ven (1986: 591)	"the development and implementation of new ideas by people who over time engage in transactions with others within an institutional context."
Urabe (1988: 3)	"the generation of a new idea and its implementation into a new product, process, or service, leading to the dynamic growth of the national economy and the increase of employment as well as the creation of pure profit for the innovative business enterprise"
Damanpour (1991: 556)	"the generation, development, and adaptation of novel ideas on the part of the firm"
Klein, Conn, & Sorra (2001: 811)	"a technology or practice that an organization is using for the first time, regardless of whether other organizations have previously used the technology or practice"
OECD (2005: 46)	"the transformation of an idea into a marketable product or service, a new or improved manufacturing or distribution process, or a new method of social service"
Onodera & Kim (2008: 112)	"the successful exploitation of new ideas and the invention, development and commercialization of new technologies, services, business models, and operational methods."
Rowe (2010: 44)	"the process of starting with a problem and working to solve it while inventing solutions along the way"

One of the earliest definitions of innovation is advocated by Schumpeter, an Austrian economist who is acknowledged as the founder of research in innovation (Courvisanos, 2009; Lin & Xiumin, 2010; Strecker, 2009). Schumpeter (1934: 87) defines innovation as 'setting up of new production function', which means new combination of production factors or production conditions (Hauschildt, 2004; Pyka & Fonseca, 2010).

The new factor combinations encompass five aspects: new goods or quality of goods, new production methods, new markets, new resources and new organizations (Schumpeter, 1934, 1950). All factor combinations are eventually replaced by new ones which lead to significant improvements – a process which Schumpeter refers to as creative destruction (McCraw, 2007; Patry, 2009). Sundbo (1998) criticizes Schumpeter’s definition of innovation as being diffuse in that there are no exact boundaries for the phenomenon.

Despite the diversity in defining the concept of innovation, several themes emerge as core elements of definition. First, innovation represents newness of idea related to a product or process. This aspect of definition creates an overlap between innovation and invention. While both terms are linked to the newness of an idea, several authors (e.g. Bullinger, 2009; Gardner, 2010; Schumpeter, 1934; Turunen, 2005) distinguish between the two terms such that invention is seen as the actual process of generation of a new idea (Osborne & Brown, 2005; Gardner, 2010). Innovation on the other hand is the process of implementing or transforming the new idea by converting them into an actual product or service (Afuah, 2004; Merrill, 2008; Rumpf, 2010).

Moreover, the perception of newness also serves to differentiate innovation from change (Slappendel, 1996). Zaltman, Duncan and Holbek (1973: 158) have commented that “while all innovations imply change, not all change involves innovation” as not everything that an organization adopts is perceived as new (Barret & Sexton, 2008).

The second feature of innovation is that it is both a process and an outcome of a process (Berchicci, 2009; Donnelian, Conboy & Hill, 2006). While some authors identify innovation as a social process (e.g. Cooper, 1998; Drejer, 2002; Osborn &

Brown, 2005), others such as Kimberly and Evanisko (1981) conceptualize innovation as an outcome. This is also reflected in Schumpeter's (1934: xix) definition of innovation as "the commercial or industrial application of something new – a new product, process or method of production." Both these two approaches (process and outcome) have a different point of focus depending on the issue under study and the context being analyzed (Osborne & Brown, 2005).

The final aspect of definition is that innovation involves change and discontinuity (Osborne & Brown, 2005; Walker, Jeanes & Rowlands, 2001). This aspect of innovation is closely related to Tushman and Anderson's (1990) notion of competence-destroying and competence-enhancing discontinuity. The two authors assert that "competence-enhancing discontinuity builds on know-how embodied in technology that it replaces" while "competence-destroying discontinuity renders obsolete the expertise required to master the technology that it replaces" (Tushman & Anderson, 1990: 609). An example of the former category is the replacement of mechanic typewriters with electric, whereas the replacement of steam engines with diesel locomotives is an example of the latter category (Low & McMillan, 2007).

A synthesis of the selected definitions of innovation indicates that innovation is the generation and implementation of something new – idea, product, process or service.

### ***2.2.3.2 Perspectives of Innovation***

Based on a comprehensive review of literature, Slappendel (1996) proposes a framework to classify the existing research work on innovation under three categories: individualist, structuralist, and an interactive process perspective.

The individualist perspective, which is grounded on social psychology, assumes that individuals are the main source of innovation in organizations, and that their personal characteristics such as age, sex, education level, personality and creativity determine innovation (Fagerberg, 2005; Harkema, 2003; Higgins, 2007; Slappendel, 1996; Trott, 2003).

The structural perspective assumes that innovation is determined by certain organizational characteristics including organizations size, its structure differentiation, task complexity, employee's job specialization, and centralization of execution of power and decision making (Brandon & Lu, 2009; Kautz & Nielsen, 2004; Slappendel, 1996). This perspective is grounded on open systems theory and structural contingency theory in which organizations are analyzed as systems of interdependent parts (Brandon & Lu, 2009; Lam, 2004). It also focuses attention to the relationship between the organization and its environmental stake holders such as customers, suppliers and government. The structuralist perspective has been criticized for making conclusions about the nature of innovation and perceiving the organization as an objective entity driven by predictable forces (Brandon & Lu, 2009; Slappendel, 1996).

The two previous perspectives of innovation (individualist and structuralist) are considered simple and linear in that innovation is assumed to occur through three overlapping stages: invention, implementation and diffusion (Aledda, 2010; Balzat, 2006; Dosi, 1988; Utterback, 1971).

The interactive perspective of innovation assumes that innovation is a dynamic and continuous phenomenon that involves constant interaction of the actions of individuals and the structural influences (Harkema, 2003; Kautz & Nielsen, 2004). This perspective emphasizes importance of organizational environment (both internal and external) on the innovation process.

Unlike the previous two perspectives (individualist and structuralist), which are simple and linear, the interactive perspective hinges on the nature of innovation as a complex and non-linear process (Bessant & Rush, 1995; Phillimore, 1999; Smits, Merkerk, & Guston, 2010). Kline and Rosenberg (1986: 275) mention that “models that depict innovation as a smooth, well-behaved linear process badly misspecify the nature and direction of the causal factors at work. Innovation is complex, uncertain, somewhat disorderly, and subject to changes of many sorts.”

From the three perspectives of innovation, the present research will adopt the interactive perspective which views innovation as a complex and non-linear phenomenon. This perspective gives the benefit of accounting for both individual and structural factors through an analysis of their interconnection (Cijsouw, Jorna & Rakhorst, 2007; Slappendel, 1996; Zendejas & Chiasson, 2008). Table 2.12 summarizes the three perspectives of Innovation as postulated by Slappendel (1996).

Table 2.12  
Summary of Innovation Perspectives (Slappendel, 1996)

	<b>Individualist</b>	<b>Structuralist</b>	<b>Interactive process</b>
<i>Basic assumptions</i>	Change/innovation is caused by individuals	Change/innovation is determined by structural characteristics	Change/Innovation is produced by the interaction of structural influences and the actions of individuals
<i>Conceptualization of a change/innovation</i>	Static and objectively defined objects or practices	Static and objectively defined objects or practices	Content is perceived, changes/innovations are subject to reinvention and reconfiguration
<i>Conceptualization of the change/innovation process</i>	Simple, linear with focus on the adoption stage	Simple, linear with focus on the adoption stage	Complex, social process of interrelated events and stages seen from different perspectives
<i>Core concepts</i>	Champion Leaders, Entrepreneurs Change agents	Environment, Size Complexity, Formalization Centralization Professionalism	Context Innovative capability Proliferation Shocks

### 2.2.3.3 *Types of Innovation*

Several authors propose different approaches to define categories of innovation. According to Zaltman et al. (1973), the types of innovation can be classified under three broad categories: degree of anticipation, initial focus and outcome or effect.

Under degree of anticipation, innovations are classified as either programmed or non-programmed. While programmed innovations are scheduled in advance and represent further development of extant products or services, non-programmed innovations are not planned ahead and are triggered either by the detection of slack resources or an imminent crisis (Anderson & Gasteiger, 2007).

According to the initial focus of innovation, Utterback and Abernathy (1975) distinguish between product and process innovation. Product innovations are

concerned with products introduced to meet a user or a market need, while process innovations involve the equipment, method and systems employed to produce the products (Damanpour & Aravind, 2006; Damanpour & Gopalakrishnan, 2001). Product innovation results in product differentiation and an increase in product quality (Damanpour & Aravind, 2006). It is mainly driven by customers' demand for new products and management's desire to penetrate new markets (Boer & During, 2001; Meeus & Edquist, 2006). Process innovation is oriented towards the efficiency or effectiveness of production and may lead to a decrease in the cost of production (Adner & Levinthal, 2001; Damanpour, 2010).

Also under initial focus, Grossman (1970 cited in Damanpour & Gopalakrishnan, 1999: 65) distinguishes between ultimate and instrumental innovation. Ultimate innovations are those that are ends in themselves whereas instrumental innovations are those that facilitate the adoption of ultimate innovations at a later point in time (Damanpour, 1988, 2001).

In terms of innovation's outcome or effect, Nord and Tucker (1987) describe two types of innovations: radical and routine innovation. Routine innovations are new, but in many ways resemble earlier ones, while radical innovations are entirely new practices and their introduction involves considerable change in the way the business is run (Haartsen, Groote & Huigen, 2000). The more an innovation differs from existing alternatives, the higher is its degree of radicalness. Table 2.13 summarizes the classification proposed by Zaltman et al. (1973).

Table 2.13  
Zaltman et al.'s (1973) typology of innovation

Classification scheme	Example of Innovation	Key Authors
Degree of anticipation	Programmed vs. non-programmed	Knight (1967)
Initial focus	Product vs. process	Utterback and Abernathy (1975)
	Instrumental vs. radical	Grossman (1970)
Outcome or effect	Radical vs. routine	Nord and Tucker (1987).

Carayannis, Gonzalez and Wetter (2003: 118) propose an approach to classify innovation along four dimensions: process (the way in which the innovation is developed); content (the technical or social nature of innovation); context (environment in which the innovation emerges); and impact of innovation (social or technical change resulting from innovation).

Another approach to classifying innovation is suggested by Gia (2011: 16). The author classifies innovation into three categories: (i) innovation item – related to the object of innovation; (ii) degree of innovativeness – which refers to the extent of innovation; and (iii) innovation paradigm – which comprises of either closed (within the company) or open innovations (combining internal and external knowledge).

Osborne and Brown (2005) propose a more comprehensive method of classifying innovation types. They identify five classifications of innovation based on (i) the origin of innovation; (ii) organization distress or organization slack; (iii) who benefits from innovation and how; (iv) product or process; (v) the relationship between the impact of innovation on its organizational context. Table 2.14 presents a summary of these innovation types.

Table 2.14  
Osborn and Brown's (2005) typology of innovation

Dimension of Innovation	Key Authors
As 'science-push' or 'market-pull'	Burns & Stalker, 1961; Gassmann & Zedtwitz, 2003; Geenhuizen, 2009; Geroski & Walters, 1998; Marcus, 2011; Rumpf, 2010
As organization stress or organization slack	Knight (1967) Haustein, Maier & Uhlmann, 1981; Rehoux, 2006
As technical or administrative innovation	Daft and Becker (1978) Dodgson, Gann & Salter, 2008; Kodama, 2010; Sáez & López, 2010; Van De Ven, 1986; Wetter, 2010
As product or process innovation	(Damanpour, 1987; Damanpour, 1991; Damanpour & Gopalakrishnan, 2001; Damanpour, 2010; Koellinger, 2008; Utterback & Abernathy, 1975;
In relation to impact of innovation on organizational context and wider market.	Abernathy and Clark (1985)

The first classification focuses on the origin of innovation on the basis of 'science-push' or 'market-pull' (Burns & Stalker, 1961; Gassmann & Zedtwitz, 2003; Geenhuizen, 2009; Tunzelmann, Marlerba, Nightingale & Metcalfe, 2008). Science, technology or supply push model of innovation starts with discoveries in basic science, and from these discoveries come new goods and services (Geroski & Walters, 1998; Marcus, 2011; Rumpf, 2010). The influence of market on innovation development leads to the market or demand pull model (Marcus, 2011; Rumpf, 2010; Trott, 2005).

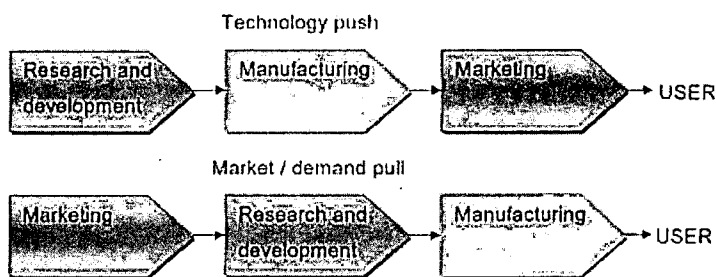


Figure 2.1: Technology-Push Vs Market-Pull Innovation Models (Trott, 2005: 23)

Figure 2.1 illustrates the two models of innovation that were dominant in the first half of the twentieth century (Schlossstein, 2010). Both science-push and market-pull models have been criticized for being unidimensional linear sequential models (Andersson, Batten & Karlsson, 1989; Schlossstein, 2010; Schmoch, 2007). Research shows that innovation is rarely a linear process that is driven by a single source – either science or potential market demands (Sundbo & Gallouj, 2000; Tödtling & Kaufmann, 1999). Rather, innovation involves random processes that are more complex and uncertain (Gassmann & Zedtwitz, 2003; Tushman & Anderson, 1986).

The second classification of innovation by Osborn and Brown (2005) is by looking at the organization stress and organization slack. Slack and distress situations were first used in innovation research by Knight (1967) in his model of the intra-firm innovation process (Haustein, Maier & Uhlmann, 1981; Rehoux, 2006). Slack innovation takes place when a successful organization has surplus resource to undertake innovation while distress innovation occurs when an organization is in trouble and needs to change to avoid extinction (Isaksen, 1987; Zaltman et al., 1973). The limitation of classifying innovation as stress or slack is that it ignores potential environmental factors that might stimulate innovation (Osborn & Brown, 2005; Rothwell & Zegveld, 1981).

The third dimension of classifying innovation is based on the early work of Daft and Becker (1978) who distinguish between technical and administrative innovation. According to these authors, technical innovation involves new technologies, products and services while administrative innovation refers to new procedures, policies and organizational forms (Dodgson, Gann & Salter, 2008; Kodama, 2010; Sáez & López, 2010; Wetter, 2010). Van de Ven (1986: 592) however, argues that making such a distinction (between technological and

administrative innovation) often results in a fragmented classification of the innovation process because most innovations involve new technical and administrative components.

The fourth typology of innovation is based on distinguishing between product and process innovation (Damanpour, 1987; Damanpour, 1991; Damanpour & Gopalakrishnan, 2001; Damanpour, 2010; Koellinger, 2008; Utterback & Abernathy, 1975; Urabe, 1988). Damanpour and Gopalakrishnan (2001) emphasize that differentiating between product and process innovation is important because their implementation requires different organizational skills.

The final dimension of classifying innovation proposed by Osborn and Brown (2005) is in relation to its impact on organizational context and wider market. Abernathy and Clark (1985) extended the concept of the effect of innovation on the existing capabilities of a firm. They suggested a matrix of four types of innovations: architectural, market niche, regular and revolutionary innovation which are summarized in Table 2.15.

Table 2.15  
Abernathy and Clark’s (1985) Typology of Innovation

Market knowledge	Technical capabilities	
	<i>Preserved</i>	<i>Destroyed</i>
<i>Preserved</i>	Regular Innovation	Revolutionary Innovation
<i>Destroyed</i>	Niche Innovation	Architectural Innovation

According to Abernathy and Clark (1985), an innovation is regular if it maintains the existing technological and market capabilities; revolutionary if it is a radical technical innovation but an incremental market innovation; niche if it enhances

technological capabilities but obsoletes market capabilities; and architectural if it is both a radical and market innovation.

Established firms are most likely to exploit regular, revolutionary and niche inventions (Ellonen, Wikström & Jantunen, 2009; Papadiuk & Choo, 2006; Serenko & Detlor, 2004). New entrants are likely to be successful in exploiting architectural innovations and, to a lesser extent, niche innovations (Abernathy & Clark, 1985).

In summary, the previous section presented different approaches of classifying innovation types in the extant literature. A summary of these approaches is presented in Table 2.16.

**Table 2.16**  
**Summary of Approaches for Classifying Innovation**

Authors	Dimensions of Innovation
Zaltman et al. (1973)	Degree of anticipation
	Initial focus
	Outcome or effect
Carayannis et al. (2003)	Process (the way in which the innovation is developed);
	Content (the technical or social nature of innovation);
	Context (environment in which the innovation emerges);
	Impact of innovation (social or technical change resulting from innovation).
Osborn and Brown (2005)	As 'science-push' or 'market-pull'
	As organization stress or organization slack
	As technical or administrative innovation
	As product or process innovation
	In relation to impact of innovation on organizational context and wider market.
Gia (2011)	Innovation item – related to the object of innovation
	Degree of innovativeness – the extent of innovation;
	Innovation paradigm –closed (within the company) or open innovations (combining internal and external knowledge).

It is argued by Osborn and Brown (2005) that none of the classification schemes aforementioned provides a sufficient classification of the concept of innovation. Because of this limitation, this study will adopt a system-wide approach to

innovation at organizational level. This approach examines the adoption of three types of innovations: product, process and administrative innovations. This perspective maintains a distinction between technical (new technologies, product and service) innovations and administrative (new procedures, policies and forms) innovations (Van de Ven, 1986). Laforet (2010) also asserts that such a wider perspective is more relevant as it enables firms to improve monitoring and implementation of each type of innovation as well as the overall innovation.

#### *2.2.3.4 Innovation in the SMEs*

Innovation in SMEs differs considerably from innovation in large organizations (Rothwell & Dodgson, 1994). Compared to large and established firms, the decision making process in SMEs tends to be shorter which implies that the entrepreneurs and owner managers can be key drivers of innovation in their firms. However, the centralized form of management in SMEs hinder the innovative process if the owner-managers are less amenable to others' advice and are reluctant to delegate decision-making to others (Varis & Littunen, 2010).

The structure of SMEs also provides an advantage over large enterprises when implementing innovation. Whereas the simple and flatter structure in SMEs facilitates the implementation of innovation, the mechanistic and bureaucratic structure in large organizations make them slower and less flexible to adaptation of innovation. To illustrate the central role of the entrepreneur on innovation, North and Smallbone (2000) report that for 85 percent of the firms in their study, the owner-managers of the firms played a key role in the initiation and development of innovations.

Another aspect that may influence the extent of innovation in SMEs is the type of culture adopted by the entrepreneurs and owner-managers. On one hand, the fewer

number of employees can easily share common beliefs and values related to innovative ideas. On the other hand, this can also be a problem if the owner-manager does not encourage an innovative culture or the development and creation of new innovative ideas.

Some of the opportunities associated with innovation in the SME context include: intense competition (Grama & Fotache, 2007), technological innovations (Tilley & Tonge, 2003), product innovation (Salavou & Lioukas, 2003), process innovation (Maes, 2008), and better positioning in the market (Grant, Laney & Pickett, 2002).

#### ***2.2.3.5 Innovation in Malaysia: Overview and Policies***

From an agricultural-based economy in the 1970s, Malaysia began transforming to a middle-income country by gradually expanding its economic activities. From the 1980s to mid 1990s the country had transitioned from a producer of raw materials such as tin, copper, petroleum and rubber into a major manufacturer and exporter of electronics and information technology products (Dufey, Gran & Ward, 2008; Harvie & Lee, 2008; Willnat & Aw, 2009). This was an important phase in the transformation of Malaysian economy and growth (Din & Krishna, 2007).

The intensifying economic competition among nations and globalization has led to the Malaysian state to recognize the urgent need to transform the Malaysian economy from a production-based to a knowledge-based economy (Fleming & Søborg, 2010; Guan, 2006; Mustapha & Abdullah, 2004). As a consequence, the Malaysian government in 2007 adopted the balance approach of market-led and technology-driven innovations.

The technology-driven model assumes that scientists invent new technologies which are transferred into prototypes before they are commercialized in a large scale (Ziesak, 2009; Trott, 2003). In the market-driven model innovative ideas emanate from the needs and wants of the customers (Figure 2.3).

Policies to develop and strengthen Malaysia’s National Innovation System (NIS) are orchestrated around Vision 2020, which serves as the nation’s roadmap for economic development (Wonglimpiyarat, 2011). Freeman (1987: 1), who first coined the term “National Innovation System” (Radošević, 1998), defines it as “the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies.

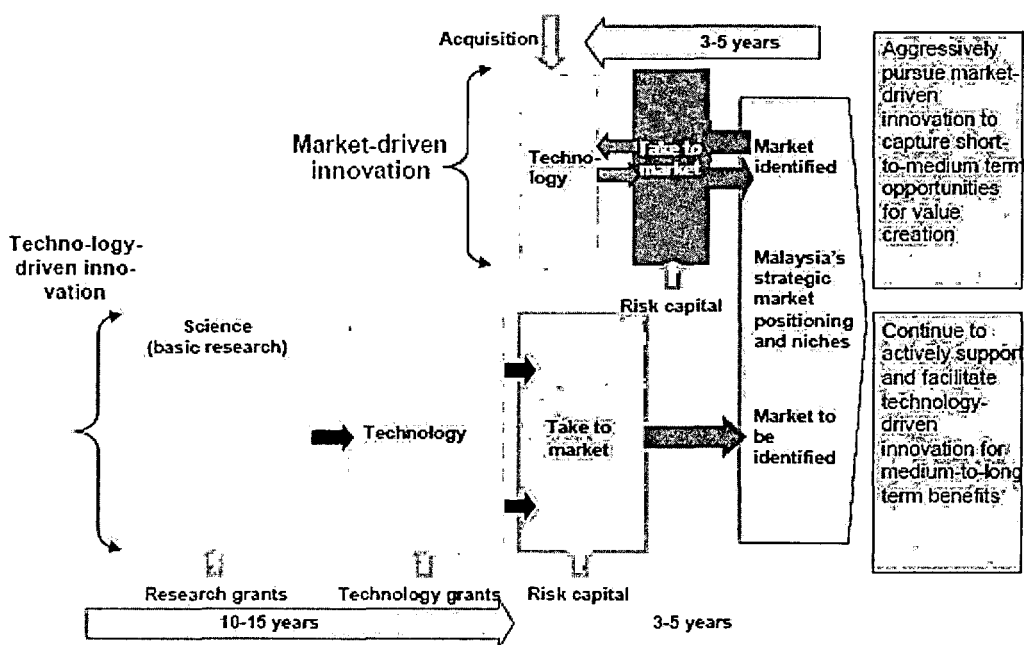


Figure 2.2 Malaysia's National Innovation Model (MOSTI, 2007)

Recognizing the need to formulate a national policy on innovation, the Malaysian government has incorporated innovation as a key component in all its

current policies and plans. For example, the second thrust of the Ninth Malaysian Plan (2006-2010) is aimed at “enhancing the national capacity for knowledge and innovation” (Badawi, 2006: 23). Rasiah (1999: 183) asserts that most innovations are realized in firms through the introduction of new products and processes. He further claims that a significant amount of innovation emerges from the production floor, where learning enhances product and process improvement capacities.

The recognition of the need to strengthen the innovation system in Malaysia is reflected in Malaysia’s investment in ICT, in particular, in its Vision 2020 strategy (Celik, 2007). This includes the development of a Multimedia Super Corridor (MSC), which was launched in 1997 as a test bed for new ideas and an environment to jumpstart innovation in ICT (Huff, 2002, 2004; World Bank, 2007). The MSC is designed to accelerate progress towards the main objective of Vision 2020 — to transform Malaysia into a knowledge-based society.

The MSC includes several technology parks such as Technology Park Malaysia, Cyberjaya, Selangor Science Park, and UPM-MTDC Park (Mhd Sarif, 2009: 69). These parks are used by governments to encourage innovation in the high technology industry (Mhd Sarif, 2009). Besides the parks, the Malaysian government has also established several institutions to coordinate and implement innovation-related activities. The key actors in the country’s NIS are listed in Table 2.17.

Table 2.17  
Key Players in the NIS (Abulhassan & Omar, 2009)

Institution	Role played
The Ministry of Science, Technology and Innovation (MOSTI)	the country's main implementing body for S&T and innovation
National Council for Scientific Research and Development (NCSRD)	advisory body to the government; to strengthen technology base through enhancement of R&D activities and formulation of technology development programs
The National Information Technology Council (NITC)	focuses on issues relating to information and communication technologies
The National Innovation Council (NIC)	national steering committee, bringing together most of the other science and technology- related councils
Malaysian Development Corporation	A private entity that was formed by the government to act as a catalyst for the ICT industry

Another recent policy initiative adopted by Malaysia is “an integrated approach to increasing local SMEs capabilities for technology acquisition and global competitiveness” (World Bank, 2010: 85). The principal SME policy under the Ninth Malaysia Plan (2006-2010) is the “development of a competitive, innovative and technologically strong SME sector that is able to contribute to the domestic economy and compete globally. Strategies will be directed at acquiring technologies to propel SMEs up the value chain in the manufacturing, agriculture and services sector” (SME Corporation, 2010).

The Malaysian Innovation Agency Act 2010 was enacted to facilitate the radical technology-related transitions of SMEs whereas the Malaysian Innovation Agency is the statutory body under which all innovative activities are centralized (Bernama, 2011a). Still in its drafting process, the National Innovation Policy aims to provide a unifying framework and guidelines (Bernama, 2011a). Furthermore, Special Innovation Unit (Unik) was established to assist SMEs in innovating for their businesses (Bernama, 2011b). Launched as an initiative under the Prime Minister's

Office, Unik aims to introduce new technologies to SMEs and address innovation needs among the business fraternity.

#### **2.2.4 Organizational Performance**

Organizational performance (OP) is a crucial component of empirical research in business and management studies (Dess & Robinson, 1984). Authors such as Dess and Robinson (1984), Hubbard (2009), Rogers and Wright (1998) and Venkatraman and Ramanujam (1986) acknowledge that conceptualizing OP in the field of business policy is a daunting task. The reason for the difficulty in conceptualizing the OP construct is that “(it) is a complex and multidimensional phenomenon” (Dess & Robinson, 1984: 265).

The literature identifies two main types of OP measures namely financial and non-financial measures. Financial performance (FP) is quantitative information expressed as a monetary unit, while non-financial performance (NFP) is qualitative information expressed as a non-monetary unit (Mejia, Berrone & Santos, 2010).

OP measures that rely solely on FP metrics such as return on assets (ROA), return on equity (ROE), sales and sales growth have been criticized for over-emphasizing short-term returns that discourage long-term investments and do not capture all the relevant dimensions of OP (Crowford & Cox, 1990; Kaplan & Cooper, 1998; Tangen, 2004).

NFP measures focus on firm’s long-term success factors such as customer satisfaction, internal business process efficiency and employee satisfaction (Hoque, 2005; Mejia et al., 2010). Such non-accounting measures are better than financial metrics in terms of capturing the value of intangible assets and are more useful in predicting future FP (Ittner & Larcker, 1998). This type of performance measure also

suffers a potential drawback when organizations fail to identify, analyze and act on the appropriate non-financial measures (Ittner & Larcker, 1998).

Another aspect related to the measurement of OP is objective versus subjective indicators (Muckler & Seven, 2000; Schachter, 2010). Objective measures refer to the actual numerical measures of performance such as annual sales. Subjective measures, on the other hand, are the perception based measures that depend upon the opinions of individuals (Dawes, 1999).

Obtaining objective measures of performance has been a source of concern for research in strategic management and business policy particularly when it involves small and medium firms as in the present study. Dess and Robinson (1994: 266) assert that “the researcher investigating small firms is often confronted with an inability to obtain objective measures on a consistent basis.” The authors go further to explain the causes of such inability (1994: 266-267):

First, access to performance data on privately-held firms is severely restricted. Such information is not publicly available. Owners, very sensitive about releasing any performance-related data, are the sole gatekeepers to such information on individual firms. Secondly, even if access to such information is obtained with privately-held firms, there is greater risk of error attributable to varying accounting procedures in these firms.

Recognizing the limitations of relying on one aspect OP (either FP or NFP) and the inherent problems found in obtaining objective measures of OP, the present research will combine both financial and non-respondents indicators of OP. Additionally, the study will also use subjective data based on perception of senior management of participating companies.

Brownell and Dunk (1991) posit that the nature of any bias by this form of self-reporting measure has never been described or shown to impair the inferences drawn from the data. This opinion is further supported by Venkatraman and

Ramanujam (1987: 10) who assert that “neither type of measure (subjective and objective) is intrinsically superior to the other in terms of consistently providing valid and reliable measures of performance.” Brownell and Dunk (1991) also argue that there is no convincing evidence that objective measures e.g. financial data are either more reliable or valid in studies.

Other authors such as Dess and Robinson (1984), Pearce, Robbins and Robinson, (1987) Hurt and Banbury (1994), and Dawes (1999), generally accept that subjective performance measures are highly correlated with objective ones, and can be used if objective data are not available or easily obtained.

## **2.3 EMPIRICAL STUDIES**

A considerable body of literature examines the interrelationships between OL, innovation and performance in a wide range of industry and environments. The empirical studies analyzed in this section will cover three types of relationships: between OL and performance, between innovation and performance, and between OL and Innovation.

### **2.3.1 OL and Organizational Performance (OL – OP)**

The extant literature on OL proposes the need to pursue learning in order for organizations to remain competitive and improve their performance (Fiol & Lyles, 1985). OL is perceived as a way of adapting to environmental demands (Chakravarthy, 1982; Huysman, 1999), and the greater the uncertainty in the environment, the greater the need for learning (Heijden, 2002; O’Keeffe, 2006). Since 1990s, there has been growing interest in analyzing the impact of learning orientation (LO) on performance.

Simonin's (1997) study of LO and performance link incorporated both financial and non-financial measures. His study investigated the influence of know-how on tangible and intangible benefits within the context of strategic alliances. Tangible benefits are strategic and financial: generating additional profits, improving market share, and sustaining competitive advantage. Intangible benefits are learning or knowledge-based: learning specific skills and competencies. Findings from his study suggest strong relationship between learning orientation and both financial and non-financial performance indicators.

Jashapara (2003) examined the role of LO, culture, and focused learning on OP. Based on a stratified sample of 181 UK construction companies, the study used structural equation model (SEM) and developed a new instrument for a learning organization. Results of the study suggest that double-loop learning and cooperative cultures have a positive effect on organizational performance. The study also suggests that the effect of competitive forces means that LO focused on efficiency and proficiency leads to competitive advantage in the UK construction industry.

Ramayah, Mohamed, Muhamad, and Ng (2004) investigated how manufacturing firms develop capabilities and resources that are inimitable, and non-substitutable in pursuit of higher performance and competitive advantage. Data was collected from a sample of 68 managers in manufacturing firms in Northern Peninsular Malaysia. The results of their study indicate that internal learning lead to more proprietary technology development and in turn proprietary technology lead to higher level of manufacturing performance. The study also shows that internal learning and proprietary technology are important means for a manufacturing firm to gain competitive advantage. This implies that management should carefully identify the critical resources and capabilities that should be developed internally.

Lopez, Peon & Ordas (2005) examined the relationship between LO and business performance for 195 Spanish firms with more than 200 employees using structural equation modeling. The results of their investigation provide support for the view that LO contributes positively to innovation and competitiveness and to financial performance. In addition, the results show a positive relationship between innovation and competitiveness and financial performance. It can be noted that although the study supports a positive relationship between LO and performance, it is based on a narrow concept of business performance that does not take into account the non-financial performance indicators.

In their empirical study of 220 companies in Slovenia, Dimovski and Skerlavaj (2005) used the OLIMP (Learning orientation and Information Management Processes) questionnaire to examine the relationship between LO and both financial and non-financial performance. Three latent constructs (LO, financial performance and non-financial performance) were operationalized using eight measurement variables and 42-item self-administered questionnaire. Analysis of the data collected suggest that (i) the impact of LO on financial performance is statistically significant, positive and strong, and that (ii) influence of LO on non-financial performance is statistically significant, positive, and even stronger than in the first case. The study also provides empirical support for the notion that higher level LO is valuable from the point of view of business performance.

Santos-Vijande, Sanzo-Pérez, Álvarez-González, and Casielles (2005) studied the relationship between market orientation (MO) and LO and, in particular, the former's contribution to the generation of double-loop learning. Their LO model comprised of three elements: commitment to learning, open-mindedness and shared vision, which are all acceptable elements of LO (Senge, 1990). Using a 13-item scale

on 272 Spanish industrial companies, the empirical study provides evidence that LO positively affects organizational performance through MO as moderating variable. The study also showed a significant influence of LO on firm's trust in a strategic customer.

Using data from 229 Spanish SME's across four different industries, Garcia-Morales et al. (2006) investigated the influence of supportive leadership and teamwork on LO, innovation and financial and operational performance. Results of their study show that personal mastery, transformational leadership, shared vision, absorptive capability, teamwork capability, LO and innovation are positively linked to performance in SMEs. Findings also indicate that LO is significant and positively linked to performance in learning and entrepreneurial SMEs.

Noorhisham (2007) explored the link between OL processes of knowledge acquisition, transfer and utilization and the performance of the Malaysian aviation industry. Using a qualitative research design employing the case study method, the author interviewed eleven respondents for the study alongside the on-site observations. The findings suggested that knowledge has been acquired through four different processes: technology transfer; expert coaching; personal exploration and hands-on experience. The acquired knowledge was transferred and shared within the organizations through three different mechanics: in the form of documented operating procedures; mentoring; and in-house training activities.

Jiménez-Jiménez and Cegarra-Navarro (2007) analyzed data from 451 Spanish companies using the learning scale developed by Lopez et al. (2005), which is based on Huber's (1990) definition of learning (knowledge acquisition, knowledge distribution, knowledge interpretation and organizational memory). The results

indicate that LO has a positive effect on performance, and that the influence of MO on performance is only significant when it is mediated by LO.

Ngui, Songan and Hong (2008) empirically tested a model of the relationships between organizational learning capability (OLC) and performance in the context of SMEs in Malaysia. They applied SEM to analyze the datasets from 256 manufacturing and services SMEs. Statistical results showed that entrepreneurial orientation (EO) and human-capital development practices have direct positive effects on SMEs' OLC. It was further found that human-capital development practices mediated the relationship between EO and OL capability. This implied that while EO fosters the need for a strong OLC, human-capital development practices serve as the mechanisms for developing such capability. Lastly, empirical evidence was provided to support the notion that OLC enhances the performance of SMEs.

Skerlavaj and Dimovski (2009) examined the influence of LO on the performance of 203 Slovenian and 202 Croatian countries using both financial and non-financial performance measures. Results of their empirical study indicate that LO has a very strong direct impact on non-financial performance (measured in terms of employee, supplier, and customer points of view). Furthermore, the effect of LO on financial performance (measured in terms of return on assets and value added per employee) is also positive and strong, but indirect and exhibited through non-financial performance. However, no direct effect on financial performance is established in any of the two countries.

Jiménez-Jiménez and Sanz-Valle (2011) used data from 451 Spanish companies to empirically test the relationship between LO and both performance and innovation. The findings provide evidence that both variables (LO and innovation) contribute positively to business performance. The study also finds that LO affects

innovation while the relationships were all found to be moderated by size and age of the firm, industry, and environmental turbulence.

Mansor, AbdulMalik, and Mat, (2010) examined the impact of LO on non-financial performance (competency of Islamic banking employees) in the state of Terengganu and Kelantan in Malaysia. Data was collected from 170 staff of Bank Islam Malaysia Limited and analyzed through multiple regression analysis. LO construct consisted of five measures: internal exchange, learning approaches and participative policy making, learning climate, reward flexibility, and informing. Findings of the study suggest that most of the variables investigated significantly contribute towards enhancing the competency level of the staff of the institution. The study however, does not provide a clear measurement of the competency construct. Moreover, the five indicators selected by the authors are drawn from the eleven characteristics of a learning company proposed by Pedler, Burgoyne and Boydell (1997), yet there is no rationale presented for selecting only five of the eleven dimensions.

Zhao, Li, Lee and Chen (2011) examined the relationships among EO, experimental learning (EL) and acquisitive learning (AL), and firm performance (FP) in China. EL is associated with learning to transform, extend, and exploit the firm's existing internal knowledge. AL is associated with learning new competencies and knowledge externally beyond the firm's current boundaries (Morgan & Berthon, 2008). Data analysis from 607 firms using SEM indicated that both EL and AL enhanced FP although the effects from AL were weaker and became non-significant when external knowledge was embedded into the firm's internal private knowledge.

In sum, the previous studies provide evidence in support of the positive association between OL and OP. There is however, mixed findings in relation to the

nature of the relationship as to whether it is a direct relationship or indirect. While most of the studies suggest a direct relationship, few studies such as Santos-Vijande et al. (2005) and Skerlavaj and Dimovski (2009) found that the relationship is mediated by MO and non-financial performance respectively. This might be due to the fact that there is no consistency in measuring the performance constructs, thus resulting in conflicting findings in some empirical studies. The studies have incorporated different measures of performance ranging from financial (such as ROA) to non-financial performance (such as employee motivation). A summary of the previous empirical studies is provided in Table 2.19.

Table 2.18  
Summary of Empirical Studies on OL and OP

Author(s)	Methodology	Key Findings
Simonin (1997)	Survey of 151 firms	Strong relationship between OL and both financial and non-financial performance indicators
Jashapara (2003)	Survey of 181 firms in UK construction	Double-loop learning and cooperative cultures have a positive effect on organizational performance (OP)
Ramayah et al. (2004)	Survey of 68 managers in manufacturing firms in Malaysia.	Internal learning leads to more proprietary technology development and in turn proprietary technology will lead to higher level of manufacturing performance.
Lopez et al. (2005)	Survey of 195 Spanish firms with more than 200 employees	OL contributes positively both to innovation and competitiveness and to financial performance
Santos-Vijande et al. (2005)	Survey of 272 Spanish industrial companies	OL positively affects OP through MO as moderating variable
Morales et al. (2006)	Survey of 229 Spanish SME's across four different industries	OL is significant and positively linked to performance in learning and entrepreneurial SMEs.
Noorhisham (2007)	Case study and interview with 11 respondents in the Malaysia's Aviation industry	Knowledge acquired through four different processes is transferred and shared within the organizations through in the form of documented operating procedures, mentoring, and in-house training activities.
Jiménez-Jiménez and Cegarra-Navarro (2007)	Survey of 451 Spanish companies	The influence of MO on OP is only significant when mediated by OL; OL has positive and strong effect on OP
Ngui et al. (2008)	Survey of 256 SMEs in	Human-capital development practices have

Author(s)	Methodology	Key Findings
	Malaysia	direct positive effects on SMEs' OL capability; mediated the relationship between entrepreneurial orientation and OL capability.
Mansur et al. (2010)	Survey of 170 staff in Malaysia Data analyzed by multiple regression	OL contributes to non-financial performance (competency)
Zhao et al. (2011)	Survey of 607 firms in China	Both experimental learning (EL) and acquired learning (AL) enhanced firm performance

### 2.3.2 Innovation and Organizational Performance (I—OP)

The management literature contains different approaches to understanding the types and classification of innovation as detailed in the previous chapter.

Innovation is argued to be an important determinant of a firm's long term success especially in competitive and volatile business environments (Darroch & McNoughton, 2002; Raisch, 2004; Scherer, 1992). In the context of increasing complexity and rapid technological changes, only those companies with innovation capabilities will be able to respond faster to the challenges as well as exploit new market and product opportunities (Brown & Eisenhard, 1995). In the words of Rosner (1968: 164), "organizations adopt innovations in order to become better adapted to their environment or to improve their chances of achieving their goals." Other authors consider innovation an important organizational capability for the creation of new products and processes and the ability to respond to dynamic markets (Hurley & Hult, 1998; Senge, 1990).

Both empirical and theoretical researches confirm the positive relationship between innovation and performance. For example, in an empirical study of public libraries, Damanpour and Evan (1984) analyzed the impact of adoption of types of innovation on organizational performance. The authors found that the association between technical and administrative innovations is stronger in high-performance than

in low-performance libraries. Similar results were replicated by Ettlíe (1988) in the manufacturing industry. He reported that both technical and administrative innovations simultaneously account for the success of firms and that during competitive and turbulent times; firms have to maintain a congruency between the two types of innovation.

Zahra and Das (1993) examined two models of the association between manufacturing companies' innovation strategy and their financial performance. The first examines the simultaneous effect of the dimensions of innovation strategy on company financial performance, and the second is a sequential model that suggests a causal sequence among the dimensions of innovation strategy that may lead to higher performance. Data was collected from a sample of 149 manufacturing companies to test the models. The findings of the study (i) support the importance of innovation strategy as a predictor of financial performance; (ii) suggest that both models are appropriate for examining the associations between the dimensions of innovation strategy and performance; and (iii) show that the sequential model explains the indirect contribution of individual dimensions of innovation to company performance.

Calantone, Cavusgil and Zhao (2002) combined both qualitative and quantitative methodologies to study the relationship between learning orientation, firm innovation and firm performance in the US firms measured as both objective (ROA, ROI and ROS) and subjective (profitability) measures. Results from their path analysis support the authors' hypothesis that LO is critical for innovation and performance.

Prajogo (2006) conducted a comparative study of the relationship between innovation and business performance between manufacturing and service firms. Innovation was measured in terms of product and process innovation while

performance was represented by sales growth, market share and profitability. Data for the study was gathered from 194 managers in Australian firms drawn from the manufacturing and service sectors (52% and 47% respectively). The study found that (i) there was no significant difference between manufacturing and service firms in both product and process innovation performance; (ii) there is a stronger correlation for manufacturing firms than for service firms between innovation and business performance, particularly in relation to process innovation; (iii) process innovation shows a relatively stronger relationship with business performance than product innovation in manufacturing sectors.

Carol and Mavis (2007) studied the relationship between innovation and organizational performance of Taiwanese SMEs in the manufacturing and services sector. Company performance was measured in terms of company sales. Empirical data were collected through a telephone survey from a population consisting of companies with a total employee number less than 200 located in the Northern Part of Taiwan. The research found that eighty per cent of the surveyed companies conducted some sort of innovation. However, administrative innovation was found to be more important in explaining the company performance compared to technological innovation.

The study by Van Auken, Madrid-Guijarro and García-Pérez-de-Lema (2008) investigated the relationship between the degree of innovation (measured as innovation in products, processes and administration systems) and performance among a sample of 1,091 Spanish manufacturing SMEs. An important contribution of the study is the empirical evidence on the relationship between three types of innovation (product, process, and managerial/systems) and four measures of performance (human relations approach, internal process approach, open systems

approach, and rational goal approach). Findings of the study provide evidence that innovation positively impacts SMEs performance in low and high technology industries. The study also found that innovation is more important to achieving a competitive advantage to high technology firms than low technology firms. These results support the proposition that innovation is crucial to firm's sustainable competitive advantage.

Damanpour, Walker and Avellaneda (2009) studied the adoption of three types of innovation (service, technological process, and administrative process) in service organizations. Their study proposed that the impact of innovation on organizational performance depends on compositions of innovation types over time. Data was collected from 428 public service organizations in the UK over four years. Findings suggest that (i) it is unfavorable to focus on adopting a specific type of innovation every year; (ii) there is no effect on consistency in adopting the same composition of innovation types over the years; and (iii) divergence from the industry norm in adopting innovation types could possibly be beneficial to organizational performance.

Garrido and Camarero (2010) examined the relationship between learning orientation, innovativeness and performance for the case of 386 British, French and Spanish museums. Findings of the study show that learning orientation significantly influences both innovativeness and performance. The study also provides evidence that technological and innovations are related to economic performance while product innovations have a greater impact on social performance.

Terziovski (2010) studied the innovation practice and its effect on performance of Australian SMEs. Drawing data from a sample of 600 SMEs in the manufacturing sector, the study found that innovation strategy is a key driver to performance of SMEs, which do not appear to implement innovation culture in a strategic and

structured manner. The study concludes that SMEs' performance is likely to improve as they increase the degree to which they recognize that innovation culture and strategy are closely aligned throughout the innovation process.

Li, Zhou and Si (2010) examined the impact of two types of firm's innovation activities (exploratory innovation and exploitative innovation) on performance. Data of interest were collected from 397 enterprises in eastern, middle, and western China. Using hierarchical regression analyses the study found that both exploratory innovation and exploitative innovation have a positive effect on firm performance, and that the fit between innovation activity and business strategy of the firm has significant impact on firm performance. In terms of corporate strategy, the study concludes that exploratory innovation activity fits defenders while exploitative innovation activity fits prospectors. Using Miles and Snow's (1978) typology of corporate strategy, defenders and prospectors are viewed as two extremes of a continuum. While defenders operate in stable environment with low complexity and dynamism, prospectors operate in a broad and diversified market domain using innovative technologies and other resources (Erasmus, 2005). They are considered as early adaptors in their markets or industry.

Rosenbusch, Brinckmann, and Bausch (2010) conducted meta-analyses techniques to aggregate prior empirical research on the innovation-performance relationship of SMEs. The analysis comprised of 42 empirical studies on 21,270 firms. The overall finding of the study reveal that innovation has a positive effect on the performance of SMEs but this relationship is dependent to a large extent to certain factors such as age of the firm, type of innovation, and the cultural context. Several other findings are reported from the study: (i) fostering an innovation orientation has more positive effects on firm performance than creating innovation process outcomes

such as patents or innovative products or services; (ii) innovation process outcomes lead to a greater increase in SME performance; (iii) innovation has a stronger impact in younger firms than in more established SMEs, suggesting that liability of newness of younger firms can also be an asset for new firms; and (iv) innovation has the strongest positive impact in cultural environments characterized by collectivism such as those found in many Asian countries while in more individualistic cultures such as the U.S., the relationship between innovation and performance is weaker.

In general, the previous empirical researches summarized in Table 2.19 add to the existing body of knowledge which argues that firm-level innovation is a predictor of organizational performance. A number of studies (e.g. Carl & Mavis, 2007; Van Auken et al., 2008; Terziovski, 2010) have also focused on SMEs in an attempt to highlight their importance and comparison with the large scale firms.

**Table 2.19**  
Summary of Empirical Studies on Innovation and OP

Author(s)	Methodology	Key Findings
Zahra and Das (1993)	Survey of 149 manufacturing companies to test two proposed models.	Both proposed models are appropriate for examining the associations between the dimensions of innovation strategy and performance
Calantone et al. (2002)	Qualitative and quantitative methods	Results from their path analysis support the authors' hypothesis that LO is critical for innovation and performance
Prajogo (2006)	Survey of 194 managers in Australian firms	Process innovation shows a relatively stronger relationship with business performance than product innovation in manufacturing sectors.
Carol and Mavis (2007)	Survey from a population consisting of companies with employees less than 200 in Taiwan	Administrative innovation was found to be more important in explaining the company performance compared to technological innovation.
Van Auken et al. (2008)	Survey of 1,091 Spanish manufacturing SMEs.	Innovation positively impacts SMEs performance in low and high technology industries; innovation is more important to achieving a competitive advantage to high technology firms than low technology firms
Damanpour et al. (2009)	Survey of 428 public service organizations in the UK over four years	It is unfavorable to focus on adopting a specific type of innovation every year; divergence from the industry norm in adopting innovation types could possibly be beneficial to OP.
Garrido and Camarero (2010)	Survey of 386 British, French and Spanish museums.	LO significantly influences both innovativeness and performance; technological and innovations are related to economic performance while product innovations have a greater impact on social performance
Terziovski (2010)	Survey of 600 SMEs in the manufacturing sector in Australia	Innovation strategy is a key driver to performance of SMEs, which do not appear to implement innovation culture in a strategic and structured manner.
Li et al. (2010)	Survey of enterprises in China	Exploratory innovation and exploitative innovation have a positive effect on firm performance; the fit between innovation activity and business strategy of the firm has significant impact on firm performance
Rosenbusch et al. (2010)	Meta-analyses techniques comprising of 42 empirical studies on 21,270 firms	Innovation has a positive effect on the performance of SMEs but this relationship is dependent to a large extent to certain factors such as age of the firm, type of innovation, and the cultural context

### 2.3.3 Organizational Learning and Innovation

The effect of OL on innovation has been an important area of study in management. It contains several theoretical and empirical researches that attempt to explain the relationship between the two concepts. Owing to the firms' heterogeneous resources,

capabilities, competencies, and skills, the learning process provides a path to potential internal and external opportunities leading to the development of firm's knowledge base (De Pablo González Del Campo & Skerlavaj, 2009). Through this knowledge, a firm develops a culture that is conducive for creativity and innovation. (Lee & Chang, 2007; Plessis, 2007; Terziovski, 2009; Tsai, 2001). Thus, the more knowledge is shared between the members of the organization, the greater will be the innovation capability.

Innovation also requires the transformation and exploitation of existing knowledge, which is achieved through information and knowledge sharing among employees (Jiménez- Jiménez & Sanz-Valle, 2011). In sum, OL allows the development, acquisition, transformation and exploitation of new knowledge that enhances innovation (Jiménez- Jiménez & Sanz-Valle, 2011).

Several models are proposed in the literature to explain the relationship between OL and innovation. For example, the theoretical framework proposed by Cohen and Levinthal (1990) and Zahra & George (2002), propose that a firm's absorptive capacity is responsible for its innovative performance. They define absorptive capacity as the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends. Empirical testing of the frameworks in studies such as Fosfuri and Tribo (2008), which examined the concept of absorptive capacity and its impact on Spanish firms' innovation, reveals that potential absorptive capacity is a source of competitive advantage in innovation, especially in the presence of efficient internal knowledge flows.

Coombs and Hull (1998) propose their path-dependency model in innovation. The strength of this model is that it does not separate technological innovation from past developments, but assumes some kind of continuity in the process of

technological changes (Schienstock, 2007). According to Coombs and Hull, the model also assumes that there are specific routines known as knowledge management practices (KMPs), which are particularly important in shaping the knowledge base of the firm and making it available in the in the innovation process.

In another study of semi-conductor industry, Sørensen and Stuart (2000) relate their model of innovation with organizational age and obsolescence. They propose that as companies grow older, they accumulate experience and develop competencies and routines that help them innovate at greater rates than new companies. Despite being more innovative, older companies face the challenge of maintaining a fit between their organizational capabilities and outcomes and the changing demands of their environments.

The existing literature suggests that there is a positive effect of OL on performance, and argues that this relationship is mediated by innovation. In other words, it is suggested that OL allows firms to develop capabilities that lead to innovation, which consequently affects performance (Alegre & Chiva, 2008; Baker & Sinkula, 1999, 2002; Dharmadasa, 2009; Hurley & Hult, 1998; Kokoglu, Imamoglu, & Ince, 2011; Morgan, & Berthon, 2008).

Some studies have adopted qualitative methodologies to investigate the effect of OL on innovation. For instance, Forrester (2000) used semi-structured interview technique to examine to compare how two different auto manufacturers used teams to provide innovations for cost reduction purposes. Her study reveals a positive relationship between OL and innovation. Another study using only qualitative methodology is by Yeung, Lai and Yee (2007), who used case study approach to examine the impact of OL on innovativeness, internal efficiency, customer satisfaction, and financial performance. Basing their case studies o three

manufacturing companies, their research found that OL happens when it is valued by senior management, and supported by an appropriate learning infrastructure and culture, leading to organizational efficiency.

Other studies utilize quantitative methodologies to analyze the relationship between OL and innovation. These studies adopt a cultural approach for measuring OL. For example, Lee and Tsai (2005) used a survey questionnaire to study the relationships between MO, LO and innovativeness in a sample of 700 manufacturing and service firms in Taiwan. The results show that emphasis of LO is associated with the levels of business innovation.

Keskin (2006) used a questionnaire-based survey of managers from small-sized-firms operating in Turkey to examine the relations among market-orientation, learning-orientation, and innovativeness in SMEs. Data set of 157 respondents were analyzed using SEM and results show that firm innovativeness positively affects firm performance, and that firm learning-orientation positively influences firm innovativeness.

In a survey study of accounting firms in Thailand, Ussahawanitchakit, (2008) assessed the relationships among OL, innovation orientation, and firm efficiency. His research model combines the effect of OL on firm performance mediated by innovation orientation. The results show that shared vision, open-mindedness, and intraorganizational knowledge sharing have significant positive and direct effects on accounting firms innovation orientation. Likewise, innovation orientation has an important relationship with firm efficiency. Innovation orientation is understood as the extent to which the firm's culture promotes and supports innovation.

Lee, Tan and Chiu (2008) used survey questionnaires to examine how organizational culture and OL contribute to innovation performance in seven Taiwan's

high-tech industries. Results showed that there is a positive and significant association between organizational culture and innovation, and between OL and innovation performance. The study also provides empirical support to the argument that firms of high learning-oriented have better process, administrative and product innovation than those of low learning-oriented.

Tajeddini (2009) analyzed data from 87 small size business manufacturing and service firms in Tehran to examine the effect of learning orientation on innovativeness. The study found that higher levels of commitment to learning, shared vision and open-mindedness account for increased innovation in Iranian SMEs. The author's regression analysis also suggests a significant impact of commitment to learning, shared vision and open-mindedness on the market share.

Finally, some studies in the literature focus on the impact of only one phase of the OL process or one type of innovation such as product or process innovation. For instance, Alegre and Chiva (2008) examine how OL capability affects product innovation performance. OL capability is conceptualized through five dimensions: experimentation, risk taking, interaction with the external environment, dialogue and participative decision making. Using structural equations modeling to analyze a data set from the ceramic tile industry, the study provides supports that OL affects innovation performance.

Table 2.20  
Summary of Empirical Studies on OL and Innovation

Author(s)	Methodology	Key Findings
Forrester (2000)	Qualitative: semi-structured interviews	Positive relationship between OL and innovation
Yeung et al. (2007)	Case study of three manufacturing companies	OL happens when it is valued by senior management, and supported by an appropriate learning infrastructure and culture, leading to organizational efficiency.
Lee and Tsai (2005)	700 manufacturing and service firms in Taiwan	Positive influence of LO on Innovation
Keskin (2006)	Survey of 157 respondents in Turkey, data analysis using SEM	Firm's LO positively influences firm innovativeness
Ussahawanitchakit, (2008)	Survey questionnaire	Innovation orientation (IO), defined as the extent to which the firm's culture promotes and supports innovation, has an important relationship with firm efficiency.
Lee et al. (2008)	Survey of 7 Taiwan's high-tech industries	Positive and significant association between OL and innovation performance; provides empirical support that firms of high learning-oriented have better process, administrative and product innovation than those of low learning-oriented.
Tajeddini (2009)	Survey of 87 small size business manufacturing and service firms in Tehran	Higher levels of commitment to learning, shared vision and open-mindedness account for increased innovation in Iranian SMEs

The empirical studies summarized in Table 2.21 collectively indicate the positive impact of OL on innovation. Several models have been proposed to explain the notion of innovation and its effect on firm performance. These include the absorptive capacity model (Cohen & Lavinthal, 1990), the path-dependency model (Coombs & Hull, 1998), and finally the innovation model related to firm's age and obsolescence (Sørensen & Stuart, 2000).

## 2.4 GAPS IN THE LITERATURE

Analysis of the previous empirical research on OL, innovation and OP reveals some significant themes in the literature.

One of the obvious themes emerging from the empirical studies is the confirmation of the beneficial role of OL on innovation and various dimensions of organizational performance. These results confirm the assumption by Pucik (1988) and Stata (1989) that OL is a key to achieving sustainable competitive advantage.

Moreover, the prior studies differ significantly in their main purpose, samples, methodologies and operationalization of the constructs. This is mainly attributed to lack of consensus in defining and conceptualizing the research variables (Huber, 1991; Garvin, 1993). Because of the lack of convergence in the field, it is difficult to assume generalizability of the findings reported from different research settings.

Therefore, the present study seeks to reduce a gap in the literature by adapting a broader understanding of organizational performance. This is because most of the previous empirical studies have narrowed down the notion of performance to specific aspects such as financial or non-financial measures. Using one specific dimension of performance is considered too restrictive and imprecise because organizational performance is a complex and multifaceted concept (Prieto & Rivella, 2006).

Similarly, most of the previous studies investigated innovation as either technological or administrative innovation. It has been argued that the sole use of administrative and technological dimensions in the assessment of innovation is insufficient because of the possibility of reciprocal relationship between the two types of innovation, as well as failure of either dimension to fully capture all the dimensions of innovation (Cooper, 1998). The present research therefore, seeks to reduce this gap in the literature by employing a multi-dimensional perspective of innovation that encompasses product, process and administrative innovations.

Another contribution of the present research is related to the research design which is intended to focus on small and medium sized firms in a developing economy.

Majority of the previous studies have been conducted in large scale firms in developed economies including the US, the UK and certain European countries, and across different industries. Recognizing the advantage of strong economies and the benefits enjoyed by large firms, the finding of previous studies are difficult to replicate on other settings especially the small and medium-scale businesses. Thus, this research intends to fill this gap by empirically assessing the extent of OL and its impact on innovation and OP of Malaysian SMEs.

## **2.5 CHAPTER SUMMARY**

This chapter has reviewed the theoretical, conceptual and empirical literature related to the field of the study. Drawing on the resource-based theory of the firm, this research has shown that firm's internal capabilities in the form of OL and innovation are responsible for the achievement and sustainability of competitive advantage. The theoretical background of the study has provided a detailed framework of the perspectives, types and levels of OL and innovation. The empirical studies provided in the last part of the chapter show a positive effect of OL on both innovation and OP constructs. Subsequently, a positive relationship between firm innovation and performance has also been indicated in the studies. In general, the review of literature was an important step in developing a clear understanding of the present research, and as prerequisite for the formulation of research framework and hypotheses in the subsequent chapter.

## **CHAPTER THREE**

### **THEORETICAL FRAMEWORK AND HYPOTHESES**

#### **3.1 INTRODUCTION**

This chapter aims at developing the theoretical framework that will be the basis for investigating the research problem and developing hypotheses (Sekaran & Bougie, 2010). The process of building the theoretical framework will proceed as follows: Section 3.2 will define the variables in the conceptual model. In section 3.3 a conceptual model with testable hypotheses will be developed to examine the relationships between various variables in the model. The chapter concludes with a summary in section 3.4.

#### **3.2 CONCEPTUALIZATION OF RESEARCH CONSTRUCTS**

One of the important parts of the research process involves the conceptualization of research constructs. Conceptualization is the process of taking a construct and refining it by giving it a conceptual or theoretical definition (Neuman, 2006). A construct is thus a conceptual term used to describe a phenomenon of theoretical interest (Nunnally, 1978) or “an element of scientific discourse that serves as verbal surrogates for phenomenon of interest” (Edwards & Bagozzi, 2000: 157). The present research contains three main constructs which will be conceptualized as discussed in Sections 3.2.1 through 3.2.3.

### **3.2.1 Organizational Learning (OL)**

OL in this study represents an independent or antecedent variable. An independent variable is a variable that is presumed to cause change in another variable (Johnson & Christensen, 2010). In this research, OL is conceptualized as a higher order construct which comprises of four subconstructs: commitment to learning, shared vision, open-mindedness, and intra-organizational knowledge sharing. It is proposed that the intercorrelations among these subconstructs (dimensions) are explainable in terms of a higher OL construct.

### **3.2.2 Organizational Performance (OP)**

Organizational performance (OP) in this study represents the dependent variable, which is the outcome or consequence that the researcher seeks to understand or explain (Schwab, 2005).

Following researchers such as Prieto and Revilla (2006), OP in the present study is conceptualized as multi-dimensional construct with multiple indicators. This way, it is possible to incorporate both financial and non-financial measures. Gartner (1990) emphasizes that researchers are encouraged to adopt a multidimensional view of performance in order to recognize the inherent tradeoffs between such issues as growth and profitability.

Financial measures are indicated by return on assets (ROA), sales growth, and profitability. Non-financial measures are customer growth, employee satisfaction, and quality in products and services.

### 3.2.3 Innovation (I)

Innovation in this study is conceptualized in three ways. First, as intervening variable that mediates between the independent variable (OL) and dependent variable (OP) in a causal chain (Schwab, 2005). Second, it is conceived as independent variable which predicts an impact on OP. Third, it is seen as dependent variable which is influenced by OL. In all these three relationships, innovation is conceptualized as a higher order construct consisting of three subconstructs: product, process and administrative innovation. Adopting this conceptualization of innovation renders it less situation-specific because it covers a range of innovations (Midgley & Dowling, 1978).

### 3.3 DEVELOPMENT OF CONCEPTUAL MODEL AND HYPOTHESES

To examine the relationships between (i) OL and innovation; (ii) innovation and OP; (iii) OL and OP and, (iv) the indirect (intervening) effect of innovation between OL and OP; the conceptual model in Figure 3.1 is developed.

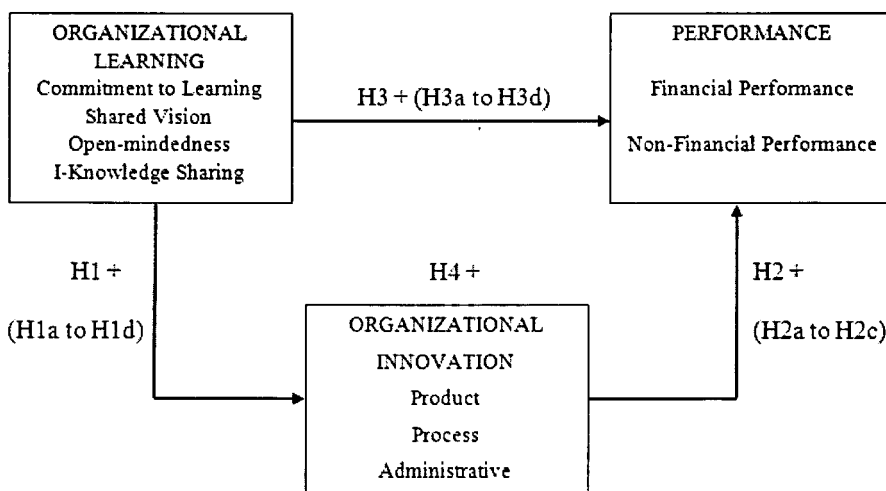


Figure 3.1: Conceptual Model

Based on Baker & Sinkula (1999), Calontone et al. (2002), Dharmadasa (2009), Hurley & Hult (1998), and Santos-Vijande et al. (2005)

Based on the research framework depicted in Figure 3.1, four main research hypotheses are postulated in this study to examine the network of relationships among the research variables. The following sections discuss the development of hypotheses.

### **3.3.1 OL and Innovation**

Prior research suggests that learning is critical to the process of innovation. A number of authors (e.g. Alegre & Chiva, 2008; Baker & Sinkula, 1999, 2002; Dharmadasa, 2009; Huber, 1998; Hurley & Hult, 1998; Kokoglu, Imamoglu, & Ince, 2011; Morgan, & Berthon, 2008; Nonaka, 1991) attest that OL has a positive impact on innovation. Similarly, Stata (1989) posits that OL is the principal process by which innovation occurs. Hurley and Hutt (1998) also support the strong connection between the development of people and the innovativeness of the culture. They suggest that the more an organization encourages members to learn and influence group decisions, the more innovative that organization is. Thus, the following hypothesis is adopted:

*H<sub>1</sub>: OL will have positive and direct impact on firm's innovation.*

Consistent with prior research, the present study captures learning orientation as second order construct. Its first order indicators are: commitment to learning, shared vision and open-mindedness, and intraorganizational knowledge sharing. Commitment to learning is the degree to which an organization promotes learning and is willing to foster a learning climate (Calontone, Cavusgil & Zhao, 2002). Commitment to learning has been directly linked to the amount of learning that an organization is able to achieve such that the more an organization values learning; the more likely it is that learning will occur. Commitment to learning enhances an organization's ability to understand the market better by proactively collecting information about a particular market (Ussahawanitchakit, 2008). Therefore:

*H<sub>1a</sub>. Commitment to learning is directly and positively related to innovation.*

Shared vision interconnects the activities of employees and develops relationships based on the exchange of information and shared mental models (Akgun, Keskin, Byrne, & Aren, 2007). The sharing and exchange of knowledge among organization's employees gives an organization a competitive edge and thereby sustain in the competitive markets. Shared vision is believed to encourage teamwork and group problem solving by employees and hence make their amount of dependency on top management negligible (Goh & Richards, 1997). Thus:

*H<sub>1b</sub>: Shared vision is directly and positively related to innovation.*

Open mindedness refers to the ability of firms to accept new ideas, and the willingness to question long-held assumptions about behavior and events (Akgun, et al., 2007; Santos-Vijande et al., 2005). To create a climate of openness, organizations need to break their cultural and functional barriers, show the willingness to learn all types of opinions and experiences, and eliminate the egocentric attitude of self-praise (Jerez-Gomez et al., 2005). Given the rapid rate of changing technology, reliance on old knowledge and routines renders an organization's knowledge obsolete. An open-minded organization promotes new and innovative ideas and procedures, which in turn contribute to the achievement of competitive advantage. On this basis:

*H<sub>1c</sub>. Openness and experimentation is directly and positively related to innovation.*

Intraorganizational knowledge sharing refers to collective beliefs or behavioral routines that are linked to the spread of learning within an organization (Moorman & Miner, 1998). It ensures that the knowledge and information gathered from different sources is kept alive, and provides a reference for future achievement (Lukas, Hult & Ferrell, 1996). Knowledge normally resides within individuals (Nonaka, 1994).

Therefore, knowledge sharing within the organization is necessary in order to prevent loss of information as a result of employee turnover and transfer (Lukas et al., 1996).

It is therefore hypothesized that:

*H<sub>1d</sub>: Intra-organizational knowledge sharing is directly and positively related to innovation.*

### **3.3.2 Innovation and OP**

Innovation has been argued to be one of the potential factors through which firms may gain competitive advantage in the marketplace (Barney, 1991; Damanpour & Evan, 1984). Prior research provides evidence that effective innovation serves as a key instrument for firm performance (Baker & Sinkula, 1999; Calantone et al., 2002; Damanpour & Evan, 1984). Thus it is postulated that:

*H<sub>2</sub>: Innovation is positively associated with the performance of SMEs in the ICT business*

Previous research studies show mixed findings as to which type of innovation has greater impact on performance. While acknowledging the differences in operational definitions of performance, certain studies (e.g. Carol and Mavis, 2007) report a stronger relationship of administrative innovation with performance compared to technological innovation. Similarly, results of empirical studies on technological innovations show differences in their findings. To further explore the relationship between the different types of innovation with performance, the following sub-hypotheses are formulated:

*H<sub>2a</sub>: Product innovation is positively and directly related to OP.*

*H<sub>2b</sub>: Process innovation is positively and directly related to OP.*

*H<sub>2c</sub>: Administrative innovation is positively and directly related to OP.*

### 3.3.3 OL and OP

Previous studies in this domain provide evidence on the impact of OL on overall organizational performance (OP). Therefore, it is hypothesized that:

*H<sub>3</sub>: OL is positively and directly related to OP*

Based on the conceptualization of OL as comprising of four dimensions, the following sub-hypotheses are formulated:

*H<sub>3a</sub>. Firm's commitment to learning is positively related to OP.*

*H<sub>3b</sub>. Shared vision is positively related to OP.*

*H<sub>3c</sub>. Openness and experimentation is positively related to OP.*

*H<sub>3d</sub>. Intra-organizational knowledge sharing is positively related to OP.*

The research does not only suggest a positive effect of OL on OP but also argues that this relationship is mediated by innovation. Some researchers (e.g. Baker & Sinkula, 1999, 2002; Hurley & Hult, 1998) propose that OL allows the company to develop capabilities that enhance innovation and that innovation is what positively affects performance. Based on these arguments, it is proposed that:

*H<sub>4</sub>: The positive relationship between OL and OP is mediated by innovation.*

## 3.4 CHAPTER SUMMARY

In this chapter, a conceptual framework was developed and presented to illustrate the associations among OL, innovation and OP. The chapter begins with a conceptual definition of the research variables in the study. OL is the independent variable for two research variables in the study: innovation and OP.

In one relationship, innovation is an independent variable with OP, and in another relationship, a mediating variable between OL and OP. Based on the

conceptual framework and extensive review of literature in the previous chapter, four main hypotheses were formulated.

In  $H_1$ , it is proposed that OL will have positive relationship with innovation. Based on the conceptualization of OL as a higher order construct, all its four subconstructs or dimensions (commitment to learning, shared vision, open mindedness and knowledge sharing) are also hypothesized to have positive relation with innovation.

The second hypothesis ( $H_2$ ) reflects the positive association between innovation and OP. It contains three sub-hypotheses related to the three types of innovations (product, process and administrative). Similarly,  $H_3$  predicts the relationship between OL and OP, and follows the sequence of OL in  $H_1$ .

The final hypothesis ( $H_4$ ) is related to the mediating effect of innovation between OL and OP. In this hypothesis, it is predicted that innovation will mediate the relationship between OL and OP. A summary of these hypotheses and their related research questions is provided in Table 3.1.

Table 3.1  
Hypotheses and Research Questions

Hypotheses	Research Question
<p><b>H1: OL is positively and directly related to innovation</b>  H1a. Commitment to learning is directly and positively related to innovation.  H1b. Shared vision is directly and positively related to innovation.  H1c. Openness and experimentation is directly and positively related to innovation.  H1d. Intra-organizational knowledge sharing is directly and positively related to innovation.</p>	<p>RQ1: What is the influence of OL on innovation for SMEs in the ICT sector?</p>
<p><b>H2: Innovation is positively associated with the performance of SMEs in the ICT business</b>  H2a. Product innovation is positively and directly related to OP.  H2b. Process innovation is positively and directly related to OP.  H2c. Administrative innovation is positively and directly related to OP.</p>	<p>RQ2: What is the influence of innovation on OP of SMEs in the ICT sector?</p>
<p><b>H3: OL is positively and directly related to OP</b>  H3a. Firm's commitment to learning is positively related to OP.  H3b. Shared vision is positively related to OP.  H3c. Openness and experimentation is positively related to OP.  H3d. Intra-organizational knowledge sharing is positively related to OP.</p>	<p>RQ3: What is the influence of OL on OP of SMEs in the ICT sector?</p>
<p><b>H4: The positive relationship between OL and OP is mediated by innovation.</b></p>	<p>RQ4: Does innovation mediate the relationship between OL and OP?</p>

# **CHAPTER FOUR**

## **RESEARCH METHODOLOGY**

### **4.1 INTRODUCTION**

This chapter outlines the research methodology and techniques adopted in this dissertation. Following the introduction, section 4.2 provides an overview of the two main research approaches in social sciences, and identifies the research methodology chosen for this study. Section 4.3 outlines the research methods which include description of the research participants, instrumentation, and procedures for data collection.

### **4.2 RESEARCH METHODOLOGY**

Research methodology in the context of this research refers to “the procedural framework of research, which describes an approach to a problem that can be put into practice in a research program or process” (Remenyi & William, 1998: 28). There are two approaches to research methodology namely, the qualitative and the quantitative approaches.

The qualitative approach is concerned with “subjective assessment of attitudes, opinions and behavior” (Kothari, 2008: 5). A qualitative methodologist therefore, captures what people say and do as indicators of their complex world, and attempts to understand the world from a viewpoint of the informants (Bogdan & Taylor, 1975). In the domain of management and marketing studies, qualitative methodology uses inductive methods to gather information as text-based units that represent the social reality and attributes of the phenomenon being studied (Kothari, 2008). Most often,

the ultimate goal of qualitative approach is theory building, which leads to the formulation of a theoretical explanation that specifies a poorly understood phenomenon (Strauss & Corbin, 1990). Yet qualitative methods can also be used to test a theory (Ketchen & Berg, 2006: 169).

Quantitative approach, on the other hand, relies mainly on a hypothesis which is deductively derived from a theory (Johnson & Christensen, 2010; Karami, 2007). It uses standardized instruments to collect data on narrowly defined variables (Biddle & Anderson, 1986). Unlike in qualitative approaches where the researcher is interactive with the participants, the role of researcher in quantitative methodology is independent of participant's involvement (Cooper & Emory, 2008; McKenzie, Powell, & Usher, 1997).

The choice of any one or both the two approaches largely depends on the objectives of the research, the nature of the research problem, and theoretical frameworks that inform the study (Creswell, 1994; Piekkari & Welch, 2004).

This dissertation adopts a quantitative research approach based on the assumption that knowledge about reality can be obtained through the eyes of the researcher (Jonker & Pennink, 2010). The nature of the research problem is confirmatory rather than exploratory, and therefore, deductive method is used primarily for description, explanation, and prediction of the research variables in the study (Gill, Johnson & Clark, 2010). Another justification for adopting a quantitative approach in this research is that the outcome of the research is theory testing by means of conceptual model. This involves developing theoretically based hypotheses and collecting established data to test the viability of the hypotheses (Benz & Newman, 2008).

### 4.3 RESEARCH METHODS

The research method employed in the present study is the survey method which focuses on surveys that are conducted to advance scientific knowledge. Thus, a distinction is drawn between the intended systematic and scientific survey method, and general survey that involves gathering information about the characteristics, actions, or opinions of a population (Tanur, 1983). Survey method involves collecting systematic data which allows for systematic comparison between cases on same characteristics (De Vaus, 2004).

The survey method used in this study is in line with the objective of the research, which is aimed at explaining, hypothesizing and testing the relationship among the research constructs. The ultimate aim is to test the existing theories on which the current research is founded and “enhance our understanding of the relationships among theoretical constructs and the mapping of these constructs onto the empirical worlds” (Edwards & Bagozzi, 2000: 172).

The survey method incorporates several designs, the common of which are: cross-sectional and longitudinal survey designs. A survey design is used in this study to refer to the number of measurement points and the number of groups included in the study (Gustavsson, 2007). Cross-sectional design involves investigating characteristics of a phenomenon at a given point in time or one measurement point (David & Sutton, 2004). When the investigation is repeated for at least two measurement points, it becomes longitudinal survey (Babbie, 2010; Cooper & Schindler, 2008).

Although longitudinal design is superior to cross-sectional in terms of internal validity due to the advantage of temporal lag between the independent and dependent variables (Gustavsson, 2007), they are extremely time consuming for both participants

and the researcher (Jackson, 2005). Longitudinal surveys also involve huge costs in tracking and persuading participants repeatedly (Farrington, 1991; Gravetter & Forzano, 2009). Because of these challenges, the present study uses cross-sectional survey design to compare data of SMEs in the ICT industry in Malaysia in the same point of time. Neutens and Robinson (2010) assert that graduate students should consider conducting a cross-sectional study rather than a longitudinal study.

However, the use of cross-sectional design in this study is subject to potential bias due to common method variance (CMV). CMV refers to “variance that is attributable to the measurement method rather than to the constructs the measures represent” (Podsakoff, MacKenzie, Lee & Podsakoff, 2003: 879). CMV is considered a major threat to the validity of cross-sectional studies (Ketchen & Berg, 2006). Potential sources of common method bias include: common rater effects, such as consistency motif; item characteristics, such as common scale format; item context, such as the scale length; and measurement context, such as when the predictor and the criterion are measured at the same point in time (Ketchen & Berg).

Following the multiple procedural remedies of reducing CMV proposed by Podsakoff et al. (2003), the present study will use different scale lengths for the design, such as 5-point and 7-point; different scale anchors, such as strongly agree/strongly disagree versus better than/worse than, separate the independent variable from dependent variable in the questionnaire design, and use secondary data source to supplement primary data (Ketchen & Berg, 2006).

In addition to the above measures, the research will also test the existence of CMV by using the Harman’s single factor test. The Harman’s single factor analysis proposed by Podsakoff and Organ (1986), indicates that CMV is likely to exist if there

is one single factor emerging from a principal component analysis (Avolio, Yammarino & Bass, 1991; Chang, Van Witteloostuijn & Eden, 2010).

### 4.3.1 Study Population and Sample Frame

Population refers to all people or subjects under study from whom a sample is to be drawn for the research (Somekh & Lewin, 2005). A sample is defined as a set of target respondents selected from a larger population for the purpose of a study (Singh, 2007). A sample frame is any material or device used to gain observational access to the finite population of interest (Sarndal, Swensson, & Wrettman, 1992).

The population of interest in this study is defined as Malaysian small and medium sized companies providing value added services in the ICT sector. The sample for the study is drawn from a theoretically available population of 2520 companies listed in the official database of the Multimedia Super Corridor (MSC) as of September 2011. The database provides the name of the company, its brief activity, year of approval and contact information. Table 4.1 shows the number of companies listed in the MSC database according to their respective technology cluster and their operational status.

Table 4.1  
Malaysian Status Companies by Cluster (MSC Database, 2011)

Technology Cluster	Awarded	Operational
Creative Multimedia	275	200
Institutions of Higher Learning (IHL) & Incubators	105	98
Information Technology	1,940	1,477
Shared Services & Outsourcing	200	181
<b>Total</b>	<b>2,520</b>	<b>1,956</b>

The selection of target population is based on explicit criteria defined by the researcher in the light of the scope and purpose of the research. The purpose of the current research is to gain insight into the role of OL and innovation by examining their relationship with organizational performance. The scope of the research is the Malaysian-owned companies classified as SMEs, which operate in the ICT sector and have attained the MSC status.

Based on the research purpose and scope, two clusters were not included in the study: institutions of higher learning (IHL) and the shared services and outsourcing clusters (SSO). This is because IHL are beyond the scope of the present research which focuses on the ICT industry. Similarly, the SSO cluster is mainly dominated by foreign-owned companies, while this present research's interest is local owned companies.

The selection of the remaining clusters (IT, hardware design, creative multimedia and internet business) resulted in a target population of 1,677 (200 + 1,477). Deducting the foreign owned companies and 50/50 joint ventures from the two clusters, the final target population for sampling is 1,345. This final definition of  $N = 1,345$  included those Malaysian companies with MSC-status companies which are operational in creative multimedia and IT business. This population ( $N$ ) however, is likely to include companies that are not categorized as SMEs in Malaysia because at the time of conducting this research, the MSC database did not indicate the number of full-time employees in each registered company.

#### **4.3.2 Sampling Design**

The sampling technique adopted in this study is based on probability procedure. Probability sampling is a procedure in which each element of population has a

nonzero chance of selection (Cooper & Schindler, 2008; Salkind, 2010). Under this sampling technique, stratified random sampling is chosen to increase the sample's statistical efficiency (Cooper & Schindler, 2008), and to ensure that the sample chosen is representative of the population (Levy & Lemeshow, 2009).

In stratified random sampling, a population is divided into two or more mutually exclusive strata or subpopulation on the basis of certain characteristics (Burns & Burns, 2008; Levy & Lemeshow, 2009). A simple random sample is then drawn from each stratum in proportion or non-proportion to its size (Sharma, 2004). On the basis of technology cluster, the population elements were stratified into creative multimedia and IT in order to obtain homogeneous subsets of the population (Babbie, 2010; Dess, Ireland & Hitt, 1990).

Following the stratification, systematic sampling was applied as recommended by Babbie (2010). First, the stratified companies were combined in a continuous list, beginning with creative multimedia companies and ending with IT companies. Considering limitations of time and budget, a sample size was set at  $n = 450$ . Next, a random number 2 was chosen between 1 and 3 such that a company having that number and every 3rd company in the list was selected in the sample. This produced a sampling ratio of  $1/3$ .

After selection of the sample, the Excel program was then instructed to print the companies' names and mailing addresses on self-adhesive mailing labels. The labels were then transferred to envelopes for mailing the survey questionnaires.

### **4.3.3 Measurements**

To test the proposed research hypotheses, multi-item scales were adopted from previous studies for the measurement of the constructs. The following section describes the measurement instruments used in the study.

#### ***4.3.3.1 Organizational Learning***

From the conceptual framework, four dimensions of OL are identified: commitment to learning, shared vision, open-mindedness, and intra-organizational knowledge sharing. This construct is measured using a seven-point Likert-type scale, ranging from 1 (strongly disagree) to 7 (strongly agree) adopted from Calontone et al. (2002). The first three dimensions are all measured by four items while intra-organizational knowledge sharing is measured with a five-item scale (Appendix I). Studies that use a similar scale such as Farrell and Oczkowski (2002), Farrell and Mavondo (2004), Hult, Hurley & Knight (2004), Keskin (2006), and Ussahawanitchakit (2008), report an acceptable internal consistency of the scale with an alpha ranging from .80 to .90.

#### ***4.3.3.2 Innovation***

As mentioned in the previous section, innovation in the present study is operationally defined as product, process and administrative innovation. To measure this construct, the study uses the measurement instrument developed and validated by Nasution and Mavondo (2008). The scale incorporates all three subconstructs of innovation using a 15-item scale. Respondents are asked to indicate to what extent their organization undertakes the innovation practices. Responses are measured on a seven-point Likert scale ranging from 1 (not at all) to 7 (to a very great extent). Cronbach's alpha

coefficient for the instrument's reliability is reported to be .951. It thus surpasses the 0.7 threshold recommended by Cronbach (1951) and Nunnally (1978).

#### 4.3.3.3 Organizational Performance

Organizational performance is measured in terms of financial and non-financial indicators. To measure the construct, this study will adapt the organizational performance measure developed by Prieto and Revilla (2006). The measurement tool is based on a five-point Likert scale ranging from 1 (very unsuccessful) to 5 (very successful). Cronbach's alpha values for the financial and non-financial measures are .72 and .90 respectively, which suggests satisfactory levels of construct reliability (Nunnally, 1978; Streiner, 2003). Table 4.1 summarizes the operational definitions of the three research constructs used in the study.

Table 4.2  
Summary of Research Constructs

Latent variables (Construct)	Measurement Variables (Indicators)	No. of items	Source	Alpha	
OL	Commitment to learning	4	Calontone et al. (2002)	.80	
	Shared vision	4			
	Open-mindedness	4			
	Intra-organizational knowledge sharing	5			
Innovation	Product	5	Nasution & Mavondo (2008)	.90	
	Process	5			
	Administrative	5			
OP	Financial	Return on assets (ROA)	Prieto & Revilla (2006)	.85	
		Sales growth			1
		Profitability			1
	Non-financial	Customer growth			1
		Employee satisfaction			1
		Quality in products and services			1

#### **4.3.4 Data Collection Procedures**

For the collection of primary data in this study, a survey questionnaire was mailed to the chief executive officers or managing directors of the selected organizations. The reason for choosing these managers as respondents is their critical importance in making decisions and developing the culture of learning orientations.

The rationale for choosing this type of survey administration is the cost effectiveness and speed in terms of dissemination and data analysis (Lippert, 2002). After about 10 days of mailing the questionnaire, a telephone follow-up was made to non-respondents to verify that they had indeed received the questionnaire, and reminding them of the importance of the research study (Fowler, 1993).

#### **4.3.5 Methods of Data Analysis**

The selection of appropriate method of analysis is determined by the hypotheses and characteristics of the data. The present study intends to examine the structure of simultaneous relationships among three main variables: OL, innovation and performance. This type of analysis requires a sophisticated statistical tool such as structural equation modeling (SEM) that will leverage the complex techniques needed to manage multiple variable relationships. With the advent of versatile and powerful computer software programs performing such analyses has been reasonably convenient for many researchers.

To test the research hypotheses of this study, two types of multivariate analysis will be utilized. First, the SEM technique will be applied using analysis of moments structure program (AMOS 18.0) to simultaneously test the hypotheses concerning the relationships among OL, innovation and performance.

SEM is a “comprehensive statistical approach to testing hypotheses about relations among observed and latent variables” (Hoyle, 1995: 1). This technique is chosen because of its unique advantages over other multivariate statistical methods such as multiple regression analysis. For instance, SEM offers flexibility to model complex relationships among multiple variables, and visually represents them in a path diagram (Bowen & Guo, 2011; Salkind, 2010). It also allows for modeling latent (unobserved) variables and measurement error in the manifest (observed) variables (Byrne, 2010; Timm, 2002). Additionally, SEM provides the ability to test a priori theoretical and measurement assumptions against empirical data (Chin, 1998; Hoyle, 1999). Moreover, SEM allows the simultaneous addressing of the issues related to construct measurement and the structural relationships among constructs (Hair, et al., 2010; Schreiber, Nora, Stage, Barlow & King, 2006).

Besides these technical privileges offered by SEM, the other justification for adopting SEM, from a research design perspective, is its confirmatory approach (Bowen & Guo, 2011; Byrne, 2010). This study’s impetus emerged from the need to determine the role of OL and innovation as predictors of OP. Consequently, the goal is to determine a priori specified inter-variable relationships derived from the literature. This goal is congruent with the core objective of SEM, which is to confirm a set of proposed research hypotheses (Kline, 2005; Robson, 1998).

For all these reasons, SEM is deemed appropriate for the statistical examination of interrelationships among OL and innovation that directly or indirectly influence organizational performance.

SEM comprises both measurement models and structural models (Anderson & Gerbing, 1988; Bowen & Guo, 2011). The measurement models (also known as CFA models) depict the links between the latent variables and their observed measures;

whereas the structural models depict the links among the latent variables themselves (Anderson & Gerbing, 1988; Byrne, 2010; Hair et al., 2010).

In the second multivariate technique, regression analysis will be utilized to test the hypothesis related to the mediating effect of innovation on the hypothesized OL-OP link. This analysis is based on Baron and Kenny's (1986) approach for testing mediation effect. Next, as recommended by Baron and Kenny, Sobel's (1982) test is used to determine that the critical ratio, which represents the indirect effect of the independent variable on the dependent variable via the mediator, is significantly different from zero.

Baron and Kenny's (1986) mediation test is a series of four steps, each step represented by a regression analysis. To illustrate this, M in Figure 4.1 is assumed to be the intervening variable between X and Y.

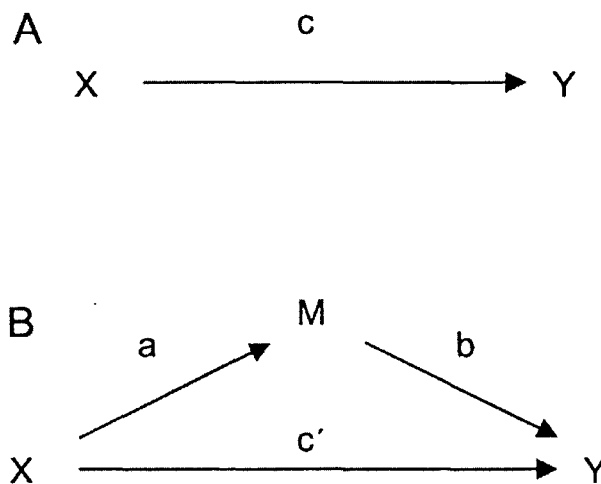


Figure 4.1: Baron and Kenny's Mediation Test

Therefore, to establish the mediating effect of M, four steps are carried out as depicted in Table 4.3.

Table 4.3  
Baron and Kenny's (1986) Mediation Analysis

Steps	Analysis	Regression Equation
1	Conduct a simple regression analysis with X predicting Y to test for path <i>c</i>	$Y = a + bX + e$
2	Conduct a simple regression analysis with X predicting M to test for path <i>a</i>	$M = i_1 + aX + e_1.$
3	Conduct a simple regression analysis with M predicting Y to test the significance of path <i>b</i>	$Y = i_2 + c'X + e_2.$
4	Conduct a multiple regression analysis with X and M predicting Y to test for path <i>c'</i>	$Y = i_3 + cX + bM + e_3$

Steps 1-3 in Table 4.3 are aimed at confirming that the type of relationships existing among the variables is zero-order relationships. If one or more of these relationships are non-significant, it is usually concluded by researchers that meditation effect is not possible. Having obtained significant relationships from Steps 1 to 3, the researcher proceeds to step 4.

In the fourth step, if the effect of M remains significant after controlling for X, then some form of mediation is supported. If X is no longer significant after controlling for M, the finding supports full mediation. If X is still significant (i.e., both X and M significantly predict Y), the finding supports partial mediation.

#### 4.4 CHAPTER SUMMARY

This chapter provided an outline of the research design and methodology for the empirical part of the study. Based on the nature of the research problem and the research questions, the study utilizes a quantitative approach to analyze data and test the research hypotheses. Data will be collected using survey questionnaires that have been used and validated in previous empirical research.

The chapter also outlines the study population and the sampling frame obtained from the MSC database. Stratified random sampling is the chosen method of

sampling 450 cases from the sample frame. Under measurements section, the chapter describes the operationalization of the three variables of the study: OL, innovation and OP. Finally, the chapter identifies the statistical techniques and procedures that will be used to test the research hypotheses. In the next chapter, analysis of the research questions and hypotheses are performed using the suggested statistical techniques, and the results are presented.

## **CHAPTER FIVE**

### **DATA ANALYSIS AND RESULTS**

#### **5.1 INTRODUCTION**

This chapter presents and analyzes the empirical data collected for the study. After this introduction, the chapter proceeds as follows: Section 5.2 presents the profile of the respondents. Section 5.3 deals with data screening and test for assumptions of multivariate analysis. This includes analysis of missing data, detection of outliers, test for normality and assessment of common method bias. Section 5.4 deals with the measurement properties with regard to scale's reliability and unidimensionality while descriptive statistics is given in section 5.5. Following this, multivariate analysis using structural equation modeling (SEM) is employed in to test the hypotheses formulated in chapter three. This begins with the assessment of measurement models in section 5.8 before examining the full fledged SEM model in section 5.9. A summary of the results obtained then concludes the empirical section of this study.

#### **5.2 PROFILE OF THE RESPONDENTS**

This section aims at highlighting the relevant features of each attribute contained in the dataset using univariate data analysis (Vercellis, 2011). The demographic variables of the respondents analyzed in this section include position of the respondents, age of the firms, business activity, and business management.

### 5.2.1 Profile of Respondents by Position

The profile of respondents by their positions is summarized in Table 5.14. The table shows that most of the participants were chief executive officers (CEOs), general managers, vice presidents and managing directors. This indicates that most respondents were high-ranking executives, and were therefore in a position to provide relevant feedback to the survey questions.

Table 5.1  
Profile of Respondents by Position

		Frequency	Percent	Cumulative Percent
Valid	COO	4	1.4	1.4
	MD	59	21.2	22.7
	CEO	163	58.6	81.3
	GM	47	16.9	98.2
	OTHERS	5	1.8	100.0
	<b>Total</b>		<b>278</b>	<b>100.0</b>

Notes: COO: Chief Operating Officer, MD: Managing Director, GM: General Manager.

### 5.2.2 Profile of Respondents by Company Age

Significant differences are observed in the age profile of respondents as evidenced by data presented in Table 5.15. Slightly more than half (58.6%) of the surveyed companies have been operating their business between 10 and 14 years.

Table 5.2  
Profile of Respondents by Age

<i>N</i> = 278		Frequency	Percent	Cumulative Percent
Valid	0-4	4	1.4	1.4
	5-9	59	21.2	22.7
	10-14	163	58.6	81.3
	15-19	47	16.9	98.2
	>20	5	1.8	100.0
	<b>Total</b>	<b>278</b>	<b>100.0</b>	

On the other hand, companies that have been in operation for less than 10 years but more than 5 years makes up about 21% of the surveyed firms. Companies with the longest years of operation (over 20 years) make up only 1.8% of the participating companies.

### 5.2.3 Profile of Respondents by Business Activity

The surveyed companies are involved in four main business activities: Information Technology (IT), Hardware Design, Creative Multimedia, and Internet-Based Business as shown in Table 5.16. Approximately one third of the surveyed companies identified themselves as operators in creative multimedia, which is responsible for creating a platform for distributing and broadcasting information and entertainment.

Table 5.3  
Profile of Respondents by Business Activity

<i>N</i> = 278		Frequency	Percent	Cumulative Percent
Valid	IT	60	21.6	21.6
	Hardware Design	79	28.4	50.0
	Creative Multimedia	86	30.9	80.9
	Internet-Business	53	19.1	100.0
	<b>Total</b>	<b>278</b>	<b>100.0</b>	

#### 5.2.4 Profile of Respondents by Management of Business

The survey questionnaire also asked responding firms to indicate whether they are run by owners (entrepreneurs) or paid managers. Slightly more than half of the firms (51.4%) have employed managers to run and operate the firms as shown in Table 5.17. This implies that most of the SME owners prefer their business to be run by trained and qualified managers especially in a highly specialized industry such as ICT. This is consistent with studies such as Bowen, Morara and Mureithi (2009) and Priyanath (2006) who found that SMEs that are run by managers with decision making authority are more likely to prosper because of the qualifications and skills of the employed personnel.

Table 5.4  
Profile of Respondents by Management of Business

	<i>N</i> = 278	Frequency	Percent	Cumulative Percent
Valid	Owners	135	48.6	48.6
	Paid Managers	143	51.4	100.0
	<b>Total</b>	<b>278</b>	<b>100.0</b>	

### 5.3 RESPONSES AND CODING

To carry out the survey, 450 questionnaires were mailed to the sampled SMEs on 28<sup>th</sup> September 2011. Considering the time lags required for mail delivery and return of completed questionnaires, two month duration was deemed sufficient timeline for conducting the survey project (Kennedy, Tarnai & Wolf, 1983). Based on this timeline, the researcher set 30<sup>th</sup> November 2011 as the deadline for receipt of the completed surveys. In total, 302 questionnaires were returned yielding a response rate of 67 percent. For a study conducted through mail survey, a response rate exceeding

60 percent is good albeit difficult to achieve (Johnson, 2010; Rubin & Babbie, 2011). Similar studies in Malaysia have yielded much lower response rate. For example, in their study of process innovation in SMEs, Yahya et al. (2011) obtained a response rate of 10% from a total of 400 questionnaires distributed to CEOs.

The rate of nonresponse at 34 % is explained by change of respondent's address that has not yet been reflected in the database, busy schedule of senior company executives, and disclosure restrictions (Baruch & Holtom, 2008).

Data coding started with marking sequential numbers on the received questionnaires in an ascending order. The first page of each questionnaire was marked with an alphanumeric identification number to create a codebook for identifying variables in the SPSS. The codebook included variable name, variable label, and variable code (Appendix IV). Following this, the data set was then examined and screened to prepare it for further analysis.

#### **5.4 DATA SCREENING AND ASSUMPTIONS FOR MULTIVARIATE ANALYSIS**

Prior to conducting any form of statistical analysis, it is crucial that the raw data is first prepared and organized in a way that will make them appropriate for such analyses (DePoy & Gitlin, 2005). To achieve this goal, diagnostic screening is conducted in order to ensure that the dataset conforms to the requirements specified in the research, and the assumptions of the intended analyses are met.

The first step in screening the data involved a check for the accuracy of the data coding and entry into the statistical computer program (SPSS). A random sample of 23% of the returned questionnaire ( $n = 70$ ) was retrieved and subsequently

compared with the data entered into the SPSS program file for each matched case. No entry or coding discrepancies were identified.

The next step involved checking the data ranges for each variable entered to ensure all data fits within the prescribed range. With the aid of Explore procedure in SPSS, all the data entered were found to be within the specified parameters.

Following this step, the data was then examined in relation to the size variable. The scope of the present study is SMEs in the ICT industry in Malaysia with full-time employees not exceeding 50. Since this information was not captured by the MSC database, firms which indicated more than 50 full-time employees were eliminated from the sample (see section 1.4). This reduced the sample size by 18 ( $n = 284$ ).

#### **5.4.1 Treatment of Missing Data**

The remaining 284 respondents were then screened for any missing data. This procedure is aimed at determining whether the extent of missing data – if any – is a source of concern for this study, and determine the appropriate method of remedying the problem. Addressing the issue of missing data is particularly important because the presence of missing data may affect the strength of the study design and validity of the conclusions about variable relationships (Maxwell & Delaney, 2003; McKnight, 2007). In addition, advanced multivariate techniques such as SEM, may not be fully explored with the presence of missing data (Schumacker & Lomax, 2004).

To accomplish this task, the Missing Value Analysis Module in SPSS program was utilized to examine the pattern and extent of missing values and their treatment. Out of the 38 variables of the study, 9 variables were found with missing values ranging from 0.8 % to 1.7 % (Table 5.1).

Table 5.5  
Nonresponse rate for Nine Variables of the Study

Variable	OL1	OL4	OL10	IN5	IN10	OP2	OP5	OP6
No. of missing values	4	6	4	5	8	5	7	6
Rate (%)	0.8	2.0	0.8	1.1	1.7	1.1	1.5	1.3

From Table 5.1, none of the variables had missing value exceeding 5% range according to the guidelines set forth by Tabachneck and Fidell (2001). This implies that missing data is sufficiently low, and does not lead to bias impact on the analysis and results of the study (Hair et al., 2010). No variable at this stage is considered for elimination due to missing data.

Prior to remedying the missing data, it is necessary to diagnose the pattern of randomness of the missing data (Kline, 2005; McKnight, 2007). This is because the pattern of randomness dictates the appropriate method for remedying the missing values (Laursen, Little & Card, 2011). Little and Rubin (1987) distinguished three patterns of missing data: missing completely at random (MCAR), where missing values are independent of the variables of interest; missing at random (MAR), where missing values are dependent only on observed variables; and missing not at random (MNAR), where missing data depends on observed variables.

To test the MCAR assumption, a chi square test developed by Little (1998) is used to test the null hypothesis that the missing data is MCAR. Utilizing the MVA program in SPSS, results of Little's test produced a chi square of 261.70 (270) where  $p = 0.6230$ . The non-significant  $p$  value leads to non-rejection of the null hypothesis, which indicates that the missing data is MCAR.

The next step involves the selection of the appropriate imputation technique to accommodate missing data in the analysis. Imputation is “the process of estimating the missing value based on valid values of other variables/cases in the sample” (Hair et al., 2010: 49). Missing data which are classified as MCAR allows for the widest range of potential remedies, whereas missing at random (MAR) data are remedied solely by model-based approaches (Kline, 2005; Hair et al., 2010).

Imputation of missing data in this study utilizes the Expectation-Minimization (EM) approach. The EM method has an advantage of “using all available variables as predictors for imputing the missing data” (Allison, 2002: 20). The method is based on a two-iterative approach: the E step uses regression analysis to estimate the missing values; while in the M step maximum likelihood procedure is used to estimate the parameters using the missing data replacements (Little & Rubin, 1987; Kline, 2005).

Using the MVA program, the EM algorithm was used to impute 45 missing values (10%), and a new dataset with no missing values was created for further analysis.

#### **5.4.2 Assessment of Outliers**

After examination and treatment of missing data, the data set was then scrutinized for presence of any outliers. As suggested by Kline (2005), Hair et al. (2010), and Cramer and Dennis (2004), this is a necessary step prior to conducting multivariate analysis in order to avoid biased results. An outlier is an extreme value on a single variable (univariate outlier) or multiple variables (multivariate outliers) (Tabachnick & Fidell, 2007).

#### 5.4.2.1 *Univariate Outliers*

To check for univariate outliers, the raw scores of all items were transformed to standardized z-scores using SPSS program. According to Field (2005) and Tabachnick and Fidell (2007), standardized scores in excess of  $\pm 3.29$  ( $p < 0.01$ , two-tailed) are considered potential outliers. The SPSS output for this analysis showed that the frequency distribution of z-scores did not show presence of any outlier as all values fell between the range of -2.23 and 2.56. This suggests that none of the scores is a possible outlier.

#### 5.4.2.2 *Multivariate Outliers*

Next, a check for multivariate outliers was done to identify extreme scores on two or more variables or atypical pattern of scores (Tabachnick & Fidell, 2007). This analysis was performed in SPSS program using linear regression with dummy dependent variable to obtain Mahalanobis distance statistic ( $D^2$ ) (Armitage, Berry & Matthews, 2008; Kline, 2005). The  $D^2$  statistic indicates the distance in standard deviation units between a set of scores for an individual case and the sample means for all variables (Kline, 2005: 54).

The alpha was set at a conservative level of 0.001 with 38 degrees of freedom equal to the number of variables in this study (Kline, 2005: 51). The corresponding chi square statistic ( $\chi^2$ ) is 70.71. Using regression analysis, scores in excess of this  $\chi^2$  are possible multivariate outliers. Results of this analysis detected six scores that violated the chi-square criterion. These scores were therefore treated as “extreme” outliers and consequently deleted from the dataset. This procedure reduced the sample size from 284 to 278. Table 5.2 presents the SPSS output for Mahalanobis distance.

Table 5.6  
SPSS Output for Mahalanobis Distance

	Residual Statistics				
	Minimum	Maximum	Mean	Std. Dev.	N
Mahalanobis Distance	11.950	104.042	37.858	14.545	278

### 5.4.3 Assessment of Normality

Data screening also involves the assessment of normality, which is defined as the degree to which the distribution of the sample data corresponds to a normal distribution (Hair et al., 2010: 72). Normality of distribution is an essential requirement for multivariate analysis such as SEM (Bagozzi & Baumgartner, 1994; Byrne, 2001; Schwab, 2005). As a first step, univariate normality for each variable is assessed, followed by multivariate normality for two or more variables and their combinations.

#### 5.4.3.1 Univariate Normality

Univariate normality is examined using two statistical descriptive indices namely skew and kurtosis (Hoyle, 1995; Meyers, Gamst & Guarino, 2006). Skew and kurtosis are measures of symmetry and peakedness respectively (Kothari, 2008; Lomax, 2001).

Under normal distribution, the coefficient of skew as calculated by SPSS equals to zero (Black, 2008; Field, 2009; Miles & Shevlin, 2010). As a rule of thumb, a distribution is considered skewed if its skew values are greater than 1 or less than  $-1$  (Bowen & Guo, 2011; Walker & Maddan, 2005). It is therefore desirable to obtain skew values that are as close as possible to zero.

Kurtosis is a measure of whether the distribution of the data is peaked or flat in comparison with normal distribution (Bowen & Guo, 2011). Leptokurtic distributions are datasets with positive kurtosis characterized by high degree of peakedness, while platykurtic are datasets with negative kurtosis and high degree of flatness (Kline, 2005; Lomax, 2007; Salkind, 2010). As in skew, a normal distribution for kurtosis, also known as mesokurtic distribution, has values between 1 and  $\infty$  (Bowen & Guo, 2011; Walker & Maddan, 2005) based on SPSS that uses zero for normal distribution.

The values of skewness and kurtosis and their standard errors for OL construct are given in Table 5.3. The skewness value of 0.55 for OL3 suggests a slight positive skew such that there are more scores at the low end of the distribution. This means that the distribution is not perfectly symmetrical but it exhibits an acceptable level (1 and -1) of skew (Walker & Maddan, 2005). On the other hand, all kurtosis values suggest that the distribution is mesokurtic as these values fall between the range of  $\infty$ 1.00 and 0. In sum, it can be concluded that this distribution is considered to be a reasonable approximation to the normal curve.

Table 5.7  
Univariate normality for OL Construct

Indicator	Skewness		Kurtosis	
	Statistic	S.E	Statistic	S.E
OL1	-.04	.15	-.80	.29
OL2	.20	.15	-.63	.29
OL3	.55	.15	-.25	.29
OL4	.13	.15	-.84	.29
OL5	.21	.15	-.86	.29
OL6	.29	.15	-.74	.29
OL7	.20	.15	-.87	.29
OL13	-.04	.15	-.43	.29
OL14	-.05	.15	-.43	.29
OL15	-.18	.15	-.47	.29
OL16	-.04	.15	-.25	.29

The measures of symmetry and peakedness for innovation are shown in Table 5.4. At least four variables have higher than zero skew values indicating the presence of a slight negative skew such that there are more scores at the high end of the distribution. This is however, not a source of concern as these values are less than  $\pm 1.00$  (e.g. -.93, and -.87).

Table 5.8  
Normality Test for Innovation Construct

Indicator	Skewness		Kurtosis	
	Statistic	S.E	Statistic	S.E
IN1	-.75	.15	-.33	.29
IN2	-.93	.15	.48	.29
IN3	.16	.15	-1.09	.29
IN5	-.27	.15	-.99	.29
IN6	-.27	.15	-.78	.29
IN7	-.30	.15	-.54	.29
IN8	-.29	.15	-.48	.29
IN11	.25	.15	-1.01	.29
IN12	.29	.15	-1.24	.29
IN14	-.71	.15	-1.00	.29
IN15	-.87	.15	-.33	.29

Correspondingly, four variables (IN3, IN11, IN12 and IN14) have kurtosis slightly greater than  $\pm 1.00$  indicating a more platykurtic distribution than normal. Such kurtosis values are considered problematic (Bowen & Guo, 2008; Kline, 2005), and therefore warrant additional analysis.

Following guidelines in the literature, the four offending variables with negative kurtosis (long tail to the left) can be expanded by rescaling them to squares (DeCoster, 2001; Fraser, 2008). This procedure normalizes the moderate left kurtosis values. Using compute function in SPSS, the data in the four distributions (IN3, IN11,

IN12 and IN14) were transformed by obtaining their squares. A second test of normality was conducted and the results of the four variables after transformation are shown in Table 5.5. Results of the squared transformations of the new variables show that the values of kurtosis for the four distributions are within the normal range, and close to zero.

Table 5.9  
Univariate Normality for Innovation after Transformation

Indicator	Skewness		Kurtosis	
	Corrected Statistic	S.E	Corrected Statistic	S.E
IN3	.80	.15	-.23	.29
IN11	-.83	.15	.20	.29
IN12	.76	.15	-.26	.29
IN14	-.31	.15	-.23	.29

The univariate normality test for OP is shown in Table 5.6. From the table, two values of skew (OP5 and OP6) exhibit the presence of positive and negative skew respectively. Similarly, with the exception of OP5, all kurtosis values show presence of leptokurtic and platykurtic curves with kurtosis values fairly above  $\pm 1.0$ .

Table 5.10  
Univariate Normality for OP Construct

Indicator	Skewness		Kurtosis	
	Statistic	S.E	Statistic	S.E
OP1	.46	.15	-1.28	.29
OP2	-.07	.15	-1.24	.29
OP3	-.15	.15	-1.14	.29
OP4	.05	.15	-1.40	.29
OP5	1.15	.15	.10	.29
OP6	-1.37	.15	1.26	.29

As in innovation, this moderate violation of normality of distribution requires further analysis to correct for the failure in normality. Consistent with guidelines in the literature, the positive skew greater than one with long tail to the right can be normalized by rescaling in square roots, natural logarithms or inverses (Fraser, 2008; Tabachnick & Fidell, 2001). Square root transformation is appropriate for moderate skew, log transformation for severe skew and inverse for extremely severe skew (Field & Miles, 2010; Sheskin, 2007; Tabachnick & Fidell, 2001).

From Table 5.6, the positive skew value (1.147) for OP5 is moderately deviated from a normal distribution suggesting its normalization by square root. On the other hand, OP1 through OP4 and OP6 all have negative deviation. Using the strategy applied in the OI construct, these variables were transformed by obtaining their squares. Results of the transformed variables of the OP construct are presented in Table 5.7.

Table 5.11  
Univariate Normality for OP after Transformation

Indicator	Skewness		Kurtosis	
	Corrected Statistic	S.E	Corrected Statistic	S.E
OP1	.92	.15	-.30	.29
OP2	.50	.15	-.67	.29
OP3	.41	.15	-1.0	.29
OP4	.54	.15	-.84	.29
OP5	.93	.15	-.61	.29
OP6	-.44	.15	.02	.29

The transformed data depicted in Table 5.7 for OP construct indicates that the values of skewness and kurtosis are within the acceptable range of 1 and -1. Although

the distributions are not perfectly symmetrical, as exhibited by the negative values, the values are no longer a threat to normality assumption.

#### **5.4.3.2 *Multivariate Normality***

The examination of univariate normality provides an initial indication of multivariate normality (Kline, 2005; Meyers et al., 2006). This however, does not necessarily imply that the multivariate assumption is satisfied. Statistics scholars posit that “normality on each of the variables separately is a necessary, but not sufficient, condition for multivariate normality to hold” (Stevens, 2002: 262; DeCarlo, 1997). The univariate normality test therefore, provides one of the conditions necessary for multivariate normality (Kline, 2005; Pedhazur & Schmelkin, 1991). Another aspect of multivariate normality is the detection and deletion of outliers discussed in section 5.4.2, which contributes to achieving multivariate normality (Kline, 2005).

The AMOS program provides a robust statistical tool for analyzing multivariate normality (Byrne, 2001; Raykov & Marcoulides, 2006; Schumacker & Lomax, 2004). Under Analysis Properties, the test for normality and outliers provides a coefficient of multivariate kurtosis and its critical ratio (C.R), known as Mardia’s normalized estimate. As a guideline, Bentler (2005) proposed that C.R values greater than 5.00 are indicative of non-normal multivariate distribution.

All the 38 variables of the study were entered in a confirmatory factor model (discussed in detailed in section 5.8.1) and AMOS output for normality was analyzed. The multivariate coefficient of 27.912 and its z-statistic (C.R) 4.068 indicates that the sample is multivariate normal.

#### 5.4.4 Test for Common Method Bias

In section 4.3.1, it was highlighted that the use of cross section and single method research design creates a potential threat of common method bias (CMB). This bias arises from “the variance that is attributable to the measurement method rather than to the constructs the measures represent” (Podsakoff et al., 2003: 879). Examining the presence of common method variance (CMV) is important because the presence of the variance is a form of systematic measurement error that biases the estimation of the true interconstruct relationship (Lance & Vandenberg, 2009: 311; Malhotra, Kim, & Patil, 2006).

Prior to conducting the survey, ex ante strategies were used to minimize the effect of CMV. These include the use of different scale lengths for the questionnaire, such as 5-point and 7-point; different scale anchors, such as strongly agree/strongly disagree versus better than/worse than, and separation of the independent variable from dependent variable in the scale (Podsakoff, et al., 2003).

In addition, ex post statistical analysis is used as a diagnostic approach to examine the existence of CMV (Chang, Van Witteloostuijn & Eden, 2010). Following recommendations by Podsakoff and Organ (1986), Harman’s single factor test is used. This technique utilizes exploratory factor analysis to evaluate the amount of variance in observed variables that can be explained by a single factor. CMV is likely to exist if “(i) a single factor emerges from unrotated factor solutions, or (ii) if a first factor explains majority of the variance in the variables” (Podsakoff & organ, 1986: 536).

Results of the exploratory factor analysis revealed that out of the 8 factors that emerged, the first factor accounted for 12.73 percent of total variance explained 68 percent (Table 5.3). Since 12.73 is significantly less than half of the total variance, the

analysis suggests the impact of method effects is not likely to bias the self-reported data (Lance & Vandenberg, 2009).

**Table 5.12**  
**Harman's single Factor Test**

Component	Eigenvalue	Sum of square loadings		Rotation of sum of square loadings	
		% of variance	Cumulative %	% of variance	Cumulative %
1	7.16	18.85	18.85	<b>12.73</b>	12.73
2	5.15	13.56	32.40	9.78	22.50
3	3.92	10.31	42.72	9.67	32.17
4	3.62	9.52	52.25	9.67	41.84
5	2.08	5.47	57.72	8.80	50.63
6	1.49	3.92	61.63	8.57	59.20
7	1.38	3.64	65.28	4.65	63.85
8	1.06	2.79	68.07	4.21	68.06

## **5.5 SUMMARY OF DATA SCREENING AND MULTIVARIATE ASSUMPTIONS**

In summary sections 5.3.1 through 5.3.4 were aimed at screening the data for accuracy, completeness, and normality in order to achieve a fit between the data and the assumptions of multivariate analysis. In checking the accuracy of data, 18 out of the 302 participating companies were beyond the scope of the study as their size exceeded 50 full-time employees dictated by the definition of SMEs in the Malaysian context. This reduced the sample size from 302 to  $n = 284$ .

Next, the data was screened for any missing values. Nine variables were found to contain missing cases within an acceptable range of 0.8% and 1.7%. The missing data were remedied using EM method which accommodated 45 missing values accounting for a total of 10%, and thus generating a complete data set.

The data was then checked for presence of univariate and multivariate outliers. The frequency distribution of standardized z-scores did not detect any score in excess of  $\pm 3.29$ . Multivariate outliers were examined using Mahalanobis Distance. Linear regression with a dummy dependent variable showed a violation of chi square criterion in six cases of the study sample. These extreme outliers were thus deleted from further analysis reducing the sample size from 284 to  $n = 278$ .

The remaining sample was inspected for normality of single and multiple variables as an important criterion of SEM analysis. Univariate analysis detected the presence of few variables deviating from normality. These variables were transformed by either expanding or shrinking them to obtain normalization. Multivariate normality was statistically tested using AMOS program. The z-statistic of multivariate kurtosis was between the acceptable range of 0 and 5 as recommended by Bentler (2005).

Finally, the scores were checked for presence of bias against common or single method. Ex post statistical test of single-factor analysis did not show potential effect of common method variance as evidenced by 12.73 % variance accounted by the first factor from a total of 68% variance explained by eight factors.

## **5.6 RELIABILITY AND INTERNAL CONSISTENCY**

After performing data screening and examining potential biases, a reliability analysis is conducted in the next sections to assess the psychometric properties of the measurement scales. Reliability refers to the quality of a measuring instrument that would cause it to report the same value in successive observations of a given case as long as the phenomenon being measured has not changed (Wagner, Babbie, Halley & Zaino, 2011). Reliability usually precedes validity because reliability is concerned with creating a measure that is then tested in relationship to other others (Stangor,

2007). The first following sections present analysis of the reliability and internal consistency measures.

### 5.6.1 Coefficient Alpha

Coefficient alpha is a measure of reliability of an instrument, which is defined by Nunnally (1967 cited in Cortina, 1993) as “the extent to which measurements are repeatable” (1993: 206). The most widely used index of reliability and internal consistency is the Cronbach’s alpha (Cortina, 1993; Rao & Sinharay, 2007; Salkind, 2010). Internal consistency is the extent to which individual items correlate with one another or with the test total (Brown et al., 2011; Hair et al., 2010; Streiner, 2003). The alpha coefficients for each subscale are shown in Table 5.9.

Table 5.13  
Cronbach’s Alphas for the Measurement Scales

Research Construct	Dimensions	No. of items	Cronbach’s $\alpha$
Organizational Learning	Commitment to Learning	4	.83
	Shared Vision	4	.74
	Open-mindedness	4	.88
	Knowledge sharing	5	.81
Innovation	Process Innovation	5	.75
	Product Innovation	5	.90
	Administrative Innovation	5	.71
Organizational Performance	Financial and Non-Financial	6	.76
Overall		38	.76

The alpha values displayed in Table 5.9 for each of the eight subscales are within the range of .71 and .90 as recommended by Nunnally (1978) and DeVellis (1991). According to Streiner and Norman (2008), scales with alpha values above .90

are likely to suffer from excessive redundancy, while those with alpha less than .70 are likely to be unreliable. The alpha values recorded in Table 5.6 also fall within the alphas reported in the original instruments from where the subscales were adopted as detailed in Chapter 4.3.3 in this study.

### **5.6.2 Item-to-Total Correlation**

Although the Cronbach's alpha is the most common index for examining reliability and internal consistency, it also suffers from certain limitations. For instance, the alpha is affected by the scale length, and thus high values do not guarantee internal consistency (Cortina, 1993; Rodriguez & Maeda, 2006; Streiner, 2003). Researchers such as Cortina (1993), Schmitt (1996) and Sijtsma (2009) have highlighted other limitations of Cronbach's alpha.

To complement the shortcomings of the coefficient alpha, item-total correlation (ITC) analysis is used to further examine the internal consistency of the research instrument. This test uses Pearson correlation coefficient to examine the correlation between a particular item and the total of all other items in the scale (Field, 2009; Kerlinger, 1978).

Per guidelines recommended by De Vaus (2002), Field (2009), Nunnally and Bernstein (1994), and Streiner and Norman (1995), an item with a low ( $r < 0.3$ ) item-total correlation (ITC) such that the alpha increases if the item is deleted, implies that the item does not add to the explanatory power of the subscale. In this case, the item is considered for elimination or moved to another subscale (Cohen, Manion & Morrison, 2007; Nunnally, 1978). Table 5.10 shows the corrected item-total correlation (CITC) for the OL construct and the subsequent changes in Cronbach's alpha if each individual item is eliminated in turn.

From Table 5.10, the range of CITC for commitment to learning (CL) is .47 and .66. These values are well above the recommended .30 threshold. For the shared vision (SV), all items except OL8 are above the .30 cutoff criteria. The deletion of OL8 would increase the alpha level of the SV subscale to .80. Similarly, all items under open mindedness (OM) dimension performed poorly in the item analysis test with values below .30. A further inspection of the results shows that only one item (OL17) under knowledge sharing (KS) dimension did not meet the CITC criteria of .30. The deletion of this item would increase the alpha level to above .80.

Table 5.14  
Item-to-total Correlation for OL

Dimension	Items	Item-total Correlation	R <sup>2</sup>	$\alpha$ if item deleted
Commitment to Learning (CL)	OL1	.47	.67	.78
	OL2	.54	.68	.78
	OL3	.58	.67	.78
	OL4	.66	.73	.77
Shared Vision (SV)	OL5	.65	.82	.77
	OL6	.64	.86	.77
	OL7	.63	.81	.77
	OL8	.24	.58	.80
Open-mindedness (OM)	OL9	.21	.67	.80
	OL10	.17	.66	.80
	OL11	.16	.68	.81
	OL12	.20	.52	.80
Knowledge sharing (KS)	OL13	.43	.85	.78
	OL14	.42	.88	.79
	OL15	.37	.84	.79
	OL16	.38	.70	.79
	OL17	.02	.05	.80

Following recommendations in the literature that an item which falls below the recommended threshold should be eliminated from the scale, all items below the .30

cutoff (OL8, OL9, OL10, OL11, OL12, and OL17) were therefore excluded from further analysis. The low CITC of these items indicate that they do not measure the same thing as the rest of the items in their respective subscale (Blanche, Durrheim & Painter, 2006; Nunnally, 1978; Taylor, Sinha & Goshal, 2006).

For the organization innovation construct, Table 5.11 displays ITC statistics for its three dimensions: process innovation (PROCIN), product innovation (PRODIN), and administrative innovation (ADMIN).

Table 5.15  
Item-to-total Correlation for Innovation

Dimension	Items	Item-total Correlation	R <sup>2</sup>	$\alpha$ if item deleted
Process Innovation (PROCIN)	IN1	.38	.32	.74
	IN2	.490	.50	.73
	IN3	.40	.43	.74
	IN4	.21	.34	.76
	IN5	.40	.30	.74
Product Innovation (PRODIN)	IN6	.31	.56	.75
	IN7	.30	.76	.75
	IN8	.33	.71	.75
	IN9	.21	.38	.75
	IN10	.22	.65	.74
Administrative Innovation (ADMIN)	IN11	.48	.60	.73
	IN12	.41	.57	.74
	IN13	.21	.19	.76
	IN14	.43	.44	.74
	IN15	.30	.26	.75

All items in the PROCIN subscale satisfy the recommended threshold  $\geq .30$  for CITC. Only two items from PRODIN (IN9 and IN10) and one item from ADMIN (IN13) are below the cutoff criteria and were thus eliminated from further analysis.

Item analysis of organizational performance is provided in Table 5.12. This research construct comprises of two dimensions: non-financial performance (NFP) and financial performance (FP) dimensions with three items in each dimension.

Table 5.16  
Item-total Correlation for Organizational Performance

Dimension	Items	Item-rest Correlation	R <sup>2</sup>	$\alpha$ if item deleted
Financial Performance (FP)	OP1	.46	.33	.73
	OP2	.61	.39	.68
	OP3	.44	.30	.73
Non-Financial Performance (NFP)	OP4	.62	.42	.68
	OP5	.50	.28	.71
	OP6	.34	.13	.75

The item total statistics for all variables of FP and NFP depict a strong CITC ranging from .34 to .62. These values indicate a good measure of internal consistency of the research instrument. This implies that the scale employed in this study is reliable (Ellis & Mead, 2002; Taylor, Sinha & Goshal, 2006).

In summary, the results of reliability and internal consistency suggested the use of 28 indicators for 8 dimensions (factors) as exhibited in Table 5.13:

**Table 5.17**  
**Number of Indicators after Item Analysis**

<b>Dimension</b>	<b>Indicators</b>	<b>Total</b>
Commitment to learning (CL)	OL1, OL2, OL3, OL4	4
Shared Vision (VS)	OL5, OL6, OL7	3
Knowledge Sharing (KS)	OL13, OL14, OL15, OL16	4
Process Innovation (PROCIN)	IN1, IN2, IN3, IN5	4
Product Innovation (PRODIN)	IN6, IN7, IN8,	3
Administrative Innovation (ADMIN)	IN11, IN12, IN14, IN15	4
Financial Performance (FP)	OP1, OP2, OP3	3
Non-Financial Performance (NFP)	OP4, OP5, OP6	3
Total		28

## **5.7 DESCRIPTIVE STATISTICS**

As asserted by Babbie (2010: 467), descriptive statistics is “a medium for describing data in manageable forms.” It involves summarizing basic characteristics of a data set to allow for easier preliminary interpretation (Harlow, 2005; Kothari, 2008). What should be reported in descriptive statistics is dependent on the nature of the data and the type of measurement scale used (Fraser, 2008; Glenberg, 1996). Researchers generally agree that the Likert scale assumes an ordinal-level of measurement in which the response categories have rank order, but the intervals between them are not presumed equal (Boslaugh & Watters, 2008; Monette, Sullivan & DeJong, 2010). There is however a disagreement on the legitimacy of treating the Likert scale as interval-level data (Knapp, 1990; O’Brien, 1985; Vigderhous, 1977; Wang, Yu, Wang & Huang, 1999), which has implication on the appropriateness of including the mean as measure of central tendency and standard deviation as measure of dispersion in descriptive analysis (Fraser, 2008; Monette et al., 2010).

Labovitz's (1970: 517) examination of the assignment of numbers to rank orders has shown that "ordinal variables can be treated as if they conform to interval scales." He argues that the amount of error that can occur in doing so is minimal compared to the considerable advantages accrued to the researcher. O'Sullivan and Rassel (1995: 274) provide a thoughtful summary of this debate in the following words:

The level of measurement of a Likert-type index is ordinal. The items do not really measure the quantity of a characteristic, but we can use the items to rank the cases. However, by adding together the numbers assigned to the responses categories of each item, we are treating the measurement as if it were interval. This practice allows us to use more statistical techniques for analysis. Many analysts feel that treating Likert-type scales as if they were interval measures provides more advantages than disadvantages.

Adopting the views of treating the Likert scale as interval scale (Labovitz, 1970; O'Sullivan & Rassel, 1995; Salkind, 2010), this study uses the mean to assess the central tendency, while the dispersion is assessed by the minimum, maximum and standard deviation. Table 5.18 summarizes the descriptive statistics of respondents' ratings on OL.

Table 5.18  
Descriptive Statistics for OL

Indicator	Min.	Max.	Mean	Std. Deviation
OL1	2	7	4.50	1.09
OL2	3	7	4.62	1.09
OL3	3	7	4.47	1.07
OL4	3	7	4.97	1.18
OL5	3	7	4.99	1.19
OL6	3	7	5.05	1.14
OL7	3	7	5.06	1.16
OL13	1	7	4.27	1.52
OL14	1	7	4.21	1.56
OL15	1	7	3.91	1.37
OL16	1	7	4.19	1.29

Organizational learning (OL) construct was measured using a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) with higher values indicating higher degree of agreement. From Table 5.18, the highest means for OL6 and OL7 indicate that the respondents considerably agree that *commonality of purpose* and *sharing organizational vision across departments* are among the important variables that contribute to OL. The lowest mean value in OL15 suggests that most of the respondents do not agree that there are specific mechanisms for sharing the lessons learned.

Innovation construct was measured using a seven-point Likert scale ranging from 1 (not at all) to 7 (to a very great extent) with higher values indicating higher degree of agreement. Table 5.19 shows the descriptive results of innovation which is captured by 11 indicators.

Table 5.19  
Descriptive Statistics for Innovation

Indicator	Min	Max.	Mean	Std. Deviation.
IN1	1	7	5.45	1.21
IN2	1	7	5.74	1.06
IN3	1	7	4.64	1.29
IN5	1	7	5.12	1.25
IN6	1	7	5.09	1.15
IN7	1	7	5.03	1.07
IN8	1	7	5.99	1.04
IN11	1	7	4.45	1.26
IN12	1	7	4.47	1.34
IN14	1	7	5.51	1.50
IN15	1	7	5.46	1.23

High means of 5.99 and 5.74 for IN8 and IN2 respectively suggest that *seeking new services* and *updating work practices to improve productivity* are among the key

priorities of the surveyed firms in terms of their innovation orientation. The lowest mean recorded for IN11 suggests that the sampled firms are not keen in continuously introducing new ways to manage their business. This may be explained by the complexities and high risks associated with altering the methods of managing business, and frequent introduction of changes.

Organizational performance (OP) construct was measured using a five-point Likert scale ranging from 1 (very unsuccessful) to 5 (very successful) with higher values indicating higher degree of endorsement. The descriptive results of OP explained by six indicators are shown in Table 5.20.

Table 5.20  
Descriptive Statistics for OP

Indicator	Min	Max.	Mean	Std. Deviation
OP1	1	5	3.32	1.40
OP2	1	5	3.75	1.29
OP3	1	5	3.05	1.35
OP4	1	5	3.69	1.38
OP5	1	5	2.72	1.02
OP6	1	5	2.93	.96

As seen in Table 5.20, the mean scores for all indicators of OP generally suggest a relatively higher rating of performance measures. Additionally, the lowest mean score endorsed by the surveyed firms is OP5 representing *sales growth* (mean = 2.72), while the highest score is seen in OP4 which represents *return on assets* (mean = 3.69).

In summary, this section has presented the descriptive statistics for the research variables in order to create a concise and understandable picture of the data. The next sections will explore the inferential statistics intended to explain the

variables of the study and to test the research hypotheses. The sections start with the examination of the measurement models prior to conducting a full-fledged structural model.

## **5.8 MEASUREMENT MODELS**

To examine the relationships among the variables of the study, this research utilizes Anderson and Gerbing's (1988) two step-approach to modeling. The approach emphasizes the analysis of two distinct models: the measurement model, which specifies the relationships among the measured variables; followed by the structural model, which identifies the relationships among latent independent and dependent variables proposed by the theory (Cheng, 2001; Schumacker & Lomax, 2004).

The measurement model is tested by use of confirmatory factor analysis (CFA). The CFA approach examines the nature of the dimensions of a latent variable to determine if (i) the data support the hypothesized dimensions of the latent variable, and (ii) the indicators measure the latent variable well (Brown, 2006; Kline, 2005; Salkind, 2010; Schumacker & Lomax, 2004). To achieve this, the researcher specifies the factor structure, the variables measured by each latent factor, and the correlation among the factors (Kline, 2005; Schumacker & Lomax, 2004).

In this study, the CFA approach serves two main purposes: (i) to determine that a measurement model is adequate for the sample study prior to conducting a substantive hypotheses testing (Anderson & Gerbing, 1988; Kline, 2005), and (ii) to provide evidence that the multiple items in this study can be represented by valid composite scores (Bowen & Guo, 2011; Byrne, 2010). This allows for the assessment of a more parsimonious subset of items that can be used in research or practice

(Brown, 2006; Schumacker & Lomax, 2004). In this case, the CFA provides appropriate loadings which indicate the importance of each item to the overall measure (Byrne, 2010; Kline, 2005).

Both measurement and structural models begin with model specification (Maruyama, 1998; Weston, 2006). Model specification is the process of identifying every relationship and parameter to be included in the model of interest (Hoyle, 1995, 2011; Schumacker & Lomax, 2004). In fact, no analysis can take place if the researcher has not specified a model of the relations among the variables to be analyzed.

Model specification is followed by model identification, which is concerned with whether the set of parameters of the model are consistent with the data (Byrne, 2010; Heck & Thomas, 1999; Long, 1986). Model identification provides fundamental information on whether models can be estimated by CFA and SEM analyses. It is determined by the numeric relationship between the number of non-redundant elements ( $p^*$ ) in the sample covariance matrix defined by the formula:  $p^* = p(p+1)/2$ , where  $p$  indicates the number of indicator variables (Hoyle, 1998; Kline, 2005; So, 2010). The goal in both CFA and SEM is to specify a model that satisfies the criterion of overidentification (Byrne, 2010; Foster, Barkus & Yavorsky, 2006; Hoyle, 1995; Marcoulides & Hershberger, 1997). To achieve this condition, the difference between  $p^*$  and the number of estimated parameters ( $q$ ), which equals the degrees of freedom ( $df$ ), must be greater than zero ( $p^* > q \rightarrow df > 0$ ) (Byrne, 2010).

### **5.8.1 First order CFA Model**

The first order CFA is aimed at testing the existence of the eight dimensions hypothesized in this study denoted by the labels CL, SV, OM, KS, PROCIN,

PRODIN, ADMIN, FP and NFP (see appendix IV for variable coding). Moreover, the first order CFA will also examine the unidimensionality of each dimension. This is achieved by assessing the factor loadings and construct validity of the CFA model. Anderson and Gerbing (1982: 454) assert that “lack of unidimensionality most often represents a measurement model misspecification, (and) typically occurs with initial models.”

Based on previous research and theory (see chapter 2.3 onwards), a hypothesized eight factor model (Figure 5.1) provided the specification input for analysis using AMOS Graphics (version 18.0).

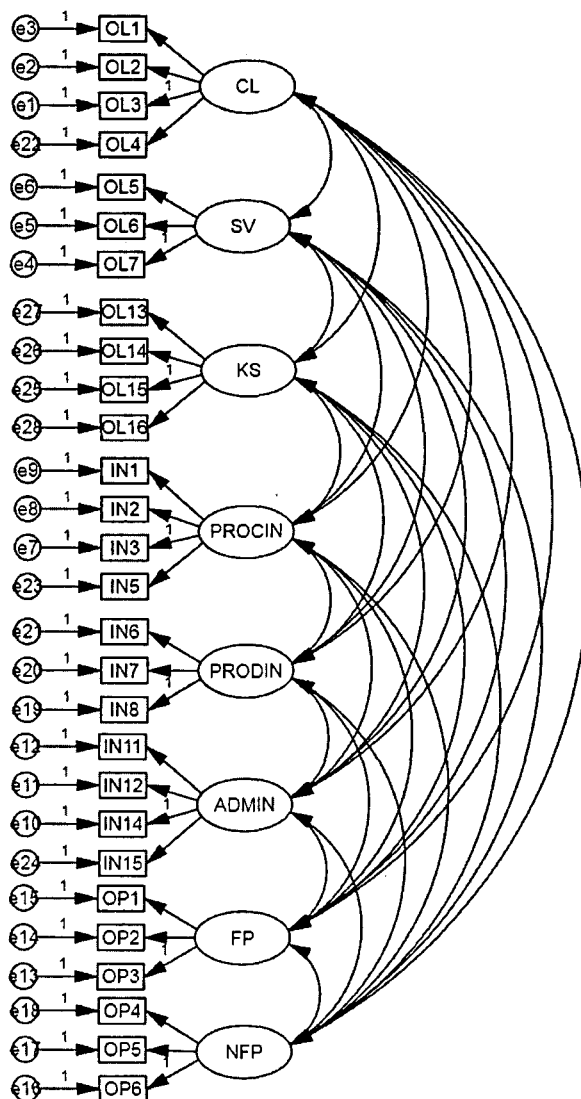


Figure 5.1: First order CFA Model Specification

The model represents the hypotheses that OL1 through OL4 measure CL; OL5, OL6, and OL7 measure VS; OL13, OL14, OL15, and OL16 measure KS; IN1, IN2, IN3, and IN5 measure PROCIN, IN6, IN7, and IN8 measure PRODIN; IN11, IN12, IN14 and IN15 measure ADMIN; OP1, OP2, and OP3 measure FP; and finally OP4, OP5, and OP6 measure NFP.

It is also hypothesized that all the eight factors (from CL to NFP) covary with each other, that is, all their associations are specified as unanalyzed (Kline, 2005; Maruyama, 1998). These eight factors are exogenous variables while the measurement errors attributed to each indicator are unobserved exogenous variables.

The 28 indicators (sub constructs) are endogenous variables. Each indicator is a continuous variable represented as having two causes – a single underlying factor that the indicator is supposed to measure, and all other sources of causation that are represented by the error term (Kline, 2005).

For model identification, the number of distinct sample moments ( $p^*$ ) is  $28(28+1)/2 = 406$ , while the number of estimated parameters is 84 (20 regression paths, 28 covariances and 36 variances). The difference between  $p^*$  and  $q$  ( $df$ ) is greater than zero ( $p^* > q \rightarrow df > 0$ ), hence, the model is overidentified.

To examine the model fit, multiple fit indices are used. The chi-square ( $\chi^2$ ) statistic, normed chi square or critical ratio ( $\chi^2/df$ ), and the root mean square error of approximation (RMSEA) are all indicators of model misfit (Yang, 2010; Hair et al., 2010). Thus, values closer to zero for these indices are indicative of better fit (Bentler, 1990). RMSEA values of less than 0.08 are usually recommended, while values between .08 and .10 are generally suggestive of an adequate fit (MacCallum, Browne & Sugawara, 1996).

The comparative fit index (CFI), which is the most widely used incremental fit index, is a measure of model's goodness of fit. It is an improved version of the normed fit index (NFI), and the closer its value is to 1.0, the better the fit of the data to the model (Hair et al., 2010). Models with CFI values close to 0.95 indicate a relative good fit between the hypothesized model and the observed data (Hu & Bentler, 1998, 1999).

On the basis of these indices, the first order confirmatory model was estimated using maximum likelihood (ML) technique since the data satisfied normality assumption (see section 5.3). The ML technique yields parameter estimates that are unbiased, efficient and asymptotically normal allowing for parameters to be tested for statistical significance (Enders & Bandalos, 2001; Tenenbaum & Driscoll, 2005).

The initial estimation of the first order CFA model did not provide a reasonably good fit for the data. While the chi square did not reach the desirable level of significance [ $\chi^2(322) = 1479.23; p < 0.01$ ], the remaining indices are also not satisfactory: normed  $\chi^2 = 4.59$ ; RMSEA= 0.114; and CFI = 0.770. These results suggest that the model does fit the data well.

To improve the model fit, several diagnostic measures were carried out as recommended in the literature (Byrne, 2010; Hair et al., 2010; Kline, 2005). The first step involved the examination of the standardized factor loadings (path estimates) such that loadings below the acceptable cutoff values of 0.50 are considered for elimination (Hair et al., 2010). By examining the path estimates of the first factor model (see Table 5.22), four items were found to violate this rule. These are: OL1 (0.263), OL15 (0.399), IN5 (0.459) and IN15 (0.427).

In the next diagnostic measure, the standardized residuals, which are the differences between observed and predicted covariances, were examined to ensure

that none exceeds the 4.0 benchmark (Kline, 2005). The residuals associated with the four indicators above (OL1, OL15, IN5 and IN15) exceeded the 4.0 benchmark.

Based on the above diagnostic measures, the four indicators were eliminated since the model fit suggests a great need for improvement. The number of indicators was thus reduced to 24 which will also be the number of observed variables in the revised model.

In addition to these diagnostics, the modification indices (MIs) were also examined to identify the largest MIs for the covariance of the error terms. Per convention, the error terms with the largest MIs were allowed to covary because the variables showed high degree of correlations (Byrne, 2010; Kline, 2005). These covariances of the error terms were supported theoretically due to the nature of commonality arising from word similarity and redundant content. This results into a high correlation between the variables, and it is therefore reasonable to assume that the error terms that are not fully explained by the latent factor are related.

Following these diagnostic measures, the first order CFA model was then re-estimated using the default ML estimation technique. The overall model chi square statistic is  $\chi^2(201) = 396.8; p < 0.01$ . Due to the sensitivity of  $\chi^2$  to sample size, other fit indices are also examined (Anderson & Gerbing, 1982; Hair et al., 2010). The normed  $\chi^2$  is 1.98, which is below the 2.0 cutoff, and therefore, suggests a very good fit for the model (Hair et al., 2010). See Appendix V for a complete AMOS output of the model fit.

**Table 5.21**  
**Comparison of Initial and Revised CFA Model**

Fit Index	First order confirmatory factor model	
	Revised Model	Initial Model
Chi square ( $\chi^2$ )	396.80	1479.23
Degrees of freedom	201	322
<i>p</i> value	0.000	0.000
Normed $\chi^2$	1.98	4.59
CFI	0.954	0.770
RMSEA	0.059	0.114

Other absolute fit measures also provide support for the model fit. The RMSEA is .06, which is below the .70 guideline for a model of this complexity (Hair et al., 2010). Using the 90 percent confidence interval, the upper bound of this RMSEA (.060) is also below the recommended guideline (.08). Similarly, CFI is .954, which is above the .92 guideline for a typical model (Hair et al., 2010). Table 5.21 compares the fit indices between the initial and the revised measurement models.

### 5.8.2 Assessment of Model's Construct Validity

Having verified the adequacy of the first order confirmatory model, the research then proceeds to evaluate the construct validity of the model. By definition, construct validity is “the extent to which a set of measured items actually reflect the theoretical latent construct those items are designed to measure” (Hair et al., 2010: 686). It involves providing psychometric evidence of two types of validity tests: convergent validity and discriminant validity (Bagozzi, Yi & Phillips, 1991; Schumacker & Lomax, 2004; Kline, 2005). In convergent validity, indicators of a specific construct are supposed to converge, that is, share a high proportion of variance in common (Gallagher, Ting & Palmer, 2008).

### ***5.8.2.1 Convergent Validity***

The initial step to testing convergent validity is to check whether the coefficients between the items and the factors (unstandardized factor loadings) are positive and significant (Anderson & Gerbing, 1988). The results in Table 5.22 confirm that all loadings in the first order CFA model are positive and highly significant ( $p < 0.01$ ) as required for convergent validity.

In addition to confirming the direction and statistical significance using the unstandardized loading estimates, the convergent validity is also tested by examining the standardized loadings and the coefficients of composite reliability (C.R) and average variance extracted (AVE).

Table 5.22  
Factor Loadings for First Order CFA

Indicator	Main construct	Factor Loadings		Std. Error
		Unstandardized	Standardized	
OL4	CL	1.00	.88	<sup>a</sup> —
OL3	CL	.83***	.75	.05
OL2	CL	.74***	.65	.06
OL7	OM	1.00	.80	<sup>a</sup> —
OL6	OM	1.00***	.83	.04
OL5	OM	.89***	.89	.048
OL16	KS	1.00	.76	<sup>a</sup> —
OL14	KS	0.66***	.91	.09
OL13	KS	0.55***	.91	.09
IN3	PROCIN	1.00	.68	<sup>a</sup> —
IN2	PROCIN	.87***	.74	.09
IN1	PROCIN	.76***	.60	.09
IN8	PRODIN	1.00	.86	<sup>a</sup> —
IN7	PRODIN	0.74***	.95	.06
IN6	PRODIN	.99***	.76	.06
IN14	ADMIN	1.00	.65	<sup>a</sup> —
IN12	ADMIN	0.58***	.85	.14
IN11	ADMIN	1.20***	.80	.13
OP3	FP	1.00	.79	<sup>a</sup> —
OP2	FP	.80***	.67	.09
OP1	FP	.85***	.67	.09
OP6	NFP	1.00	.72	<sup>a</sup> —
OP5	NFP	0.57***	.90	.12
OP4	NFP	0.61***	.82	.11

Notes: <sup>a</sup> Fixed parameter; \*\*\* Significant at  $p < 0.001$  (two-tailed).

According to recommended guidelines, the minimum values for AVE is .50, and for construct reliability is .70 (Hair et al., 2010). Similarly, the minimum values of standardized estimates should be .50 as recommended in the literature (Hair et al., 2010). The standardized loading estimates are presented in Table 5.23 for each indicator. The table also depicts values of AVE and composite reliability for each construct (dimension).

Table 5.23  
Assessment of Convergent Validity

	CL	SV	KS	PROCIN	PRODIN	ADMIN	FP	NFP
OL2	0.65							
OL3	0.75							
OL4	0.88							
OL5		0.89						
OL6		0.83						
OL7		0.80						
OL13			0.92					
OL14			0.92					
OL16			0.76					
IN1				0.61				
IN2				0.74				
IN3				0.68				
IN6					0.76			
IN7					0.95			
IN8					0.86			
IN11						0.80		
IN12						0.85		
IN14						0.65		
OP1							0.67	
OP2							0.67	
OP3							0.79	
OP4								0.83
OP5								0.90
OP6								0.72
<b>AVE</b>	<b>0.59</b>	<b>0.71</b>	<b>0.75</b>	<b>0.55</b>	<b>0.74</b>	<b>0.59</b>	<b>0.51</b>	<b>0.67</b>
<b>CR</b>	<b>0.81</b>	<b>0.88</b>	<b>0.90</b>	<b>0.71</b>	<b>0.74</b>	<b>0.81</b>	<b>0.75</b>	<b>0.86</b>

*Notes.* AVE = Average Variance Extracted, CR = Construct Reliability

From Table 5.23, the lowest factor loading is .61, which links process innovation (PROCIN) to item IN1. Five other items (OL2, IN3, IN14, OP1 and OP2) exceed the minimum cutoff .50 for loading estimates but fall just below the .70 standard.

The AVE estimates are all above the 50 percent threshold as recommended by Fornell and Larcker (1981). It indicates that the amount of variance captured by each construct exceeds the variance due to measurement error. Similarly, all CR values are above the recommended .70 threshold.

Taken together, the evidence provided supports the convergent validity of the first order CFA model. Although few indicators have loading estimates below the .70 standard, it appears that they do not significantly harm the model fit or internal consistency of the measurement model.

**5.8.2.2 Discriminant Validity**

To assess the discriminant validity, the study uses Fornell and Larcker’s (1981) test of shared variance. The test compares the AVE estimates for each factor with the variance shared between the construct and other constructs in the model. The shared variance is the squared correlation between the two constructs. If the AVE estimates are greater, then it implies that the constructs can be adequately discriminated (Fornell & Larcker, 1981).

Table 5.24  
Assessment of Discriminant Validity

	AVE	MSV	ASV
CL	0.59	0.52	0.22
SV	0.71	0.70	0.20
KS	0.75	0.22	0.09
PROCIN	0.55	0.44	0.17
PRODIN	0.74	0.02	0.01
ADMIN	0.59	0.53	0.13
FP	0.51	0.53	0.15
NFP	0.67	0.12	0.03

Notes. AVE = Average variance extracted, MSV = Maximum shared variance, ASV = Average shared variance

The results in Table 5.24 indicate that the AVE estimates for each factor is greater compared to the maximum shared variance (MSV) and average shared variance (ASV) except for one dimension (FP) in which  $AVE < MSV$ . This is however not considered a serious problem since the FP construct reliability exceeds the AVE estimate while its ASV value is far below the AVE index. Thus, the test provides evidence of discriminant validity using the Fornell-Larcker criterion.

In summary, this section presented the results for the first order CFA model. The purpose of the model was to assess the degree to which first order factors served as underlying constructs for second order factors. It also involved testing unidimensionality of the multi-item constructs, and eliminating unreliable items. Because of poor fitting, the initial model was revised to meet the recommended model fit using 24 indicators and 8 factors. The revised model provided a reasonable fit to data thus verifying the adequacy of the model. Consequently, several tests were performed to establish the model's construct validity and reliability. Results of validity (convergent and discriminant) and reliability tests confirm that first order CFA model is valid and reliable.

### **5.8.3 Second order CFA Model for OL**

Having established the adequacy of the hypothesized first order factorial model, a series of second order CFA models are conducted to test the null hypothesis that the first order factors reflect a higher order construct. Thus, three second order CFA models will be analyzed to test the null hypotheses that OL, OI and OP are all higher order constructs.

The second order CFA model for OL is based on previous empirical research and theory (see Chapter 2.3 and onwards). A hypothesized three-factor model (Figure

5.2) provided the specification input for analyses by AMOS. The model represents the hypotheses that CL, SV and KS all represent OL construct.

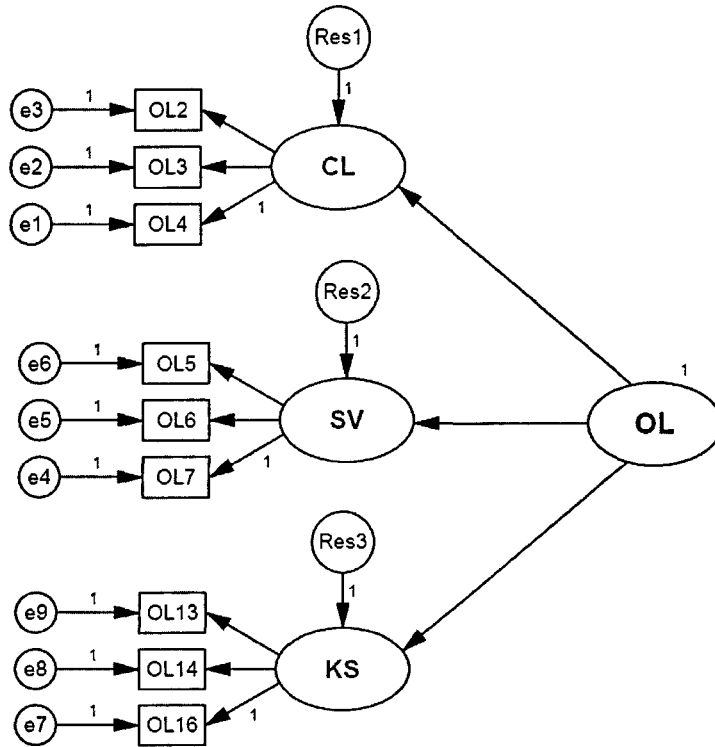


Figure 5.2 Model Specification for Second Order CFA (OL)

As shown in Figure 5.2, all the nine indicators are specified as observed endogenous variables, while CL, SV and KS are specified as unobserved endogenous variables. The OL construct, nine error terms and three residuals are specified as unobserved exogenous variables.

Given nine as the number of variables, the number of data points ( $p^*$ ) is  $9(9+1)/2 = 45$ , while the number of parameters to be estimated ( $q$ ) is 21 (9 regression weights and 12 variances). The difference between  $p^*$  and  $q$  is greater than zero ( $p^* > q \rightarrow df > 0$ ), and therefore, the second order CFA model for OL is overidentified.

Using the multiple fit indices highlighted in section 5.6.1, the initial estimation of the model was below the recommended guidelines for a good model fit. The following fit indices were reported: chi square = 408.2 (24);  $p < 0.01$ , normed  $\chi^2 = 17.0$ ; RMSEA= 0.24; and CFI = 0.826. These results indicate that the second order CFA model does not fit the data well.

To improve the model fit, diagnostic measures were performed in which the modification indices (MIs) were examined to identify the largest MI for the covariance of the error terms. To reduce the amount of chi square, the error terms with the largest MIs were allowed to covary due to the presence of high correlations among the variables (Figure 5.2).

While the covariances of the error terms were supported technically by the CFA output, it was theoretically reasonable to expect a high correlation between the variables in the CFA model as they all measure a single construct (OL).

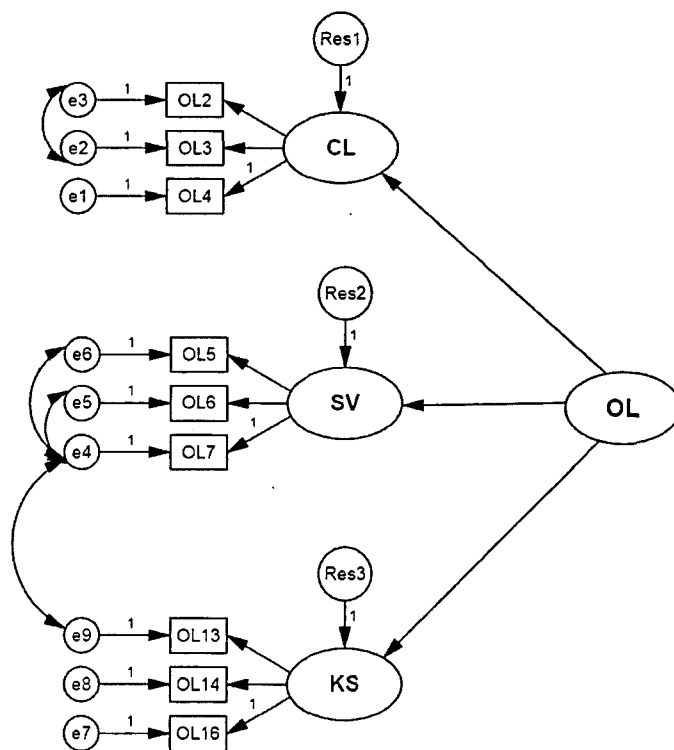


Figure 5.3 Revised Model Specification for OL

Thus, the error terms that are not fully explained by the latent factors were covaried as depicted in Figure 5.3. Results of the modified second order CFA model fit the data reasonably well. The overall model chi square ( $\chi^2$ ) statistic is 17.56 with 13 degrees of freedom. The  $p$ -value for the revised model is 0.175, which is non-significant at 0.05 (type I error rate). Therefore, the null hypothesis that the population covariance matrix equals the matrix implied by the CFA is rejected (Bowen & Guo, 2011; Byrne, 2010; Kline, 2010).

Other fit measures provide additional support to the goodness of fit of the revised model: RMSEA = 0.044 and CFI = 0.998. A comparison between the fit measures of the initial model and the revised model is shown in Table 5.25.

Table 5.25  
Comparison of Initial and Revised Fit Measures for CFA Model (OL)

Fit Index	Second order confirmatory factor model (OL)	
	Revised Model	Initial Model
Chi square ( $\chi^2$ )	17.56	408.20
Degrees of freedom	13	24
$p$ value	0.175	0.000
Normed $\chi^2$	1.351	17.0
CFI	0.998	0.826
RMSEA	0.044	0.24

Similarly, the factor loadings for the second order model are shown in Table 5.26. The loading estimates from the measurement item to the respective first-order constructs range from .65 to .99 and are all significant at  $p < 0.01$ .

Table 5.26  
Factor Loadings for Second Order CFA (OL) Model

Indicator	Path	Construct	Factor Loadings		S.E.	t-value	p-value
			Unstandardized	Standardized			
CL	<---	OL	.89	.97	.07	13.13	***
SV	<---	OL	.96	.96	.07	13.89	***
KS	<---	OL	.67	.68	.08	8.97	***
OL4	<---	CL	1.00	.93	— <sup>a</sup>		
OL3	<---	CL	.85	.85	.05	17.32	***
OL2	<---	CL	.77	.78	.04	17.62	***
OL7	<---	SV	1.00	.88	— <sup>a</sup>		
OL6	<---	SV	.99	.89	.04	25.60	***
OL5	<---	SV	.65	.95	.05	13.06	***
OL16	<---	KS	1.00	.83	— <sup>a</sup>		
OL14	<---	KS	.89	.92	.06	14.77	***
OL13	<---	KS	.77	.97	.06	13.19	***

Notes. —<sup>a</sup> Fixed parameter; S.E = Std Error; \*\*\* Significant at  $p < 0.001$

These results confirm the identification of OL as a higher order composite representation of three factors: CL, SV and KS.

#### 5.8.4 Second order CFA Model for Innovation

Founded on previous empirical research and theory, the second order CFA model for innovation is hypothesized as a three-factor model comprising of process innovation (PROCIN), product innovation (PRODIN) and administrative innovation (ADMIN). The model represents the hypotheses that these three types of innovations converge to a single construct of innovation.

As shown in Figure 5.4, nine indicators (three for each dimension) are specified as observed endogenous variables while PROCIN, PRODIN and ADMIN are specified as unobserved endogenous variables. The higher-order construct (OI),

and all the model's error terms and residuals are specified as unobserved exogenous variables.

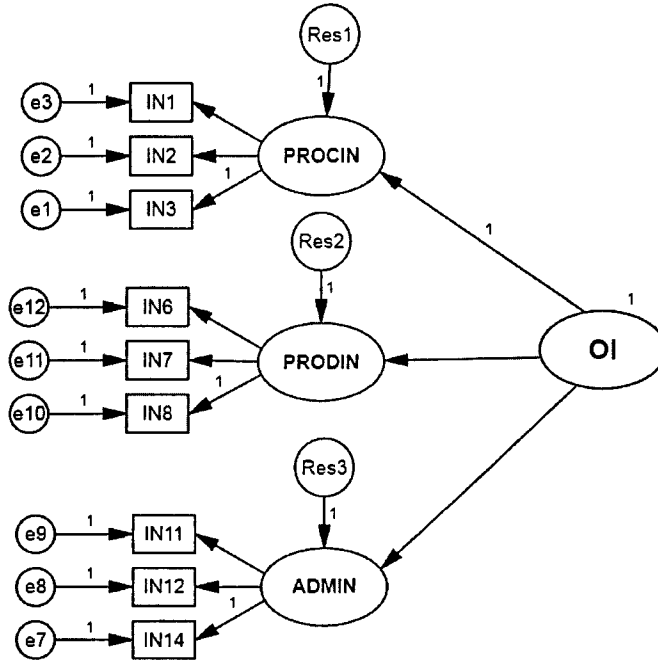


Figure 5.4: Model Specification for Second Order CFA (IN)

The number of non-redundant elements in the model ( $p^*$ ) is  $9(9+1)/2 = 45$ , and there are 20 distinct parameters (8 regression paths and 12 variances) for estimation. The degrees of freedom indicated by the difference between  $p^*$  and  $q$  is greater than zero, and hence the model is overidentified.

Results of the initial estimation of the second order CFA model are: chi square = 68.0 (24);  $p < 0.05$ , normed  $\chi^2 = 2.83$ ; RMSEA= 0.081; CFI = 0.957. The absolute fit indices are within the acceptable range: normed  $\chi^2$  is within 2 and 5, while the badness of fit measure (RMSEA) is below the 0.8 threshold. Similarly, CFI index is above 0.92 threshold. These results suggest that the model fits the data moderately well, and thus, model respecification was not necessary.

Table 5.27  
Factor Loadings for Second Order CFA (I) Model

Indicator	Path	Construct	Factor Loadings		S.E.	t-value	p-value
			Unstandardized	Standardized			
PROC	<---	OI	1.00	.97	<sup>a</sup> -		
PROD	<---	OI	.58	.96	.06	10.39	***
ADMIN	<---	OI	.76	.68	.07	10.42	***
IN3	<---	PROC	1.00	.93	<sup>a</sup> -		
IN2	<---	PROC	.66	.85	.18	3.62	***
IN1	<---	PROC	.88	.78	.19	4.66	***
IN8	<---	PROD	1.00	.89	<sup>a</sup> -		
IN7	<---	PROD	.76	.89	.05	16.93	***
IN6	<---	PROD	.99	.95	.06	17.05	***
IN14	<---	ADMIN	1.00	.83	<sup>a</sup> -		
IN12	<---	ADMIN	.66	.92	.14	4.67	***
IN11	<---	ADMIN	.70	.97	.15	4.65	***

Note: <sup>a</sup> Fixed parameter; S.E = Std Error; \*\*\* Significant at  $p < 0.001$

In addition, all factor loadings (standardized) on first order constructs were significant (at  $p < 0.01$ ) with values ranging from .51 to .95 (Table 5.27). Likewise, factor loadings from first-order factors to the second-order factor were all significant. These results suggest that Innovation is a higher order construct modeled by three types of innovation: process, product and administrative innovation.

### 5.8.5 Second order CFA Model for OP

The second order CFA model for organizational performance (OP) is derived from previous theory and empirical work (see Chapter 3.2 and onwards). The two-factor model hypothesizes that financial performance (FP) and non-financial performance (NFP) reflect one single construct of OP.

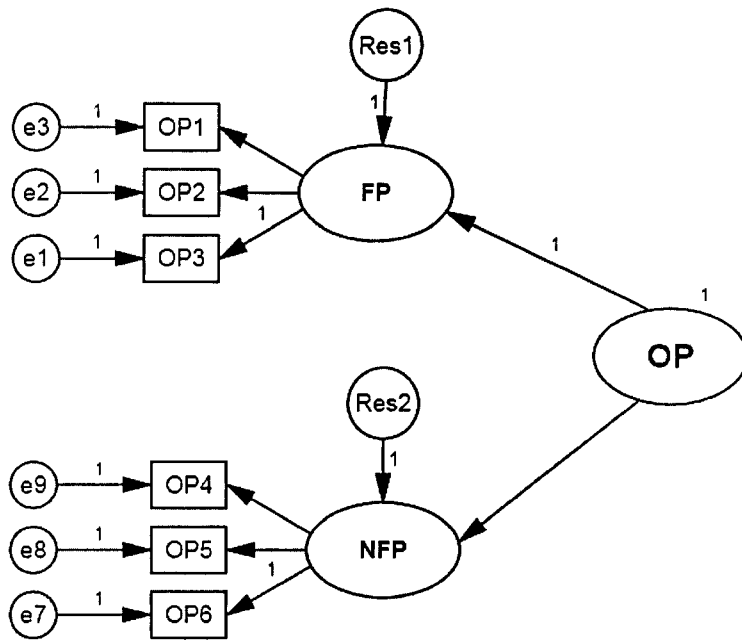


Figure 5.6: Model Specification for OP

Model specification is displayed in Figure 5.6. The model shows two types of endogenous variables: observed, comprising six indicators, and unobserved comprising of FP and NFP. The unobserved exogenous variables are the higher-order construct (OP), six error terms, and two residuals.

For model identification, the value of  $p^* = 21$ , while  $q = 13$  (5 regression weights and 8 variances), hence  $df > 0$ . The model is therefore overidentified. Results of the initial estimation of the second order CFA model for OP indicate a strong model fit with a  $\chi^2 = 16.47$  (8);  $p > 0.05$ . The non-significant value of  $p$  implies that the sample covariance matrix is not equal to the matrix implied by the CFA model, and thus the null hypothesis is rejected.

Other indices also support the second order CFA model: normed  $\chi^2 = 2.0$ ; RMSEA= 0.062; and CFI = 0.985. These absolute and incremental indices provide a robust statistical fit of the model to the data. Moreover, all factor loadings are significant at  $p < 0.01$  (Table 5.28).

Table 5.28  
Factor Loadings for Second Order CFA (OP)

Indicator	Path	Construct	Factor Loadings		S.E.	t-value	p-value
			Unstandardized	Standardized			
FP	<---	OP	1.00	.88	— <sup>a</sup>		
NFP	<---	OP	.64	.92	.20	4.00	***
OP3	<---	FP	1.00	.66	— <sup>a</sup>		
OP2	<---	FP	.88	.78	.16	5.58	***
OP1	<---	FP	.92	.59	.12	5.12	***
OP6	<---	NFP	1.00	.73	— <sup>a</sup>		
OP5	<---	NFP	.67	.89	.12	3.34	***
OP4	<---	NFP	.72	.84	.11	6.55	***

Note: —<sup>a</sup> Fixed parameter; S.E = Std Error; \*\*\* Significant at  $p < 0.001$

These results suggest that organizational performance (OP) is a higher order construct modeled by non-financial performance (NFP) and financial performance (FP).

## 5.9 SUMMARY OF THE MEASUREMENT MODELS

The SEM analysis in this research began with an evaluation the underlying factor structure that captures the hypothesized research model. Through CFA, the measurement theory was tested based on the covariance between all measured items. The first measurement model was aimed at verifying the existence of eight dimensions that were derived from previous research and theory, and examining their dimensionality. Results of the first order CFA analysis indicated that the data did not fit the conceptual model, and thus diagnostic measures were performed per recommendations in the literature to improve the model fit. Diagnostic measures

suggested the deletion of four items. Results of the modified first order CFA model provided strong support to the hypothesized first order factors.

Next, a series of second order CFA models were conducted to verify that three higher order constructs are composite representation of their proposed indicators. The initial second order CFA for OL did not stand up to the model adequacy measures. It was thus diagnosed for a better fit by examining the model’s modification indices. Results of the modified model lent support that commitment to learning, shared vision and knowledge sharing are dimensions that can be modeled by OL. Similarly, in the second order CFA model for OI, process, product and administrative innovation were found to be represented by OI. Finally, non-financial performance and financial performance were modeled by a single construct of OP. A summary of the second order CFA models is provided in Table 5.29.

Table 5.29  
Summary of Second Order CFA Models

Second Order CFA Model	Fit Indices				
	$\chi^2$	Normed $\chi^2$	<i>p</i>	RMSEA	CFI
Organizational Learning	17.57	1.35	0.18	0.04	0.98
Innovation	68	2.83	0.00	0.08	0.96
Organizational Performance	16.45	2.01	0.04	0.06	0.97

Having satisfied the requirements for measurement models in terms of overall model fit and validity, the structural model is then examined to test the research hypotheses and the proposed relationships among the research constructs.

## 5.10 STRUCTURAL MODEL

This section focuses on testing the theoretical model which depicts the links among the latent constructs. SEM examines a theoretical model by combining both measurement and structural model in the same analysis.

Given that the measurement models have already been assessed and verified in the previous confirmatory factor models, the testing of structural relationships using SEM analysis will examine two issues: acceptance of the proposed model measured by overall and relative model fit; and estimates of structural parameters, which are equivalents of regression coefficients.

The structural model is specified visually in Figure 5.6. The model shows that OI and OP are (unobserved) endogenous constructs. Similarly, OL, eight error terms and two residuals are (unobserved) exogenous variables.

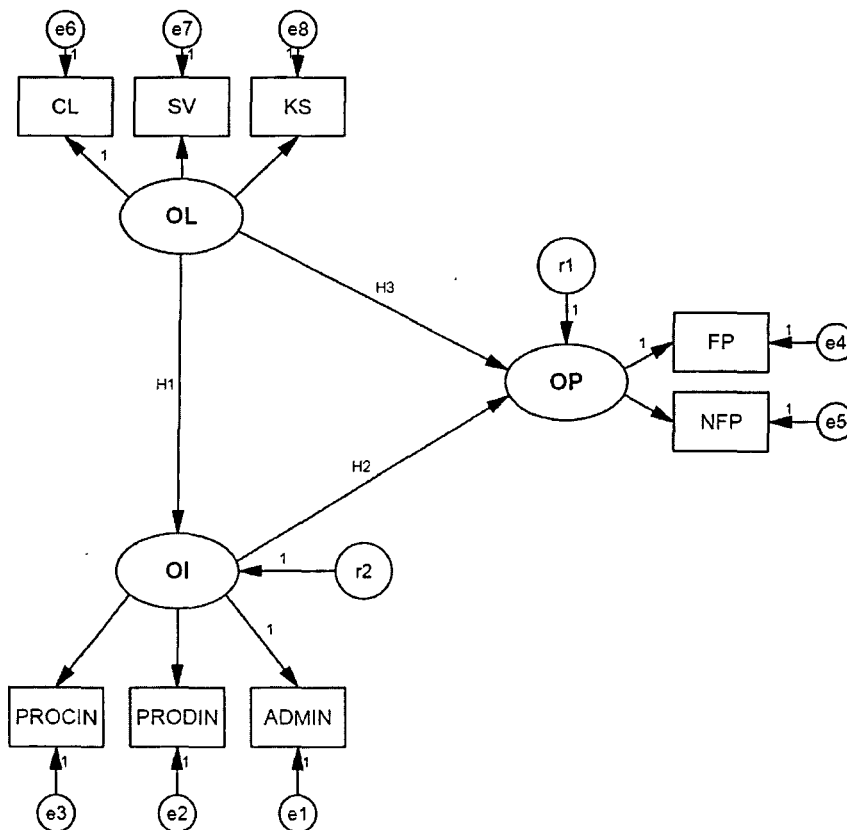


Figure 5.7: Structural Model Specification

From Figure 5.6,  $H_1$  is represented by the direct path between OL and I;  $H_2$  is captured by the path linking I and OP; while  $H_3$  is represented by the path diagram connecting OL and OP. All the paths between the constructs proceed only from the predictor to the outcome and thus the model is specified as recursive.

For model identification, the number of distinct sample moments ( $p^*$ ) is  $8(8+1)/2 = 36$ , while the number of distinct parameters to be estimates is 19 (8 regression weights and 11 variances). The difference between data points and estimated parameters is 17 degrees of freedom, and since ( $df > 0$ ), the structural model is therefore overidentified. Using the default ML method, the structural model is tested to assess the model fit and whether or not the structural relationships are consistent with theoretical expectations.

The hypothesized structural model predicting OL, I and OP resulted in an acceptable fit:  $\chi^2$  is 37.284 (17);  $p = 1.80$ , thus rejecting the null hypothesis. The ratio of  $\chi^2$  to degrees of freedom is 2.193, and the model's CFI is 0.978 with RMSEA of 0.066. Thus all the absolute measures and the incremental fit index indicate that the model provides a good model fit as depicted in the output for the path diagram in Figure 5.xx. Having obtained a relatively good model fit, the researcher then proceeds to examine and test the proposed hypotheses.

## 5.11 HYPOTHESIS TESTING

The first hypothesis stated that there is a positive relationship between OL and innovation. As shown Figure 5.7, the structural path for  $H_1$  (OL-I) is in the expected direction (positive), and the relationship between the two constructs is significant ( $t = 2.602, p < 0.01$ ). This finding therefore provides empirical support for  $H_1$  that OL has a positive relationship with innovation.

The second hypothesis proposes that innovation is positively related to OP. According to Figure 5.7, the structural path linking I and OP is positive as expected and the path estimate is significant ( $t = 4.868, p < 0.001$ ). This finding lends support to  $H_2$  that innovation is a significant predictor of OP.

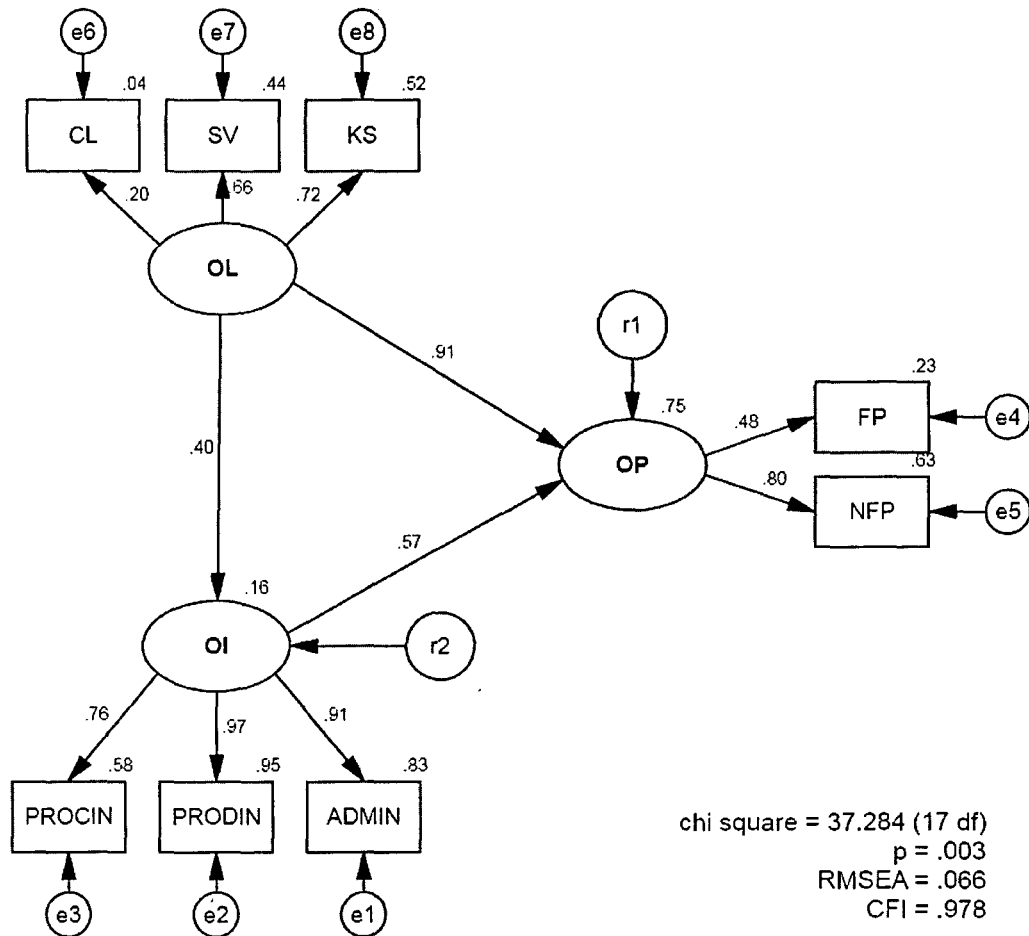


Figure 5.7: Path Diagram for Structural Model with Standardized Loadings

In the third hypothesis, it was predicted that OL will have positive relationship with OP. From Figure 5.7, the parameter for OL-OP link is both positive and significant as hypothesized in this study ( $t = 2.619, p < 0.01$ ). Thus, this finding also provides empirical support for  $H_3$  that OL is a significant predictor of OP.

The structural model also examines the magnitude and significance of the first order factor loadings. Table 5.30 provides the values of the path coefficients and *t*-values of the first order factors. The table shows that all factor loadings are significant ( $p < 0.01$ ), and all except one factor loading are above .50. The factor with a low loading estimate is CL which loads on OL at .20. However, examination of the standardized residual covariances for CL show that all correlations are close to zero, and therefore, the low factor loading for CL is not considered a serious problem given its high significance.

Table 5.30  
Factor Loadings and *t*-values for Structural Model

Model Relationships	Hypotheses		Parameter estimates		t-value	Result
	Label	Sign	Standardized	Unstandardized		
<i>Hypotheses</i>						
OL → I	H1	+	.38	1.46	2.60**	Supported
I → OP	H2	+	.57	.35	4.87***	Supported
OL → OP	H3	+	.91	2.04	2.62**	Supported
<i>Second Order Constructs</i>						
I → ADMIN			.91	1.00	<sup>a</sup> —	
I → PRODIN			.97	1.05	26.17***	Supported
I → PROCIN			.76	.85	16.77***	Supported
OP → FP			.48	1.00	<sup>a</sup> —	
OP → NFP			.80	1.86	5.77***	Supported
OL → CL			.20	1.00	<sup>a</sup> —	
OL → SV			.66	2.44	2.87**	Supported
OL → KS			.72	3.22	2.88**	Supported

Fit Indices:  $\chi^2 (17) = 37.284$ ;  $\chi^2/df = 2.19$ ; CFI = 0.978; RMSEA = 0.066.

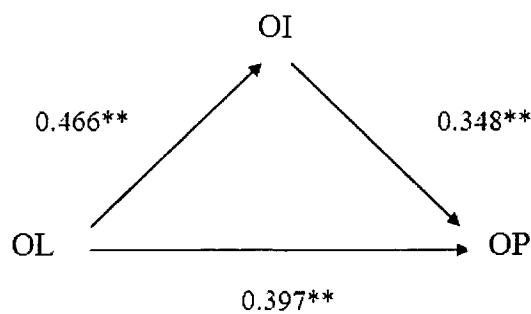
Notes: <sup>a</sup> Fixed parameter; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

The fourth hypothesis states that innovation mediates the relationship between the independent variable (OL) and dependent variable (OP). To test this hypothesis, Baron and Kenny's (1986) test of mediation effect will be utilized (as explained in section 4.3.5).

The first regression analysis (step 1) was performed with OL predicting OP. The results indicate that OL is a significant predictor of OP ( $b = .56, p < 0.05$ ), and explained 22.56% of the variance in OP.

In the second step, I is regressed onto OL to determine path  $a$ . The results also confirm that OL is a significant predictor of I ( $b = .47, p < 0.05$ ), and explained 17.6% of the variance in OI.

In step 3, OP is regressed onto I to estimate path  $b$ . The results of the regression equation show that I is a significant predictor of OP ( $b = 0.35, p < 0.05$ ), and explained 10.32% of the variance in OP. All the three regression equations confirm that all paths are significant, and therefore, the researcher proceeds to step 4 testing for the effect of mediation by I (Figure 5.8).



\*\* Significant at  $p < 0.01$  (two tailed)

Figure 5.8: Results of Mediation Analysis

In the last equation, OP is regressed onto OL while controlling for I (path  $c'$ ). The resulting regression coefficient for  $c'$  ( $b = .40$ ) was found to be non-significant

( $p > 0.05$ ). This finding indicates that innovation (I) shows some form of mediation in the relationship between OL and OP.

Next, the value of  $c^*$  is examined to see if it equals zero (total mediation) or is less than the absolute value of  $c$  (partial mediation). Results show that  $c^*$  (.40) is smaller in absolute value than  $c$  (.56), thus confirming partial mediation of I with respect to OL and OP. A summary of the four regression analyses is provided in Table 5.31.

Table 5.31  
Result of Mediation Test

Steps	Model	Path	IV	DV	B	S.E	$\beta$	t-value
1	OL – OP	$c$	OL	OP	0.56	0.07	0.25	7.87
2	OL – I	$a$	OL	OI	0.47	0.08	0.33	5.58
3	I – OP	$b$	OI	OP	0.35	0.08	0.22	4.46
4	OL – OP	$c^*$	OL	OP	0.40	0.06	0.24	6.20

Notes: IV: Independent variable; DV: Dependent variable; S.E: Standard error

Having established the existence of mediation in the research model, the Sobel's (1982) test is used to examine whether the indirect effect of the IV on the DV via the mediator ( $a*b$ ) is significantly different from zero, as recommended by Baron and Kenny (1986) and MacKinnon, Warsi, and Dwyer (1995). The test calculates the z statistic as given in the following formula:

$$z = \frac{a \times b}{\text{sqrt}[b^2 s_a^2 + a^2 s_b^2]}$$

where  $a$  and  $b$  are regression coefficients obtained from steps 2 and 3 of the regression analysis,  $S_a$  is the standard error of the relationship between the X and M, and  $S_b$  is the standard error of the relationship between M and Y.

To conduct this test, an online computer program developed by Preacher and Leonardelli (2001) was used. Prior to running the test, the following inputs were made into their respective cells: regression coefficient of  $a$  (.47) and its standard error  $S_a$  (.08), regression coefficient of  $b$  (.35) and its standard error  $S_b$  (.080).

Results of the Sobel's tests ( $z = 3.541, p < 0.01$ ) lead to rejection of the null hypothesis that the indirect effect of  $a*b$  is zero. This consequently suggests that the effect of the mediating variable (I) on OL-OP link is significant.

Therefore, by including I in the model, the direct association between OL and OP was reduced. This indicates that I has a partial mediating effect on the relationship between OL and OP. Based on this analysis, the predicted mediation by I on OL-OP is confirmed, and thus  $H_4$  is empirically supported.

## 5.12 CHAPTER SUMMARY

This chapter provided a detailed report of data analysis and results. Initially, the raw data was screened for any missing values and outliers. Analysis of missing values using SPSS detected 45 missing values, which were imputed using the EM algorithm technique. The complete data set ( $n = 284$ ) was then examined for outliers. The  $z$ -score test did not show any value as an outlier since all values were below the recommended  $\pm 3.29$  cutoff. Following this, multivariate outliers were examined based on Mahalanobis distance statistic. Using the chi square criterion, six cases were detected as outliers and consequently deleted from the dataset.

The dataset was also screened and scrutinized to ensure that the assumptions for multivariate data analyses are fulfilled. Univariate normality was assessed using skewness and kurtosis index. Values exceeding the recommended range ( $\pm 1$ ) were transformed as per guidelines in the literature. The data set was also checked for

multivariate normality, and no violation was detected. Following this, the raw data was then inspected for presence of CMV to determine if there is any bias arising from the use of single informant approach. The Harman's single factor test did not show any presence of CMV in this study.

Following data screening, the research instrument was then examined for its psychometric properties. All the subscales showed acceptable levels of reliability coefficients (.70 to .90). Additionally, results of item-to-total correlation provided further support to internal consistency by deleting 10 items from the instrument whose correlations were below the  $r = .30$  cutoff.

Next, the convergent and discriminant validities were examined using CFA model for all first order factors. The significant loading estimates and AVE provided evidence for convergent validity. For discriminant validity, the Fornell and Larcker's (1981) test indicated that the AVE estimates were greater than the amount of shared variance thus lending support to discriminate validity of the research model and instrument.

Results of the CFA analysis confirm that each of the higher order constructs were composite representations of their first order indicators. Following this, a full-fledged structural model was performed based on the theory and hypothesized relationships of the research constructs. All global fit indices of the structural model provided a good model fit. The SEM analysis suggested that  $H_1$  through  $H_3$  are all supported by the data. Similarly, results of the mediation analysis also lent support to  $H_4$  that innovation mediates (partially) the positive relationship between OL and OP.

## **CHAPTER SIX**

### **DISCUSSION AND CONCLUSION**

#### **6.1 INTRODUCTION**

This chapter provides a detailed interpretation of the results presented chapter five. The discussion is guided by the research questions formulated in chapter one. The remaining sections of this chapter proceed as follows: section 6.2 discusses the research questions; section 6.3 presents the implications of the research on theory, management practice and policy making; section 6.4 outlines the limitations and avenues for future research; and section 6.5 provides the chapter summary and conclusion.

#### **6.2 PRINCIPAL FINDINGS AND INTERPRETATION**

In this study, the researcher tested the interrelationships among OL, innovation, and OP of SMEs in a fast developing country, Malaysia. The findings revealed that the research instruments developed for the Western culture are generally resonant with the Malaysian context except for 14 (38-24) items which had to be excluded for not meeting the standard psychometric properties.

Overall, the psychometric properties of the measurement scales and model fit statistics were comparable with empirical studies conducted in more developed nations and the Western Culture.

As postulated in  $H_1$  of this study, OL is found to have positive relationship with all the three types of innovation (administrative, product and process innovation). This is consistent with the previous empirical studies such as Forrester (2000), Hurley and

Hult (1998), Keskin (2006) Lee and Tsai (2005), Salavou and Lioukas (2003), and Ussahawanitchakit (2008).

The findings also show a positive relationship between innovation and the two types of organizational performance (financial and non-financial performance) as proposed in  $H_2$ . This finding also concurs with previous empirical of Baker and Sinkula (1999), Forrester (2000), Keskin (2006), Lee and Tsai (2005) and Tajeddini (2009).

This study also provides evidence that all OL is directly and positively related to organizational performance as put forward in  $H_3$ . Previous empirical studies by Jashapara (2003), Lopez et al. (2005), Mansur et al. (2010), Ramayah et al. (2004), Santos Vijande et al. (2005), and Zhao et al. (2011) confirm this relationship in variety of industries and research settings.

The intervening effect of innovation between OL and OP was tested using the four-step procedure proposed by Baron and Kenny (1986). The Sobel test was used to measure the significance of the intervening effect. The finding also supported  $H_4$  that innovation mediates the relationship between OL and OP. Researchers such as Baker and Sinkula (1999, 2002), and Hurley and Hult (1998) posited that OL allows a company to develop capabilities that enhance innovation which has a subsequent positive impact on organizational performance.

### **6.2.1 Organizational Learning and Innovation (OL-I)**

The first research question in this thesis examines the effect of OL on firm's level of innovation. Results of this empirical study suggest that OL positively influences firm's innovation. Considerable body of research attests that innovation performance is highly influenced by knowledge generated by organizational learning (Alegre &

Chiva, 2008; Baker & Sinkula, 1999, 2002; Dharmadasa, 2009; Huber, 1998; Hurley & Hult, 1998; Kokoglu, Imamoglu, & Ince, 2011; Lee, Tan & Chiu, 2008; Liao & Wu, 2010; Liao, Fei & Liu, 2008; Morgan, & Berthon, 2008; and Nonaka, 1991).

The findings of this study provide evidence that successful innovation is not entirely a function of environmental factors, but a consequence of managerial commitment to learning. The process of OL as conceptualized in this study consists of commitment to learning, shared vision, open mindedness and knowledge sharing. The combination of these characteristics is responsible for the implementation and generation of new ideas, processes and products, thus supporting the notion that innovation is itself a learnable activity (McKee, 1992).

Based on the OL theory, Argyris and Schon (1978) distinguished three levels of learning which they termed as single-loop, double-loop and deuteron- or meta-learning. They conceptualize single-loop learning as minor modifications that occur in an organization without altering the existing norms and technologies. When the learning involves change in organizational norms and technologies it becomes double-loop learning. Meta-learning is a more comprehensive form of learning that involves a change in both the behavior of the organization and the learning process (Dierkes, Marz, & Teele, 2003).

These three levels of learning are directly related to innovation. The innovation literature shows that the three learning levels juxtapose three types of innovation, namely incremental, discontinuous and innovation (McKee, 1992; Sauder & Sherman, 1994).

In single-loop mode, an organization undergoes learning within a particular organizational framework guided by its norms and routines. Although open to the external environment, the organization's capabilities to respond to the environmental

stimuli are limited by its existing technologies. This form of learning contributes to innovation but at a very incremental level due to the strict attachment of organizational members to the norms and routines of the organization.

By moving one level higher in the learning hierarchy proposed by Argyris and Schon (1978), organizations perceive the environment in a different perspective. This is achieved by changing the underlying norms and technologies so that they are compatible with environmental needs. This change requires organizations to unleash the previously held beliefs thus leading to a higher level of innovation known as discontinuous innovation (Corso & Pellegrini, 2007; Garcia & Calantone, 2002; Lynn, Morone & Paulson, 1996). To achieve this level, organizations focus on their internal environment to ensure that there is high status of shared vision, commitment and knowledge sharing that facilitates the decision making process.

In the third theme, an organization is evaluated in terms of its overall ability to innovate. At this stage, a more comprehensive mode of learning takes place whereby the organization faces the task of generalizing or institutionalizing its innovation ability on a specific task. Most importantly, organizations have to embed the culture of learning into their norms and routines such that errors are accepted and learned from (Akgun et al., 2007).

In sum, the findings of this empirical research have shown that a positive learning climate is necessary for SMEs that seek to perform better in terms of innovation performance. Accordingly, firms which adopt lower-level (adaptive) learning progress to higher-level (generative) learning where radical innovations are witnessed through discovery of new technologies and markets.

## **6.2.2 Innovation and Organizational Performance (I-OP)**

The second research question investigates the influence of innovation on the OP of SMEs. Based on the findings of this study, innovation was found to have positive and highly significant influence on OP. This finding concurs with substantial theoretical and empirical work such as Calantone et al. (2002), Carol and Mavis (2007), Damanpour and Evan (1984), Damanpour et al. (2009), Garrido and Camarero (2010), Han and Celly (2008), Li et al. (2010), Lööf and Heshmati (2006), Love, Roper and Du (2009), Terziovski (2010), and Van Auken et al. (2008).

The findings reported in the empirical part of this thesis show that innovation strategy helps the often resource-limited SMEs to cope with the turbulence of external environment and, is therefore, a key propeller of business success (Baker & Sinkula, 2002; Darroch & McNaughton, 2002; Lyon & Ferrier, 2002).

In the context of highly dynamic and changing environment, innovative companies utilize such environment to their advantage by exploiting new products and processes and exploring new market opportunities ahead of their competitors (Brown & Eisenhardt, 1995).

By conceptualizing innovation as a higher order construct, this research also uncovers three different dimensions that influence the strength of the relationship between innovation and SME performance: process innovation, product innovation and administrative innovation. The finding therefore supports the premise that a strategic innovation approach that incorporates three dimensions of innovation is more beneficial to SMEs than just a single dimension such as new product development or process innovation (Cooper, 1998; Damanpour, 1988; Rosenbusch, et al., 2010). Cooper (1998) posited that the approach of treating innovation as a multidimensional

phenomenon would enable researchers to successfully describe the relationships between organizational variables and the adoption of innovation.

Administrative innovation was conceived as changes made to organization's policies, allocation of resources, and improvement in management techniques (Daft, 1978; Teece, 1980; Wetter, 2010). As with all forms of innovations, the implementation of administrative innovations may require a significant change in the internal mechanisms of the company, its tasks, systems, and most importantly its organizational culture (Drury & Farhoomand, 1996).

However, the ability of an organization to make the necessary changes may at times be hindered by internal pressures such as sunk costs and the unwillingness to abandon established norms (Alas, 2008; Drury & Farhoomand, 1996). Considering the question of how much change the organization needs, the results of this empirical research concurs with Damanpour, Szabat, and Evan, (1989), Gaertner, Gaertner, and Akinnusi, (1984) and Naveh, Meilich, and Marcus (2006), that administrative implementation of administrative innovation is associated with better performance.

Product innovation involves change in the end product or service offered by an organization, whereas process innovation represents changes in the way firms produce end products or services (Utterback, 1994; Wetter, 2010). Historical evidence shows that process innovation has mostly been associated with well-established and bureaucratic firms that operate in mature markets (Porter, 1980). On the basis of economies of scale, these large firms incur less costs of input materials compared to small-sized firms and thus the benefits that innovation yields was more in large firms than in the small-sized companies.

Nonetheless, with the emergence of recent technologies and management techniques, this justification is no longer valid (Cooper, Hollingshead Wallace, 1997;

Parthasarthy & Sethi, 1992). For instance, the advances in computer technologies have rendered the sophisticated systems feasible, and thus large established firms are not any more dominating the process innovations. The proposition that SMEs possess the same capabilities of implementing and benefitting from process innovation as the large firms (Arrow, 1987; Nieto & Santa Maria, 2010; Tether, 1998) is consistent with the findings of the present empirical research.

Taken together, the results of this empirical study have shown that SMEs, which are mostly limited by tangible resources, are able to improve their performance based on the inputs of both process and product innovations. This finding coincides with the work of Añón Higón & Driffield (2010), Hall Lotti and Mairesse (2009), Hilmi, Ramayah, Mustapha and Pawanchik (2010), Salavou & Avlonitis (2008), Subrahmanya, Mathirajan and Krishnaswamy (2010), and Yahya et al. (2011).

### **6.2.3 Organizational Learning and Organizational Performance (OL-OP)**

The third research question posed in this thesis examines the influence of OL on the OP of SMEs. OL in this study was conceptualized from a cultural perspective which is rooted in an interpretive approach to human behavior. The perspective is based on the notion that “members of organizations create a set of intersubjective meanings that can be assessed by artifacts such as symbols, metaphors, ceremonies and myths, and that are tied together by values, beliefs and emotions” (Pawlowsky, 2001: 72).

The results of empirical analysis of this study provide further evidence that OL has a positive influence on OP, which encompasses both economic and non-economic measures. This finding is consistent with previous empirical studies such as Baker and Sinkula (1999), Calantone et al. (2002), Farrell (1999), Farrell and Oczkowski (2002), Garcia-Morales, Llores-Montes and Verdu-Jover (2006), Keskin (2006), Wang

(2008), Santos-Vijande et al. (2005), Sinkula et al. (1997) and Ussahawanitchakit (2008).

The results of this study are also congruent with other empirical studies which use a process-based measure of OL that distinguishes five stages of the learning process: information acquisition, information dissemination, shared interpretation, and organizational memory. These studies include Berchicci and Tucci (2010), Chou, Chang, Cheng, and Tsai (2007), Gonzalez-Padron, Chabowski, Hult and Ketchen (2010), López Sánchez, Santos Vijande and Trespalacios Gutiérrez (2010), and Tippins and Sohi (2003).

The findings of this study also concur with early theoretical research that associates learning with improved performance. For instance, Argyris and Schon (1978: 323) argue that OL based on experience reflects improved task performance. In the same line, Etheredge and Short (1983: 42) posit that learning leads to increased intelligence, which is responsible for increased effectiveness of behavior. Research also shows that learning increases the capacity of an organization to perform better. Similarly, theorists such as Day (1994), Slater and Narver (1995) and Tsang (1997) hold that performance is enhanced by the ability of organizations to learn.

Arguing from a resource-based perspective, researchers postulate that firms that are able to learn about customers, competitors and environment have a better chance of sensing and responding quickly to events in the marketplace (Day, 1994; Sinkula, 1994; Tippins & Sohi, 2003). An organization which is quick to learn from its errors and respond promptly to environmental stimuli should outperform the one which ignores learning from previous errors. Furthermore, organizational memory, which is an accumulation of lessons acquired in the past, make up a vital source of knowledge for organization members (Tsang, 1997). This way, OL enables firms to

build organizational capabilities from experience and consequently engage in repeating the experiences in order to further improve them (Gulati, 1999; Levinthal & March, 1993).

In sum, this empirical study has shown that OL is an important component of organizational capabilities that are required to achieve company's success. It reveals the organizational potential to achieve better performance through creation of value to customers, suppliers and other stakeholders.

#### **6.2.4 Innovation as a Mediator between OL and OP**

The final research question guiding the present study examines the mediating effect of innovation on the link between OL and OP. Using Baron and Kenny's (1986) approach to testing mediation, this empirical study established that innovation partially mediates the relationship between OL and OP. This finding lends support to the proposed model of this research which hypothesized that OL will have positive impact on OP both directly and indirectly via innovation.

The indirect effect of OL on OP through innovation is consistent with empirical work of Aragon-Correa, Garcia-Morales and Cordon-Pozo (2007), Baker and Sinkula (1999), Calantone et al. (2002), Jimenez-Jimenez and Sanz-Valle (2011), Garcia-Morales, Jimenez-Barrionuevo, and Gutierrez-Gutierrez (2011) and Ussahawanitchakit (2011). These findings also support the theoretical argument that OL generates capabilities and resources which are essential for OP (Grant, 1996a, Smith, Lorenzoni & Lipparini, 1999; Vasudevan & Tanniru, 1996).

By viewing OL as the central tenet of an organization's adaptation and response to environmental challenges, the gains made from this target resource become the predictor of another source of competitive advantage, innovation (Ray et al., 2004;

Smith et al., 1996). This way, the firm is able to derive the benefits of innovation by redeploying the advantages gained from OL, and consequently result in a unique resource configuration that leads to better performance.

To summarize, the present empirical study has therefore provided an empirical basis to support that OL can sustain competitive advantage through its interaction and influence on innovation, thereby creating a critical link in exploiting the advantages of OL-OP relationship.

### **6.3 RESEARCH CONTRIBUTION AND IMPLICATIONS**

This section focuses on the contribution of this research and their implications. Specifically, the section will look at contributions of the research to theory, methodology and practice.

#### **6.3.1 Theoretical Contributions**

This dissertation expands the RBV of the firm by proposing and testing a theoretical framework of how firms develop internal capabilities as its key drivers for sustained competitive advantage. Although the RBV of the firm does not provide a framework of the critical factors that contribute to the generation of new resources, in this case OL and innovation, the extensive body of literature reviewed in this study provides an explanation of how these capabilities are developed both at individual and organization level.

The substantive literature also provides empirical support for the key factors and elements that influence OL and innovation. By integrating the three streams of literature, a research model was developed to assess the influence of the internal capabilities of the firm (OL and innovation) impact on OP.

The research model proposed that firms implement OL practices (commitment to learning, shared vision and knowledge sharing) at organizational level to generate the supporting organizational level outcomes, that is, innovation and performance.

This research contributes to the theory in several ways. The RBV of the firm is used to explore firm's potential for creating and mobilizing capabilities by analyzing the role that OL and innovation play in sustaining competitive advantage of the firm. In so doing, this research bridges the gap between theoretical and empirical discussions by showing the usefulness of the complex inimitable resources that are embedded within an organization.

The study also contributes to the theory by testing the relationships between OL, innovation and OP in an integrated model. This integration underscores the importance of firm specific resources in form of knowledge creation and mobilization. The knowledge created and acquired through OL leads to the creation of another target resource (innovation) which can mediate the effect of OL on OP. This provides evidence that competitive advantage is determined by how a firm configures its knowledge created through OL in order to leverage the resources and capabilities embedded in the firm.

The study also examines OL and innovation constructs in SMEs within the Malaysian context. This is crucial for two reasons. First, it broadens the application of OL and innovation paradigms in this information age where the SMEs face an increasing pressure to respond to the challenges of emerging technologies. Second, it sways the focus of research on OL and innovation away from the United States and Europe where it has dominated for the past decades.

Hofstede (1980, 1993) and Rosensweig (1994) have critically questioned the generalizability of management theories developed in one culture or nation to other

cultures and nations. Recognizing the cultural disparities between the Western nations and a developing South-Asian country like Malaysia, this research contributes by offering an empirical back-up to the theoretical foundations developed entirely in Western contexts.

### **6.3.2 Methodological Contribution**

The study also presents several methodological contributions. Rather than relying on unidimensional measures, this research utilizes a broad measure of innovation comprising of product, process and administrative innovation, and a multidimensional measure of performance that includes financial and non-financial performance.

In addition, the research popularizes the application of structural equation modeling in studies of organizations and strategy. This technique allows for rigorous and simultaneous assessment of the measurement properties of constructs operationalized in this research, and thus provides robust statistical evidence for the various analyses performed.

### **6.3.3 Practical Contributions, Implications and Recommendations**

The findings of this research provide useful insights for managers and entrepreneurs who seek to improve their bottom-line performance by leveraging the benefits of information-based economy. An organization aspiring to enhance corporate performance should develop and improve its OL capability. This implication is especially essential for SMEs which operate in a highly versatile and technology-driven industry such as ICT industry. In line with this implication, several recommendations are made.

As senior executives of their companies, the managers undertake the responsibility to foster a learning climate through developing and facilitating managerial support for building the relevant knowledge in the organization. They should promote the acquisition of new knowledge through the development of new ideas, empowering employees to make decisions and take risks.

The executives should also enhance the culture of knowledge sharing within the firm. For example, informal mechanisms can be set up to encourage the sharing of best practices among employees of different departments. Team work may also be an important component of knowledge sharing whereby employees are made to communicate and exchange their views freely while working on particular projects. Additionally, executives of SMEs need to create a climate of openness and experimentation. This can be achieved through creating rewards for innovative ideas and risk-taking endeavors. This way, the firms will cultivate a culture of accepting different types of opinions and experiences and avoid egocentric attitudes where one person's opinion, beliefs or experience is considered superior to others.

Besides these recommendations which aim at developing and facilitating managerial support to OL, practitioners should also design and implement mechanisms that would improve a firm's learning capability. These include consideration of structures, shared practices and information technologies that are practical for the organization to build on its intangible resources and skills.

Another important finding of the study is that developing an organizational learning culture that will improve innovation. This implies that investing effort, time and money into initiatives aimed at developing a learning-oriented culture can bring about augmented innovativeness within modern organizations. This research would provide theoretically and empirically supported evidence for building innovation-

related firms for Malaysian organizations. It further lends support to the notion that OL is the basis for organizational capabilities required to efficiently induce firm innovativeness. Consequently, innovativeness is an internal capability with the potential to create value for stakeholders through improved OP.

In line with this implication, it is recommended that managers play their critical role in deciding the form of OL that determine the type of innovation performance, that is, incremental, radical or evolutionary.

Additionally, as posited by Vera and Crossan (2003), managers and practitioners must align the organization's learning strategy with the organization's business strategy. This is to ensure that the knowledge created through OL is compatible with the organization's objectives. Overall, managers should decide the content and method of learning within the strategic context of the organization's needs.

#### **6.4 LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH**

Although this study was designed to address the research problem as accurately as possible, the results and findings should be interpreted in light of the inherent limitations. Specifically, the study used key-informant procedure whereby top managers responded to both dependent and independent variables of the research.

Despite the fact that test for common method variance did not indicate the presence of method bias, it is recommended that future research should consider other forms of minimizing the bias through the use of multiple respondents where the source of answering dependent variable is not the same as independent variable. One way to overcome this limitation is by using objective measures (hard data) to assess

the dependent variable although this is reliant on the willingness of the participating companies to disclose their financial details.

Another apparent constrain of this research is the nature of the survey design which is cross-sectional. While the findings of this study may be beneficial in understanding the nature of the relationship between OL, I and OP, the findings may also be validated by a different approach other than cross sectional design. Thus future studies may incorporate the use of longitudinal data in order to overcome the shortcoming caused by the time lag in cross-sectional design.

Moreover, the survey sample was primarily SMEs in the ICT industry. It would thus be interesting to see that future research investigates whether the findings can be replicated in other industries such as manufacturing, transport and logistics, and agriculture. It would be equally interesting if further research also examines the research constructs by comparing SMEs with large enterprises, Malaysia with another developing country that shares similar features, and ICT industry with other sectors of the economy.

Finally, the research design does not take into account the contextual factors and conditions which may be necessary for evaluating the overall effects of learning and innovation of business performance. Thus, future research may take into consideration such characteristics like age, type of industry, market power, organizational structure, leadership and human resource management to determine the extent to which learning orientation and innovation affects performance.

## 6.5 CONCLUSION

This research has explored and reviewed three main streams of literature: OL, innovation and OP. All the three streams of literature were examined from the perspective of RBV. The RBV was used to guide the research model of this study in order to provide further insights on the dynamics of resource considerations that determine how a firm achieves sustained competitive advantage.

The empirical part of the study hypothesized and tested the interrelationship among three research constructs: OL, innovation and OP. Using robust statistical techniques, this empirical study has established the following findings: (i) OL is directly and positively related to innovation; (ii) innovation is directly and positively related to OP; (iii) OL is positively related to OP; and finally (iv) the positive relationship between OL and OP is mediated by innovation.

The study concludes that learning at the organizational level is a crucial component that aligns organizational resources with external change. OL is aimed at contributing directly to strategic renewal by establishing a fit between organizational routines and systems with the external dynamic environment. These findings and empirical results enhance our understanding and conceptualization of the OL phenomenon in a fast growing and SME-dominated economy. It is hoped that by emphasizing the role of OL and innovation, company executives and firm owners may be attracted to investing and implementing the notion of learning in their organizations in order to reap the benefits of the knowledge-driven economy.

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# APPENDIX I

## SURVEY QUESTIONNAIRE

**SECTION 1: This section pertains to General Information about your company. Please check the appropriate box:**

### Company Information

#### 1. Position of Respondent

- |  |   |
|--|---|
| <input type="checkbox"/> Chief Executive Officer | <input type="checkbox"/> General Manager              |
| <input type="checkbox"/> Managing Director       | <input type="checkbox"/> Other (please specify) _____ |
| <input type="checkbox"/> Chief Operating Officer |   |

#### 2. Years of operation:

- |                                |                                       |
|--------------------------------|---------------------------------------|
| <input type="checkbox"/> 0-4   | <input type="checkbox"/> 15-19        |
| <input type="checkbox"/> 5-9   | <input type="checkbox"/> 20 and above |
| <input type="checkbox"/> 10-14 |                                       |

#### 3. Number of Full-time employees:

- |                                  |  |
|----------------------------------|--|
| <input type="checkbox"/> 1-50    | <input type="checkbox"/> 151-200       |
| <input type="checkbox"/> 51-100  | <input type="checkbox"/> 201 and above |
| <input type="checkbox"/> 101-150 |  |

#### 4. Nature of Business:

- |   |  |
|---|--|
| <input type="checkbox"/> Information Technology | <input type="checkbox"/> Creative Multimedia     |
| <input type="checkbox"/> Hardware Design        | <input type="checkbox"/> Internet-Based Business |

#### 5. Business managed by:

- |                                  |  |
|----------------------------------|--|
| <input type="checkbox"/> Owner/s | <input type="checkbox"/> Paid Managers |
|----------------------------------|--|

**SECTION 2:** This section pertains to Organizational Learning. Please choose the scale that best describes your company by checking the appropriate box:

1	2	3	4	5	6	7
<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Slightly disagree</b>	<b>Neutral</b>	<b>Slightly Agree</b>	<b>Agree</b>	<b>Strongly Agree</b>

	<b>Variable: Commitment to Learning</b>	1	2	3	4	5	6	7
1	Our organization's ability to learn is the key to our competitive advantage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	The basic values of this organization include learning as key to improvement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	The sense around here is that employee learning is an investment, not an expense.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Learning in my organization is seen as a key commodity necessary to guarantee organizational survival.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Variable: Shared Vision</b>							
5	There is a commonality of purpose in my organization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	There is total agreement on our organizational vision across all functions, and divisions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	All employees are committed to the goals of this organization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Employees view themselves as partners in charting the direction of the organization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Variable: Open-mindedness</b>							
9	We are not afraid to reflect critically on the shared assumptions we have made about our customers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Personnel in this enterprise realize that the very way they perceive the marketplace must be continually questioned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	We rarely collectively question our own bias about the way we interpret customer information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	We continually judge the quality of our decisions and activities taken over time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Variable: Intraorganizational knowledge sharing</b>							
13	There is a good deal of organizational conversation that keeps alive the lessons learned from history.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	We always analyze unsuccessful organizational endeavors and communicate the lessons learned widely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	We have specific mechanisms for sharing lessons learned in organizational activities from department to department	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Top management repeatedly emphasizes the importance of knowledge sharing in our company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	We put little effort in sharing lessons and experiences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION 3: This section pertains to Innovation. Please choose the scale that best describes your company by checking the appropriate box:**

1	2	3	4	5	6	7
Not at all	To a very small extent	To a small extent	To a moderate extent	To a fairly great extent	To a great extent	To a very great extent

	<b>Variable: Process Innovation</b>	1	2	3	4	5	6	7
18	We constantly benchmark our operating systems to world-class standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Work practices are constantly updated to increase productivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	We constantly use technology to enhance service quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Our organization invests heavily in developing new operating systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	We continuously train our people in emerging industry technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Variable: Product Innovation</b>							
23	Our organization has introduced many new services to the market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Our organization has introduced many modifications to the existing services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Our organization constantly seeks to find new services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Our organization has introduced more new services than our competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	The new services we introduced have caused significant changes in the industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Variable: Administrative Innovation</b>							
28	We constantly introduce new ways of managing our business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Our organization invests in updating administrative procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Management constantly seeks new ways to improve administrative systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Our organization empowers employees to take initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Our competitors use our administrative systems as a benchmark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION 4: This section pertains to Organizational Performance (for the previous two years and the present year). Please choose the scale that best describes your company by checking the appropriate box:**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Very successful	Slightly successful	Neither successful nor unsuccessful	Slightly unsuccessful	Very unsuccessful

<b>Non-Financial Performance</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
33	Growth of number of customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Employee satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	Quality in products and services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Financial Performance</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
36	Return on assets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	Sales growth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Profitability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for participating in this survey. If you would like a summary of the survey report please contact the researcher, Islam Mohamed at [imsaalim@hotmail.com](mailto:imsaalim@hotmail.com).

## APPENDIX II

### APPROVAL LETTER FROM THE UNIVERSITY



25 September, 2013

#### TO WHOM IT MAY CONCERN

#### CONFIRMATION AND APPROVAL TO CONDUCT PHD RESEARCH

Dear Sir/Madam,

The Department of Business Administration at the International Islamic University Malaysia hereby confirms that Mr. Islam Mohamed Salim (Matric No. C0917463) is a registered graduate student of the Faculty of Economics and Management Science. He is undertaking a full-time course of research for the degree of Doctor of Philosophy in Business Administration.

The faculty's Department of Business Administration has approved his doctoral dissertation project entitled, "Organizational Learning, Innovation and Performance - an empirical study of Malaysia's ICT companies." The student may thus proceed with the collection of data from the relevant sources while observing all the ethical guidelines of research and data collection.

Any assistance provided to the researcher will be greatly appreciated.

**EMERITUS PROFESSOR DR. MOHAMED BIN SULAIMAN**  
Head of Department of Business Administration  
Faculty of Economics and Management Sciences  
Contact No. 603 6196 4731  
Email: mohamed.sulaiman@iium.edu.my



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INTERNATIONAL ISLAMIC UNIVERSITY  
MALAYSIA

*Sanction of Knowledge and Virtue*

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## APPENDIX III

### COVER LETTER

<Name>,  
<Position>,  
<Company>,  
<Address>.

Month, Day, Year.

Dear <Name>,

I am a graduate student at the International Islamic University Malaysia studying for my PhD program under the supervision of Emeritus Professor Dr. Mohamed bin Sulaiman. For my dissertation, I am examining the impact of Organizational Learning and Innovation on organizational performance of Information and Communication Technology (ICT) companies in Malaysia. Since your company is within the realm of ICT, and has achieved the prestigious MSC status, I am inviting you to participate in this research by completing the attached survey questionnaire.

The questionnaire has three printed pages and contains four sections (1-4) covering several aspects of the research agenda. If you choose to participate in this study, please answer all the questions as honestly as possible without concern over right or wrong answer. I would like to assure you that all information collected will be treated with strict confidence and used for research purposes only. Your name as well as the name of your company will strictly remain anonymous.

Enclosed with this survey is a self-addressed, postage-paid envelope to be used for returning completed surveys. Thank you for taking time to assist me in my educational endeavors. The data collected will eventually help us to better understand the role of organizational learning and innovation in improving organizational performance. If you would like a summary copy of this study please complete and detach the Request for Information Form and return it to me in a separate envelope. If you require additional information or have questions pertaining to this research, you may contact me at the address provided below or contact my research supervisor directly at [mohamed.sulaiman@yahoo.com](mailto:mohamed.sulaiman@yahoo.com) or telephone no. 603 6196 4731 (office).

Yours Sincerely,

Islam Mohamed Salim  
PhD Candidate (Matric No. G0917463)  
Department of Business Administration, IIUM.  
Email: [insaalim@hotmail.com](mailto:insaalim@hotmail.com); Mobile No: 0060 173338161

## APPENDIX IV

### VARIABLES AND CODING SCHEME

Dimension	Variable Label	Name	Values
Demographics	Position of Respondent	D_Pos	1= CEO, 2=MD, 3=COO, 4=GM, 5=Other
	Years of operation	D_Age	1=0-4, 2=5-9, 3=10-19, 4=20-49, 5= >50
	Number of full-time employees	D_Size	1=1-50, 2=51-100, 3=101-150, 4=151-200, 5= > 200
	Business Activity	D_Business	1=IT, 2=Hardware Design, 3=Creative Multimedia, 4=Internet-based
	Business Management	D_Mgt	1=Owner, 2=Paid Managers
Commitment to Learning (OL)	Our organization's ability to learn is the key to our competitive advantage.	OL1	<i>7 Point-Scale:</i> 1=Strongly Agree 2=Disagree 3=Slightly Disagree 4=Neutral 5=Slightly Agree 6=Agree 7=strongly Agree
	The basic values of this organization include learning as key to improvement.	OL2	
	The sense around here is that employee learning is an investment, not an expense.	OL3	
	Learning in my organization is seen as a key commodity necessary to guarantee organizational survival.	OL4	
Shared Vision (SV)	There is a commonality of purpose in my organization.	OL5	
	There is total agreement on our organizational vision across all functions, and divisions.	OL6	
	All employees are committed to the goals of this organization.	OL7	
	Employees view themselves as partners in charting the direction of the organization.	OL8	
Open Mindedness (OM)	We are not afraid to reflect critically on the shared assumptions we have made about our customers.	OL9	
	Personnel in this enterprise realize that the very way they perceive the marketplace must be continually questioned.	OL10	
	We rarely collectively question our own bias about the way we interpret customer information.	OL11	

	We continually judge the quality of our decisions and activities taken over time.	OL12	
Knowledge Sharing (KS)	There is a good deal of organizational conversation that keeps alive the lessons learned from history.	OL13	<i>7 Point-Scale:</i> 1=Strongly Agree 2=Disagree 3=Slightly Disagree 4=Neutral 5=Slightly Agree 6=Agree 7=strongly Agree
	We always analyze unsuccessful organizational endeavors and communicate the lessons learned widely.	OL14	
	We have specific mechanisms for sharing lessons learned in organizational activities from department to department	OL15	
	Top management repeatedly emphasizes the importance of knowledge sharing in our company	OL16	
	We put little effort in sharing lessons	OL 17	
Process Innovation (PROCIN)	We constantly benchmark our operating systems to world-class standards	IN1	
	Work practices are constantly updated to increase productivity	IN2	<i>7-point scale</i> 1=Not at all 2=To a very small extent 3=To a small extent 4=To a moderate extent 5=To a fair great extent 6=To a great extent 7=To a very great extent
	We constantly use technology to enhance service quality	IN3	
	Our organization invests heavily in developing new operating systems	IN4	
	We continuously train our people in emerging industry technologies	IN5	
Product Innovation (PRODIN)	Our organization has introduced many new services to the market	IN6	
	Our organization has introduced many modifications to the existing services	IN7	
	Our organization constantly seeks to find new services	IN8	
	Our organization has introduced more new services than our competitors	IN9	
	The new services we introduced have caused significant changes in the industry	IN10	
Administrative Innovation (ADMIN)	We constantly introduce new ways of managing our business	IN11	
	Our organization invests in updating administrative procedures	IN12	
	Management constantly seeks new ways to improve administrative systems	IN13	
	Our organization empowers employees to take initiatives	IN14	

Dimension	Variable Label	Name	Values
	Our competitors use our administrative systems as a benchmark	IN15	
Non-Financial Performance (NFP)	Growth of number of customers	OP1	<i>5 point scale</i> 1=Very successful 2=Slightly successful 3=Neutral 4=Slightly unsuccessful 5=Very Unsuccessful
	Employee satisfaction	OP2	
	Quality in products and services	OP3	
Financial Performance (NFP)	Growth of number of customers	OP4	
	Employee satisfaction	OP5	
	Quality in products and services	OP6	

## APPENDIX V

### AMOS OUTPUT FOR MODEL FIT SUMMARY

#### Revised First Order CFA Model

##### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	99	396.898	201	.000	1.975
Saturated model	300	.000	0		
Independence model	24	4565.604	276	.000	16.542

##### RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.105	.896	.845	.601
Saturated model	.000	1.000		
Independence model	.441	.347	.290	.319

##### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.913	.881	.955	.937	.954
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

##### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.728	.665	.695
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

##### RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.059	.051	.068	.038
Independence model	.237	.231	.243	.000

## Revised Second Order CFA (OL)

### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	32	17.565	13	.175	1.351
Saturated model	45	.000	0		
Independence model	9	2278.796	36	.000	63.300

### RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.056	.979	.926	.283
Saturated model	.000	1.000		
Independence model	.824	.213	.016	.170

### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.992	.979	.998	.994	.998
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.361	.358	.360
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

### RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.044	.000	.091	.529
Independence model	.587	.566	.607	.000

### FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.097	.025	.000	.109
Saturated model	.000	.000	.000	.000
Independence model	12.590	12.391	11.547	13.276

## Second Order CFA (OI)

### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	21	67.929	24	.000	2.830
Saturated model	45	.000	0		
Independence model	9	1057.168	36	.000	29.366

### RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.107	.951	.908	.507
Saturated model	.000	1.000		
Independence model	.435	.532	.415	.426

### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.936	.904	.957	.935	.957
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.667	.624	.638
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

### RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.081	.059	.104	.013
Independence model	.320	.304	.337	.000

### FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.245	.159	.083	.262
Saturated model	.000	.000	.000	.000
Independence model	3.816	3.687	3.317	4.083

## Second Order CFA Model (OP)

### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	13	16.447	8	.036	2.056
Saturated model	21	.000	0		
Independence model	6	569.235	15	.000	37.949

### RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.074	.981	.949	.374
Saturated model	.000	1.000		
Independence model	.582	.591	.427	.422

### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.971	.946	.985	.971	.985
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.533	.518	.525
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

### RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.062	.015	.104	.281
Independence model	.365	.340	.391	.000

### FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.059	.030	.002	.087
Saturated model	.000	.000	.000	.000
Independence model	2.055	2.001	1.733	2.296