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Investigating the Relationship between Organizational Innovation Capability and Firm Performance with Irish SMEs

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Institiúid Teicneolaíochta Átha Cliath
Dublin Institute of Technology

Investigating the Relationship between Organizational Innovation Capability and Firm Performance with Irish SMEs

Maryam Bukhamsin

D13124238

Dissertation Form

A dissertation submitted in partial fulfilment of the requirements of Dublin
Institute of Technology for the degree of MSc in Computing
(Information and Knowledge Management)

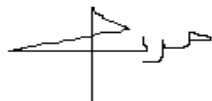
May 2015

DECLARATION

I certify that this dissertation, which I submit for examination for the award of MSc in Computing (Information and Knowledge Management), is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

This dissertation was prepared according to the regulations for postgraduate study of the Dublin Institute of Technology and has not been submitted in whole or part for an award in any other institute or university.

The work reported on in this dissertation conforms to the principles and requirements of the Institute's guidelines for ethics in research.



Signed: _____

Date: 02 May 2015

ABSTRACT

The topic of innovation capability and its relationship with performance has been examined by several previous studies. The purpose of this thesis is to investigate the relationship between innovation capability aspects proposed by the Innovation Value Institute (IVI) and firms' overall performance. IVI is specialised in developing organizational and innovation capability in order to improve firms' performance. In addition, this study presents the most important aspects of innovation capability that are directly and positively associated with firms' overall financial and operational performance. This empirical study was conducted on small- and medium-sized enterprises (SMEs) in Ireland; the data was collected from both managers and employees through a web-based questionnaire. The survey covered around 650 managers and employees in Irish SMEs that employ from 10 to 249 people and have revenue ranging from €2m to €50m; a total of 107 responses were used for this study. The approach of this study is quantitative; the data was analyzed by linear regression analysis using SPSS software. The findings show that two important aspects of innovation capability, innovation process and leadership management, are directly and positively associated with overall firm financial and operational performance. The practical implications of this study involve enhancing firms' financial and operational performance through developing innovation capability. Therefore, companies can benefit from the findings of this study by applying or taking better account of these aspects in their daily operations. Most previous studies focused either on studying innovation capability aspects as one group, without examining the relationship aspect by aspect, or just studying one aspect or factor of innovation capability and its relationship with performance. This study examines multiple aspects of innovation capability as well as investigating the relationship between each innovation capability aspect and the firm's overall performance.

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GLOSSARY OF TERMS

AVE: Average Variance Extracted.

C: Collaboration.

CD: Capability Development.

CMF: Capability Maturity Framework.

CR: Composite Reliability.

EU: European Union.

GVA: Gross Value Added.

IDA: Industrial Development Authority.

IM: Innovation Management.

INP: Innovation Process.

IT: Information Technology.

IVI: Innovation Value Institute.

KM: Knowledge Management.

LM: Leadership Management.

P: Performance.

PVE: Percentage Variance Explained.

R&D: Research and Development.

RAR: Rewards and Recognition.

RR: Roles and Responsibility.

RT: Risk Taking.

SFI: Science Foundation Ireland.

SMEs: Small- and Medium-sized Enterprises.

SP: Strategic Planning.

SPSS: Statistical Package for Social Sciences.

V: Vision.

VIF: Variance Inflation Factor.

Chapter 1. INTRODUCTION

Nowadays, with the rapid rate of change in the business world, companies are increasingly including innovation in their strategy and consider it as playing an essential role in their growth and sustainability. Therefore, they allocate more time and money to innovation. However, intensive competition, the pace of technological changes and the changing demands from customers have made the mission of innovation much more complex. Moreover, the rapid increase in available knowledge, which is directly connected to innovation, has added to the complexity. Innovation can be a procedure of using new knowledge or even utilising existing knowledge so as to achieve new processes, services, knowledge or products (Plessis, 2007). Innovation capability is considered to be an essential aspect of an organization's growth and success. Innovation capability can be defined as the capacity of an organization to innovate more; in other words, it is the organization's potential to accomplish innovative outcomes (Neely *et al.*, 2001). In particular, it means the ability of a firm to create new knowledge (e.g. intellectual property) and to implement the applicable knowledge and creative ideas successfully to achieve market value (Zhao *et al.*, 2005). Moreover, it refers to the organization's ability to modify and develop existing products or technologies and to create new ones (Wonglimpiyarat, 2010). Many companies seek to develop their innovation capability in order to attain innovative outputs, increase their profits and achieve higher performance. Many studies have been conducted to examine the correlation between innovation capability and firm performance, and they have found that innovation capability is an important factor in an organization's success. Small- and medium-sized enterprises (SMEs) can avail considerably more from applying innovation strategies in order to develop and foster innovation, and they also have a greater chance of growing and succeeding (Rosenbusch *et al.*, 2011).

The Innovation Value Institute (IVI) is specialised in improving firms' performance through developing their capabilities. IVI is also specialised in identifying the capability for innovation management (IM). Innovation capability makes firms able to introduce main products to the market, come up with innovative business procedures, boost business value and accelerate the pace of innovations in the market. IVI has divided innovation capability according to various categories: People and Culture; Strategy and Management, and Processes, Tools and Metrics (Innovation Value Institute, 2012). The objective of this

research is to investigate the relationship between the innovation capability aspects proposed by IVI and firms' overall performance, specifically that of Irish SMEs. This study will present the most important aspects of innovation capability that are positively and directly associated with a firm's overall performance.

1.1. Overview of Project Area

Knowledge and innovation share a very important relation, in which innovation refers to the execution of great ideas which can result in economic growth and development by using available resources in a more productive manner. In our current economies, innovation refers not just to the ideas that an individual brings forward, but also to the exchange of knowledge between companies and individuals, resulting in positive outcomes (Schiuma, 2013). This communication makes available knowledge that can be used to introduce something new in the industry. The firms must create an environment where each employee plays their part and contributes their knowledge to that particular field. All the knowledge that has been assembled must be appreciated as a strong asset for the company. If any gap remains between the knowledgeable ideas provided by the internal and external sources, this can be covered by the introduction of new innovative ideas. Firms often benefit from learning from all sorts of information provided to them, and this should be a continuous process for companies because consistency ensures competitive advantage with respect to other competitive firms (Akram *et al.*, 2011). Innovation capability here plays a vital role in enhancing a firm's innovation skills. Lawson and Samson (2001) defined innovation capability as "the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders." Innovation capability varies according to the type of innovation (such as product innovation or process innovation), and also differs from firm to firm; it can be specified through multiple factors (Saunila *et al.*, 2014).

A number of studies have focused on the link between innovation and firm performance, and shown the importance of improving different innovation capability, which leads to firms' growth and success (Calantone *et al.*, 2002; Keskin, 2006; Dobni, 2008; Bowen *et al.*, 2010; Jiménez-Jiménez & Sanz-Valle, 2011; Saunila & Ukko, 2011). Most of these researchers showed that some innovation capabilities affect firm performance in general. However, few researchers studied the impact of innovation on both classes of firm performance, which are firm financial and operational performance (Tidd, 2001; Bueno *et al.*, 2010; Saunila & Ukko,

2011; Kafetzopoulos & Psomas, 2015). The researchers examined various categories of innovation capability from different perspectives; some included some joint innovation capability, while others concentrated on just one or two categories of innovation. This study will investigate the effect of innovation capability from the IVI point of view on firm performance, bearing in mind that IVI is specialised in developing companies' capabilities in order to improve performance.

1.2. Research Background

Innovation has become vitally important for many organizations and is considered to be essential for many companies to attain competitive advantage. Many studies have shown that organizations that possess a range of particular advantages are most likely to effectively apply innovation strategies in order to achieve greater profits and market share (Prajogo & Ahmed, 2006). Innovation capability plays a significant role in promoting and developing organizations. Many companies seek to develop their innovation capability in order to attain innovative outputs, increase profits and achieve higher performance.

Several researchers have studied the connection between innovation and firm performance, and shown the importance of innovation in leading to growth and success (Calantone *et al.*, 2002; Keskin, 2006; Prajogo & Ahmed, 2006; Bowen *et al.*, 2010; Jiménez-Jiménez & Sanz-Valle, 2011). Calantone *et al.* (2002) found that organizations need to have a robust learning orientation in order to obtain competitive advantage. They divided learning orientation into four aspects: "commitment to learning, shared vision, open-mindedness, and intraorganizational knowledge sharing", and emphasized the impact of the learning orientation on innovation, which subsequently affects firm performance. However, Keskin (2006) studied the association between market orientation, learning orientation and innovativeness in SMEs, and found that having a learning orientation positively affects a firm's innovation, but also that market orientation has an indirect affect on a firm's innovation and performance through affecting learning orientation directly and positively, which in turn affects firm innovativeness. Jiménez-Jiménez and Sanz-Valle (2011) examined the relation between organizational learning, performance and innovation, and stated that there is a positive relation between organizational learning and innovation and performance. Prajogo and Ahmed (2006) examined the technological factor and the human factor, such as the 'role of leadership', 'people and culture', etc, of innovation management, through investigating the relation among innovation stimulus, innovation capacity and innovation

performance framework; they found a direct and strong association between innovation capacity and innovation performance, but no direct effect of innovation stimulus on innovation performance.

Lawson and Samson (2001) studied how to develop innovation capability in organizations to increase innovation and performance; they also stated that the capacity of innovators is significant in order to attain high and effective performance. Moreover, they stated: “The notion of capability is useful to apply to innovation as it is the capability to innovate that creates the potential for firm-wide behaviours leading to systematic innovation activities within the firm.” They divided innovation capability into seven aspects in order to lead organizations to improve and exploit these innovation-capability aspects on both the individual and collective level, and to attain sustainable innovation results and higher business performance. Saunila, Pekkola and Ukko (2014) examined the relationship between the innovation capability and firm performance of SMEs and they also discussed the performance measurement effects on this relationship. The authors also divided innovation capability into seven aspects but with different considerations. They found that the performance measurement has an important presence in the link between innovation capability and firm performance. Saunila (2014) also carried out several studies on, for example, the impact of the overall innovation capability aspects on both financial and operational performance; she found that the aspects of innovation capability have an influence on financial performance more than on operational performance. In another study, she examined the role of innovation capability on firm performance in order to illustrate the important aspects of innovation capability that directly influence firm performance.

Most of the studies that examined the relationship between innovation capability and performance were conducted in relation to large companies. While SMEs can benefit by enhancing, communicating and embracing innovation, they also have greater opportunities to grow and succeed operationally and financially (Rosenbusch *et al.*, 2011). Few studies have examined the impact of innovation capability aspects on firm performance. Some researchers have studied the connection between individual aspects of innovation capability and firm performance, there is a lack of consensus on whether the relationship has a positive or negative effect, or even exists (Saunila, 2014).

The main issue is that each of the researchers studied a different group of innovation capability aspects, where some had some aspects in common with other researchers, while others focused on just one or two categories of innovation capability, such as the human factor, or the organisation factor.

1.3. Research Project

The main purpose of this research is to solve this issue by examining the relationship between the organizational innovation capability proposed by IVI and firm performance in the context of Irish small- and medium-sized enterprises (SMEs). IVI is specialised in improving firms' performance through developing their capabilities. It uses a standard framework called the IT Capability Maturity Framework (IT-CMF), which is based on empirical studies of the best practices in the industry in relation to 35 capabilities, where innovation capability is a part of IT-CMF (Innovation Value Institute, 2014).

This project aims to investigate the following research question:

RQ: What are the most important aspects of the innovation capability proposed by IVI that are significantly and positively related to the overall firm financial and operational performance?

To conduct innovation measures that are used to examine the connection between innovation and firm performance, two classes of performance measure are required. The first category deals with financial performance; for instance, profitability, share price and return on investment. The second deals with overall operational performance, such as quality and productivity (Tidd, 2001; Tangen, 2004; Saunila, Pekkola & Ukko, 2014; Kafetzopoulos & Psomas, 2015).

1.4. Research Aims and Objectives

In order to answer the research question and tackle the problem, this study will be conducting a survey which will target SMEs in Ireland. It will be analysed using a quantitative approach. The results of the analysis might assist firms to leverage innovation capability in order to improve their performance.

The objectives are:

1. Getting knowledge about innovation capability, firm performance and other researchers' approaches to measure innovation capability and firm performance. Furthermore, investigating IVI (IT-CMF) and how they facilitate innovation in Irish companies through improving their innovation capability. In other words, what are the innovation capabilities represented by IVI?
2. Designing a framework that includes the innovation capability proposed by IVI and its relation to firm performance. Moreover, preparing the survey based on the aspects of the innovation capability that illustrate or explain firm performance.
3. Implementing and conducting the survey questionnaire on Irish SMEs.
4. Evaluating and analysing the survey results and highlighting the most influential aspects of innovation capability on firm performance.

1.5. Research Methodology

1. To achieve objective one, a literature review will be conducted about different studies that have defined innovation capability aspects and the relationship between innovation capability and firm performance as well as investigating innovation in Ireland, Irish SMEs and innovation capability aspect proposed by IVI.
2. To achieve objective two, a survey questionnaire will be designed according to what will emerge in the literature review about IVI innovation capability aspects, and firms' overall financial and operational performance. This study will use the survey method because it is easier to collect high number of responses based on the research topic since it is not complicated to set up a questionnaire using survey software. Moreover, surveys do not consume much time to be set and the survey distribution can be done using the internet to reach targeted audience. Lastly, the availability of scientific method to analyze the surveys' results makes it simple to get reliable outcomes.
3. To achieve objective three, the survey will be conducted to achieve the goals of this research and the data will be collected from Irish SMEs by using a web-based questionnaire.

4. To achieve objective four, the results will be analysed using quantitative approach because the strength of a number based research comes from the large exposure of audience and the precise translation of the numbers into clear quantity based charts and tables. In additions, a quantitative approach is a common method used by many researchers to examine the link between different variables and find the impacts in a precise way.

1.6. Scope and Limitations

- The results of this research, conducted on SMEs in Ireland only, may not be completely generalisable because the empirical findings will just cover one particular country (Ireland).
- The findings of this research show both managers' related aspect and employees' related aspect in a unique model and not independently (not in different models).
- The number of responses is good but not high enough because it is not easy to collect high number of responses given the time constrains and because the survey does not cover all types of companies. Moreover, many people do not have the incentive to fill the survey.

1.7. Thesis Structure

Chapter 1: This introductory chapter describes the background, the aim and the objectives of the study and the research methodology, as well as the scope and limitations of the research. It also outlines the way that the research is organized and divided into chapters.

Chapter 2: This chapter consists of the review of the literature that discusses innovation, innovation capability, the aspects of innovation capability according to various studies and the connection between innovation capability and performance. Furthermore, it gives an overview of innovation in Ireland, of Irish small- and medium-sized enterprises (SMEs), of the Innovation Value Institute (IVI) and of the innovation capability aspects proposed by IVI.

Chapter 3: This chapter explains the design of the framework for the relationship between innovation capability (proposed by IVI) and firm performance. It also discusses the research methodology for this research, the hypotheses development, questionnaire development, data collection, and data analysis.

Chapter 4: This chapter discusses the research analysis and findings; it also contains the reliability and validity tests as well as hypotheses testing.

Chapter 5: This chapter consists of the discussion and the awareness of the strengths and weaknesses.

Chapter 6: This chapter includes the conclusion of the research, problem definition, contributions to the body of knowledge, limitations and future work.

Chapter 2. LITERATURE REVIEW: INNOVATION CAPABILITY AND FIRM PERFORMANCE WITH EMPHASIS ON IRELAND

In recent years, innovation and creativity have come to be regarded as essential for firms' competitiveness and success. The importance of innovation has generated many academic studies and researches on the subject of innovation. Consequently, innovation has become a broad topic that is perceived in many various ways (Dobni, 2008; Smith *et al.*, 2008). An organization's innovation capability is the key motive for fostering innovation so as to lead to an organization's success. Studies have defined innovation capability in different ways, since innovation capability varies from organization to organization, and it also differs according to the type of innovations and the multiple effective factors (Saunila, Pekkola & Ukko, 2014). In particular, many researchers have examined innovation capability and its relation to firm performance in order to find out the most important capability that leads to better firm performance. Rosenbusch *et al.* (2011) stated that small- and medium-sized enterprises (SMEs) have greater opportunities to grow and succeed operationally and financially through concentrating on developing, embracing and delivering innovations to the marketplace.

This chapter will review the academic literature and studies on innovation capability aspects and their relation to firm performance. The main objectives of this chapter are to understand the various broad-ranging aspects of innovation capability that are considered important for developing innovation management, in addition to their relation with performance in organizations. Next, it studies the innovation environment in Ireland and Irish SMEs, which are the focus of this research. Finally, it defines the main aspects of innovation capability as proposed by the Innovation Value Institute (IVI).

2.1. Innovation Definitions

There are various ways of defining innovation. First, Schumpeter (1934) defined innovation in various aspects such as in terms of the introduction of new goods, methods, procedures, market and structure of an organization, which means a new combination of fundamental resources (Croitoru, 2012). Chen *et al.* (2004) also defined innovation as a new combination of fundamental elements of production. In fact, innovation is a process of recombining existing things or resources (Schiuma, 2013).

By and large, innovation is considered to be the process of applying discoveries and new concepts; this process results in introducing new outcomes, products and processes (Gloet &

Terziovski, 2004). Much of the innovation literature has viewed innovation as the process of using new technology to develop new products. However, innovation is broader than this definition, since it may mean successfully applying a new idea in an organization, no matter where it occurs within the organization (Nisula & Kianto, 2013). Chen *et al.* (2004) took a different approach in defining innovation; they believe that innovation refers to the process of newly combining the main factors of production and injecting them in the system. Innovation is about the skills of implementing and managing research so as to use a new technology to come up with new products in the market that meet customer needs.

On the other hand, Plessis (2007) views innovation in terms of activities that depend on technical and physical knowledge. Those activities should result in the formation of “product development routines”. Nisula and Kianto (2013) share the view that innovation is not restricted to the procedure of developing a new product, but it can also apply to the development of new processes and strategies, as well as coming up with new business ideas. They also state that innovation activities are not only a result of research centres but can occur anywhere within an organization.

In 2003, Hekmen defined innovation as the knowledge process that has a target of creating new knowledge so as to develop commercial solutions. Innovation here is a process that includes knowledge possession and sharing so as to create new knowledge. The author added that “innovation is the adoption of an idea or behaviour that is new to the organization”. Innovation is all about creating new ideas and knowledge that help business to achieve new outcomes, by improving business structures and processes from the inside to create products that meet market needs (Plessis, 2007). Schiuma (2013) defined innovation as the resultant of exchanging implicit knowledge with codified knowledge and “an interactive process of learning and exchange where interdependence between actors generates an innovative system or an innovative cluster” (Schiuma, 2013). The author illustrates here the difference between two types of innovation, radical and incremental. The incremental innovation is defined as “line extensions or modifications of existing products”. Usually, incremental innovation does not lead to major change in business behaviour but enhances competences and provides more knowledge and opportunities. On the other hand, providing new technologies can lead to changing the whole market structure. Thus, results have to be observed in the longer term, and thus these kinds of innovations are riskier. Finally, according to Gloet and Terziovski (2004), companies that adapt both radical and incremental innovations are more likely to succeed than companies that adapt one type of innovation.

2.2. Innovation Capability

There are several definitions of innovation capability, according to Calantone *et al.* (2002) who defined it as the level of organization inventiveness. Girma *et al.* (2009) described innovation capability in terms of the connection between exports and innovation capacity. Innovation capability can be described over a wide scope and at the various levels on which it meets the requirements of a firm's strategy, adapts to various conditions and a competitive environment (Guan & Ma, 2003). Based on the firms view, innovation capability is considered as essential to firms attaining strategic competitiveness. With respect to evolutionary theory, it is considered as critical to firms obtaining and sustaining competitive advantage and enhancing firm performance in a dynamic environment (Sher & Yang, 2005). Innovation capacity involves innovation culture, the capability of internal processes and the capability to comprehend the environment (Neely *et al.*, 2001).

On the other hand, Romijn and Albaladejo (2002) defined innovation capability as the knowledge and skills that are required to absorb and develop existing technologies efficiently, in addition to producing new ones. Wonglimpiyarat (2010) agrees with Romijn and Albaladejo in stating: "Innovation capability refers to the ability to make major improvements and modifications to existing technologies and to create new technologies". Zhao *et al.* (2005) stated that innovation capability means the ability of a firm to create knowledge, such as intellectual property, and the successful implementation of the applicable knowledge and creative ideas within a firm to achieve market value.

Innovation capability is also defined as a vital factor that fosters innovation in the culture of an organization, and also as promoting the activities internally of comprehending and responding to the external environment properly (Akman & Yilmaz, 2008). Tuominen and Hyvönen (2004) defined innovation capability in an organization in terms of two categories: technical innovation and managerial innovation. Rothwell (1994) studied innovation processes that include various critical factors that lead to business success, such as strategic factors and facilitating factors. Perdomo-Ortiz *et al.* (2006) came up with the term "business innovation capability" to illustrate the success conditions of innovation processes. The success factors are considered as "business innovation capability dimensions", and the success factors are used to measure the capabilities (Perdomo-Ortiz *et al.*, 2006).

Many studies have focused on the organizational phase of innovation. Some studies pointed out the common factors that are shared by innovative enterprises, especially the factors that affect the competencies needed for managing innovation (Saunila & Ukko, 2011).

2.2.1. Aspects of innovation capability according to various studies

- **Neely *et al.* (2001)** applied a framework that analyses business performance, firm innovation and associated contextual factors. They divided innovation capability into three aspects, as shown in the first part of Figure 1:

- 1) **Innovation culture:** the organization's culture that embraces innovation culture by encouraging and supporting innovation.
- 2) **Internal processes capability:** the ability to merge useful information and knowledge from various resources and encourage cooperation to create innovation.
- 3) **Capability to understand environment:** the ability to comprehend the business embodiment in order to understand technological and market progression.

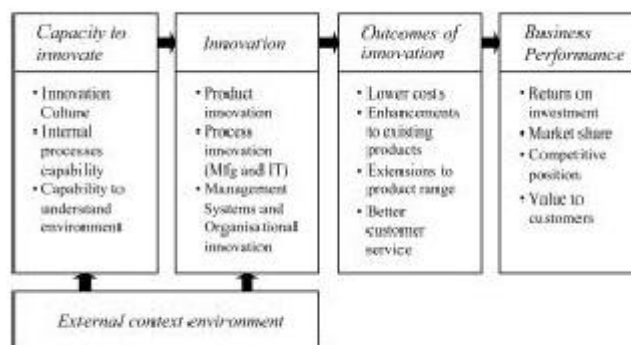


Figure 1: Firm innovation and business performance (Neely *et al.*, 2001)

- **Lawson and Samson (2001)** studied how to develop innovation capability in organizations. The authors identified the aspects comprising innovation capability and showed how these aspects can assist in attaining effective innovation performance. They studied the model that focuses on innovation and innovation outcomes in which it forms the fundamental competitive strategy for companies. The model of innovation capability is aimed at providing a theoretical framework that highlights the most influential aspects on innovation success. Lawson and Samson divided innovation capability into seven aspects, as shown in the model of innovation capability in Figure 2.

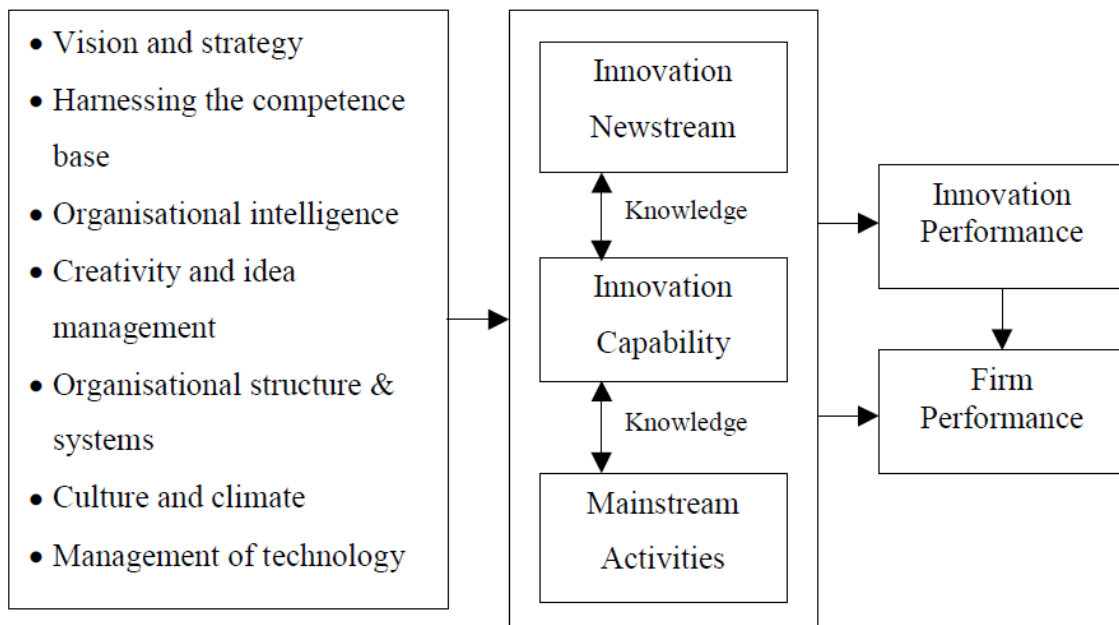


Figure 2: A model of innovation capability (Lawson & Samson, 2001)

The seven aspects of innovation capability, according to Lawson and Samson, are:

- 1) **Vision and strategy:** there is a strong relation between vision, strategy and innovation, which is essential to innovation management. Successful innovation needs an obvious articulation of the joint vision and the organization's expression of the strategic guidance. Strategy is the responsibility of identifying resources, procedures, systems and products that companies adapt in order to overcome the presence of uncertainty in their environment; clarifying where a company needs to make decisions about which functions and business should be implemented and in which markets. Lack of innovation strategy will result in making interest and attention become scattered. Creating a clear vision can facilitate generating distinct products that compete in the market and have a competitive advantage.
- 2) **Harnessing the competence base:** the capacity to utilise the appropriate resources by directing them effectively to where they are needed in order to generate successful innovation. Harnessing the competence base is divided into four important elements: resources management, variety of funding channels, innovation champions, and taking advantage of e-business principles.

- 3) **Organizational intelligence:** “the capability to process, interpret, encode, manipulate and access information in a purposeful, goal-directed manner, so it can increase its adaptive potential in the environment in which it operates” (Lawson & Samson, 2001). Knowledge and ideas are the fundamental elements of the innovation processes; thus intelligent organizations can benefit from such information by lowering the ambiguity and the uncertainty of innovation. Furthermore, this enables them to determine new ways to exclude unprofitable options; this depends on the ability to create, communicate and take action as regards appropriate and up-to-date information. Organizational intelligence mostly involves learning about customers and learning about competitors, and is important for comprehending both markets and competitors.
- 4) **Creativity and idea management:** Creativity can come as a result of consistency and repetition, such as the aggregation of millions of small acts by employees. On the other hand, it can arise from a revolutionary concept that brings a new product or strategy to the firm. Therefore, organizations should promote creativity in on the different levels and encourage staff to take a risk by trying and testing new methods or processes. Creativity can result from bringing new knowledge and applying it elsewhere, or may be vision-driven; that is, through setting a goal and seeking to achieve this goal according to the company’s needs. Creativity is considered to be the “process of generating ideas”.
- 5) **Organizational structure and system:** For a company to be innovative, it needs a proper business structure. This structure should align with the surrounding environment; otherwise there is a great chance of failure. Organizational structure and system focus especially on the three elements of organisational structure, reward systems, and ‘stretch’ goals for innovation.
- 6) **Culture and climate:** The right culture and climate play a big role in achieving innovation, or failing to do so. Culture and climate are composed of four components: “tolerance of ambiguity, empowered employees, creative time, and communication”.
- 7) **Management of technology:** Technology management is important for companies. While shifting to external networks and using from the whole corporate knowledge base demonstrate that there is more concern with technology management within the company than with research and development. Several authors improved “technological competence audits” in order to enable companies to assess and manage their technological capacity,

necessities and potentials against the general business goals. Innovative organizations have the ability to connect their main technology strategies with innovation strategy and market approaching strategy, and this linkage can create a strong technique for competitive advantage.

- **Smith *et al.* (2008)** studied the factors that affect organizational capability to manage innovation. The authors determined the factors shared among innovative companies that affected the ability to manage and accomplish innovation at organizational level. They also identified the relationship between these factors in order to help academics and practitioners to comprehend which factors are important to increase the ability of organizations to manage innovation. The authors concentrated on nine factors that affect an organization's ability to manage innovation: technology, innovation process, corporate strategy, organizational structure, organizational culture, employees, resources, knowledge management, and management style and leadership. The model in Figure 3 shows the relationship between these nine factors that influence the management of innovation.

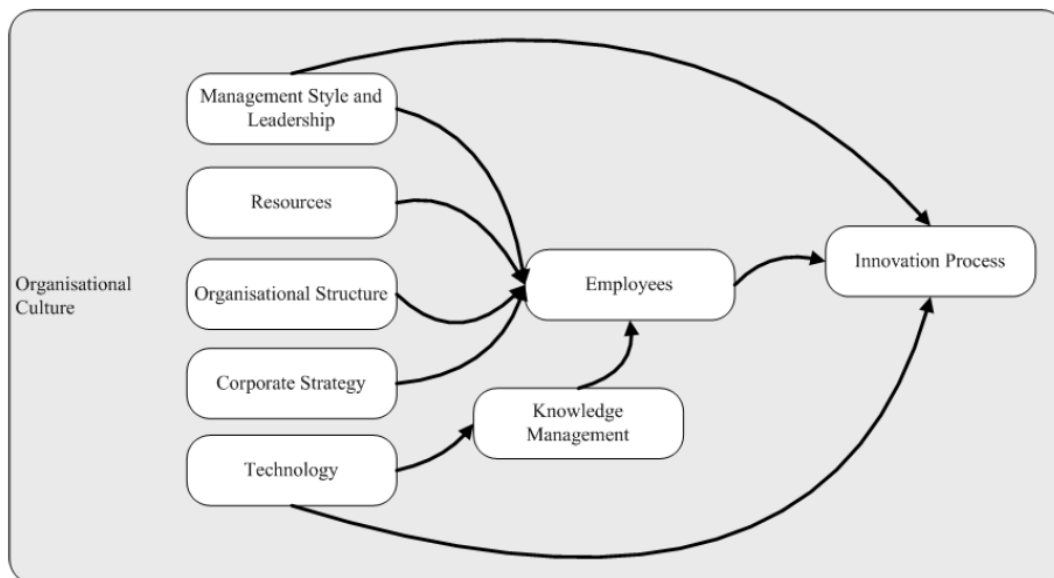


Figure 3: Model of the relationship between factors influencing innovation management (Smith *et al.*, 2008)

The nine factors that affect the ability of an organization to manage innovation are presented below, with further explanation:

- 1) **Technology:** the role of technology is important as an influencing factor. It is important to avail of technology to assist the progress of innovation and innovative actions within and between organizations. The technology factor consists of three sub-factors: use of technology, technical skills and education, and technology strategy. Technology has an indirect effect on employees via knowledge management, where ICT is used to facilitate knowledge transfer. Technology is also used to support different phases of the innovation process.
- 2) **Innovation process:** the operational process has an effect on organizational innovativeness. The innovation process is associated with the generation, improvement and application of innovations. It contains three sub-factors: idea generation, implementation mechanism, and selection and evaluation techniques. The innovation process is derived from other factors in the model, and is influenced by the organization's leadership, the employees, and the technology used in order to empower the management of the process.
- 3) **Corporate strategy:** strategy outlines the various aspects of the innovation strategy and corporate strategy, and how these aspects affect innovation management. Moreover, strategy includes four aspects: the organizational strategy, the innovation strategy, the organization's vision and goals, and the decision-making strategy. The corporate strategy needs to be improved to reflect the culture of the organization and to link the shared vision and the objectives of the organization. It is important for all employees of the organization to understand the corporate strategy so they can assist it to achieve its targets.
- 4) **Organizational structure:** organizational structure often depends on the configuration of different departments of an organization, and plays an important role in influencing the ability of an organization to manage innovation. It comprises three elements: organizational differentiation, centralisation and formality. Furthermore, organizational structure has a direct impact on employees, through various avenues such as the way of organising teams and the level of formality. Organizational structure commonly determines the nature of jobs in a firm. While one creative employee in the organization can develop innovation, teams of employees would be more important and more influential on the overall organizational ability to innovate.
- 5) **Organizational culture:** 'culture' refers to the beliefs and values of the organization, and impacts its ability to manage innovation. Moreover, organization culture involves the organization's approach to communication, cooperation, attitude to risk and attitude to

innovation. Organizational culture is considered a fundamental part of an organization, in which it applies the values and functions that are generated within its operation. In addition, it is the most common factor discussed in relation to the ability of an organization to manage innovation. The relation between organizational culture and strategy is very complicated, and it is hard to separate the impacts of strategy and culture on each other. This relationship between the culture and strategy factors has been examined in two ways. First, the effect of having a culture that motivates risk-taking will result in developing strategies that contain higher degrees of risk. Secondly, through having a common vision of innovation, the strategic objectives of the organization will translate into the culture of the organization.

- 6) **Employees:** in this context, employees mean the non-managerial employees, who play a significant role in influencing innovation management. This factor takes into consideration employee personalities, employee competences and education, employee training, and motivating employees to be innovative. Employees are considered to be a channel between organizational factors and the innovation process. Employees are regarded as a rich source of ideas and knowledge; thus they should be motivated to participate in the initial steps to help ensure that a continuous supply of ideas are generated that become inputs in the innovation process. Employees need to be trained and educated in order to affect positively the innovation process.
- 7) **Resources:** resources here refer to the human, physical and financial resources of an organization. The resources factor comprises four aspects: the degree to which slack resources are used; resources planning and management; technology resources, and financial resources. This factor has an impact on the ability of an organization to manage innovation. Therefore, effective and sufficient materials and resources should be given to employees in order to encourage the generation of new ideas.
- 8) **Knowledge management:** knowledge management here means managing and using knowledge to manage innovation. This factor covers all of the knowledge aspects, such as knowledge of the internal and external environment, the usage of knowledge repositories, and organizational learning. Knowledge resources can be collected into a single knowledge repository, while employees can access a massive knowledge base collected from both inside and outside the organization in order to support the development of new

ideas. Moreover, successful use of knowledge and learning tools can result in integrating the development and implementation of new ideas.

9) **Management style and leadership:** this factor includes various important aspects relating to management responsibilities and approaches to manage innovation, the management pattern within the firm, and the management role in motivating employees to become innovative.

- **Martínez-Roman *et al.* (2011)** studied how to analyse innovation in SMEs by using innovation capability. The authors showed that three factors affect innovation capability: knowledge, organization, and human factors; all three are from the same managerial innovation family. The Conceptual Model of innovative capability is shown in Figure 4.

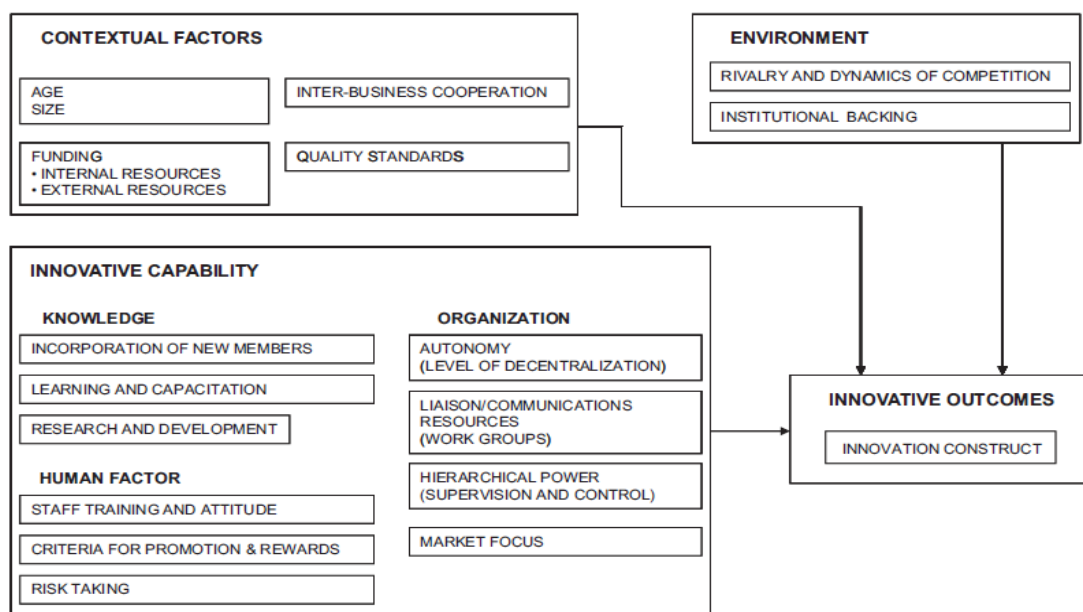


Figure 4: Conceptual model of innovation (Martínez-Roman *et al.*, 2011)

The three factors that include innovation capability aspects are shown below:

- 1) **Knowledge:** different studies have found that there is an association between innovation and the creation and appropriation of knowledge within an organization. This factor includes three aspects of innovation capability. The first aspect is incorporation of new members into the company, as an external source of the knowledge needed to achieve innovation. The second aspect is learning and capacitation, which is related to “the internal

creation of organizational knowledge”. Researchers have shown that learning, continual staff training and knowledge exchange and experimentation foster innovation. Therefore, learning and capacitation have an impact on innovation, being a source of internal knowledge for organizations. Likewise, the third aspect, which is research and development, determines and assesses the internal effort in order to generate technological knowledge, and also concentrates especially on increasing knowledge and accrued/collected experiences, such as the advantages produced through this activity in businesses. Furthermore, research and development also includes external R&D, involving technological collaboration with businesses, collaboration with technological institutions and acquisition in technology markets.

- 2) **Organization:** this factor refers to the characteristics of an organization’s management and its approach to business. It includes four aspects of innovation capability: autonomy (decentralization), communication resources, hierarchical power, and market focus. First, autonomy reflects the advantages of having “flexible communication and decentralization of decision-making for innovation”. Secondly, communication resources refer to work groups where it is considered as a basic element of the organizational structure that improves innovation through stimulating communication, functional categorisation and flexibility in business. Thirdly, the hierarchical power involves aspects of supervision and control where it can prioritise innovation since it contributes to more flexible decision-making or can have a negative impact, if the business becomes more complicated. Finally, market focus assesses the impact of market orientation strategy on the innovation outputs in the business.
- 3) **Human:** there is a link between innovation, an organization’s human resources and organizational culture. This factor consists of three aspects of innovation capability: staff training and attitude, promotion and rewards, and risk-taking. Staff training and attitude involve training and motivating employees in order to learn and generate new ideas and concepts in the business. Promotion and rewards involves rewarding individual efforts that result in achieving successful innovation outcomes. Risk-taking is one of the major features of an innovation culture in an organization.

- **Kallio *et al.* (2012)** studied innovation capabilities with an emphasis on the factors that most influence them. Innovation capability itself is considered to be a “future success factor” where many firms allocate resources in order to assist managers in the development process. It is pivotal to know how innovation capability is perceived before commencing a development procedure to develop innovation capability. However, the author mentions four factors that most influence innovation capabilities. Figure 5 depicts these four elements separately, although in organizations they are mixed together. The combination of these elements is more efficient for a firm, but they are depicted as in the figure to provide a bird’s-eye view.

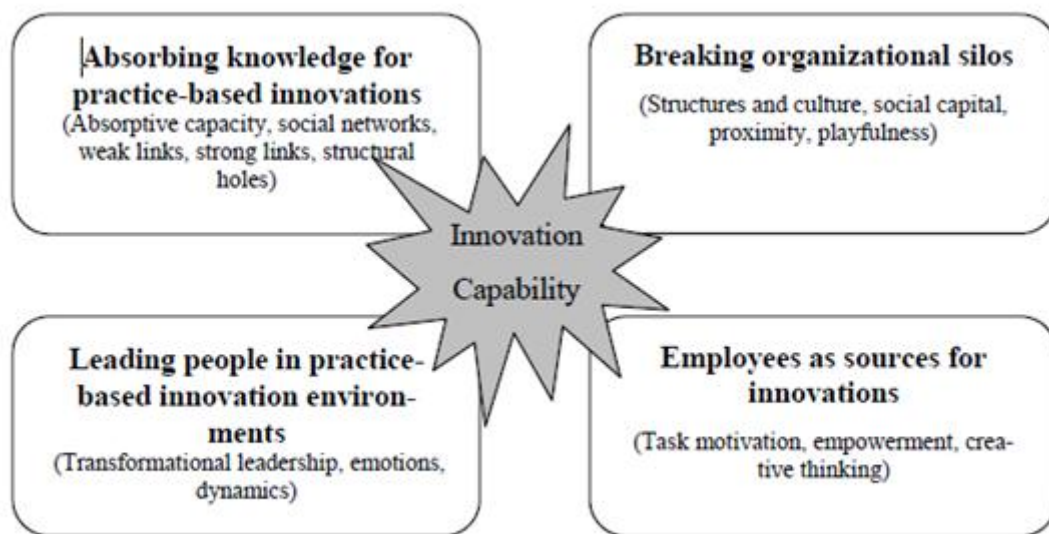


Figure 5: Elements of innovation capability (Kallio *et al.*, 2012)

- 1) **Absorbing knowledge for practice-based innovation:** for instance, the need to have connections outside the office, bearing in mind that some connections are extremely useful while others may harm the organization. Another example is trying to acquire business ideas and, more importantly, turn them into potential businesses.
- 2) **Breaking organization silos:** this relates to structure, culture, proximity and playfulness. Understanding the relations between different functions is critically important; it is said that “Innovation potential lies in the interfaces of different fields of expertise”. Moreover, open meetings are more productive since communication gaps are the main barriers to innovation and creativity.
- 3) **Leading people in practice-based innovation environments:** a leader does not necessarily know everything but should lead his or her team in adhering to the firm’s

strategy without neglecting to try exploring new things. Moreover, dynamics plays a role in motivating employees, especially if a member of staff witnesses the effort exerted by his or her supervisor.

4) **Employees as sources for innovations:** employees are more innovative when they are encouraged to embrace risk-taking behaviour, in addition to bringing their own ideas to the table along with contributing to the firm's innovative activities.

- **Saunila (2014)** studied the link between each aspect of innovation capability and overall performance in case of SMEs. The author divided innovation capability into seven aspects: participatory leadership culture, ideation and organizing structures, work climate and wellbeing, know-how development, regeneration, external knowledge, and individual activity (see Figure 6).

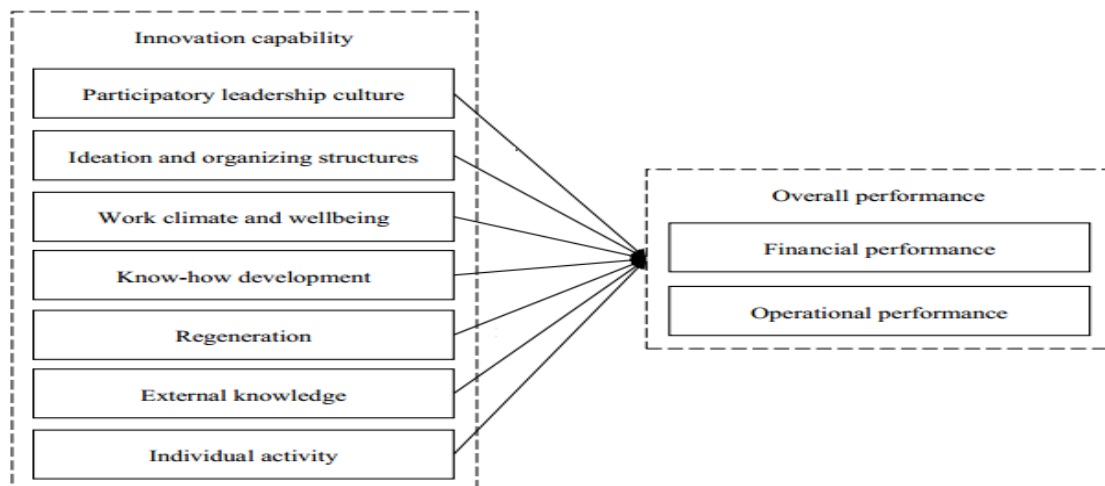


Figure 6: Aspects of innovation capability and firm performance (Saunila, 2014)

1) **Participatory leadership culture:** This aspect refers to the general environment of an organization that advocates innovation, without omitting the role of leadership in facilitating innovation. It also considers the ability of the leader to lead, advocate and retain innovation practices in the organization. Thus, managers should allow staff to spend time and resources on developing personal skills.

2) **Work climate and wellbeing:** This aspect is related to the wellbeing of the staff and also the work environment that facilitates innovation, such as cooperation and values. The probability of innovation is greater in a climate where employees show greater competence, integrity, reliability, loyalty to the firm, and openness to each other. Another

relevant factor is an employee's motivation as regards participating in the work community, as well as in relation to his or her own wellbeing.

- 3) **Ideation and organizing structures:** these refer to the structures and systems that enable successful innovation, in relation to generating innovation, developing, implementing, and finally organizing the work tasks. Thus, specific innovation tools are required to ensure the flow of idea generation.
- 4) **Know-how development:** this concerns the knowledge and competencies of the employees that contribute to innovation capability. If a firm is serious about learning and development, then it should thoroughly understand its environment, which includes customers, competitors, and latest technology.
- 5) **External knowledge:** this refers to the practice of availing of the knowledge in external networks to support the innovation capability of a firm. This is vital to the firm since collaboration with customers, competitors and suppliers can fill the gap in knowledge that the enterprise itself could not fill.
- 6) **Regeneration:** this highlights the ability of an organization to learn from previous experience and to the proper use of the experience to foster innovation and improve operations. An organization should be mature enough to take the risk of learning from mistakes and allowing the learning curve to take its course.
- 7) **Individual activity:** this is about people who are internally motivated and are keen to carry out work that will help to create an innovative work environment. Other authors suggest that firms should question their norms, practices and beliefs in order to develop a more innovative organization.

2.3. Relationship between Innovation Capability and Firm Performance

Innovation is the most important factor that decisively affects the nature or outcome of an organization's performance. Calantone *et al.* (2002) stressed that organizations need to have a robust learning orientation in order to acquire competitive advantage. The authors divided learning orientation into four components: "commitment to learning, shared vision, open-mindedness, and intraorganizational knowledge sharing". They found that the overall

learning orientation affects firm innovativeness, which in turn affects firm performance. They also found that the firm's innovativeness can be measured through the degree of innovation adoption by the company, and on the ability and willingness to change, which is positively associated with performance (Calantone *et al.*, 2002). Keskin (2006) demonstrated the affect of market orientation on firm innovativeness through learning orientation; this finding shows that creating customer information and knowledge, evolving and then achieving a marketing plan and being willing to challenge assumptions and values have a positive effect on firm innovativeness. Furthermore, a firm's innovativeness refers to the willingness to practise new ideas and concepts, explore new approaches and methods, to creativity in the operations procedures, and the rate of introducing products; these all affect positively a firm's performance. Jiménez-Jiménez and Sanz-Valle (2011) studied organizational learning, which is considered as a foundation of obtaining sustainable competitive advantage and an essential factor in improving organization performance. The authors found that organizational learning has a positive effect on organization performance. Bowen *et al.* (2010) examined the link between organizational innovation and performance, and found that there is a positive correlation between the two. Saunila (2014) examined the connection between innovation capability and firm performance within SMEs. The author divided innovation capability into seven aspects and found that only three aspects of innovation capability have an influence on overall firm performance; these are know-how development, ideation and organizing structures, and leadership culture.

Innovation is classified into different categories such as technical innovation and organizational innovation; thus each kind of innovation has an effect on different domains of performance (Subramanian & Nilakanta, 1996). Technical and administrative innovation play important roles in improving companies' performance and contributing to increasing an organization's value (Saunila, Pekkola & Ukko, 2014). Therefore, innovating companies are always interested in economic growth and thus can easily take advantage of emerging opportunities and products compared to non-innovating companies (Jimenez-Jimenez and & Sanz-Valle, 2011). Firms' collaboration and coordination can be developed by enabling administrative innovation, which in turn results in having better efficiency measures. Technical innovation increases the competitiveness of the firm, which has a positive impact on the outcomes of effectiveness measures (Subramanian & Nilakanta, 1996). Organizational innovations represent the necessary conditions that assist in using technical product and innovation processes efficiently; thus organizational innovations are considered as "sources of competitive advantage"; they also affect business performance with respect to lead times,

quality, productivity and flexibility (Armbruster *et al.*, 2008). There is a strong and positive relationship between organisational innovations and the overall organization performance; therefore, innovation should be well understood and well managed by managers to increase operational performance in the organization (Saunila, Pekkola & Ukko, 2014).

According to Gopalakrishnan (2000), other measures can also affect firms' performance such as innovation speed and innovation magnitude. The innovation speed is a sign of an organization's resources and capabilities as well as the swiftness of adopting procedures or products that are in the field of interest in the industry. It significantly affects financial performance, "measured by the average return on assets" (Saunila, 2014). Furthermore, innovation speed generates positive results at organization level; it is stated that any increase in innovation speed will result in a decrease in development costs and in turn have a positive impact on product quality, while at the industrial level, it is argued that there is a relation between the increase of innovation speed and market share. Innovation magnitude refers to the number of innovations adopted by an organization from the available innovative ideas in the market. Most of the researchers believe that adopting more innovations leads to greater benefits, profits and reduced organization cost (Gopalakrishnan, 2000).

Other studies state that innovation and organization performance measures are positively related to each other. It has been found that R&D expenses can be used as an essential measure of innovation; the more R&D investment, the higher the growth in productivity. However, R&D expenditure has shortcomings when it is used as an innovation measure. R&D expenditure also does not represent all the efforts of innovation, such as learning by practising, human capital and a firm's knowledge. In some cases, using R&D expenditure as a measure of innovation is inaccurate, especially in cases of developing innovation through cooperation between an R&D department and universities or between an R&D department and other agencies that pay the R&D expenditure. In many cases, small firms do not allocate dedicated funds to an R&D department, instead they fund all activities together. Finally, it is not always the case that more expenditure on the R&D department leads to better innovation outcomes and better performance, but small innovation efforts can result in better performance (Hashi & Stojcic, 2013).

2.3.1. Measurement of innovation capability

For an organization, it's vital to keep improving innovation capabilities in order to have and to maintain competitive advantage. Managers need to use innovation measures to aid them in two areas:

- To make focused decisions that rely upon explicit data
- To keep aims and daily pursuits in alignment with the short- and long-term innovation plans

Therefore, it is extremely important to assess the organization's innovation capability precisely, and to manage well any factor that will have an effect on the innovation capability.

It is said that everything can be measured, despite the fact that it is very difficult to measure an intangible. The question here is, "is it worth measuring?" if the measures do not meet the precise standards and if the benefit does not cover the cost. Indirect measures can be used to measure intangible items. In such cases, where the item or phenomenon can not be measured directly, the closest items are measured instead. There are two types of indirect measures: objective measures and subjective ones. Objective measures are conducted by using quantitative information whereas subjective measures are made by relying on people's opinion without providing them with a clear standard (Saunila, *et al.*, 2012).

2.3.2. Performance measurement

According to Neely *et al.* (2005), performance measurement is "the process of quantifying the efficiency and effectiveness of action". It is also defined as the procedure to quantify the activity of an event, action or input, or the outcome. It is also considered to be an action that depends on performance measurement and that can enhance processes, motivation and behaviour. In addition, performance measurement reflects effectiveness in that it measures how much the firm is meeting customer requirements, and efficiency in that it measures how the organization avails of its resources from an economic point of view while maintaining an appropriate level of customer satisfaction (Neely *et al.*, 2005; Saunila & Ukko, 2012). Taking an example that is related to the performance of manufacturing a reliable and good-quality product, with respect to effectiveness, increasing the reliability and quality of a product may result in increasing the rate of customer satisfaction. With respect to efficiency, business costs can be reduced by decreasing any flaws in a product, which leads to fewer warranty claims. Therefore, business performance level can be determined by the

efficiency and effectiveness of operations (Neely *et al.*, 2005). According to Tidd (2001), performance measurement is divided into two types: financial performance, such as profits and investment returns, and market performance, such as growth or share. Tangen (2004) examined two measures of firm performance, financial performance (e.g. profitability, market) and operational non-financial performance (e.g. flexibility, quality, productivity). Saunila (2014) and Kafetzopoulos and Psomas (2015) also divided performance into two classes: financial performance (profitability, net profit) and operational performance (productivity and quality).

Saunila and Ukko (2012) reported that there are different types of measures such as “direct and indirect, objective and subjective, and financial and non-financial ones”. Indirect measures must be used in cases where items can not be directly measured. Objective measures are conducted by using quantitative information whereas subjective measures are made relying on people’s opinions. Previously, performance measurement usually related to financial measures, but nowadays it is considered in terms of a comprehensive operation. In other words, many matters in an organization can affect organizational performance, such as management and leadership, operations quality, employee motivation, and a product’s ability to meet customers’ requirements. There are various purposes in using performance measurement, such as to lead activities, to communicate information and to motivate employees.

2.4. Innovation in Ireland

Ireland is pursuing an ambitious strategy to build an economy that is innovation-driven through science, technology and innovation initiatives – not only by providing the capital to encourage research and entrepreneurial investment, but also by ensuring that the country is well equipped with the latest education, technology and entrepreneurial support. Ireland is aiming to be a leader in innovation; it is currently ranked 11th in global innovation (Global Innovation Index, 2014). It is doing better in terms of entrepreneurial behaviour where it is ranked fifth, and is ranked ninth in assets management. Coughlan and Devins (2008) state: “Our ambition is to put innovation at the core of our policies and strategies for the future, so that Ireland becomes a leader in innovation” (Coughlan and Devins, 2008).

The enterprise development agencies highlight two points: the ability of small and medium-sized enterprises to benefit from research and new studies, and secondly, the increase in demand from enterprises for ready-to-use research capabilities. One of the

initiatives to address this issue was establishing Science Foundation Ireland (SFI). In addition to being a linkage between research institutes and industry, SFI is responsible for transferring technology to the market to make sure that investors get the best economic return from the R&D investment.

To maintain the sustainability of innovation, the Government took measures to protect the heavy investments in R&D, for example. The intellectual property that is the harvest of the research has to be protected, identified and commercialized; this is achieved by raising awareness amongst researchers and industry of the precious value of intellectual property, and the necessity of protecting it. Furthermore, intellectual property has to be economically attractive to entrepreneurs. Finally, intellectual property must be protected by firm legal frameworks (Coughlan & Devins, 2008).

2.4.1. Small and medium-sized enterprises in Ireland

SMEs, according to the European Union, are enterprises that participate in “an improved business environment” and promote three values: growth, investment and entrepreneurship. For an enterprise to fall in the category of Small to Medium, they have to have fewer than 250 employees and have a total income of €50 million or a balance sheet of a maximum of €43 million. There are three forms of SMEs: a micro enterprise has fewer than 10 employees; a small enterprise has more than 10 employees and fewer than 50; a medium-sized enterprise has between 50 and 249 employees (McHugh, 2010). Statistics show that 90.8% of enterprises in Ireland are micro enterprises and employ 27% of the workforce in the business market, while small enterprises comprise 7.7% of the total number of enterprises, employing 22.6% of employees in the business economy. Only 1.3% of firms in Ireland fall in the category of medium-sized enterprises; they employ 19% of the workforce in the business economy (Central Statistics Office, 2011).

2.4.1.1. SMEs’ contribution to the Irish economy

SMEs are considered to be the “key driver” and “spine” of the Irish economy, according to the Irish Government. SMEs employ seven out of 10 people in the business market and account for almost half of turnover, at 50.1%, and 46.0% of gross value added (GVA). “GVA is the gross income from operating activities and is the balance available to enterprises to pay employees and realise a return on investment” (McHugh, 2010; Central Statistics Office, 2011).

To support this fact with some figures, below are four points:

1. Ireland has about 230,000 SMEs.
2. Irish SMEs generated over €10 billion to the annual budget.
3. Irish SMEs employed up to 900,000 people.
4. More than 90% of food companies in Ireland are SMEs.
5. There are about 20 SMEs per 1,000 individuals in Ireland, nearly half the EU average.

(McHugh, 2010)

2.4.1.2. Irish environment for SMEs

The EU has set 10 principles for SME practices to gain growth. Ireland has above-average results for entrepreneurship and low-cost business start-ups. The time required to finish the formal procedure for opening a start-up is two weeks, while the EU average is 10 days. The cost of opening a start-up is 3% per capita, which is much lower than the 7% EU average. Regarding entrepreneurship, a survey showed that 85% of Irish people reckon that having a successful new business indicates ‘high status’, while the EU average is 69% (McHugh, 2010).

2.4.1.3. Challenges for SMEs

Given that SMEs are not diversified and given the harsh effects of downsizing on SMEs, SMEs are vulnerable to financial crises and face limited access to financing, limited cash flow due to late payments, and intense competitiveness. Competitiveness is a main challenge for Irish businesses as they face increases in rents and utility costs, in addition to transport costs. Irish SMEs need to avail of Internet technology to increase sales. Currently 40% of domestic SMEs do not have any online presence and therefore are missing potential customers (McHugh, 2010).

2.4.1.4. Irish SMEs and innovation

SMEs attempt to benefit from the third-level institutions and research centres to bring innovation to their products and services. They are keen to maintain sustainable growth, develop their capability to innovate and drive job creation, so as to ensure their survival and gain competitive advantage via innovation (Sherlock & Lambkin, 2013). In Ireland many

firms in the pharmaceuticals, software industry, medical devices and biotechnology sectors have taken advantage of organizations that support and finance innovation such as InterTradeIreland, Science Foundation Ireland (SFI), Industrial Development Authority (IDA) and Enterprise Ireland (Coughlan & Devins, 2008). According to Enterprise Ireland, each €1 it has invested has been worth €7.71 to firms. The collaboration between higher-education institutions, Irish SMEs and government-funded organizations is key to the innovation process. For instance, Enterprise Ireland cooperated with InterTradeIreland and Invest Northern Ireland to create Go-Source, “an all-island public procurement directory and web site”, as well as Go-Tender, which provides SMEs with information and coaching that may improve their chances of signing public procurement contracts (Coughlan & Devins, 2008).

2.4.2. Innovation Value Institute (IVI)

In 2006, the National University of Ireland Maynooth along with Intel founded a not-for-profit research institute called the Innovation Value Institute (IVI), with the goal of improving IT management. IVI is specialised in improving firms’ performance through developing their capabilities. It aims to set up a global standard for managing IT through researching, developing and conducting studies that are “empirically proven” and establishing “industry validated IT best practice through a unique open collaboration between leading academic and industry practitioners”. IVI constructed a standard framework called the IT Capability Maturity Framework (IT-CMF) which is based on empirical studies of the best practices in the industry in relation to 35 capabilities. IVI introduces innovation management as part of this framework, in which it includes the main innovation capability aspects. Moreover, IVI provides organizations with a long-term plan of best practices and metrics to both improve capability maturity and maintain positive outcomes. This plan includes methods to evaluate performances over time (Innovation Value Institute, 2015).

Nowadays, the institute is engaged in improving and spreading the IT-CMF. The aim of IVI, from the director’s point of view, is to be a “centre of excellence for IT Management and IT-driven business value and innovation through the development and use of our IT-CMF, which is at the heart of our research agenda”. Many global companies have used IT-CMF to resolve a range of capability issues such as capability management and improvement, organizational structural design and organization benchmarking, risk management, best practices, and Cloud computing involving services innovation and external sourcing (Innovation Value Institute, 2015).

IVI gained the Technology Centre status award from the Irish Government (specifically, Enterprise Ireland and the Industrial Development Authority). It succeeded in facilitating an international consortium of more than 90 global organizations (Innovation Value Institute, 2015).

IT Capability Maturity Framework (IT-CMF)

The IT-CMF takes a “maturity model approach” to increasingly attain success. It includes four main capabilities, called macro-capabilities, as shown in Figure 7: (1) Managing IT like a business, which is a “feedback mechanism for adjusting inputs and optimizing the output value”, and which includes innovation management capability which forms the major part of this research, (2) Managing the IT budget, which is considered to be the “input to the production process”, (3) Managing IT for business value or the “output”, and (4) Managing the IT capability, which is the “production engine”. The four macro capabilities are measured against five maturity levels. The IT-CMF is composed of 35 critical capabilities for reaching maturity. Moreover, it provides the building blocks that show the specific component that should be dealt with at every level of maturity (Innovation Value Institute, 2014).

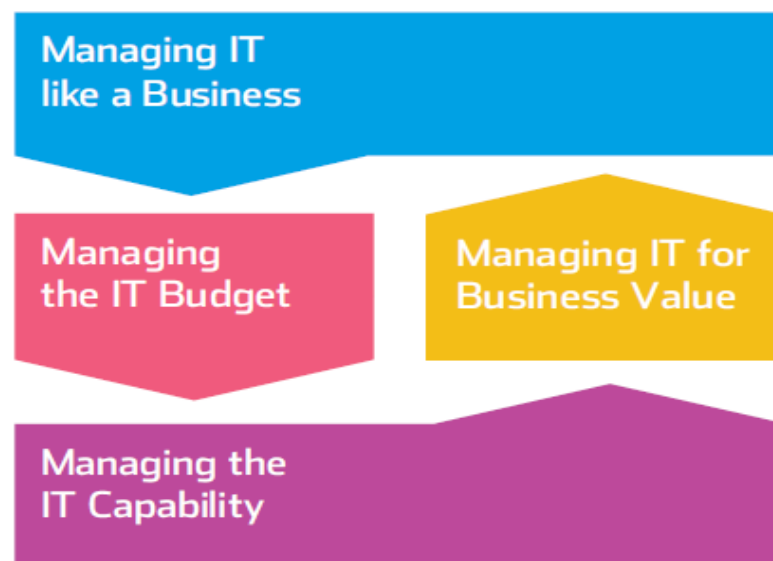


Figure 7: IT Capability Maturity Framework (IT-CMF) (Innovation Value Institute, 2014).

2.4.2.1. *Innovation management (IM)*

Managing innovation can be defined as the ability to invent and implement the managed practices, procedures, structures or mechanisms that are new to the market and are aimed at promoting organizational objectives. Innovation management includes the introduction of new features and originality to an organization, and represents a specific format of the organizational change. It can also be defined as bringing about differences in structure, quality or conditions through managing an organization's activities (Birkinshaw *et al.*, 2008). According to Volberda *et al.* (2013), SMEs and large companies show that not only is successful innovation led by technological innovation, but also that it relies strongly on innovation management. Innovation management involves changing a company's organizational structure, practices and procedures and availing of the company's technological knowledge principles and its performance in relation to innovation (productivity as well as competitiveness). Many recent studies demonstrate that innovation management "explains a substantial degree of the variance of innovation performance of firms" (Volberda *et al.*, 2013).

According to IVI, innovation management (IM) involves determining, generating, funding and measuring innovation in an organization so as to generate business value; it supports the introduction of main products to the market and provides innovative procedures or solutions to enhance business. The importance of IM is manifested in integrating strategies and business for innovation, improving information technology in order to lead to successful business value through innovation, engaging in effective communication to demonstrate business value, while monitoring effectiveness, reviewing innovation procedures and optimising resources according to progress reports. For these reasons, organizations should develop their innovation management. The mature capability of innovation management contributes to boosting business value as a result of innovations, recognition of value and accelerating the pace of innovations into the market. The greater the IM level achieved by an organization, the more it can benefit from the advantages of IM. Enhancing business value with IM can be done by considering four main actions:

- Determining the scope and the aim of IM and the essential business of innovation development within the organization
- Comprehending the maturity level of the innovation capability in the organization
- Developing and managing innovation capability consistently in order to improve IM

- Tracking and observing IM developments and demonstrating the advancement and value that are delivered over time

IM includes various aspects of innovation capability, including strategy and management, people and culture, and processes, tools and metrics (Innovation Value Institute, 2012).

2.4.2.2. Innovation capability aspects proposed by IVI

The main organizational innovation capability aspects proposed by IVI are:

1) Vision: the essential mission or core purpose of an organization. Facilitating innovation in the organization requires having a vision or purpose (Sloane, 2006). For successful innovation, a clear common vision and solid strategic directions are needed; this is critical for establishing and regulating innovation (Lawson & Samson, 2001). Establishing the organization's vision is considered to be the platform for strategic and corporate plans, objectives and metrics. Moreover, vision plays an important role in inspiring employees to be more creative and innovative (Sloane, 2006). A shared vision can also encourage employees to generate ideas and to help meet the organization's needs (Smith *et al.*, 2008). In addition, creating a vision is considered leading to the creation of new products and in turn ensuring an outstanding place in the market (Lawson & Samson, 2001). Therefore, the vision must be determined, well-defined, communicated and executed (Innovation Value Institute, 2012).

2) Strategic Planning: Strategic planning consists of the processes that define the organization's strategy, directions and decision-making on designating the appropriate resources to accomplish the organization's strategy (Argenti, 1968). According to IVI, "Strategic Planning (SP) is the process of formulating a long-term vision and translating it into an actionable, strategic plan for the organization". SP also defines the dimensions of innovation impact along with business strategy. The aim of strategic planning is to support and enable the business strategy and also to increase the organization's business value by fostering innovation. The importance of strategic planning is manifested in studying the main strategic issues and options that support achieving the clear goals of the organization's activities, which in turn support decision-making, keeping the business strategy in line with business value, ensuring clear communication of objectives to all stakeholders in order to enhance performance, and complying with innovation standards to ensure highest efficiency and therefore to ensure that the added value is greater than the incurred cost (Innovation Value Institute, 2012). According to Smith *et al.* (2008), the organization's strategy includes

its vision and goals, organizational strategy, innovation strategy and decision-making strategy.

3) Leadership Management: management can manage innovation so that employees are encouraged to become more creative and innovative (Smith *et al.*, 2008). According to IVI, leadership “provides visibility and direction on how to drive innovation and gain support from leadership” (Innovation Value Institute, 2012). The ideal leadership can motivate employees to gain new experiences, push employees to achieve higher needs and objectives, and do more than is expected to support employee jobs (Kallio *et al.*, 2012). According to Saunila (2014), a participatory leadership style supports and fosters innovation. The capability to lead, guide and support generating ideas and promoting sustainable innovation behaviours are important to an organization. Moreover, it is important that leaders increase opportunities for employees to take part in the development of activities, and strike a balance in order to make employees work on good ideas. Nowadays, leadership plays an essential role in directing employees’ energy in the right direction and encouraging them to become more creative to do their job to the fullest. Leaders also need to focus on developing the innovation, creativity and risk-taking skills of the teams that work for innovation in organizations. In order to have well-equipped teams to achieve successful innovation (Sloane, 2006).

4) Risk-Taking: risk-taking can be defined as a decision that can result in potential physical consequences or financial loss, but it also may present an opportunity to attain beneficial results. The overwhelming majority of the business types that boost and grow on innovation will advocate risk-taking among management, in order to encourage the creative process in other employees (Okamoto & Edwards, 2010). The purpose of taking risks is to explore growth opportunities, so it is considered as an important standard for organizational innovativeness (Wang & Ahmed, 2004). Saunila (2014) found that the willingness to take risks is a key issue in fostering innovation. It is vital to encourage employees to be creative and take risks in order to show that risk-taking is part of the organization’s culture and there is no need to fear failure. Taking risks means taking managed, calculated and measured risks, not taking wild and extreme risks. Not all high-risk innovations lead to great outcomes, but some innovations with low risk can result in high reward and great outcomes (Sloane, 2006). According to IVI, risk-taking acceptance refers to the attitude level of taking creative but planned risk (Innovation Value Institute, 2012).

5) Collaboration: collaboration refers to the “Level and scope of collaboration at the employee level; evidence of behaviours, processes and practices that enable an environment of sharing, interaction and openness, allowing a rich, growing and open exchange of creative information” (Innovation Value Institute, 2012). Collaboration can increase the acquiring of new knowledge, productivity, quality and profitability. All this can be achieved by having a collaborative relationship among employees so as to share purpose and values. Collaboration in innovation activities has increased as cooperation is important for organizations to build and improve a body of knowledge that is aligned with innovation processes (Serrano-Bedia *et al.*, 2012).

6) Capability Development: this includes employees’ knowledge, cognition and skills in so far as they play a significant role in innovation capability. It also involves the employees’ ability to avail of every bit of information and then use this knowledge in order to “advance new operational practices, develop new schemata or thinking ways and knowledge for employees” (Keskin, 2006). Therefore, employees can easily adapt different views, ideas and processes, and improve the quality and operations of organizations as well as customer satisfaction. According to Calantone *et al.* (2002), organizations consider commitment to learning as a significant investment that is crucial for survival. It has been proven that continual employee training, knowledge exchange and experimentation foster innovation. Therefore, learning and capacitation have an impact on innovation, as a source of internal knowledge for organizations. Moreover, there is a clear connection between training employees and innovation outcomes, in that employees are motivated to increase their learning and develop new ideas (Martínez-Roman *et al.*, 2011). According to IVI, capability development refers to developing employees’ skills and applying innovation training programmes (Innovation Value Institute, 2012).

7) Roles and Responsibility: this refers to the “definition of innovation roles or organizational positions and penetration of innovation activities as part of everyday work at the employee level” (Innovation Value Institute, 2012). Developing innovation activities depends mainly on the use of an organization’s internal capabilities, such as knowledge generation. Organizations through innovation activities can invest much time and allocate more resources to explore innovation opportunities, thus increasing their ability to generate, use and reassemble knowledge, and also applying current knowledge and developing new capabilities and resources. This can result in gaining and maintaining competitive advantage in the long run (Serrano-Bedia *et al.*, 2012). According to Saunila (2014), employees’

innovation capability and activity play an important role in forming the overall innovation capability of the organization. Creative and skilled employees who are able to innovate are considered as the source of innovation in the organization, and can create a work environment that supports innovation creation. Moreover, encouraging employees to work in innovation activities leads to an increase in the creative thinking of the employees, and thus they are able to have new perspectives to solve problems and be willing to take risks. Therefore, managers should give all employees two main objectives. The first task is to work effectively on their daily job, and the second task is a part of the organization's innovation activities whereby innovation is embedded in employees' everyday activities and they are enabled to identify new ways to achieve objectives (Sloane, 2006).

8) Rewards and Recognition: this refers to the strategy of recognizing and rewarding employees according to their contribution to innovation (Innovation Value Institute, 2012). Innovation experts found that rewards are necessary and important to encourage innovation. Money is not always the best way to motivate employees to innovate. Recognition of achievement is considered as a strong and important motivator. Employees should be rewarded and recognized for generating creative and innovative ideas (Prajogo & Ahmed, 2006). According to Martínez-Roman *et al.* (2011), a promotion and rewards scheme for individual efforts can result in achieving successful innovation outcomes. Most innovative firms set up reward systems that serve as powerful motivators of creative behaviour and thus foster successful innovation activities (Lawson & Samson, 2001).

9) Innovation Process: this is “the transformation of valuable knowledge into added value (economic value) for the organization and the stakeholder” (Merx-Chermin & Nijhof, 2005). Innovation processes are mostly associated with idea generation and development, technology, evaluation techniques and implementation mechanisms. Employees play an essential role in generating and developing ideas and knowledge as inputs to the innovation process. Since the employees are considered as a rich source of knowledge and information, they need training and education so that they can contribute creative and powerful ideas to the innovation process (Smith *et al.*, 2008). A successful innovation process relies on key employees of high ability and quality who have their own strong commitment to innovation (Rothwell, 1994). According to Wang and Ahmed (2004), an innovation process involves introducing new production techniques, new management methods and new technology in order to develop production and management processes. Furthermore, an innovation process is vitally important for overall innovation capability in order to enable the organization to

avail of its resources and capabilities, and to ensure that the organization is able to reassemble and reconstruct its resources and capabilities to make them fit with the requirements of creative production, which is critical for organizational success. According to IVI, innovation processes should be standard in organizations and be included within the entire life-cycle of innovation (Innovation Value Institute, 2012).

10) Knowledge management: knowledge management (KM) means managing and using knowledge for innovation management. It covers both internal and external knowledge, and also involves organizational learning, plays an essential role in knowledge management (Smith *et al.*, 2008). Moreover, KM also includes knowledge assets that can improve innovation processes, such as designing products, and developing products and services (IVI innovation document, 2012). The core of KM provides a management framework to develop and promote innovation capability in an organization. This is considered as an absorptive capacity, whereby the organization can identify the value of the external knowledge and information, absorb the knowledge and then apply it. This ability is important to ensure innovative outcomes. However, it is possible for the organization to generate innovative outputs through using the previous knowledge accumulation that the organization has absorbed. Knowledge management enhances the communication between innovation and knowledge; the innovative efforts result from the effort and exploitation of knowledge and knowledge workers. Furthermore, the outputs of the innovation processes, such as new products, basically embody new knowledge (Prajogo & Ahmed, 2006; Carneiro, 2000).

2.5. Discussion and critical evaluation

This literature review has discussed various issues regarding innovation capability as well as firm performance. Innovation capability is considered in this study as a vital factor that fosters innovation in the culture of an organization, along with promoting activities internally that ensure that the external environment is fully comprehended and responded to (Akman & Yilmaz, 2008). Innovation capability also represents the knowledge and skills that require absorbing and developing existing technologies efficiently, in addition to producing new ones (Romijn & Albaladejo, 2002).

The literature review also examines innovation capability in terms of the findings of various studies. Many studies have concentrated on the organizational stages of innovation. Most studies address the common innovation capability aspects or factors that are shared by innovative organizations, particularly the capabilities or factors that impact on the

competencies that help managing innovation. Each of the researchers studied different categories of innovation capability, in terms of different types of innovations; some focused on innovation capability in the same terms as other researchers, while others focused on just one or two categories of innovation capability (e.g. the human factor, or organizational factor). Some researchers examined the relationship between individual aspects of innovation capability and firm performance, but there is a lack of consensus on whether the relationship has a positive or negative impact.

Most of the studies that examine the relationship between innovation capability and performance are conducted on large companies. However, SMEs could benefit by enhancing, communicating, developing and embracing innovation. According to Rosenbusch *et al.* (2011), SMEs have greater opportunities to grow and succeed operationally and financially. SMEs in Ireland are good examples for a study of this kind. They are supported financially by government-funded organizations such as the IDA and Enterprise Ireland; this support is considered key to the innovation process for Irish SMEs, in terms of fostering innovation, maintaining sustainable growth, developing the capability to innovate and gain a competitive advantage via innovation. This study therefore seeks to investigate the following research question:

RQ: What are the most important aspects of the innovation capability proposed by IVI that are significantly and positively related to the overall firm financial and operational performance with Irish SMEs?

This study will investigate the innovation capability aspects proposed by IVI and their relation to firm performance. IVI is specialised in improving firms' performance through developing their capabilities, and it constructed a standard framework (IT-CMF) that is based on the empirical studies of best practices in the industry. This framework is used by many global companies to resolve capability issues.

Chapter 3. RESEARCH DESIGN AND METHODOLOGY

Many researchers have conducted empirical studies on innovation capability and its relation to firm performance (as discussed in the literature review). In this study, the main aspects of innovation capability are based on those proposed by IVI. The methodology of this research involves a quantitative approach. This study further seeks to identify the research framework that demonstrates the innovation capability aspects proposed by IVI and overall firm performance, to develop the research hypotheses, and to determine the appropriate innovation capability aspects. This chapter also describes the methodology relating to the questionnaire, the data collection and finally the data analysis.

3.1. The Research Framework

The link between innovation capability and performance has been studied by several studies. Each study examined individual aspects of innovation capability and their association with firm performance. However, few studies examined innovation capability aspects as a whole in relation to achieving better performance. The studies concentrate only on the factors that are related to innovation capability and their influence on innovation performance. The aim of this research is to investigate the most important aspects of innovation capability (proposed by IVI) that are related significantly and positively to overall financial and operational performance in the case of Irish SMEs. In order to achieve this aim and on the basis of the literature review, the research framework has been built, as shown in Figure 8. The main aspects of innovation capability proposed by IVI are: vision, strategic planning, leadership management, risk-taking, collaboration, capability development, roles and responsibility, rewards and recognition, innovation process and knowledge management. The aim of the framework is to guide companies to focus and make an effort on developing the 10 aspects of innovation capability, and thus attain higher overall performance. In other words, the stronger the companies' innovation capability aspects, the higher their overall performance. Reaching the research objective requires developing 10 hypotheses, which are outlined below.

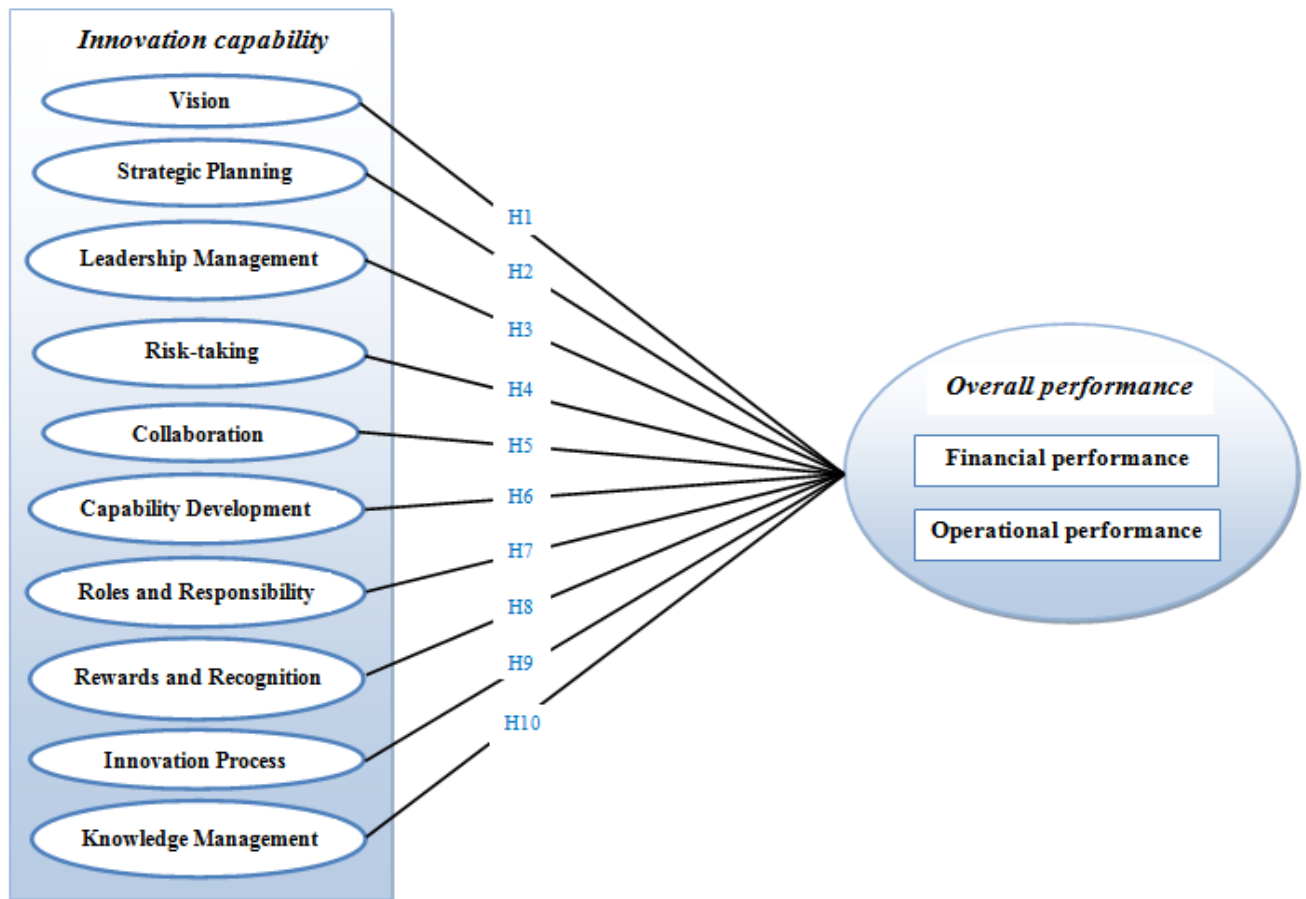


Figure 8: The framework linking innovation capability aspects to overall performance

3.2. Hypotheses Development

3.2.1. Vision and firm performance

The vision is the basis for building the corporate plan; from the vision flow the essential values and strategic goals whereby the vision can be achieved in the long run (Sloane, 2006). The connection between vision and innovation is important and effective for managing innovation. Determining vision is important for organizations to make decisions regarding what businesses and functions have to be performed and in what market. In addition, successful innovation needs a clear vision to direct and motivate all departments and individuals. Managers have to explain to employees their roles in fulfilling the vision and confronting challenges, and this inspire employees to find innovative routes to success. Moreover, managers also can play a key role in empowering employees to find new ways of doing things to accomplish the organization's vision and objectives. A clear vision is considered as a target that, when aimed at and achieved, will lead to successful performance

and the creation of new products that ensure an outstanding position in the market (Lawson & Samson, 2001; Sloane, 2006). Therefore, the hypothesis is:

Hypothesis 1: Innovation vision is significantly and positively associated with the firm's overall performance.

3.2.2. Strategic planning and firm performance

Strategic planning plays an important role in developing new product strategies and innovation; it sets specific and long-range objectives and determines how the organization establishes and executes innovation (Song et al., 2011). Strategic planning also highlights the firm's growth in relation to innovation, determines the means and ends of the firm, represents investment decisions, clarifies competitive opportunities, sets a scheme for exploiting such opportunities, and involves starting, developing and implementing innovation, which in turn promotes firm performance. (Roffe, 1999; Song et al., 2011). Many researchers have found that, when an organization applies particular planning phases, it speeds up innovation processes, which can result in higher innovation levels and greater firm performance. Eventually, strategic planning improves the speed, progress, quality and productivity of innovation (Song *et al.*, 2011). Thus, the hypothesis can be formulated as:

Hypothesis 2: Strategic planning is significantly and positively associated with the firm's overall performance.

3.2.3. Leadership management and firm performance

Leadership management is important for innovation in so far as managers have the ability to direct and support innovation creation and sustainability. Thus, managers should increase individuals' opportunities to take part in innovation development and activities. Leadership management is linked to the organization's culture and plays a significant role in encouraging employees (Saunila, 2014). Employees must feel supported as a fundamental source to generate and develop new ideas and knowledge; thus management support is required to provide them with sufficient resources and materials at the right time to make ideas emerge (Smith et al., 2008). Furthermore, leadership is one of the main driving forces in enhancing an organization's performance, and can lead to high levels of coherence, trust, commitment, stimulus and performance (Zhu *et al.*, 2005). According to Carmelia *et al.* (2010), innovation leadership involves the encouragement of employee initiatives, the

explanation of employee roles and responsibilities, strong task orientation and trust among employees to ensure work quality. The author found that innovation leadership is associated with three aspects of a firm's performance: process performance, economic performance and product performance. Therefore, the hypothesis can be formed as:

Hypothesis 3: Leadership management is significantly and positively associated with the firm's overall performance.

3.2.4. Risk-taking and firm performance

It is important for organizations to have procedures for risk-taking management that comply with best practices (Okamoto & Edwards, 2010). Creative behaviours and efforts are closely connected to risk-taking. Creative employees need to feel comfortable and encouraged to take risks; their organization thus needs to show some tolerance of risk-taking. Furthermore, creativity is considered to be part of an organizational climate that favours and supports taking risk, which in turn will lead to improving employees' willingness to be involved in creativity. Employees will thus comprehend that being creative is desired by the organization and they will be motivated to take initiatives. Consequently, the risk-taking environment will empower risky behaviours that will lead to increasing the firm's overall performance. Briefly, firms with a robust risk-taking environment will enjoy higher performance in comparison to firms with a weaker risk-taking environment (García-Granero *et al.*, 2015). Thus, the hypothesis is:

Hypothesis 4: Risk-taking is significantly and positively associated with the firm's overall performance.

3.2.5. Collaboration and firm performance

Collaboration between employees can foster innovation through the acquiring of new scientific knowledge, increasing innovation potentials and understanding more efficient solutions for improving products. Collaboration between different departments in the organization is more important in so far as it determines innovation performance and does not just involve exchanging documented information (Prajogo & Ahmed, 2006). According to Swink (2006), collaboration facilitates reaching various disciplines and functions in the organization in order to consolidate and build up expert knowledge in regard to product and process technologies. Employee collaboration is also important when developing various products. In addition, collaboration increases the amount of new knowledge and ideas,

because it encourages generating and developing ideas through sharing knowledge and experiences. Moreover, greater collaboration can accelerate introducing a new product to the market by reusing and leveraging previous development work, finding better solutions quicker through using the wide range of knowledge sources available, and enabling significant overlap of development stages. Finally, employee collaboration helps to improve the quality of work in that it increases various knowledge resources and improves the quality of design of new products. “Collaborative approaches also increase product reliability and reduce risks in product introduction. Thus, collaborative innovation can be seen as a revenue-enhancing, as well as cost-reducing, initiative”, which in turn improve a firm’s overall performance (Swink, 2006). The hypothesis is:

Hypothesis 5: Collaboration is significantly and positively associated with the firm’s overall performance.

3.2.6. Capability development and firm performance

Developing individuals’ capability is considered as a key factor in improving innovation and firm performance. Calantone *et al.* (2002) found that an organization committed to learning ensures activities of generating and developing knowledge to gain competitive advantage, and seeks to understand its environment, such as by obtaining information regarding customer requirements, competitor business, market changes and the emergence of new technology and products. Organizational learning concerns the development of new knowledge that is important for both a company’s innovation capability and its performance. According to Martínez-Roman *et al.* (2011), individual skills, education and qualifications are important for innovation. Learning and training programmes help individuals to better understand the organization’s capacity to innovate. Innovative companies seek to develop individuals’ capability constantly and thus involve them in innovation activities. Consequently, there is a positive relationship between employee capability development and firm performance (Saunila, 2014). Therefore, the hypothesis is:

Hypothesis 6: Capability development is significantly and positively associated with the firm’s overall performance.

3.2.7. Roles and responsibility and firm performance

Innovation activities should flow through all organization levels, and thus all workers, employees, managers and professionals can participate in and support innovation. The managers' responsibility is to lead and direct innovation activities in addition to their normal objectives within the organization. Every employee has a shared responsibility to participate in innovation activities in order to better meet customer needs and to explore innovative ways to introduce products or services. In other words, employees can be empowered and delegated with more responsibility to control their work. As they know the organization's goals and direction, they will try to identify the best way to accomplish their responsibility (Sloane, 2006). According to Saunila (2014), "the source of innovation resides in the creativity and innovator capability of people", whereby they can create a work environment that fosters the innovation. Therefore, employee innovativeness is considered important for organizational success and for gaining competitive advantage, and this can positively affect firm performance. The hypothesis is:

Hypothesis 7: Roles and responsibility are significantly and positively associated with the firm's overall performance.

3.2.8. Rewards and recognition and firm performance

It has been suggested by innovation scholars that rewards and recognition are necessary to foster innovation. Non-monetary reward, such as recognition of achievement, is as important as financial reward; both are considered strong motivators for employee creativity and achievements. According to Lawson and Samson (2001), reward systems are important to motivate and encourage creative behaviour, and thus are considered as a key factor in successful innovation activities. Innovative companies are aware of the positive impacts of reward systems on employees' creativity, including the "dual ladder" system, suggestion schemes, financial bonuses and public recognition. Finally, it has been shown that rewards and recognition are productive, because they lead to increased idea generation and foster creative behaviour, which in turn results in achieving higher performance in implementing new products, services or processes. Therefore, the hypothesis can be formulated as:

Hypothesis 8: Rewards and recognition are significantly and positively associated with the firm's overall performance.

3.2.9. Innovation process and firm performance

Innovation process concentrates primarily on management approaches, knowledge management, production methods, idea generation, information, technology, employees, and finance and marketing. These are all important for progressing the innovation stages of generating, developing and implementing new products, technology, services or processes. The innovation process also depends on the ability of the firm to exploit and reconfigure its knowledge, resources and capabilities to make them comply with the creative production requirements, which in turn is critical to a firm's performance and success (Wang & Ahmed 2004; Smith *et al.*, 2008; Grabara *et al.*, 2011). Innovative companies invest in and develop their capability of executing effective and successful innovation processes, and therefore achieve higher business performance (Lawson & Samson, 2001). Thus the hypothesis is:

Hypothesis 9: The innovation process is significantly and positively associated with the firm's overall performance.

3.2.10. Knowledge management and firm performance

Knowledge management improves the connection between innovation and knowledge through providing a framework for managing and using knowledge for innovation management. New products, processes and services basically embody new knowledge. Moreover, managing knowledge in the company involves considering several major practices such as managing and developing the intellectual capital of the company, which is considered as a key part of innovation infrastructure; motivating and facilitating communication, and knowledge-sharing in order to improve employee knowledge and to increase employee creativity. These practices are very important for developing an organization's capability to innovate, as well as developing technologies and gaining patents as a result of these practices, which in turn leads to achieving higher performance (Carneiro, 2000; Prajogo & Ahmed, 2006; Smith *et al.*, 2008). The hypothesis is:

Hypothesis 10: Knowledge management is significantly and positively associated with the firm's overall performance.

Table 1: Research hypotheses

Hypothesis No.	Hypotheses
H1	Innovation vision is significantly and positively associated with the firm's overall performance.
H2	Strategic planning is significantly and positively associated with the firm's overall performance.
H3	Leadership management is significantly and positively associated with the firm's overall performance.
H4	Risk-taking is significantly and positively associated with the firm's overall performance.
H5	Collaboration is significantly and positively associated with the firm's overall performance.
H6	Capability development is significantly and positively associated with the firm's overall performance.
H7	Roles and responsibility are significantly and positively associated with the firm's overall performance.
H8	Rewards and recognition are significantly and positively associated with the firm's overall performance.
H9	The innovation process is significantly and positively associated with the firm's overall performance.
H10	Knowledge management is significantly and positively associated with the firm's overall performance.

3.3. Development of Questionnaire

The survey questionnaire consists of three major parts. The first part contains background information questions to determine the size of the company, such as its revenue in millions of euro and the number of employees, as well as the employee's position in the company. The second part includes the independent variables of this research: vision, strategic planning, leadership management, risk-taking, collaboration, capability development, roles and responsibility, rewards and recognition, innovation process and knowledge management. This part includes 40 items divided into 10 subcategories (innovation capability aspects) to measure different issues associated with the aspects of innovation capability. Each of the independent variables will be measured by a Likert-type

scale of five levels (ranging from ‘1 strongly disagree’ to ‘5 strongly agree’). The third part contains the dependent variable, the firm performance, measured by two items. There is a strong correlation between “subjective and objective data on performance”, thus both are valid to calculate the company’s performance (Bueno *et al.*, 2010). In this research, the subjective perceptions of managers and employees in Irish SMEs will be used to evaluate a company’s financial and operational performance (on a scale of ‘1 weak’ to ‘4 excellent’). The items for the survey questionnaire are adopted from the literature review and other studies in such areas. These items are selected according to the appropriateness of each item and to maximize the construct’s reliability and validity. Table 2 presents all the items of the independent and dependent variables, and the references.

Table 2: Variables’ items and references

Variable name	Items	Authors
Vision	<u>Clear common purpose for innovation</u> <u>Common understanding of the organizational vision</u> <u>Innovation vision is in line with projects and platforms</u> <u>Employees' willingness to act for innovation visions</u>	Calantone <i>et al.</i> (2002), Dobni (2008), IVI innovation document (2012)
Strategic Planning	<u>Formal process</u> <u>Explicit process in determining specific long-term objectives</u> <u>Explicit procedure for generating alternative strategies</u> <u>Employees' involvement in the strategic decision-making</u>	Song <i>et al.</i> (2011), Armstrong (1982), Smith <i>et al.</i> (2008), IVI innovation document (2012)
Leadership Management	<u>Respecting employees' ideas</u> <u>Appreciating employees' achievements</u> <u>Participation of managers</u> <u>Managers' encouragement of learning and development</u> <u>Employees' participation in implementing change</u>	Wang and Ahmed (2004), Dobni (2008), Kallio <i>et al.</i> (2012), Smith <i>et al.</i> (2008), Prajogo and Ahmed (2006), Saunila <i>et al.</i> (2014)
Risk-taking	<u>Employees' encouragement to idea generation and take initiatives.</u> <u>Employees' confidence of taking risks</u> <u>Participation in high-risk projects</u> <u>Encouragement of creative risk-taking</u>	Prajogo and Ahmed (2006), Naldi (2007), García-Granero <i>et al.</i> (2015), IVI innovation document (2012)
Collaboration	<u>Effective environment for collaboration</u> <u>Increasing creativity and developing innovation</u> <u>Sharing knowledge, developing ideas and generating new ideas</u>	Antikainen <i>et al.</i> (2010), Burns (2014), Saunila <i>et al.</i> (2014)

Capability Development	Using employees' multi-skills and trainings Investing in learning Wide range of training and development process Motivating employees toward learning	Calantone <i>et al.</i> (2002), Prajogo and Ahmed (2006), Keskin (2006), Dobni (2008), Saunila <i>et al.</i> (2014)
Roles and Responsibility	Employees' participation in innovation activities "Innovation roles assigned in job description" Allocating enough time to innovation activities Knowing how to act critically	Dobni (2008), Saunila <i>et al.</i> (2014), IVI innovation document (2012)
Rewards and Recognition	Non-monetary rewards for employees' creativity Financial rewards for employees' creativity Reward system that suggests schemes, recognition	Lawson and Samson (2001), Prajogo and Ahmed (2006), Dobni (2008), IVI innovation document (2012)
Innovation Process	As common standards Sufficient resources for developing ideas Using opportunities for a new or developed product, process or service "Adopting the latest technological innovations in our processes" Creating new methods to solve problems	Wang and Ahmed (2004), Smith <i>et al.</i> (2008), Prajogo and Ahmed (2006), Pavitt (2003), IVI innovation document (2012)
Knowledge Management	Managing and using internal and external knowledge Accumulation of intellectual capital "Manages its own intellectual assets, e.g. special techniques, patents, copyrights, licenses" Opening channels for information and knowledge-sharing	Carneiro (2000), Prajogo and Ahmed (2006), Smith <i>et al.</i> (2008)
Performance	Financial (profitability) Operational (productivity)	Tidd (2001), Tangen (2004), Bueno <i>et al.</i> (2010), Saunila <i>et al.</i> (2014), Kafetzopoulos and Psomas (2015)

3.4. Data Collection

This is an empirical study where the data collection is based on conducting a quantitative questionnaire. This data was collected from SMEs in Ireland, using a web-based questionnaire to test the hypotheses. The survey sample does not include SMEs with fewer than 10 employees. The data was collected in April 2015. The surveys were distributed using various methods such as email, LinkedIn and Facebook. Approximately 650 questionnaires

were sent to both managers and employees who work in different SMEs in Ireland that employ from 10 to 249 persons and also have revenue from €2 million to €50 million. In total, 120 managers and employees responded to the survey; almost half responded within one week while the others required one or two reminders. A total of 13 of the survey questionnaires were excluded because of significant missing values; some questionnaires that had one or two missing values were not discarded. The few missing values were analysed and filled with appropriate data points by employing the expectation-maximization (EM) algorithm. The EM algorithm is widely used by researchers for analysing missing values in data. In total, 107 usable questionnaires were entered into the analysis. The data were analyzed with the Statistical Package for Social Sciences (SPSS) software.

Around three-quarters of the questionnaires were collected from employees and around one-quarter from managers. Nearly two-thirds of the questionnaires were answered by people who work in SMEs that have revenue from €2m to €10m, and about three-quarters from SMEs that employ from 10 to 149 persons.

3.5. Data Analysis

There are various techniques and methods to analyse data. The method that suits this study is the linear regression method. The term regression primarily illustrates and describes the statistical relationships between variables. To be more specific, linear regression is a method to investigate and discover the relationship between one or more independent variables (also called explanatory variables, predictors) and a dependent variable (also named response variable, explained variable or predicted variable). In the case of having one independent variable, the analysis is called simple linear regression. However, with more than one independent variable, the approach is called multiple linear regression (Xin & Su, 2009; Freedman, 2009). In this study, multiple linear regression analysis is used to evaluate the relationship between innovation capability aspects and overall firm performance, and whether the innovation capability aspects have any impact on firm performance. According to Xin and Su (2009), the regression method is the most common statistical method used in practice. This type of analysis can be found in various science domains such as “medicine, biology, agriculture, economics, engineering, sociology, geology, etc” (Xin & Su, 2009). In brief, regression analysis includes the main steps of establishing the relationship between independent variables and a dependent variable, then predicting the dependent variable based on a set of the independent variables’ values, and, finally, screening the independent variables

to identify the most important variables that explain the dependent variable. Then, the statistical computing and analysis will be conducted for the actual model parameters, using the Statistical Package for Social Sciences (SPSS) to make linear regression analysis more efficient.

This study uses factor analysis, a statistical tool to examine the relationship of variables to factors that may not be directly measured. The factor analysis is used to come up with a small number of interpretable underlying factors out of a number of variables. The eigenvalue represents the value of factor analysis and it is also used to test the unidimensionality of the constructs (Hair *et al.*, 2006). The factor loadings are also conducted; they express the relationship between each variable and the underlying factor (Rahn, 2008). This study also includes establishing the reliability and validity test as well as the linear regression assessment to test the research hypothesis, including B, t and p value.

3.6. Summary

In this chapter, based on the literature review, the research framework that links the aspects of innovation capability and overall performance has been designed. This chapter also outlined the development of hypotheses as to how each aspect of innovation capability contributes to innovation and better performance. A quantitative approach is used in this study to determine whether each individual aspect of innovation capability is significantly and positively associated with overall performance. The survey questionnaire is designed according to the research focus and it consists of 42 items divided into 11 dimensions. These items are adapted from IVI and other researches according to their appropriateness to this study. The data was collected from SMEs in Ireland with a web-based questionnaire. The data will be tested by conducting a reliability and validity test and it will be analysed by applying linear regression analysis, using SPSS software which all will be represented in the next chapter.

Chapter 4. RESULTS AND FINDINGS

This chapter includes an overview of the background information, assessing the reliability and validity of the measurement instrument and constructs of interest by conducting various psychometric tests. These tests include unidimensionality, reliability, content validity, convergent validity, discriminant validity and multicollinearity. Finally, the regression analysis is conducted to test the hypotheses.

4.1. Demographic Overview

Table 3 presents the background information on the informants who participated in the study. The firm size can be determined based on the number of employees and revenue. Around 56% of the responses came from medium enterprises with 50-249 employees while nearly 44% were from small enterprises with 10-49 employees. With respect to revenue, around 59%, 27% and 13% of the responses were received from enterprises with revenue of 2-10, 10-25 and 25-50 million euros respectively. As can be observed from the table, the overwhelming majority of the responses were received from employees, while around 28% were from managers.

Table 3: Background information on the informants

Information background	Sub-section	Frequency	Per cent
Company revenue (Million euro)	2-10	64	59.81%
	10-25	29	27.10%
	25-50	14	13.08%
No. of employees	10-49	47	43.93%
	50-149	36	33.64%
	150-249	24	22.43%
Position in company	Manager	30	28.04%
	Employee	77	71.96%

4.2. Unidimensionality Test

Factor analysis is conducted on items of each construct. Eigenvalue is also calculated, which is “a measure of how much of the variance of the observed variables a factor explains” (Rahn, 2008). Any factor with eigenvalue ≥ 1 is considered to be representing a factor. Results are shown in Table 4. These results show that the eigenvalue of each construct is above one, which convey the unidimensionality of the construct and also means that multiple dimension is not present in the construct. Table 4 also presents the percentage variance explained by each construct. It is evident from the table that all constructs show a variance ranging from 53.2% to 88.0%, which is well above 50% of the variance. The loading of each item to its underlying construct is also presented in Table 4. These loadings ranged from 0.580 to 0.938, which can also support unidimensionality; these loadings are explained in detail in the subsequent sections (Stank, Keller & Daugherty, 2001; O’Leary-Kelly & Vokurka, 1998).

Table 4: Factor loadings of the items, eigenvalue and percentage variance of the constructs

Constructs	Factor Loadings					Eigenvalue	Percentage variance explained (PVE)
	Item 1	Item 2	Item 3	Item 4	Item 5		
Vision (V)	0.842	0.838	0.673	0.874	-	2.628	65.7%
Strategic Planning (SP)	0.792	0.759	0.856	0.580	-	2.270	56.7%
Leadership Management (LM)	0.738	0.830	0.805	0.777	0.697	2.972	59.4%
Risk-Taking (RT)	0.766	0.762	0.866	0.831	-	2.446	61.1%
Collaboration (C)	0.834	0.879	0.854	-	-	2.198	73.2%
Capability Development (CD)	0.772	0.756	0.801	0.817	-	2.476	61.9%
Roles and Responsibility (RR)	0.810	0.832	0.809	0.628	-	2.395	59.8%
Rewards and Recognition (RAR)	0.812	0.887	0.818	-	-	2.114	70.4%
Innovation Process (INP)	0.771	0.742	0.737	0.757	0.634	2.664	53.2%
Knowledge Management (KM)	0.721	0.765	0.747	0.715	-	2.175	54.3%
Performance (P)	0.938	0.938	-	-	-	1.761	88.0%

4.3. Reliability Test

Reliability refers to the degree of random error that exists in any measure. Reliability also refers to the internal consistency and stability of the instrument. According to Hafiz & Shaari (2013), “the second dimension of reliability is used to assess the reliability of summated scale where several items are summed to form the total scores, if they are reliable, the items will show consistency in their indication of concept being measured”. Therefore, the reliability of the measures is assessed by calculating the Cronbach’s coefficient alpha which estimates and measures the internal consistency of a group of items. The acceptable Cronbach’s alpha should be higher than (0.70) for internal consistency (Nunnally, 1978). The Cronbach’s alpha of all constructs is found to be well above 0.7 (Table 5), which is the recommended cut-off. This shows significant support for reliability. Table 5 also shows the loading of all items, which are mostly above the suggested threshold value of 0.7, providing support for unidimensionality. From Table 5, it can also be observed that five out of 42 items are below 0.7. However, loadings of two out of these five items are just below 0.7, i.e. 0.69 and 0.67, and loadings of the other two items are 0.63, 0.628, while the loading of employees’ involvement in strategic decision-making (SP4) is 0.58. As per the recommendation of researchers, keeping the importance of the item in mind, a loading which exceeds the 0.50 threshold need not be dropped. Since the loadings of all these five items are well above 0.5, this study considered these items for further analysis. Most (37 out of 42) loadings are above 0.7, which suggests good item reliability as well. Composite reliability (CR) is also calculated of each construct. The composite reliability of all constructs is also found to be good (all above 0.8, which is well above 0.6) (Bagozzi & Yi, 1988), giving further support for reliability.

Table 5: Means, standard deviations and factor loadings of the items, and Cronbach's alpha of the constructs

Constructs and Items	Mean	Standard Deviation	Factor Loading	Cronbach's Alpha
Vision (V)	3.71			0.818
1 Clear common purpose for innovation (V1)	3.74	1.022	0.842	
2 Common understanding of the organizational vision (V2)	3.68	0.958	0.838	
3 Innovation vision is in line with projects and platforms (V3)	3.80	0.909	0.673	
4 Employees' willingness to act for innovation visions (V4)	3.63	1.005	0.874	
Strategic Planning (SP)	3.59			0.734
1 Formal process (SP1)	3.53	0.965	0.792	
2 Explicit process in determining specific long-term objectives (SP2)	3.64	0.817	0.759	
3 Explicit procedure for generating alternative strategies (SP3)	3.60	0.867	0.856	
4 Employees' involvement in the strategic decision-making (SP4)	3.60	0.940	0.580	
Leadership Management (LM)	3.64			0.829
1 Respecting employees' ideas (LM1)	3.67	0.909	0.738	
2 Appreciating employees' achievements (LM2)	3.74	0.915	0.830	
3 Participation of managers (LM3)	3.65	0.963	0.805	
4 Managers' encouragement of learning and development (LM4)	3.58	0.942	0.777	
5 Employees' participation in implementing change (LM5)	3.57	0.848	0.697	
Risk-Taking (RT)	3.34			0.788
1 Employees' encouragement to idea generation and take initiatives (RT1)	3.56	1.002	0.766	
2 Employees' confidence in taking risks (RT2)	3.33	1.007	0.762	
3 Participation in high-risk projects (RT3)	3.29	0.97	0.766	
4 Encouragement of creative risk-taking (RT4)	3.21	1.097	0.831	
Collaboration (C)	3.60			0.814
1 Effective environment for collaboration (C1)	3.59	0.900	0.834	
2 Increasing creativity and developing innovation (C2)	3.57	0.870	0.879	
3 Sharing knowledge, developing ideas and generating new ideas (C3)	3.64	0.745	0.854	
Capability Development (CD)	3.64			0.794

1 Utilising employees' multi-skills and trainings (CD1)	3.83	0.852	0.772
2 Investing in learning (CD2)	3.62	0.843	0.756
3 Wide range of training and development process (CD3)	3.57	0.953	0.801
4 Motivating employees toward learning (CD4)	3.54	0.984	0.817
Roles and Responsibility (RR)	3.45		0.775
1 Employees' participation in innovation activities (RR1)	3.40	1.036	0.810
2 Innovation roles assigned in job description (RR2)	3.37	0.986	0.832
3 Allocating enough time to innovation activities (RR3)	3.39	0.998	0.809
4 Knowing how to act critically (RR4)	3.67	0.866	0.628
Rewards and Recognition (RAR)	3.38		0.785
1 Non-monetary rewards for employees' creativity (RAR1)	3.46	1.049	0.812
2 Financial rewards for employees' creativity (RAR2)	3.49	0.975	0.887
3 Reward system that suggests schemes, recognition (RAR3)	3.20	1.136	0.818
Innovation process (INP)	3.53		0.775
1 As common standards (INP1)	3.62	0.938	0.771
2 Sufficient resources for developing ideas (INP2)	3.50	0.840	0.742
3 Using opportunities for a new or developed product, process or service (INP3)	3.45	0.903	0.737
4 Adopting the latest technological innovations in our processes (INP4)	3.60	0.889	0.757
5 Creating new methods to solve problems (INP5)	3.49	1.022	0.634
Knowledge Management (KM)	3.55		0.719
1 Managing and using internal and external knowledge (KM1)	3.70	0.815	0.721
2 Accumulation of intellectual capital (KM2)	3.57	0.943	0.765
3 Manages its own intellectual assets, e.g. special techniques, patents, copyrights, licences (KM3)	3.43	0.902	0.747
4 Opening channels for information and knowledge sharing (KM4)	3.51	0.945	0.715
Performance (P)	2.60		0.864
1 Financial (profitability) (FP)	2.54	0.708	0.938
2 Operational (productivity) (OP)	2.67	0.762	0.938

4.4. Validity Test

The validity of a measure is the degree to which it examines and measures what is intended to be measured (Dobni, 2008). Three different types of validity are conducted to assess the measurements of this study: content validity, convergent validity and discriminant validity.

4.4.1. Content validity

Content validity relies on how well the items cover the domain of the construct being measured (Dobni, 2008). The literature review was used as a support in developing and constructing the scales. Some items used to measure the constructs are recommended by the Innovation Value Institute (IVI), which relied on empirical studies of best practices in industry. The rest of items are used according to their appropriateness to the existing measurements that were tested empirically by different previous researches, and therefore are rooted in the literature. The items were developed for the 11 dimensions in this study, which were derived from an exhaustive review of the literature and evaluated by the researchers. The items and literature supports are presented in Table 3. Hence, this study has strong support for content validity.

4.4.2. Convergent validity

Convergent validity is “the degree to which multiple attempts to measure the same concept are in agreement. Measures of the same trait, no matter how derived, should be highly correlated if they validly measure a common construct” (Bagozzi & Yi, 1993). In other words, it refers to the extent to which the scores of different tests that are designed to measure the same construct are related to each other. Convergent validity is assessed by examining loading, composite reliability (CR), and average variance extracted (AVE). The AVE represents the average amount of variance extracted by the construct from all its underlying measurement variables together. The values of loading, CR and AVE are shown in Table 5 and Table 6. These values convey that all of these loadings are greater than 0.7 (except the five items which are explained under ‘reliability’ above) (Hair *et al.*, 2006); CR values are greater than 0.6 (Bagozzi & Yi, 1988) and AVE values are above 0.5, which establishes the convergent validity for the study.

Table 6: Composite reliability and AVE of the constructs for the convergent validity

Constructs	Composite Reliability (CR)	AVE
V	0.883	0.657
SP	0.837	0.568
LM	0.879	0.594
RT	0.862	0.611
C	0.891	0.732
CD	0.866	0.619
RR	0.855	0.599
RAR	0.877	0.705
INP	0.850	0.532
KM	0.826	0.543
P	0.936	0.879

4.4.3. Discriminant validity

Discriminant validity is “the degree to which measures of different concepts are distinct. That is, if two or more concepts are unique, valid measure of each should not covary too highly” (Bagozzi & Yi, 1993). Discriminant validity is assessed by comparing the square root of AVE to the average shared variances between the constructs (Hair *et al.*, 2006). The diagonal elements of Table 7 represent the square root of AVE. It has been found that the square roots of AVE of the construct are greater than all corresponding correlations of the construct, as presented in Table 7. This condition is met in all instances, which establishes discriminant validity for the study. There is one instance where the square root of AVE, 0.774, was found to be slightly (0.02) less than the correlation between RR and INP, at 0.797. The difference (0.02) is very small; all other comparisons of the square root of AVE and the correlations are well within the required limit, and, keeping the standard practice recommended by IVI in mind, the study takes this measure as acceptable. This study holds that INP and RR are the two different conceptual measures.

Table 7: Pearson correlations of the constructs with the square root of AVE for discriminant validity

Constructs	V	SP	LM	RT	C	CD	RR	RAR	INP	KM	P
V	0.810										
SP	0.438	0.754									
LM	0.432	0.422	0.771								
RT	0.437	0.380	0.595	0.782							
C	0.440	0.406	0.569	0.500	0.856						
CD	0.526	0.510	0.642	0.540	0.519	0.787					
RR	0.484	0.485	0.575	0.698	0.517	0.727	0.774				
RAR	0.354	0.397	0.626	0.628	0.390	0.667	0.664	0.839			
INP	0.409	0.379	0.580	0.714	0.479	0.678	0.797	0.715	0.729		
KM	0.399	0.537	0.577	0.558	0.505	0.688	0.656	0.629	0.640	0.737	
P	0.336	0.269	0.550	0.469	0.347	0.542	0.483	0.528	0.579	0.424	0.938

All the correlations are significant at the $p < 0.001$. Diagonal elements represent square root of AVE.

4.5. Multicollinearity

Multicollinearity is assessed for checking if the correlation among constructs is not too high, which is an indication of multicollinearity. It is not good to have very high correlation among constructs (above 0.9) because it affects the results, and thus the relationship between the constructs is unreliable. As presented in Table 7, all correlations are below 0.9; most are around 0.5 and a few are just above 0.7. This conveys that multicollinearity is unlikely to be a problem for this study. Apart from examining correlations, the study also assessed the variance inflation factor (VIF), which is reported along with the regression analysis. The VIF results are presented in Table 8. It shows that all VIFs are significantly below the cut-off value (10), which is evidence that multicollinearity is not a problem for the study (Diamantopoulos & Judy, 2006; Neter *et al.*, 1996).

Table 8: VIF of constructs

	V	SP	LM	RT	C	CD	RR	RAR	INP	KM
VIF	1.581	1.612	2.333	2.612	1.773	3.233	3.812	2.728	3.725	2.495

4.6. Hypothesis Testing

To test the hypotheses described in the previous section, the regression analysis is conducted on the factor scores of each construct, using SPSS software. Relevant results of this analysis are presented in Table 9. It conveys that the underlying independent variables together explain 42.8% of variance (R^2) of performance, which is very good. The coefficient of the relationship of independent variables (V, SP, LM, RT, C, CD, RR, RAR, INP, and KM) to dependent variable (P), along with its significance levels, is reported in Table 9. The accepted significance level is $t > 1.98$ or $p < 0.05$. The results presented show that two relationships representing hypothesis 3 ($B=0.267$, $t=2.26$, $p=0.026$) and hypothesis 9 ($B=0.357$, $t=2.4$, $p=0.018$) ($LM \rightarrow P$ and $INP \rightarrow P$) are found significant ($p < 0.05$), and hence these hypotheses are supported by the study. The B is the coefficient. The result ($B=0.267$, $t=2.26$, $p=0.026$) of the relationship of LM to P conveys that one unit increase of LM will result in a 0.267 unit increase in performance. Similarly, the result ($B=0.357$, $t=2.4$, $p=0.018$) of hypothesis 9 representing the relationship of INP to P indicates that a unit increase in INP will result in an 0.357 increase in performance. Table 9 also conveys that is lack of evidence to support the other hypotheses.

Table 9: The hypotheses results

Hypotheses	B	T	p value	Decision
H1: Vision (V) \rightarrow Performance (P)	0.042	0.431	0.667	Not Supported
H2: Strategic Planning (SP) \rightarrow Performance (P)	-0.037	-0.374	0.709	Not Supported
H3: Leadership Management (LM) \rightarrow Performance (P)	0.267	2.266	0.026	Supported
H4: Risk-Taking (RT) \rightarrow Performance (P)	0.022	0.176	0.862	Not Supported
H5: Collaboration (C) \rightarrow Performance (P)	-0.037	-0.347	0.729	Not Supported
H6: Capability Development (CD) \rightarrow Performance (P)	0.206	1.484	0.141	Not Supported
H7: Roles and Responsibility (RR) \rightarrow Performance (P)	-0.119	-0.790	0.432	Not Supported
H8: Rewards and Recognition (RAR) \rightarrow Performance (P)	0.092	0.726	0.470	Not Supported
H9: Innovation Process (INP) \rightarrow Performance (P)	0.357	2.397	0.018	Supported
H10: Knowledge Management (KM) \rightarrow Performance (P)	-0.071	-0.585	0.560	Not Supported
R	0.655			
R^2	0.428			

4.7. Summary

The data of this study was successfully tested and is considered reliable and valid based on the results of the reliability test and validity test. The unidimensionality test and multicollinearity were also conducted on the data. The hypotheses of this study were tested by regression analysis; examination of the innovation capability aspects and their relationships to overall performance suggest that some aspects of the innovation capability are related to overall performance. The results show that just two hypotheses are supported, which are hypothesis 3: Leadership management is significantly and positively associated with the firm's overall performance, and hypothesis 9: The innovation process is significantly and positively associated with the firm's overall performance. However, there is lack of evidence to support the other eight hypotheses. These findings are based on data collected from both managers and employees in SMEs in Ireland. Therefore, the RQ can be answered according to the findings of this study, according to which the innovation process and leadership management are the most important aspects of innovation capability proposed by IVI that are directly and positively related to overall financial and operational performance among Irish SMEs. The results of this study and the hypotheses will be discussed in detail in the discussion section of the next chapter.

Chapter 5. DISCUSSION

Based on the findings shown in Table 9 (the hypotheses results), the first section of this chapter discusses the findings, and includes some comparisons between the findings of this study and other studies in the same field. This chapter also looks at the awareness of the strengths and weaknesses.

5.1. Discussion

This study has presented the results of examining the relationship between the innovation capability aspects proposed by IVI and firms' overall performance, based on SMEs in Ireland. The findings show that two important aspects of innovation capability have a significant and positive relationship with overall performance, namely innovation process and leadership management.

According to the results of this study, the innovation process is the most important aspect of innovation capability; it is significantly and positively associated with overall performance. This finding provides further evidence to support previous literature indicating that the innovation process has a positive relationship with a firm's performance. Jiménez-Jiménez and Sanz-Valle (2011) showed a significant and positive relationship between organizational innovation process and performance. The study of Murat and Baki (2011) demonstrated that the innovation process includes the creation or enhancement of a method as well as developing the processes or systems. While "process improvements can diffuse resources, may reduce optimal size, and facilitate learning curve effects, it positively impacts on SMEs growth". Therefore, the innovation process is critical to performance and in turn it leads to better firm performance. The authors showed a direct positive relationship between the innovation process and a firm's overall performance (Murat & Baki, 2011). The second most important aspect of innovation capability is leadership management. This aspect is also found to be significantly and positively associated with firms' overall performance. In contrast to this study, Saunila (2014) found a negative relationship between leadership culture and overall performance. However, the present study is in line with the findings of Zhu *et al.* (2005) which showed that leadership is a valuable resource and the key driving force for developing an organization's performance and competitive advantage. The authors found that leadership has a positive relationship with organizational performance.

On the one hand, some innovation capability aspects are directly and positively associated with a firm's overall performance. Therefore, enterprises should improve these aspects to achieve better and higher performance. On the other hand, this study has found that eight aspects of innovation capability were not associated with firms' overall performance. This study found that vision was not related to overall performance, whereas Calantone *et al.* (2002) found that vision was related to firm performance but through learning orientation. Another aspect that was also not found to be associated with overall performance is strategic planning. However, Song *et al.* (2011) showed that strategic planning plays an important role in enterprise growth and financial performance, and also that well-designed formal strategic planning facilitates conducting the innovation strategy successfully, which in turn improves enterprise performance. The authors showed that strategic planning has a positive relationship with performance (Song *et al.*, 2011).

This study found that there is no association between risk-taking and the overall performance of SMEs in Ireland. However, the literature review indicated that risk-taking leads to exploring growth opportunities as an important benchmark of the enterprise's innovativeness (Wang & Ahmed, 2004). In addition, García-Granero *et al.* (2015) found that employee creativity is considered to be part of organizational climate that supports taking risk, which in turn leads to improving innovation performance as well as a firm's overall performance. The authors found that there is a strong and positive association between risk-taking and firms' innovation performance (García-Granero *et al.*, 2015). According to the results of the current study, collaboration is not associated with firms' overall performance. Antikainen *et al.* (2010), however, found that employee collaboration is productive, effective and the best way to support creative innovations. Swink (2006) found that collaboration is important during the process of developing various products, that it leads to developing work quality, and also can accelerate introducing new products to the market, which in turn enhances overall performance. Serrano-Bedia *et al.* (2012) showed a positive relationship between cooperation in innovation activities and a firm's innovation performance.

Furthermore, the findings of this study indicate that capability development is not associated with a firm's overall performance. However, many studies have found that there is a strong and positive correlation between capability development and enterprise performance. Saunila (2014) found that know-how development has a significant and positive impact on overall performance, in the employees' views only. According to Jiménez-Jiménez and Sanz-Valle (2011), "organizational learning is a basis for gaining a sustainable competitive

advantage and a key variable in the enhancement of organizational performance”; their study also found a positive association between organizational learning and performance. Calantone *et al.* (2002) found that learning orientation is positively associated with a firm’s performance, whereby the higher degree of learning orientation the higher the firm’s performance. In this study, roles and responsibility (innovation activities) are not associated with a firm’s overall performance. This is aligned with the study of Saunila (2014) which also found that there is no connection between individual activities and overall firm performance. However, Serrano-Bedia *et al.* (2012) found that having a responsibility and participating in innovation activities leads to developing new capabilities and resources as well as gaining and maintaining competitive advantage. The authors found that internal innovation activities are positively related to a firm’s innovation performance (Serrano-Bedia *et al.*, 2012). It has been suggested that rewards and recognition are necessary and important to encourage innovation. Moreover, promotion and rewards schemes for individual efforts can result in achieving successful innovation outcomes, which in turn affects positively an organization’s performance (Prajogo & Ahmed, 2006; Martínez-Roman *et al.*, 2011). However, the rewards and recognition aspect in this study was not found to be associated with overall performance. The last aspect of innovation capability (knowledge management) is also not found to be related to overall performance. However, the study of Vaccaro *et al.* (2010) found that there is a direct positive association between knowledge management and overall financial and operational performance.

In this study, the finding that eight aspects of innovation capability are not associated with overall performance does not mean that these aspects do not have value or a role to play in improving performance. The value of the eight aspects in relation to performance may be achieved through other factors or aspects, or in particular organizational conditions. Furthermore, innovation capability is not the only factor that enhances performance; many different factors can do so. Innovativeness has a direct and positive effect on performance, according to many studies (Calantone *et al.*, 2002; Bowen *et al.*, 2010; Jiménez-Jiménez & Sanz-Valle, 2011). However, the aspects that help a firm’s innovativeness do not always have a direct impact on the improvement of the firm’s performance. According to Armbruster *et al.* (2008), organizational innovation is considered as a prerequisite for developing technical products and the innovation process efficiently, and thus organizational innovations will affect the productivity, quality and flexibility of the firm. Therefore, innovation capability aspects might have a relationship with a firm’s overall performance through intermediate measures. In other words, there are many factors that mediate between

innovation capability aspects to facilitate and achieve innovations and firm performance. That may be because the paths from innovation capability aspects to a firm's performance are difficult to track directly.

Another reason might be that this study was conducted on Irish SMEs, whereas the other studies mentioned above were conducted in different countries; the study of Saunila (2014) was conducted on Finnish SMEs, that of Jiménez-Jiménez and Sanz-Valle (2011) and Serrano-Bedia *et al.* (2012) were conducted on Spanish firms; that of Calantone *et al.* (2002) was conducted on US industries, that of Prajogo and Ahmed (2006) was conducted on Australian firms, and that of García-Granero *et al.* (2015) on Spanish and Italian industries. This may account for differences in the findings of this study. Another reason could be that SMEs in Ireland might still be lacking some specific resources for ensuring innovation, or it may be that performance is not adequately backed up by innovation.

5.2. Awareness of Strengths and Weaknesses

The strengths are:

1. The innovation capability aspects of the study are adopted from Innovation Value Institute (IVI) that is specialised in improving organisations' innovation capability by using framework (IT-CMF) based on empirical studies of the best practices.
2. According to the findings of this study, the content of the survey instruments (items) that are used to test the hypotheses is reliable and thus, the internal consistency and stability of the constructs show significant support for reliability.
3. According to the findings of this study, the content of the survey instruments (items) that are used to test the hypotheses shows strong support for the three types of validity tests which are content validity, convergent validity and discriminant validity.
4. The findings of this study support two hypotheses, the innovation process has a significant and positive relationship with a firm's performance and the leadership management has a significant and positive relationship with a firm's performance, which provides further evidence and strength to support previous literature.

5. The approach of this study allows it to be duplicated in various countries and over time along with producing findings that can be comparable.

The weaknesses are:

1. The findings of this study might not be fully generalized because they cover a particular country (Ireland) only and the number of responses is good but not high enough.
2. The dependent variable (firm performance) is measured by the subjective perceptions of managers and employees in Irish SMEs to evaluate the company's financial and operational performance and it is neither measured by the exact number of profit nor the exact number of products accomplished by the company because these kinds of information are difficult to be acquired and they are considered sensitive information for many companies.
3. There is lack of evidence to support the other eight hypotheses (vision, strategic planning, risk-taking, collaboration, capability development, roles and responsibility, rewards and recognition, and knowledge management have no direct affect on a firm's overall performance) because there might be moderators or other factors that mediate the link between these eight aspects of innovation capability and the firm's overall performance which do not exist in this study.

Chapter 6. CONCLUSION

This study investigated the relationship between organizational innovation capability, as proposed by IVI, and the overall financial and operational performance of SMEs in Ireland. Previous research examined different groups of innovation capability aspects that are shared by innovative organizations, and according to different types of innovations. Moreover, while the literature suggests the existence of a direct, positive and significant association between organizational innovation capability and a firm's performance, this study examined the relationship by taking into account the innovation capability aspects proposed by IVI in a single model. Based on the collected data and the analysis results, two hypotheses were supported by this study. This study concluded that the innovation process and leadership management are the most important aspects of innovation capability that are positively and directly associated with overall performance. It found that the other eight aspects of innovation capability – vision, strategic planning, risk-taking, collaboration, capability development, roles and responsibility, rewards and recognition, and knowledge management are not associated with overall performance. Thus, a higher level of innovation process leads to achieving higher overall financial and operational performance, and a higher level of leadership management leads to higher overall performance; companies therefore need to develop these capabilities in order to improve performance. With respect to the eight aspects of innovation capability that were not found to be related to overall performance, this study has suggested that there are other aspects or factors that mediate the relationship between these eight aspects and overall performance, and therefore further studies can be conducted to identify these aspects, and then the paths from these aspects of innovation capability to overall performance could be determined precisely. In addition, the findings of this study might not be fully generalizable because they cover a particular country (Ireland) only and thus further studies could be conducted to cover other countries.

6.1. Problem Definition and Research Overview

Many studies have concentrated on the organizational stages of innovation. Most studies address the common innovation capability aspects or factors that are shared by innovative organizations, particularly the capabilities or factors that impact on the competencies that help managing innovation. The main issue is that each of the researchers studied different categories of innovation capability, in terms of different types of innovations; some focused on innovation capability in the same terms as other researchers, while others focused on just one or two categories of innovation capability (e.g. the human factor, or organizational factor). Furthermore, most of the studies that examine the relationship between innovation capability and performance are conducted on large companies. However, SMEs could benefit by enhancing, communicating, developing and embracing innovation. According to Rosenbusch *et al.* (2011), SMEs have greater opportunities to grow and succeed operationally and financially.

Therefore, the main purpose of this study is investigating the relationship between innovation capability aspects proposed by IVI and the overall firm financial and operational performance in the context of Irish SMEs. Where IVI is specialised in improving firms' performance through developing their capabilities, and it constructed a standard framework (IT-CMF) that is based on the empirical studies of best practices in the industry. This framework is used by many global companies to resolve capability issues.

6.2. Contributions to Body of Knowledge

The gist of this study is to explore more knowledge and to add value to the existing body of knowledge. The results of this thesis have implications on the researchers in this area. Despite the fact that the topic of the relationship between innovation capability and organizations' performance has been examined among various researchers, this study is considered the first attempt to connect innovation capability proposed by IVI with the overall firm's financial and operational performance in Irish SMEs. Where, IVI is specialised in developing firms' capability to innovate. This study showed that some aspects of innovation capability have positive and direct effects on achieving higher performance. Consequently, firms should enhance their performance through improving these aspects of innovation capability. Therefore, the findings of this study provide important contributions to the

existing literature. First, the evidence provided in this study found that the innovation process is significantly and positively associated with the firm's overall performance. Thus, firms should consider innovation process as a common standard and practises, employees should be given sufficient resources to generate and develop new Ideas, firms should explore and utilize opportunities for a new or developed product, process or service, and firms should also invent or develop a method or system for innovation process. This result has important implications and is considered as a major contribution for the organizations to achieve innovations and enhance their performance. Second, the findings of this study support the fact that leadership management has a positive contribution to the firm's overall performance. Therefore, leadership is a valuable resource and the key driving force for developing an organization's performance by increasing the level of innovation and gaining competitive advantages. Managers should have clear understanding of the organizations' environment and the nature of innovations in order to assist the organizations to prioritize their production, technology strategies and market. In addition, managers should also encourage employees to develop, learn and innovate, and appreciate employees' achievements toward innovation. This finding is an important contribution to the management operations, innovation and performance (especially for SMEs). Thirdly, the findings of this study indicates that the other eight aspects of innovation capability namely vision, strategic planning, risk-taking, collaboration, capability development, roles and responsibility, rewards and recognition, and knowledge management have no association with the firm's overall performance in contrary to the previous innovation researches. Thus, this study suggested that these eight aspects of innovation capability might have positive contributions in achieving better firms' performance through moderators of other factors. Finally, the results of this study consolidate the fact that "innovation strategy is an important major driving force behind firm performance and should be developed and executed as an integral part of business strategy" (Kafetzopoulos and Psomas, 2015). In brief, this study can act as a guide for the organizations (especially SMEs in Ireland) to know how to achieve higher performance by fostering and conducting innovation.

6.3. Limitations

Although this study has some interesting findings on the relationship between innovation capability aspects and firms' overall performance, it has some limitations, like any other study.

The first limitation was time constraint, in that there was pressure to prepare the survey in a very limited time. Furthermore, the survey was distributed a few days before the Easter holiday, and the employees were on holiday shortly after this, which limited the number of responses.

The second limitation is that the distribution of the survey was heavily dependent on online methods, which also limited the number of responses. While there was a plan to use offline methods, such as conducting interviews, due to the time constraint mentioned above the plan was adjusted and no offline methods were used.

The third limitation is that this study was conducted in a particular country (Ireland) and specifically on SMEs that employ from 10 to 249 people and have revenue from €2m to €50m, which made the mission of collecting a sufficient number of responses more difficult; thus there was a limitation in the types of companies that were covered.

The fourth limitation is that the data of this study was according to the subjective perceptions of managers and employees in Irish SMEs. Most of the responses were received from employees, and thus employees' opinions predominated in the results and to that extent biased the findings.

6.4. Future Work

According to the findings of this study, there are several starting points for further studies. First of all, there are eight aspects of innovation capability that were not found to be related to a firm's overall performance, which is somewhat contrary to previous studies. Therefore, there might be other aspects or factors that mediate the relationship between these aspects and overall performance; further studies could identify these aspects in order to define exactly the paths from these aspects of innovation capability to a firm's overall performance. Secondly, this study investigated the association between each aspect of innovation capability and overall performance. However, it is not obvious whether each aspect of innovation capability correlates more with financial performance or operational performance. Therefore, future studies could usefully study this subject. Thirdly, the findings of this study are based on considering the overall subjective perceptions of managers and employees together. Therefore, it is not clear whether these findings were supported more by managers or by employees; thus further studies could conduct more analysis to distinguish the managers' perceptions from those of employees.

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APPENDIX A: SURVEY QUESTIONNAIRE

Investigating the relationship between innovation capability aspects and Firm Performance with SMEs in Ireland

Study Information

The aim of this questionnaire is to determine the most important aspects of the innovation capability that significantly and positively related to firm performance and lead to achieving higher performance in the context of Irish Small- and medium-sized enterprises (SMEs). This can be done by studying the relationship between each individual aspect of innovation capability and firm performance. Managers and employees in Irish Small- and medium-sized enterprises (SMEs) only can answer this survey to help me to continue my research for my master degree in Dublin Institute of Technology (DIT). I assure you that all responses you provide will be kept confidential and stay anonymous.

Concerns

Be assured that all responses you provide will be kept confidential and stay anonymous. This survey should take around 6-7 minutes to answer.

Gratitude

I am really Grateful to all the respondents and appreciate your time and cooperation. Thank you very much.

Maryam Bukhamsin

Part 1: Background Information.

1. The company's revenue (Million Euro):

- 2-10 million Euro.
- 10-25 million Euro.
- 25-50 million Euro.

2. The number of employees in the company:

- 10-49 employees
- 50-149 employees
- 150-249 employees

3. Your position in the company:

- Manager.
- Employee.

Part 2: Innovation Capability.

Vision:

4. Our company has a clear common purpose for innovation.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

5. Our company's Employees and managers at all levels and division have a common understanding of the organizational vision.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

6. Employees are willing to act for the innovation visions and goals.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree

Strongly agree

7. Innovation vision in our company is in alignment with projects, platforms, or initiatives.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

Strategic Planning:

8. In our company, the strategic planning process is a very formal process.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

9. The strategic planning in our company is an explicit process in determining specific long-term objectives.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

10. In our company, the strategic planning includes an explicit procedure for generating alternative strategies.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

11. The managers in our company involve employees in the strategic decision making.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Leadership Management:

12. The managers convey the employees' ideas to the higher levels of the company.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

13. In our company, the employees' achievements are appreciated by the managers.

- Strongly disagree
- Disagree
- Neither agree nor disagree

- Agree
- Strongly agree

14. The managers in our company possess the right leadership qualities to participate in ideation in order to support innovation.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

15. Managers actively encourage a culture of change, development, learning, and innovation towards 'excellence'.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

16. Employees have the opportunity to take part in implementing the changes in our company.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Risk-Taking:

17. In our company, the employees are encouraged to generate new ideas and take initiatives

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

18. Employees have the confidence to take risks in our organization.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

19. Our company frequently participates in high-risk projects with expectation of high return.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

20. Our company encourages creative risk-taking.

- Strongly disagree
- Disagree

- Neither agree nor disagree
- Agree
- Strongly agree

Collaboration:

21. There is an effective environment for collaboration between employees and thus collaboration works well in our company.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

22. Collaboration among employees is productive because the diversity leads to increase creativity and superior innovation.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

23. In our company, Collaboration among the employees help to share values and purpose, generate new knowledge and develop employees' ideas further.

- Strongly disagree
- Disagree
- Neither agree nor disagree

- Agree
- Strongly agree

Capability Development:

24. In our company, employees' multi-skills and trainings are utilised to improve performance.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

25. Management in our company considers that employee learning is an investment and not as an expense.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

26. Our company has a wide range of training and development process that include career path planning for all the employees.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree

Strongly agree

27. Continual organizational learning is motivated and there are opportunities to develop employees' skills and capabilities toward supporting innovation in our company.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

Roles and Responsibility:

28. In our company, many employees participate in innovation programmes or activities.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

29. The employees are assigned with innovation roles in their job description in our company.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

30. Our company allocates sufficient time to innovation roles or activities.

Strongly disagree

- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

31. The employees in our company know how to act critically when current ways of action is needed.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Rewards and Recognition:

32. In our company, employees are recognized and rewarded with non-monetary rewards for their creativity and innovative ideas.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

33. In our company, employees are rewarded financially (bonuses and higher salaries) for their creativity and innovative ideas.

- Strongly disagree
- Disagree

- Neither agree nor disagree
- Agree
- Strongly agree

34. Our company has a reward system that suggests schemes, recognition and financial bonuses for employees' creative behaviour.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Innovation process:

35. Innovation process is considered as common standards within our company.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

36. In our company, employees are given sufficient resources to generate and develop new Ideas.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree

Strongly agree

37. Innovation processes in our company include exploring and utilising opportunities for a new or developed product, process or service.

Strongly disagree

Disagree

Neither agree nor disagree

Neither agree nor disagree

Agree

Strongly agree

38. Our company is up to date in adopting the latest technological innovations in our processes.

Strongly disagree

Disagree

Neither agree nor disagree

Neither agree nor disagree

Agree

Strongly agree

39. In our company, if the employees cannot tackle a problem using standard methods, they invent new methods.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

- Strongly agree

Knowledge Management:

40. In our company, knowledge management plays an important role for managing and utilising internal and external knowledge for innovation management.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

41. In our company, the accumulation of intellectual capital is considered important to management to acquire competitive advantage.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

42. Our Company manages its own intellectual assets like special techniques, patents, copyrights, licenses.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

43. Our company opens and maintains physical and virtual channels for information and knowledge sharing.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Part 3: Performance

44. Your company's financial performance (profitability: net profit, income growth) in the past three years.

- weak
- good
- very good
- excellent

45. Your company's operational performance (productivity: accomplished projects or products) in the past three years.

- weak
- good
- very good
- excellent