Innovation as a Strategy in Project Management

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by

Theofilos Rizos

Grenfell-Baines School of Architecture, Construction and Environment

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Supervisor: Mr. Chris Pye

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Declaration

This work is submitted to the University of Central Lancashire in partial fulfilment of the Degree of Masters in Project Management. I declare that the work presented here is my own work. The work cited from mass literature is duly referenced using Harvard Referencing System.

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Theofilos Rizos

15th of Feb 2016

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ABSTRACT

Abstract of a dissertation entitled Innovation as a Strategy in Project Management for MSc in Project Management, at the University of Central Lancashire in January 2016.

The concept of strategic innovation has evolved nowadays into a 'hot topic'. This is, due to its importance and the impacts the recent economic downturn had on organisations, enforcing them to explore its adoption as a way out. Still, the evident competitive advantages gained by firms that implement different innovative management approaches are not met in combination within current literature, whereas their aid to organisations in overcoming the recent recession is surface explored. Thus, this study aims to identify the aforementioned concept, explore its significance for European manufacturing organisations, evaluate the combined competitive advantages gained by firms, and analyse their assistance to companies in overcoming the recent economic crisis.

For this reason, a literature review has been deployed analysing in-depth the concept of innovation as a strategy, along with its significance for firms. Moreover, a quantitative method of research was adopted consisting of questionnaires, distributed to European organisations, using techniques like hand by hand, emails and social media. This resulted in a sample of 54 managers, analysed using SPSS and Excel. In this way, this research's effort in evaluating the competitive advantages gained by the combined adoption of Lean, 6 Sigma, BSC, and BIM, as well as their aid in overcoming the recession, was assisted by experienced managers involved in the decision making policy of the firms they work for.

According to the study's findings, the vast majority of European organisations adopt innovation within their activities, highlighting its significance. Moreover, economic and time benefits have been identified as the main gains of the combined usage of Lean, 6 Sigma and BSC, as BIM's adoption by the manufacturing industry was validated slow and its beneficial aid to firms couldn't be effectively assessed. Still, the aforementioned benefits were also evident after the economic crisis, assisted additionally by organisational gains and sustainability. Thus, all objectives have been met, leading to an overall fulfilment of this study's primary aim.

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Abbreviations

BSC	Balanced Scorecard
BIM	Building Information Modelling
PM	Project Management
OL	Organisational Learning
OC	Organisational Culture
NPD	New Product Development
NSD	New Service Development
LSS	Lean Six Sigma
OI	Organisational Innovation

CHAPTER 1 - INTRODUCTION

1.1 - Background

Due to continuously changing environment, highly competitive market and demanding for individualization customers, innovation tends to become organisations' main driver for existence and expansion (Xu et al., 2012). However, restricting innovation merely to technology is not enough. Organisational formation and culture, market environment, strategy of innovation and management type play also a big part in influencing the innovation's efficiency (Paladino, 2011).

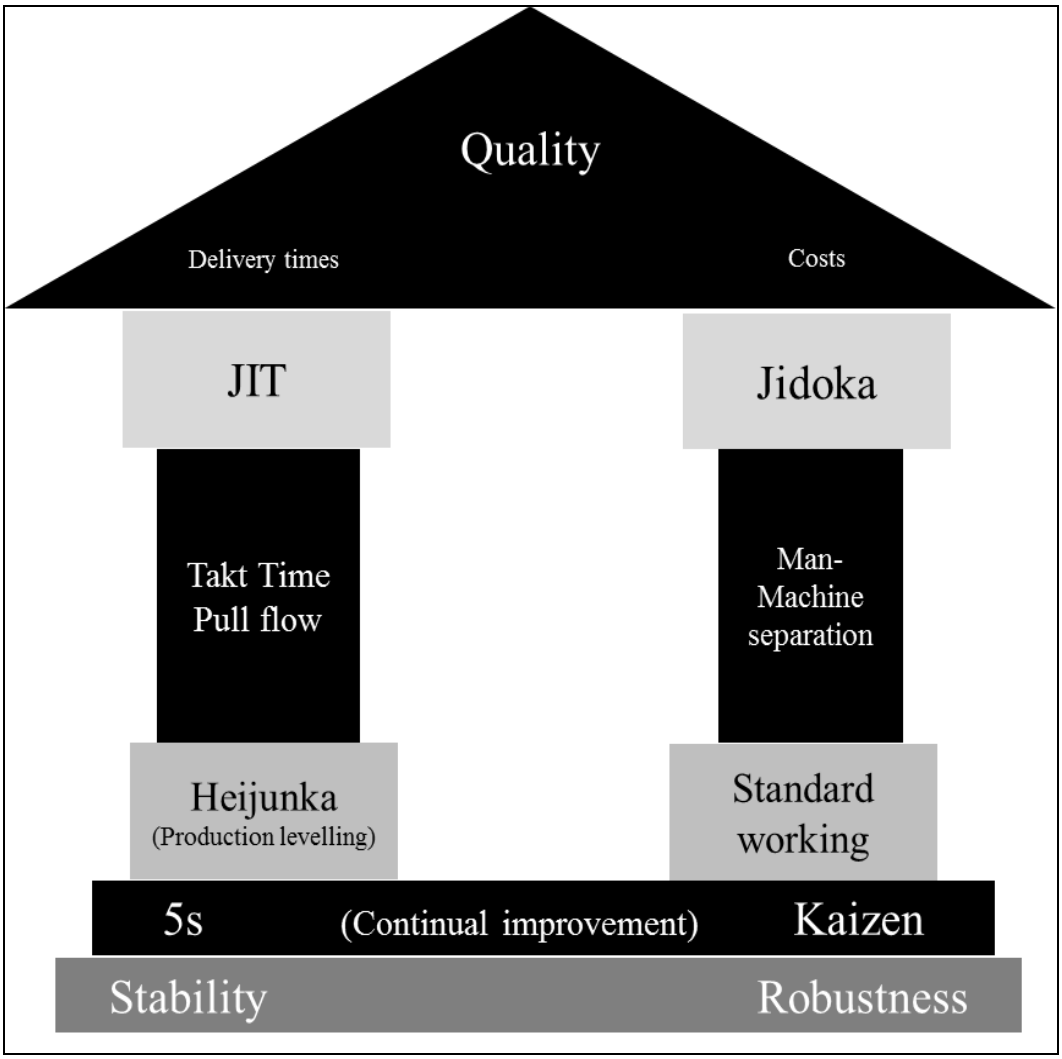
In this framework, innovation can be regarded as the successful development and/or execution of new ideas, products, technologies, or processes in order to increase efficiency and performance of organisations (Egbu et al., 1998; Panuwatwanich et al., 2008), and is categorized in several ways by innovation pioneers such as Schumpeter (1934) and Damanpour (1991). Still, its most common categorization is OECD's (2005): product, process, marketing and organisational innovation.

Regardless of such distinctions, though, innovation, as a meaning, plays a key role in organisational growth and evolution. Especially within the recent economic downturn, Rose (2010) states that innovative approaches should be regarded as the path to reinvigorate firms and ensure their revival. Hausman and Johnston (2014, p. 2721) enhance this statement, by regarding them a guarantee of *'stronger, healthier and more stable economy emerges'*. Furthermore, innovation is considered to be a competitive advantage generator for organisations (Baden-Fuller and Pitt, 1996; National Science Board, 2009) and, thus, should be the centre of strategy in all organisational levels (Oh et al., 2015). For this reason, the term is frequently adopted nowadays and has evolved into a, so called, 'hot topic'; however, it originated decades ago (Yang et al., 2012).

Lean Manufacturing or Production is an organisational innovative approach introduced in 1913 by Henry Ford and developed by Kiichiro Toyoda and Taiichi Ohno, during the 30s and especially after World War 2, in what is nowadays known as Toyota Production System (Feld, 2001). It is a systematic method for maximizing customers' value by eliminating waste (Womack et al., 1990). Lean uses several tools

and techniques aiming to specify value for customers, determine value flow for each product, introduce pull systems and decrease number of steps, information and time required (Taghizadegan, 2006).

Figure 1.1 Lean Manufacturing



Source: Rizos, (2016) adapted from: Procesportaal, (2015). Inleiding – Wat is Lean Manufacturing [online]. Available from: http://www.procesportaal.nl/categorieen/leanmanufacturing/ [cited 20 May 2015]

In addition, 6 Sigma is a set of tools and techniques, frequently combined with Lean Manufacturing nowadays (Burton, 2011). It was developed by Motorola in 1986 and established by G.E. as a business strategy in 1995, aiming to achieve predictable and stable processes producing defect-free outcomes with defined characteristics that can be measured, analysed, improved and controlled (Oppenheim, 2011).

During the 90s, new, innovative management approaches were introduced, including the Balanced Scorecard (BSC), and Building Information Modelling (BIM). BSC was introduced in 1992 by R. Kaplan and D. Norton. It is not only a recording tool of accomplished results, but an indicator of expected ones too, aiming to communicate strategy within an organisation (Kaplan and Norton, 1996). Furthermore, BIM is a lifecycle process of information management aiming to enhance data quality and interoperability, as well as cooperation between projects' participators (Ezcan et al., 2013). However, it is widely adopted by the construction industry, whereas exploitation of it within the manufacturing industry is not yet met.

Taking all of the above into consideration, innovation is the way forward for organisations, giving significant competitive advantages for growth and prosperity. However, a combined adoption of the plethora of the existing innovative approaches that exist is not analysed in depth within current literature, while innovations like BIM are not used at all in the manufacturing industry, which is the dissertation's area of research. Thus, combined competitive advantages that can be gained by enterprises are not explored, while, innovation as the answer to the recent economic recession is surface analysed. It is obvious, therefore, that gaps exist that require further investigation and analysis.

1.2 - Statement of problem

As mentioned briefly above, although all types of innovation are widely acknowledged as competitive advantage generators for organisations, their combined exploitation, as well as its positive repercussion for the organisations is not explored in detail. Especially, within the recent economic downturn, innovation is mainly inspected as a 'victim', instead of an answer to it. Thus, innovations' significance should be emphasized once more, along with the combined competitive advantages gained by the adoption of innovative management approaches, highlighting their role in overcoming economic recessions (in general) for firms that wish to thrive and grow.

1.3 - Aim and objectives

This research aims to fill the gap mentioned above, by investigating whether and how innovation can be applied as a strategy in project management, in order to give

organisations a competitive advantage and assist their effort in overcoming the recent economic downturn.

Its objectives are:

- To identify the concept of innovation as a strategy,
- To explore strategically applied innovation's significance,
- To evaluate the competitive advantage given to manufacturing organisations, and
- To analyse its aid in overcoming the recent economic recession.

1.4 - Scope and Limitations

The scope of this study is European, as innovation's adoption should provide organisations with significant competitive advantages, irrelevant of the country or region they come from, and/or do business in. Moreover, today's globalization in markets enforces this choice, as business leaders expand their activities throughout the world, demonstrating that the benefits gained can't be restricted in a specific country or region. Still, important market characteristics in America or Asia, for example, that might affect innovation's adoption and its impact on organisations, can't be properly identified by the author. This is due to lack of working experience in these areas, and, hence, it was chosen that the study should be restricted in Europe solely. In addition, the research is focused on the manufacturing sector. The reason behind this choice is the author's main profession, which is mechanical engineering and, thus, a link between this main profession and a relevant industry is aimed, excluding sectors like the construction, or service, which are considered to be beyond this study's area of research.

1.5 - Methodology

In order to achieve the aforementioned aim and objectives of this research, a quantitative methodology was used. This methodology refers to about 50 questionnaires, targeted at business professionals (managers, directors, etc.) with different positions and experience within their organisations. However, all of them should have at least 10 years of experience in a relevant position, as well as decide themselves, or participate in the strategic decision making process of the organisation they work for, so as full awareness of the researched topic is secured. Finally,

questionnaires were distributed using several techniques (hand by hand, emails and social media), and analysed using a content analysis approach, like SPSS and Excel.

1.6 - Structure of the Dissertation

This dissertation is divided into 5 chapters, the contents of which are as follows:

Chapter 1 is an introduction to the study, highlighting the need for it along with its aim and objectives.

Chapter 2 is an in-depth literature review on the topic of strategic innovation in project management, the issues of which are analysed at the end of the chapter.

Chapter 3 details the chosen methodology used in the dissertation, along with the required justification.

Chapter 4 analyses the main outcomes of the study, consisting of questionnaire findings. These findings are demonstrated in accordance to the main study questions mentioned in chapter 1.

Chapter 5, at last, sums up the research contributing the required conclusions and recommendations for both academic and professional interested parties.

CHAPTER 2 – LITERATURE REVIEW

2.1 - Introduction

This chapter is an analytical literature review of the topic Innovation as a Strategy in Project Management and is divided into three sections. The first section is about the concept and history of innovation in project management in general. The second one discusses the main innovation types available, along with the innovative management approaches adopted nowadays and their significance in providing competitive advantages to organisations. The final stage of this chapter analyses innovation's benefits, as well as the impact the recent recession had and has on innovation. Overall, chapter 2 aims to fulfil objectives 1 and 2 underlined in section 1.3

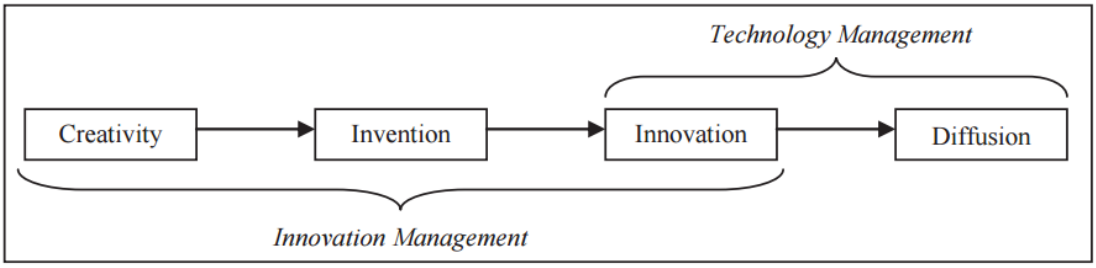
2.2 - Innovation in Project Management – Concept and History

When asked, during a presentation, of how sustainable growth can be achieved, the Procter and Gamble (P&G) executives' answer was: "*innovation, innovation and*

innovation" (Holtzman, 2008, p. 1044). Moreover, Kerber and Laseter (2007), enhance this statement, by using PepsiCo chairman's description of innovation as the core essence of every prosperous products firm. Thus, it is obvious that, innovation is the basic ingredient of organisations' success and growth, being acknowledged as an element of evolution and competitiveness within the era of knowledge-driven economy (Milutnovic and Stosic, 2013). After all, without innovation, new goods, services, or ways to manage business would never take place and development would have stalled (Milic, 2013)

If firms are to continue their existence in Schumpeterian, dynamic markets, they should be able to effectively deal with growing complexity and change (Jimenez-Jimenez and Sanz-Valle, 2011). Innovation aids organisations deal with turbulence caused by external factors and, thus, is the way leading to long-term prosperity (Baker and Sinkula, 2002). Potential challenges can be faced sooner and new opportunities regarding products, processes, markets and organisational structures can be taken advantage of in a better way than 'traditional' organisations (Darroch and McNaugton, 2003). However, innovation shouldn't be misinterpreted as invention, as it includes the practical application of creative ideas or inventions (Trott, 2005). As Turker (2012, p. 149) suggests, innovation and invention are related according to the equation: '*Innovation = theoretical conception + technical invention + commercial exploitation*'. For clarification purposes, figure 2.1 describes the relationship between inventions, innovation and technology.

Figure 2.1. Relationship between invention, innovation and technology



Source: Turker, M. V. (2012) 'A model proposal oriented to measure technological innovation capabilities of business firms – a research on automotive industry' In: *Social and Behavioral Sciences.* **41** (1), pp.147-159, p. 149

At the same time, though, specific characteristics are required by innovative firms, in order to effectively accomplish the planned innovation. Archibugi et al. (2013) state that such, innovation-driven organisations can be separated into two categories:

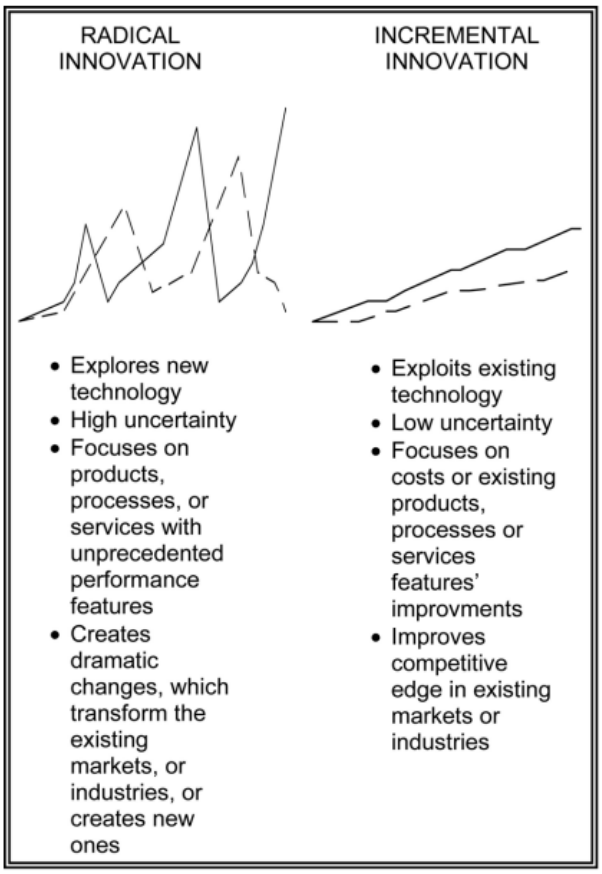
- Those following the creative accumulation procedure, which is characterized by accumulation and less opportunities, led, mainly, by established organisations. In such environments, innovation is more of a routine for these organisations, reforming existing products incrementally, which ensures low costs and prices, high competitiveness, altered and improved products.
- Those following the creative destruction procedure, which, on the other hand, is characterized by less accumulation, but high technological chances, leading to dynamic market environments, where entrepreneurs and rivalry rule the game. Such inventors create their own technological chances in means of firms or even industries, changing the economic environment.

OECD (2005) supports this distinction, regarding the organisations that follow the first model, reactive (so as they avoid losing market share), and the ones that follow the second model, proactive (so as they gain a strategic market position). Thus, innovative firms that follow the reactive strategy tend to be radical, inventive and first movers, whereas those following the proactive strategy appear to be incremental, imitative and late comers (Chang et al., 2012). Consequently, the most innovative companies seek to rapidly enlarge their market orientation, by establishing new markets and environments, instead of aiming just for technological innovations (Christensen, 2002). Typical examples, according to Oh et al. (2015) are Microsoft's attempts to the nuclear power industry, Google's exploration of the automotive industry and, of course, Apple's creation of the new smartphone market.

2.2.1 Incremental and radical innovation

In this point, it should be mentioned that, dealing with radical or breakthrough innovation is quite dissimilar to dealing with incremental or continuous innovation (Koen et al., 2010; Phene et al., 2006). Such differences are illustrated in figure 2.2 below.

Figure 2.2 Differences between radical and breakthrough innovation



Source: Milic, T. (2013) 'Innovation Management in Times of Economic Crisis' In: *Journal for Theory and Practice Management.* **66** (4), pp. 81-88, p. 84

Specifically, organisations adopting incremental innovation direct their focus on exploitative, effective, and lining-up operations, whereas those adopting radical innovation are oriented towards exploring, flexibility-upgrading, and adjusting operations (Chang et al., 2012). In order to clarify the aforementioned characteristics, a comparison of their attributes is analysed in table 2.1.

Table 2.1: Characteristics comparison between Incremental and Radical innovation

	Incremental Innovation	Radical Innovation
Accent	Upgrade of attributes of goods, services or procedures	Development of new organisational structures, goods and/or procedures that form organisational economies
Technology	Usage of the current technology	Exploration of new technologies
Prototype creation	Rectifying flaws in the design step	Informing the market about new technologies and learning from it, regarding their application
Trajectory	Linear and ongoing	Periodical and intermittent
Business case	A thorough plan can be initiated at the start of a procedure	Organisational structure and plan are developed by knowledge acquisition throughout the creation process
Generating ideas and recognizing opportunities	Applied at first with crucial phenomena being speculated and foreseen	Applied occasionally as a response to the on and off path that follow
Key players	Cross functional teams	Cross-functional people
Process	Stable, phase model	Adjustable model to changes, and stable model after uncertainty is eliminated
Organisational structures	Cross functional project team works within a business unit	Project begins in IR, migrates into organization of the incubation period Í transformation into the goal-guided project structure
Resources and competencies	Standard budgeting of resources and availability of all competencies needed	Innovative procurement of competencies and flexible supply of resources internally and externally
Ways of inclusion of operating department	Standard from the beginning	Adjustable at first - stable in later stages

Source: Rizos, 2016, adapted from Milic, T. (2013) 'Innovation Management in Times of Economic Crisis' In: *Journal for Theory and Practice Management.* **66** (4), pp. 81-88, p. 85

Based on these findings, innovation projects can be categorized in three ways: breakthrough, platform and derivative projects (Brook and Pagnanelli, 2014; Leifer et al., 2008). The difference between them refers to the alteration degree in goods or market and technology. However, due to global tendencies, new innovative organisational structures are required in order to meet consumers' demands and, thus, innovation projects' scope has expanded into new organisational models too (Brook and Pagnanelli, 2014). Taking all of the above into account, a derivative project takes advantage of incremental innovations in order to accomplish costs decrease, competence upgrade and consumers loyalty, whereas, a breakthrough innovation

project adopts radical innovations, characterized by novel, disruptive expertise aiming to reach new markets and profits (Lundvall and Vinding, 2004). At last, platform projects stand in the middle of these categories, using and expanding on existing methods in order to enlarge the market and consequently profits (Gawer and Cusumano, 2007).

However, especially large organisations tend to lag behind when bringing in such innovations, due to inadequate frameworks and models followed, such as limited exploration, ineffective planning and assessing methodologies, stiff structure and culture, inaccurate staff-hiring and reward policies, and risk avoidance (Birkinshaw et al., 2007; Juransin, 2009; McLaughlin et al., 2008). Thus, literature suggests that, organisations should adjust their learning mechanisms and strategic design, use suitable assessment procedures and set up common enterprise capital, in order to assist and take full advantage of innovation (Kelly, 2009).

In consequence, several authors have pointed out the existence of inhibitors that obstruct organisations identify, design, assess, manage and practice innovation (Stringer, 2000). According to them, organisations lack the methods, culture, governance and workforce to apply innovation of all types (McLaughlin et al., 2008). Such inhibitors refer to restricted organisational exploration (Junarsin, 2009), inadequate design and assessment structures (Birkinshaw et al., 2007; Stringer, 2000), stiff organisational structure (Birkinshaw et al., 2007; Junarsin, 2009; McLaughlin et al., 2008; Stringer, 2000), defective repayment and bonus models (Birkinshaw et al., 2007; Stringer, 2000), and avoidance of new domain exploration (Junarsin, 2009). Moreover, Valmohammadi (2012) has identified consumer-centricity, firm's structure, bureaucracy and exorbitant policing as innovation's obstacles.

On the other hand, McLaughlin et al. (2008) argue that innovation is driven by an organisational culture that substantiates risk-taking, independence and self-governance. O'Connor and McDermott (2004) support this argument, by calling such culture 'autonomous', which encourages uniqueness, inventiveness and, at the same time, tolerates potential failures. Consequently, Ekvall (2000) proposes companies to recruit inventive, innovative individuals, in order to achieve the appropriate, innovative environment, which is, also, encouraged by diversity within innovation project teams (Cabrales et al., 2008). Sammut-Bonnicci and Paroutis (2013) have

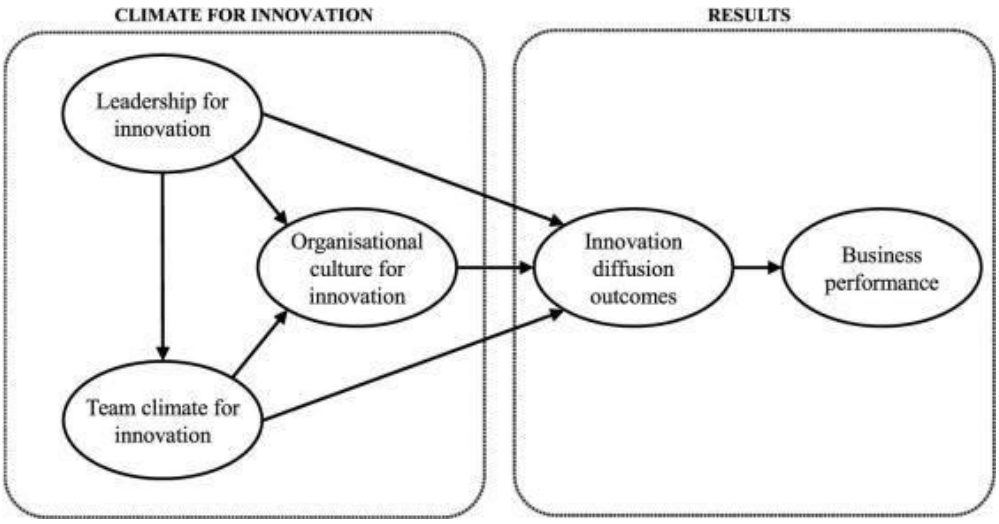
identified and summarized the main causes that lead enterprises into the decision of innovation's adoption and implementation into:

1. Market and industry differentiations,
2. Organisation's own enterprise,
3. Decision makers' strategy and business environment's analysis,
4. Inner and outer social networks.

2.2.2 Innovation drivers

Taking all of the above into account, leadership, (organisational) culture and team climate can be identified as the absolute essentials of a successful innovation adoption (Abdi and Senin, 2014). These are the drivers, without any of which, innovation can never be efficiently implemented, as they're directly related to each other. Thus, their effective collaboration within organisations results into the required diffusion of innovation and, consequently, into improved organisational performance (Laursen and Salter, 2006). As a capping stone, Panuwatwanich et al. (2008, p. 409) provide a model embodying the interrelationships between the aforementioned innovation key essentials, demonstrated on figure 2.3, below:

Figure 2.3: Innovation drivers



Source: Panuwatwanich, K., Stewart, R. A. and Mohamed, S. (2008) 'The role of climate for innovation in enhancing business performance: The case of design firms' In: *Engineering, Construction and Architectural Management*. **15** (5), pp. 407-422, p.409

Leadership is highlighted in literature as one of the most significant innovation principals, as leaders can determine the innovative initiatives, set up objectives and goals and promote the creation of a proper culture (Harbone and Johne, 2003; Montes et al., 2005). Top management can affect a proposed strategic option in order to make an innovation emphasis easier, aiming to preserve competitiveness (Talke et al., 2010). Especially the type of leadership followed can affect innovation in many ways. Transformational leadership incorporates the strategic planning of organisational change and adjustment, uninhibited environment, workforce evolution and failure tolerance (Aragon-Correa et al., 2007). Thus, such leaders focus on long-term goals, initiating a vision, which people are encouraged to strive for and organisational structures are altered accordingly to address it (Panuwatwanich et al., 2008). Additionally, Talmaciu et al. (2015) state that, both, organisations and individuals are affected positively, as there's confidence in the leader, vision is facilitated, conflict is disputed and group unity is enlarged. Team building and its supply with orientation and assistance is their responsibility (Blackler and McDonald, 2000). Moreover, they should assist operations of Organisational Learning (OL), mutual beliefs within team members, motivation, self-assurance and proactive behaviours (Aragon-Correa et al., 2007). As a summary, Panuwatwanich et al. (2008) state that leaders who want to affect culture, team environment and, consequently, innovation results should follow the basic attitudes demonstrated below:

- Generate and communicate vision,
- Look for and foster new concepts, methods and endeavours,
- Promote and assist people's inventiveness,
- Guide people in achieving an innovative attitude,
- Promote their involvement throughout the innovation procedure, and
- Confer with team members before reaching a decision.

Organizational Culture (OC) can be described as the "*values, beliefs and hidden assumptions that organizational members have in common*" (Abdi and Senin, 2014, p. 3), and plays a significant role in managing and spreading innovation (Egbu et al., 1998). Several researches underline the effect that a culture promoting creativity, inspiring people and enabling spreading procedures, has on implementing innovation (Hartmann, 2006; Hivner et al., 2003). As Hartman (2006) states, people that

experience supportive actions by the organisation realize that innovation is valued and, thus, feel inspired to innovate themselves. In consequence to leadership findings demonstrated above, firms with the appropriate, innovative OC tend to have high flexibility, independence and failure forbearance (Panuwatwanich et al., 2008). Inventiveness is fostered, innovative endeavours are valued and considered a bonus and resources are allocated appropriately to assist such efforts' completion (Hartman, 2006). Thus, it is obvious that, leadership and culture characteristics required are in complete accordance regarding innovation and should be taken into consideration if successful innovation is to be implemented.

At last, depending on the culture or climate within a team implementing innovation, it can be either hampered or promoted. Bain et al. (2001) considers the collaboration of people's capabilities and expertise, coming from different social circumstances and outlooks, as the perfect generator of inventive and innovative behaviour promotion. Nonaka (1994) agrees to this, stating that innovation takes place when personnel's knowledge is communicated within an enterprise and is translated into new and shared intuitions. To be innovative, firms have to attract, single-out, evolve, and maintain people with creative potential, as they're the origin of creative ideas (Matthew and Sternberg, 2006). Consequently, organisations focusing on team building and suitable environment shaping create the way by which innovation can be actually promoted (Talmaciu et al., 2015). Panuwatwanich et al. (2008) have identified the essential factors required for a productive team environment, which include:

- A vision of clearly determined and communicated objectives, which will guide and motivate teams,
- Safety of participants, meaning that people involved in the decision-making process aren't criticized, but encouraged and fortified instead,
- Duty orientation, which means that objectives and performance should be dealt with a common, top-quality attitude, as it will reflect on the desired goals and strategy fulfilment, and
- Innovation support, meaning that all such endeavours should be treated with consensus and actual backing, so as new, upgraded methods are achieved.

Having secured the above essential requirements, innovative firms need to embrace and implement an appropriate strategy. The main innovation strategies identified for organisations refer to: adapt/adopt strategy, gradual/sustaining innovation strategy and breakthrough/disruptive innovation strategy (Reif, 2013). The first one is the easiest, and less costing and risk-taking strategy, involving imitation and technology obtaining (Steward and Fenn, 2006). The second one identifies the value-adding ingredients within products and processes, and expands them for even better outcomes (Cheah and Chew, 2005). Thus, organisations explore new production routes, upgrading their routines and by doing that, they moderate costs, effort, and risks. At last, the third strategy requires high costs and risk-taking as organisations following it seek the innovation (of any type) that will give them the ultimate competitive advantage, outdating competitors (De Kluyver and Pearce, 2009).

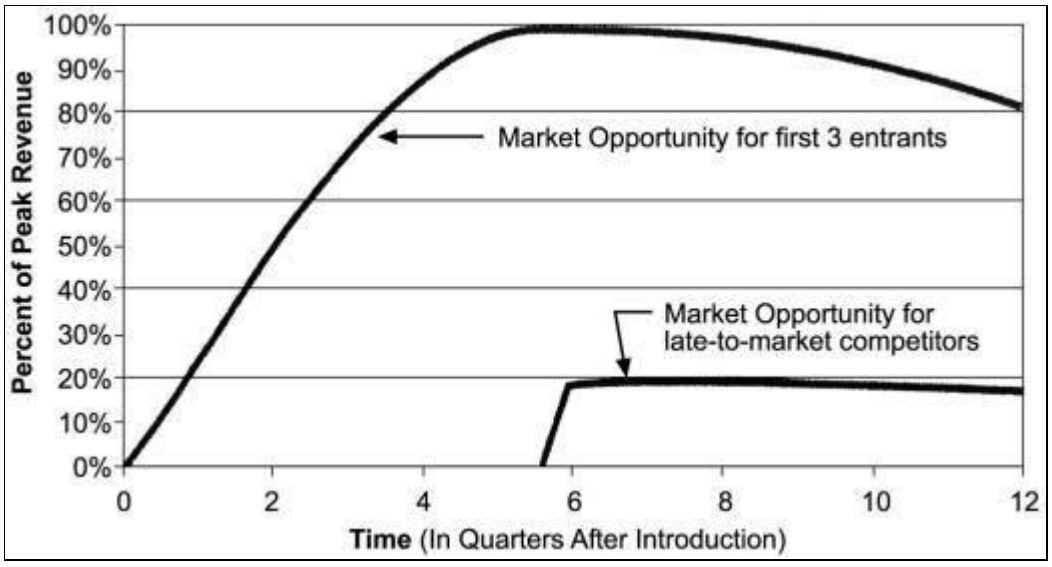
Therefore, it is obvious that, successful strategic innovation isn't an easy task. In fact, it has evolved into a complex endeavour, due to changing consumer demands, ample competition and fast technological alteration (Calantone et al., 2002). According to Chaston and Scott (2012), the main ingredients of a flourishing strategic innovation are:

1. Conventional and non-conventional business strategy collaboration,
2. In-depth comprehension of change drivers, like new trends, technology and competition,
3. Strategic lining-up, involving initiatives assistance by senior management and stakeholders,
4. Consumer intuition,
5. Organisational knowledge, technology and capabilities,
6. Top management acceptance of and willingness to support, and
7. Disciplined commitment, from idea generation to final product completion.

On top of the above though, differentiation, (fast) time-to-market, and disruptive innovations are considered to be the key factors that can promote an effective innovation implementation. Specifically, Lund (2004) regards differentiation as the generator of enhanced financial gains, by supplying customers with new products, procedures, or business structures, considered to be superior to the existing ones. Such differentiations can be specific attributes of the new product/service, its dispatch

model, the supply chain, and/or consumers' service and assistance (Kerber and Laseter, 2007). In addition, Kapsali (2011) and Holtzman (2012) argue that the differentiated product should enter the market in good time, so as higher market shares are acquired, and standardized old products are countered. Holtzman (2008) also states that early movers can be benefited by determining the industry standards of arising new varieties of goods. These advantages are demonstrated in figure 2.4. At last, disruptive innovations, following the creative destruction procedure referred above, change the rules of the game completely, outdating previous products, procedures and structures and, consequently, their competitive advantages (Tidd et al., 2001).

Figure 2.4: Early entrant advantage



Source: Holtzman, Y. (2008) 'Innovation in research and development: tool of strategic growth' In: *Journal of Management Development.* **27**(10), pp. 1037-1052, p. 1040

Organisations that identify, promote, and adopt these factors can take advantage of market opportunities, increase their share of the market or even create a new one, and establish their brand-name as a leader in that (Gawer and Cusumano, 2007).

2.3 - Innovation types and management approaches

Innovation is regarded to be a new management theory; however, it's as old as humanity itself (Fagerberg and Mowery, 2006). Although many authors have defined the term in many different ways (Barret and Sexton, 2006; Damanpour and

Gopalakrishnan, 1998; DTI, 2003; Egbu et al., 1998; PDMA, 2004; Slaughter, 1998; Steward and Fenn, 2006; van DeVen, 1986), for the purposes of this dissertation, the definition given in the background section is adopted. According to Winch (1998), innovation's creation can be regarded as a bottom-up activity, whereas, its assumption refers to top-down effort. However, it's important to mention Schumpeter's (1934, p. 65) statement: *"to produce means to combine materials and forces within our reach. To produce other things or the same things by a different method means to combine these materials and forces differently"*. The reason for this emphasis is the term used: 'new combinations'. Turker (2012) argues that, these combinations can be: a brand new product for end-users, a recently developed market, a new, previously untested production procedure, a new organisational structure, or a new constituent origin of supply. Thus, Schumpeter's statement is in complete accordance with the definition adopted and it's evident that, innovation is not just the production of a new product.

In consequence with the aforementioned arguments, literature singles out several classifications of innovation. Jimenez-Jimenez and Sanz-Valle (2011) separate innovation into technical and administrative, whereas Dervitsiotis (2012) separate it into technological and non-technological. Either way, though, OECD's categorization, provided in the background section, integrates the above main categories (Camison and Villar-Lopez, 2014): technical or technological innovation includes new products/services and processes, and administrative or non-technological includes new policies, organisational and marketing structures. However, it's important to mention that, several authors have proposed many different sub-classifications, and for that reason, figure 2.5 is provided, analysing several innovation types, demonstrated throughout the years by researchers.

In consequence to the above, Skarzynski and Gibson (2008) state that, firms shouldn't rely just on random innovative actions, but focus on achieving a holistic innovation strategy. Innovation as a strategy, which is this dissertation's main area of research, is a systematic method, consisting of deliberate, repeated procedures aiming to produce sporadic innovations, by adding value to the customers and/or the organisation (Holtzman, 2012). Zain (1995) considers strategic innovation as the output of an effective combination between firm's needs and market differentiations (regarding ideas, procedures, techniques). Thus, according to Yang et al. (2012), it can refer to a

successful assault on an established pioneer, or the creation of a brand new market, changing the game order instead of playing it in a better way.

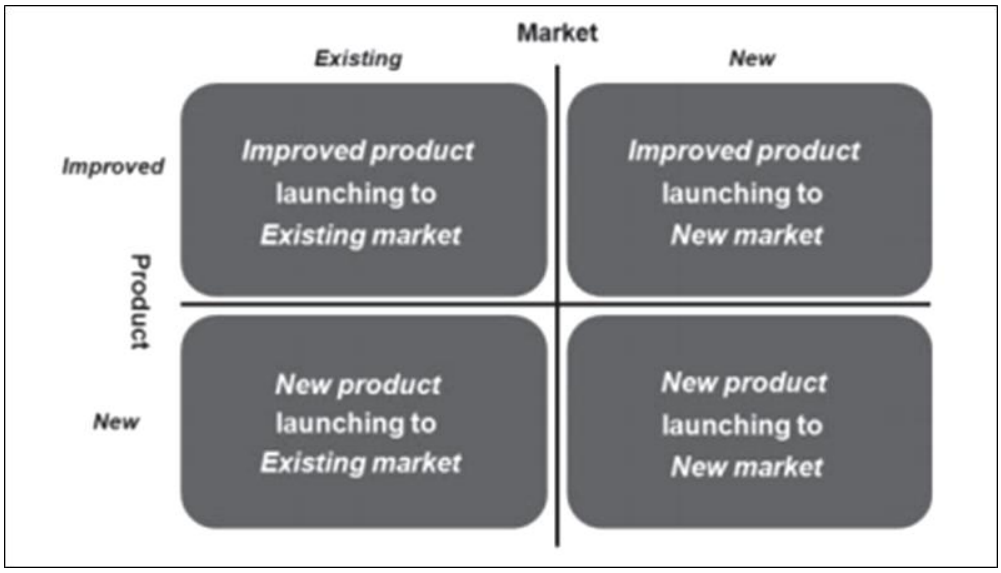
Figure 2.5: Innovation Types

Types of strategic innovation	Authors
Product Innovation	Goldenberg & Mazursky, 2002
Packaging Innovation	Matusow, 2010
Research and Development	Martin & Michael, 1994
Communication innovation	Chua & Morris, 2009
Corporate Financial Innovation	Bhattacharyya & Nanda, 2000
Human Resource Innovation	Holbrook & Hughes, 2000
Material Innovation	Parker, 1986
Alliance and Network	Cooke, 1996
Sale channel innovation	Stuart, 2010
Marketing Innovation	OECD, 2005
Mergers & Acquisitions	Vijay & Rakesh, 2008
Inbound Logistics Innovation	Sameer, Cindy & Michelle, 2006
Outbound Logistics Innovation	Sameer, Cindy and Michelle, 2006
Operations Innovation	Hammer, 2005
Sales Innovation	Stevenson, 2011
Service Innovation	Nijssen et al., 2006
Procurement Innovation	Denali, 2010
Technology Innovation	Sagar, 2006; Butler, 2006
Firm Infrastructure Innovation	Michael et al., 2009

Source: Yang, X., Jayashree, S. and Marthandan, G. (2012) 'Ideal Types of Strategic Innovation: An Exploratory Study of Chinese Cosmetic Industry' In: *International Journal of Business and Management.* **7** (17), pp. 78-87, p. 80

From a strategic point of view, organisations innovate in order to improve their performance and add value. Such improvements can be productivity increasing procedures, so as organisations gain a cost benefit over their rivals, or product innovation where organisations propose new products to enhance demand (Reif, 2013). Thus, innovative organisations can increase productivity and market share, solve problems, save funds and facilitate operations (Milic, 2013). When applicable, patent protection can be used in either of these, providing sustainable competitive advantage and profits (De Kluyver and Pearce, 2009). Other forms of innovation can be organisational alterations (or innovative organisational structures) improving effectiveness and quality, innovation capability upgrade, or product distinction, when new markets are entered and demand for products is effected (Brown, 2009). Oh et al. (2015) add to that, by distinguishing product innovation categories based on product- and market-point of view. They also provide figure 2.6, in order to clarify those categories.

Figure 2.6: Innovation categories based on product- and market- point of view



Source: Oh, C., Cho, Y. and Kim, W. (2015) 'The effect of a firm's strategic innovation decisions on its market performance' In: *Technology Analysis and Strategic Management.* **27**(1), pp. 39-53, p.42

However, innovation's categorization doesn't end here. In addition to the forms demonstrated in the above figure, several researchers (Fagerberg and Godinho, 2003; Sadowski and Sadowski-Rasters, 2006; Sandberg, 2007) argue that an important source or form of innovation is imitation. Imitation innovation brings something new to the organisation instead of something new to the market, using previously applied methods or products by other organisations (Sadowski and Sadowski-Rasters, 2006). Moreover, other researchers like Schumpeter (1939) and Arthur (2007) state that the combination of existing technologies (of all kinds) leads to innovation and, hence, that recombination is the origin of newness. In other words, by blending markets and regrouping already used technologies, organisations aim to establish new markets and products (Islam and Miyazaki, 2009). Oh et al. (2015) even regard such innovations to be a better strategy for organisations, increasing profits, as the risks included in new productions are minimized. However, it should be mentioned that other researchers like Aghion et al. (2001) regard a small amount of imitation growth-increasing, but lots of it as a growth decrease driver.

As a summary, and in order to clarify and investigate in-depth the main innovation types demonstrated above, Marketing, Process, Product/Service, and Organisational Innovations are going to be explored separately.

2.3.1 Marketing Innovation

In this type of innovation, market is the promotion driver, meaning competition and industry's framework (Porter, 1985). Marketing innovation suggests the application of new marketing techniques, changing the pre-existing ones. Such changes are driven by the relationship between consumers and suppliers, market's circumstances, external information substructures, and network studies (Holtzman, 2012). As a result, organisations can introduce new methods of presentation, differentiation, advertisement, supply, customer service and price shaping (Milic, 2013). Based on that, innovative organisations adjust and direct their operations, in order to take full advantage of the market's circumstances (Simpson et al., 2006). Thus, consumers can be regarded as the source of innovation, since their demand for special characteristics, leads to the addition of them in produced goods (OECD, 2005).

2.3.2 Process Innovation

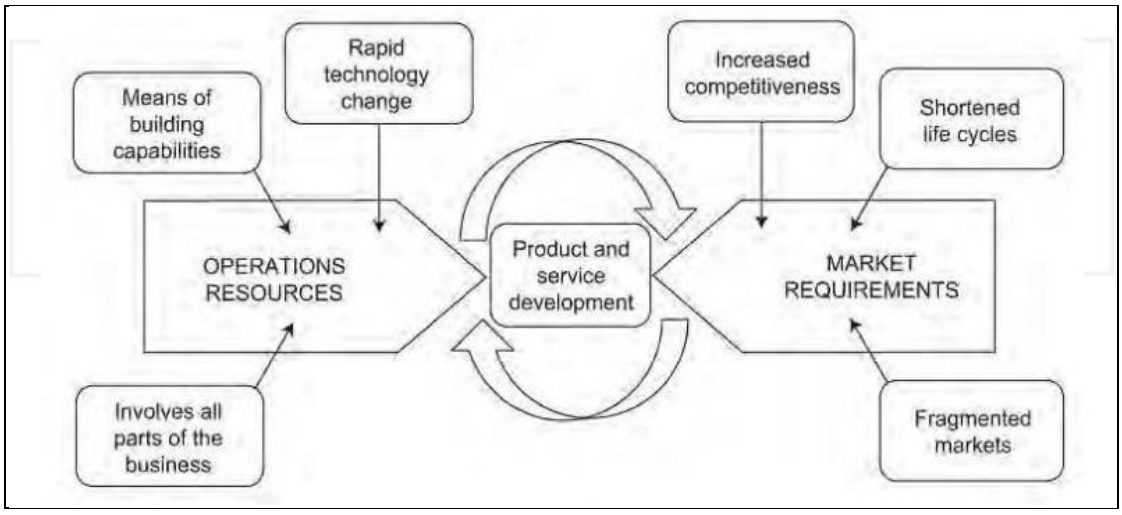
Process innovation is considered to lessen production time, reduce operational expenditure, improve productivity and make day-to-day work easier (Damanpour, 2010). This way, process innovation focuses on effectiveness, making cost leadership strategies easier for organisations (Porter, 1985). Exploiting this type of innovation, firms can produce 'new' products upgrading their performance, by introducing new procedures and techniques, while upgrading quality and 'clearness' of production (Milic, 2013). Moreover, organisations can take advantage of the technological changes enforced by the innovation type and adopt new strategies, develop them and as a result acquire more knowledge, which is the main asset of a successful innovator (Tidd et al., 2001).

2.3.3 Product Innovation

Product Innovation refers to the induction of new ways to solve customer's problems, either by introducing something new to them, or by upgrading existing ones' performance (Milic, 2013). Such upgrades can be technical details, raw materials, and constituents, making the product's usage or function better (Lundvall and Christensen,

2004). The procedure leading into such innovations, known as New Product/Service Development (NPD and NSD respectively), can be interpreted, accordingly, into a new product or service to the market, formerly unavailable for consumers (Lundvall and Vinding, 2004). This process requires fusing and collaboration of the organisation's departments, as many times innovative ideas couldn't be turned into final products, due to lack of such cooperation (Tung, 2012). Thus, the strategy of NPD/NSD can directly associate production with financial estimations, a good's life cycle, its demand and the firm's competence in general (Wright et al., 2005). Holtzman (2012, p. 51) illustrates NPD's and NSD's importance for a company's Strategy in figure 2.7 below:

Figure 2.7: Strategic Importance of NPD and NSD



Source: Holtzman, Y. (2012) 'Utilizing Innovation and Strategic Research and Development to Catalyze Efficient and Effective New Product Development' In Y. Holtzman, ed. *Advanced Topics in Applied Operations Management.* Rijeka: In-Tech, 2012. pp. 32-58, p.51

Reichstein (2004) considers three ways by which firms adopting NPD gain extra income and overcome competition: brand new customers of the offered product type, customers of rival/competitive firms, and previous customers that redirect their preferences into the new offered product or service. Thus, the implementing organisation's competitiveness and prosperity is enhanced in many ways (Damanpour, 2010). According to Bessant et al. (2005), product/service innovation can help enterprises differentiate their products and alter what they have to offer to customers. This leads organisations to gain and sustain a competitive advantage, as

these goods are difficult to be imitated, and consequently, to a positive impact on firm's performance (Gonzalez-Alvarez and Nieto-Antolin, 2005). At last, it is proved that, organisations adopting a NPD/NSD Strategy tend to encourage process and organisational innovation too, which leads to more competitive advantages gained and an overall innovative culture (Reichstein, 2004).

2.3.4 Organisational Innovation (OI)

At last, OI is the induction of novel organisational models for managing a firm, its practices, and/or its connections with external associates (OECD, 2005). According to Matthew and Sternberg (2006), it can be divided into two different stages: idea creation and creative production, called by researchers as 'creativity' and 'innovation' respectively. The first stage includes the breakdown of suppositions, and new links establishment and synthesis into a creative innovation, whereas the second one utilizes the above creations into actual product or process innovations (Mauzy and Harriman, 2003). However, several different definitions have been introduced by researchers around the world, for different types of the general term OI (Administrative, Managerial and Organisational Innovation), as illustrated in figure 2.8 provided below.

To be more specific, OI in firm's practices includes the foundation of new models within it, managing routines and processes (Armbruster et al., 2008). OI in workplace involves new models for role allocation, decision-making and new forms of functions (Battisti and Stoneman, 2010). At last, regarding a firm's connections to external associates, OI encourages cooperation with research institutes and consumers, outsourcing, and incorporation with suppliers (Camison and Villar-Lopez, 2011).

Figure 2.8: OI Definitions

Study	Terminology	Definition
Daft (1978)	Administrative innovation	Concerns organizational structure and administrative processes
Kimberly and Evanisko (1981)	Administrative innovation	Adoption of electronic data processing for a variety of internal information storage, retrieval and analytical purposes, indirectly related to the basic work activity of the hospital and more immediately related to its management
Damanpour and Evan (1984)	Administrative innovation	Innovations introduced into the organizational structure, into administrative processes and/or human resources
Damanpour et al. (1989)	Administrative innovation	Innovations in the administrative component that affect the social system of an organization
Hwang (2004)	Managerial innovation	Design of an appropriate organizational structure and processes, and a human resource system
OECD (2005)	Organizational innovation	Implementation of a new organizational method in the business practices, workplace organization or external relations
Hamel (2006)	Management innovation	A marked departure from traditional management principles, processes and practices or a departure from customary organizational forms that significantly alters the way the work of management is performed
Armbruster et al. (2006, 2008)	Organizational innovation	Changes in the structure and processes of an organization due to implementation of new managerial and working concepts and practices, such as teamwork in production, supply chain management, or quality management systems
Birkinshaw et al. (2008)	Management innovation	Invention and implementation of a management practice, process, structure or technique that is new and is intended to further organizational goals
Mol and Birkinshaw (2009)	Management innovation	Introduction of management practices that are new to the firm and intended to enhance firm performance
Battisti and Stoneman (2010)	Organizational innovation	Innovation involving new management practices, new organization, new marketing concepts and new corporate strategies
Damanpour and Aravind (2011)	Managerial innovation	New approaches in knowledge for performing management functions and new processes that produce changes in the organization's strategy, structure, administrative procedures, and systems

Source: Camison, C. and Villar-Lopez, A. (2014) 'Organizational innovation as an enabler of technological innovation capabilities and firm performance' In: *Journal of Business Research.* **67** (3), pp. 2891-2902, p. 2893

OI is a basic strategic asset of firms, and is considered to be one of the most important origins of sustainable competitive advantage, able to produce high profitability (Damanpour, 2010). Moreover, several studies have demonstrated OI's positive impact on performance (Mazzanti et al., 2006; Perdormo-Ortiz et al., 2009), whereas others highlight its promotion of technological innovations (Camison and Villar-Lopez, 2011) leading to benefits analysed extensively earlier and at the end of this chapter.

Summarising, it is evident that organisations need to implement strategic innovation and Project Management (PM) techniques in order to form and sustain a competitive advantage (Abdi and Senin, 2014). However, as shown, innovation isn't just about new products/services development, or organisational culture, but a combination of them, along with innovative processes and marketing approaches (Damanpour and Schneider, 2006). In fact, Bores et al. (2003) claim that successful innovation can be achieved with the combination of new ideas, market fusion, technology – for products

and processes - development, leadership and organisational culture. Some researchers take this statement to the next level, by using innovation as a way to create new markets and, thus, change the rules of the game (Filippetti and Archibugi, 2011; Jimenez-Jimenez and Sanz-Valle, 2011).

Regarding innovative organisational structures, analysed in the OI section, several approaches have been investigated and analysed. Although, innovation and PM have been evolved as different fields of study, practice has proved the efficiency in implementing PM approaches throughout the innovation's life-cycle (Milutnovic and Stosic, 2013). Thus, approaches like Lean manufacturing, Six Sigma, Balanced Scorecard (BSC), and Building Information Modelling (BIM) have been developed and established decades ago, although still considered innovative.

2.3.5 Innovative Management Types

In consequence to the background analysis, Lean and Six Sigma are the approaches explored, analysed and used individually, or in combination by researchers and organisations for many years now, generating the Lean Six Sigma (LSS) term (Burton, 2011; Cook, 2013; Oppenheim, 2011; Taghizadegan, 2006). For this reason, they're being analysed together in this section, although some researchers regard the LSS more of a Six Sigma approach enhanced with Lean tools, instead of an actual blend of these two models (Chiarini, 2011; Kumar et al., 2006). However, these two are the only ones studied in common by researchers, exploring their combined implementation, benefits and competitive advantages. The rest are investigated separately, or in comparison to each other, in order to identify which is the most suitable, beneficial, or easy to use, according to each study's needs.

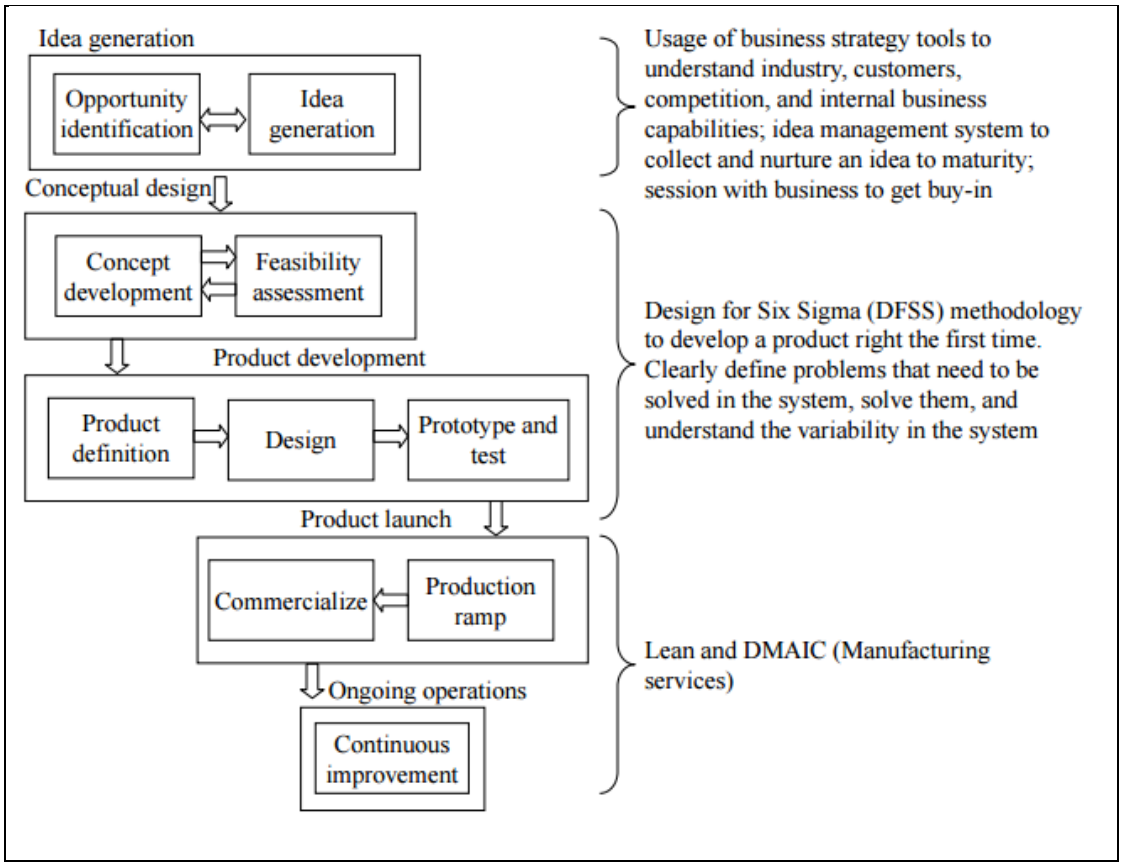
Lean and Six Sigma are quality and functioning upgrade systems, focused on continuous improvement, consumer fulfilment, and individual's and management's participation, in order to achieve procedural improvement (Chiarini, 2011). As they both seek continual upgrade, both these systems have evolved into organisational structures, following the Plan-Do-Check-Act (PDCA) model. During Plan phase, strategies are decided and objectives are determined, executed throughout the Do phase, along with the required training and learning. During phases Check and Act, the firm evaluates conformity to the original plan and acts accordingly (Burton, 2011). All of the above, though, within the DMAIC framework (Define, Measure, Analyse,

Improve, and Control), which follows the similar principles to PDCA, being more analytical (BQF, 2015).

In order to assist and facilitate the aforementioned phases, several tools and techniques are used, providing organisations with significant competitive advantages. Such tools and techniques refer to the combined adoption of 5S (or Housekeeping), Kanban (or pull systems), poka-yoke (or error-proofing) and Just-In-Time (JIT) supplies, along with the introduction of Kaizen teams for quick reaction, Black and Green belts for effective leadership, and the bottom-up suggestion teams, consisted of employees, which aim to eliminate bureaucracy and top down orientation (Plenert, 2006). Thus, combined factors like zero-defects, on-time delivery, costs, prices and customization of the product are faced and, consequently, become firm's main competitive advantages (Oppenheim, 2011). Matthiopoulou (2011) adds to these benefits waste elimination, effective communication, value determination, and upgrade pursuit, while lean thinking establishes a culture throughout the organisation.

In relation to the innovative characteristics, analysed extensively above, Six Sigma encourages people's participation and training, building effective teams, while the combined adoption of Lean minimizes its control over personnel, promoting innovation and entrepreneurship (Chiarini, 2011). This comes in contrast to many researchers' belief that LSS inhibits innovation, due to its stiff structure (Kumar et al., 2006; Oppenheim, 2011; Plenert, 2006; Snee, 2010). Hence, figure 2.9 illustrates the NPD process with LSS roles in it (Hoerl and Gardner, 2010, p. 34).

Figure 2.9: NPD process with LSS roles



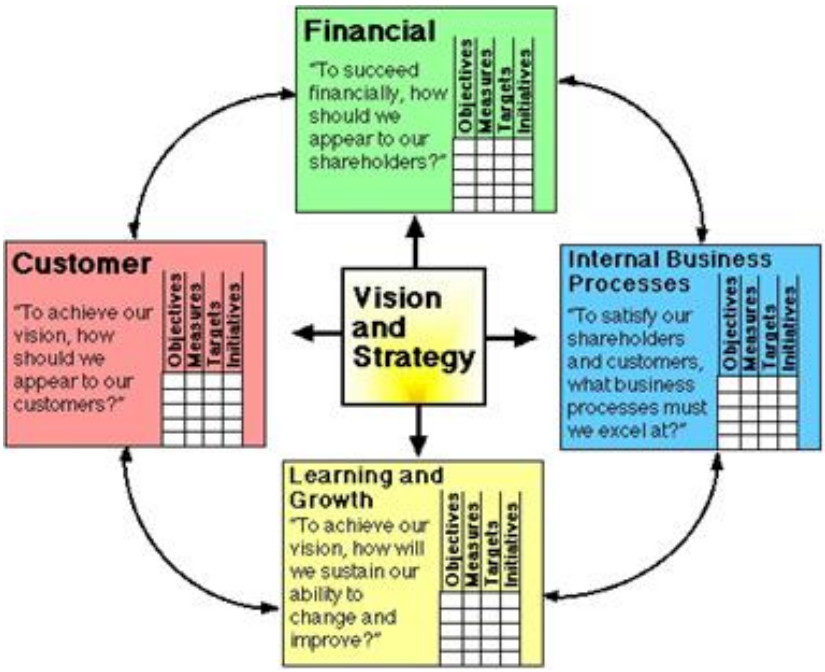
Source: Hoerl, R. W. and Gardner, M. M. (2010) 'Lean Six Sigma, creativity, and innovation' In: *International Journal of Lean Six Sigma*. **1** (1), pp. 30-38 p. 34

Moreover, LSS's focus on quality and waste elimination, adds value to products, processes and in consequence to customers (Taghizadegan, 2006). Due to their orientation, costs and production time are minimized, causing high productivity, low final prices, and increased satisfaction for the customers, as their voice is the driver for change and innovation (Hoerl and Gardner, 2010). Eventually, organisations experience increased profitability, higher market shares and fortified brand image (Snee, 2010).

The BSC concept (figure 2.10), according to Ivanov and Avasilcai (2014), attempts to connect operational control to strategy, by clarifying the cause-and-effect relations between results and their performance drivers, giving organisations the chance to innovate (Dreveton, 2013). However, it has evolved into an interactive strategic organisational system aiming to control objectives, promote exchange of views, upgrade quality and achieve organisational learning (Luo et al., 2012). This is

supported by Hoque (2014), who states that BSC is an innovatory information model and management endeavour. BSC's aim is orientated towards both strategic degree, emphasizing on identifying goals, and functioning degree, identifying the significant procedures that require monitoring (Li, 2011). Specifically, BSC is divided into 5 stages: render strategy to functional terms, line up the company to that strategy, communicate and make strategy common, create a continuous Strategy procedure and inspire change through leadership (Kaplan and Norton, 2001b). Thus, several performance factors can be determined and consequently, improved: learning and growth, internal procedures, consumer satisfaction, and overall performance (Ivanov and Avasilcai, 2014).

Figure 2.10: The BSC



Source: Wilderman Associates (2012) [Online] Available from: https://bdw1735.wordpress.com/page/2/ [cited 18 December 2015]

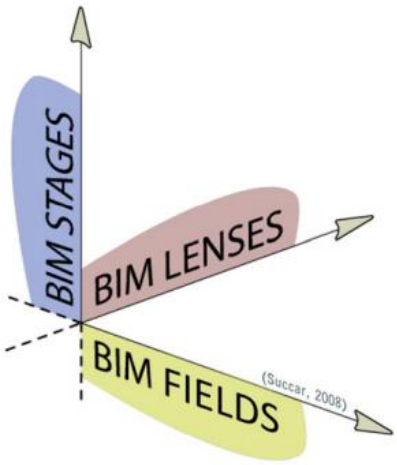
As Norreklit et al. (2012) state, BSC has become a popular innovation, nowadays, investigated and adopted extensively by researchers and managers worldwide. However, no current researches can be found analysing BSC within the recent economic recession (Norreklit et al., 2012). Still, the competitive advantages gained by its adoption are clearly analysed within literature. Basically, these advantages are based on if-then declarations, interpreting cause and effect connections (Li, 2011). According to them, investing to personnel training leads to upgraded product and

service quality, which leads to consumer satisfaction, which, consequently, leads to their loyalty and eventually to bigger market shares and higher profitability (Kaplan and Norton, 2001b). Specifically, BSC focuses on profit enhancement, reducing costs and upgrading productivity, while, its focus on consumers, aims to acquire new of them, expanding a firm's market share (Luo et al., 2012). Moreover, employees are valued, improving the overall performance of the organisation (Hoque, 2014).

At last, BIM aims to aid the project's flow and delivery using 3D digital construction models (Miettinen and Paavola, 2014). According to Succar (2009), BIM is a set of interactive methodologies, procedures and technologies aiming to manage a project's planning and data in digital form, throughout its life-cycle. As a structured data base, BIM can be used as a benchmarking and knowledge tool (Reddy, 2012); however, it's only adopted by the construction industry. Still, it is argued to be a key ingredient of change, poised to decrease industry's segmentation, upgrade its efficiency and minimize the costs of insufficient interoperability (Succar, 2009).

Kassem et al. (2014) argue that BIM is an unbounded or systemic innovation. It can be used throughout the project's life-cycle, resulting to: required materials identification, scope of work determination, systems and procedures evaluation, and data, details and other specifications interrelation (Reddy, 2012). It uses a network of taxonomic junctions and connections between them, managing knowledge, obtaining skills and making the acquisition of new information easier (Jung and Joo, 2011). This network consists of three axes (figure 2.11): BIM areas of functioning, BIM phases of implementation and BIM lenses of determination and evaluation of the two previous axes (Succar, 2009, p. 360).

Figure 2.11: BIM Framework

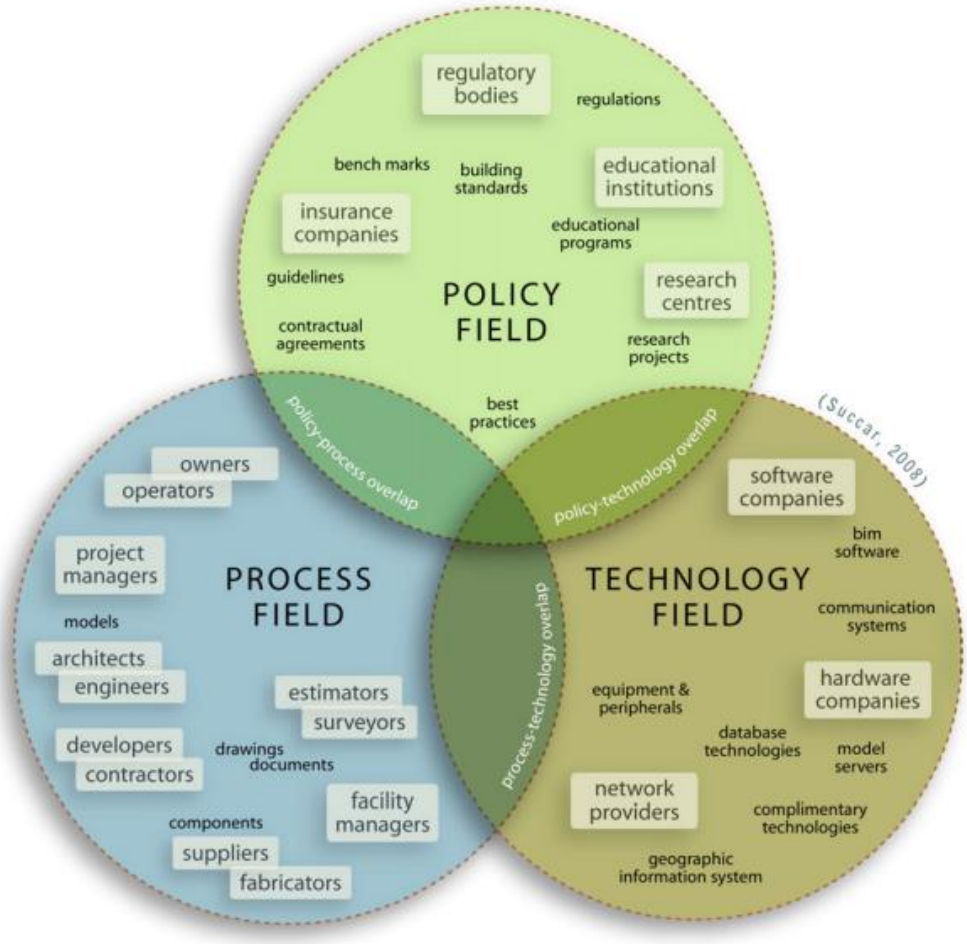


Source: Succar, B. (2009) 'Building information modelling framework: A research and delivery foundation for industry stakeholders' In: *Automation in Construction*. **18** (3), pp. 357–375, p. 360

BIM's fields of functioning are technology, process and policy, consisting of two sub-areas each: players and deliverables (Azhar, 2011). To clarify these fields, figure 2.12 is provided below, illustrating each field's ingredients, connections and overlaps.

BIM supports PM, diminishes planning faults and increases quality and productivity (Miettinen and Paavola, 2014). Moreover, it assists the management of procedures, and enhances the cooperation and communication amongst interested parties and customers (Porwal and Hewage, 2013). Azhar (2011) adds to the above, less production time, benchmarked and, consequently, upgraded performance, and innovation promotion. Furthermore, costs are assessed, controlled and decreased, environmental impacts are managed, and customer service is more effective (Jung and Joo, 2011). At last, BIM's main advantage is its facilitation of data accessibility, as new projects can be differentiated, reused, or maintained faster, more efficiently and with the less, possible, costs (Kassem et al., 2014).

Figure 2.12: BIM's interlocking fields



Source: Succar, B. (2009) 'Building information modelling framework: A research and delivery foundation for industry stakeholders' In: *Automation in Construction*. **18** (3), pp. 357–375, p. 361

2.4 - Innovation's competitive advantage and the recent economic crisis

As referred above and highlighted in a plethora of studies throughout literature, organisations innovate, as new products, processes, structures and markets give unique opportunities for competitive advantage. Most extensive, observation-based studies on the relationship between organisational performance and innovation prove its positive outcome (Thornhill, 2006; Weerawardena et al., 2006). However, other researchers like Simpson et al. (2006) underline innovation as a high-cost and high-risk operation with positive impact on performance, but also with negative, unwanted results, like vulnerability to risks, high costs, workforce discontent and unsecure

alterations. Other researchers are led into contradictory findings, like Mansury and Love (2008) who found that innovation affects growth positively, but has no impact on productive capacity, or Wright et al. (2005) who found that innovation has a positive impact on performance in hostile markets, but not in benign ones. At last, Damanpour et al. (2009) have pointed out that UK organisations using innovation in the public service sector face unwanted, negative outcomes. Regardless of these examples, though, innovation is proved to have a positive effect on firm's performance, however, their relationship is complex and innovation's adoption shouldn't be regarded a panacea to all performance challenges faced.

Innovation and the competitive advantage given to organisations regarding their performance is being extensively analysed within literature and it is proved that highly innovative firms demonstrate better financial earnings (Ferreira, 2010; Forsman and Annala, 2011; Kostopoulos et al, 2011). Specifically, Aspara et al. (2010), investigating companies of different sizes and innovation strategies followed, found out that those focusing on innovation demonstrated higher profitability than those that didn't. Tung (2012) emphasizes on the significance of innovation in securing competitiveness, consumer allegiance, and company existence. Recently, Aboelmaged (2014) found that administrative, organisational innovation leads to production quality upgrade and performance in total. Moreover, nowadays, a firm's products or services form the basis upon which they're judged by consumers, meaning that superior goods equal to superior companies (Holtzman, 2012). Especially, regarding SME's, Laforet (2011) points out improvements in their status, image, functioning effectiveness and cost advantages, all of which lead to superior monetary performance, skilled personnel induction and expertise. As a summary of the aforementioned advantages, figure 2.13 is provided, synthesizing literature inspecting the relationship between innovation and performance

Figure 2.13: Innovation and performance relationship findings

Innovation and performance	
Authors	Findings
Dadfar et al. (2013)	Positive relationship between innovation capabilities and organisational performance
Valmohammadi (2012)	Appropriate innovation inputs and effective innovation processes are related to business performance
Tung (2012)	Product innovation directly related to organisational performance
Valmohammadi (2012)	Effective innovation process are related to business performance
Ferreira (2010)	
Aboelmaged (2014)	High levels of administrative innovation increase the level of overall performance
Jansen et al. (2011)	Innovative procedures integrated into the strategic orientations, contribute to innovative organisational performance
Forsman and Annala (2011)	Organisations with higher level of innovation show better financial performance
Kostopoulos et al. (2011)	
Gunday et al. (2011)	Innovation have a positive effect on firm performance in manufacturing industries
Comacchio et al. (2007)	Using a sample of micro/small firms, analysed the relation between different approaches to innovation and sales revenue
Size, innovation, and performance	
Aspara et al. (2010)	Average profitable growth are related with innovative strategic orientations and firm size
Rothwell (1986)	
Lee (2009)	Positive non-linear relation between profit rates and firm's size
Kim and Kim (2009)	Small- and medium-sized organisations have a lower performance than large firms
Serrasqueiro and Nunes (2008)	Positive relationship between size and performance, but no significant difference were found
Ozgulbas et al. (2006)	Firm's size affects financial performance
Bughin and Jacques (1994)	Small firms have advantage in the management of innovation
Rei and Lisboa (1993)	Firm's size was not relevant when evaluating firm's performance
Salamon (1985)	Negative relationship between profitability and firm's size
Schmalensee (1989)	
Whittington (1980)	
Weber and Jenny (1974)	

Source: Augusto, M. G., Lisboa, J. V. and Yasin, M. M. (2014) 'Organisational performance and innovation in the context of a total quality management philosophy: an empirical investigation' In: *Total Quality Management and Business Excellence.* **25** (10), pp. 1141-1155, p. 1145

Apart from firm's performance, though, several other competitive advantages can be identified. Such benefits refer to market share expansion, higher profitability, brand name establishment, time saving, customer relationship fortification, sustainability and organisational gains.

2.4.1 Market share

Changes in technology and in market's speed, and better comprehension of the interrelations between the procedures used to create a new product or service, are the factors that have altered the way by which organisations gain market share nowadays (Cook, 2013). Thus, innovators can obtain the first entrants advantage referred above.

Typical example can be TOYOTA, which established a dominant position in the new hybrid-cars market, by entering it before its competitors (Holtzman, 2012).

2.4.2 Profitability

Organisations' profitability can be influenced by innovation in many ways. New goods, entering new markets tend to demonstrate notable profit margins, as competition faced is less (Makkonen et al., 2014). New entrants' competitive advantage is demonstrated above and, thus, firms' profitability can be highly increased, by expanding their market share. Moreover, customer's habits can impact those earnings, especially in technological products, as new, potentially successful products can set the standard for customers regarding a specific market (Weerawardena et al., 2006). The use of patent protection, if applicable, can secure the company's earnings, excluding competitors for years (De Kluyver and Pearce, 2009).

2.4.3 Brand name value

New innovative goods are a generator of consumer loyalty and shared (firm's) image (Cook, 2013). Although, it's quite hard to translate brand-image into financial outcomes, organisations', like Apple and BMW, performance and success can't be overlooked (Holtzman, 2012). Despite the fact that, brand image isn't influenced merely by NPD, marketing studies show that, organisations that innovate efficiently are valued and respected more by consumers, leading to higher profit margins in the long-term (Forsman and Annala, 2011).

2.4.4 Time

Time is another aspect on which innovation has positive impact. This can refer to production, distribution, delivery, and customer service time response (Makkonen et al., 2014). Thus, organisations that save significant amount of time by the adoption of all kinds of innovations tend to save valuable resources, reduce costs and add value for customers (Kostopoulos et al., 2011).

2.4.5 Organisational

Organisational competitive advantages gained are analysed in-depth within the OI section. As a summary, the first and main advantage gained by organisations is the innovative culture established which, consequently, promotes innovation in all other forms, like product/service, process and marketing (Laforet, 2011). Moreover,

innovative firms tend to create a better working environment, encouraging and motivating innovative attitudes (Mazzanti et al., 2006). At last, performance is improved as a whole, with positive impacts on productivity, profitability, and quality (Oh et al., 2015).

2.4.6 Customer Relationship

Customer relations are another highly important advantage gained by firms, analysed within current literature. Less production, distribution and delivery times, better customer service, as well as quality and value improved products and services fortify a firm's relationship with its clients (Oh et al., 2015). In addition, the establishment of new markets, or leading brand-name, leads to a superior-viewed company with positive impact in securing customers' loyalty (Brown, 2009).

2.4.7 Sustainability

At last, sustainability is an extremely important competitive advantage gained for companies, although, difficult to quantify sometimes. Specifically, innovation's ability to invigorate a brand name, adopt high quality products, services and processes, and improve cost-saving, profitability and productivity lead to more effective, sustainable organisations (Reichstein, 2004). After all, literature constantly highlights innovation as the way for organisations to survive and prosper, preserving the essential, in today's turbulent market environments, sustainability (Milutnovic and Stosic, 2013).

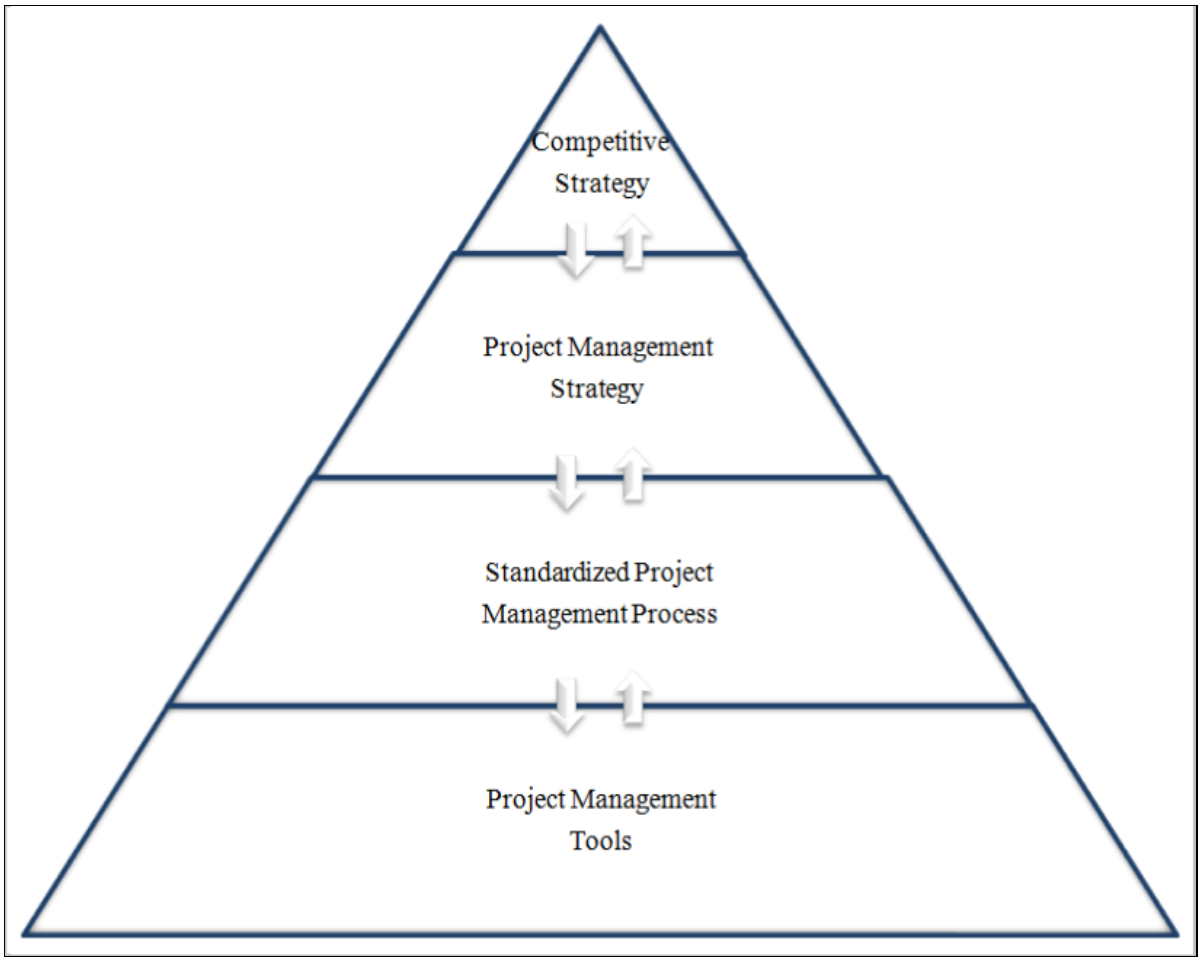
2.4.8 Innovation in PM and the recent economic crisis

Evaluating all the above competitive advantages, it is obvious that, innovation is extremely significant in modern economies, contributing in many ways. First of all, jobs are created and as a result, employees' earnings incite the economy by tax payment and goods buying (Hausman and Johnston, 2014). Moreover, innovation can ensure people's security and upgrade standards of living, as produced goods can be defence gadgets, disease identifiers and cures, or day-to-day goods that facilitate and improve people's lives (Guellec and Wunsch-Vincent, 2009). In addition, innovative goods help firms evade unnecessary, pricing conflicts that lead to less income, market shrinking and ultimately, extinction with all the sequential negative impacts in the economy (Lorenz et al., 2004).

The recent economic downturn has made an impact to all economies and organisations, meaning production degree, gross revenue, profits, hiring rate, investments, advertisement and innovation (Hruzova, 2011). Market environment is riskier and more uncertain, and thus, management should change in order to find the answers in the difficult challenges imposed. After all, a crisis could be seen as a project itself: single, risky, and short-term, with a goal to accomplish (Garies and Huemann, 2008).

A company's competitive strategy is assisted by its project management strategy, which is based on PM tools and techniques (Milosevic, 2003). This relationship is shown on figure 2.14 below. PM is widely acknowledged to be based on time, cost and quality; therefore, a crisis' enforcement of cost decrease suffocates firms in implementing their strategies and consequently PM and innovation (Matthiopoulou, 2011). On the other hand, a period of economic crisis shouldn't be wasted. Moynihan (2008) argues that organisations can learn in two ways by a crisis: 'intercrisis learning' can make firms adapt and get ready for potential new crises, and 'intracrisis learning' leads firms to seek for the required answers within the crisis period. No matter the way followed, though, organisations should make small steps first, before confidently moving to strategic implementation, as adaptation is essential in dealing with a crisis (Holmes, 2009).

Figure 2.14: The PM pyramid



Source: Milosevic, D. (2003) *Project Management Toolbox: Tools and Techniques for the Practicing Project Manager*. Hoboken: John Wiley and Sons, p. 5

Matthiopoulou (2011) suggests that, R&D projects should never be cut, as they provide innovation. Applegate and Harreld (2009, p. 2) take that argument one step further, stating that: *'The financial crisis provides a sobering reminder of what happens when innovation fails to drive productive economic growth'.* Thus, instead of saving funds, innovative organisations should encounter economic recessions as great opportunities (Friedman, 2005). This is based on the theory that innovation is counter-cyclical, which means that periods of economic downturn are a fertile ground for organisations to promote innovation (Filippetti and Archibugi, 2011). On the other hand, there's also a theory that innovation is cyclical, enforcing organisations to reduce their endeavours and investments (Archibugi et al., 2013). According to this, cost lowering seems inevitable, with positive impacts on organisations, but only in the short-term. In the long-term, such organisations have to deal with losses in many

aspects, like resources (especially expert individuals), productivity, knowledge and skills, technologies, market share, and profitability (Milic, 2013).

No doubt, demand plays a critical role in determining the extent of productions, investments and innovation. This is known as the demand-pull theory supported by many researchers worldwide (Paunov, 2012). In relation to the cyclical theory of innovation, though, justifications are been proposed both in favour and against it (Talmaciu et al., 2015).

On the contrary, entrepreneurs can use such difficult times in exploiting new technologies and procedures (Jantunen et al., 2008). Even unemployment, caused during such periods, can be beneficial for innovation, as such personnel tend to become more innovative in order to get a new job, providing knowledge and experience from competitors to innovators that will invest on them (Guellec and Wunsch-Vincent, 2009). This is supported by OECD (2009b), which argues that employees can and will be moved from mature to flourishing industries and it's up to the education and training given to them, how beneficial that transfer can be. Moreover literature and history indicate that innovative organisations are benefited first from an economic downturn's recovery having competitive advantages boosted and market domination strengthened (Friedman, 2005).

In conclusion, although, a plethora of researches underline innovation as the answer to economic downturns, studies suggesting the way in doing that are scarce (Paunov, 2012). On the contrary, innovation is examined as the victim of the recent recession (Archibugi et al., 2013; Filippetti and Archibugi, 2011; Hausman and Johnston, 2014; Hruzova, 2011; Paunov, 2012; Talmaciu et al., 2015), rather than the other way around. Thus, further research should take place, in order to directly link all the evident competitive advantages gained by innovation, with economic crises. This way, instead of applying defencing policies like cost reductions, personnel firing, and investments mitigation, organisations can adopt innovation as the way forward, benefiting themselves, customers and the global economy.

2.5 - Summary

As a summary, it should be emphasized once more, that innovation should be regarded as the means for organisations to survive and grow. Current literature

highlights the key role innovation plays in providing competitive advantage for those that adopt it. Thus, especially within or after the recent economic downturn, if firms are to continue existing and thrive, innovation is the only way to accomplish it, on the long-term.

Specifically, in the extensive literature review above, innovation is defined, along with the main drivers and factors that promote it, as well as the inhibitors that hamper it. Moreover, the characteristics every innovative firm should have are analysed, as well as the importance of leadership, culture and team climate, in order to achieve an effective implementation. Furthermore, available strategies are mentioned, leading to an in-depth examination of the innovation types as a whole and separately. Product, process, marketing and organisational innovations are explored, leading to the analysis of the main innovative management approaches adopted by organisations nowadays, as well as the benefits they provide. At the end, innovation's competitive advantages are demonstrated, along with their significance within global economies, making a connection to economic crises. In regard to the recent one, its impact on innovative efforts is explained, as well as the benefits that can be exploited, in order companies to evade it, survive, and prosper.

Despite of the literature review's extent and investigation, though, several research questions require an answer. These questions, regarding issues and discussions about the strategic implementation of innovation in project management, refer to:

1. Which are the combined competitive advantages gained by the embracement of the main innovative management approaches analysed above?
2. If and how can these benefit organisations in overcoming the recent economic recession?

These research enquiries will be examined in the next phase of research.

CHAPTER 3 - RESEARCH METHODOLOGY

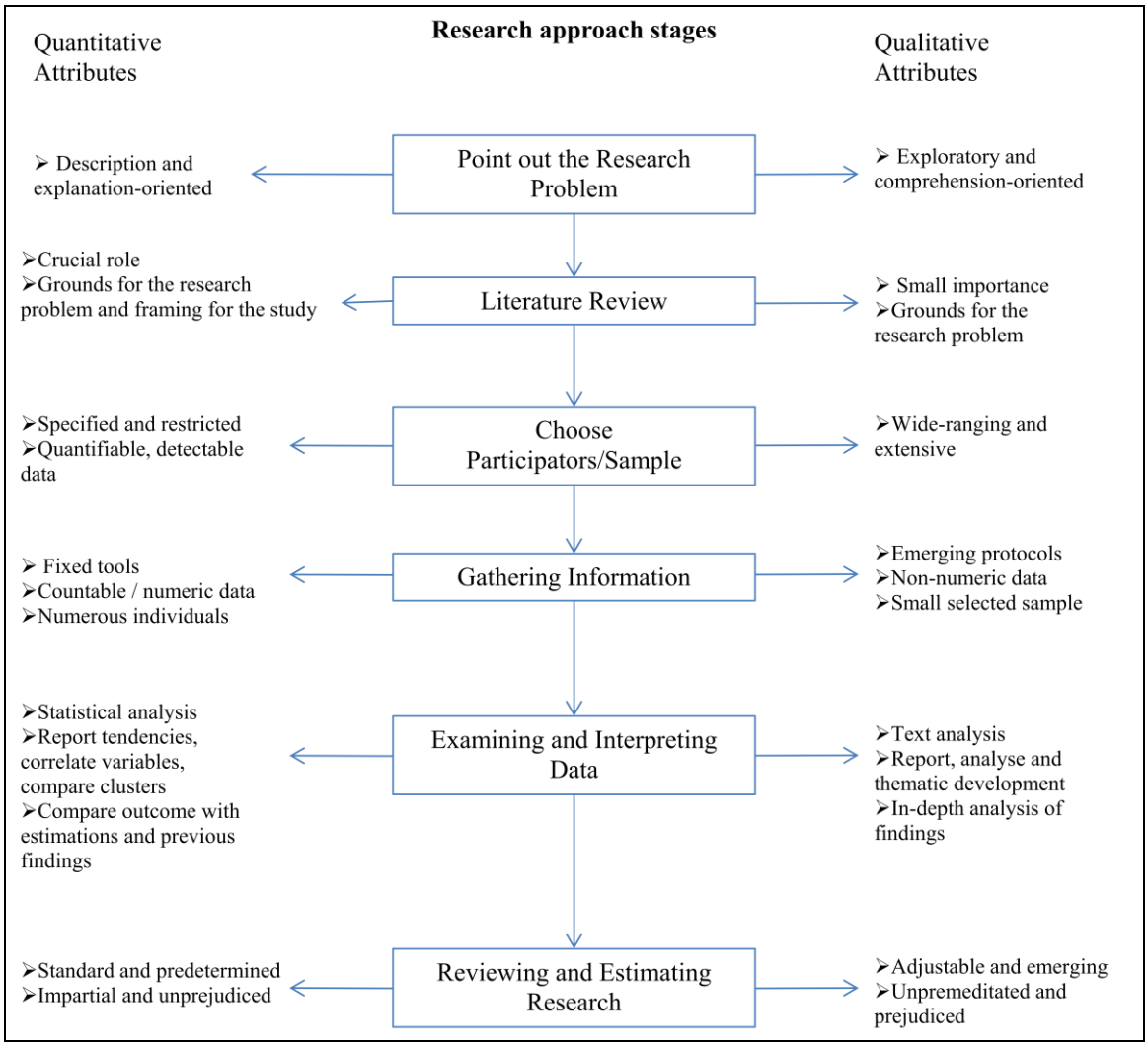
3.1 - Introduction

In this section the methodology adopted for the needs of this dissertation is discussed. After taking into consideration the substance of each research approach combined with the aim of the current research, a quantitative approach was selected. The quantitative approach was conducted using structured questionnaires that were subsequently analysed through an Excel and SPSS analysis. Hence, the grounds behind this selection along with the structured questionnaires and the analysis that took place are discussed below.

3.2 - Choice of Research Methodology

Every research methodology can be used to provide a different way to conduct a research process. As Kumar (2005) states, both qualitative and quantitative methodologies have their strengths and weaknesses, and neither is noticeably better than the other in all respects. According to Hossain (2011, p. 146), qualitative and quantitative analysis can be depicted in an eight-step development process as figure 3.1 shows below.

Figure 3.1: Research Development Steps



Source: Rizos, 2015 adopted from: Hossain, D. M. (2011) 'Qualitative Research Process' In: *Postmodern Openings.* **7** (2) pp.143 – 156, p.146

Although the two research approaches follow the same research path, as Ragin and Amoroso (2011) state, the main difference lies in data techniques. They support that in a quantitative analysis the data techniques can be considered as data condensers, while in a qualitative approach as data enhancers (Ragin and Amoroso, 2011). So, on the one hand, researchers *'condense data in order to see the big picture'* while on the other, *'when data are enhanced, it is possible to see key aspects of cases more clearly'* (Ragin and Amoroso, 2011, p. 123). Thus, a researcher selects an analysis according to the aim of their work. In between these approaches lies the mixed analysis. In the field of the mixed analysis both quantitative and qualitative data are used and analysed as to see the big picture or to identify the norms behind a certain

result. In other words, it can be seen as a combination, adopting characteristics of both qualitative and quantitative analysis.

For the needs of this research a mixed method was decided to be followed at first, as it could give a more integral approach on the subject. Unfortunately, the cancelation of the two UK interviews that were scheduled in December, because of the managers' personal reasons, would have led to a wrong result, as the chosen sample would reflect the option of one country solely and the European character of the research would be lost. So, as the European character on the matter was rated to be more important, a quantitative method was finally embraced to lead in more holistic results.

As mentioned in the background chapter, the aim of this dissertation is to investigate whether and how innovation can be applied as a strategy in project management, in order to give organisations a competitive advantage and assist their effort in overcoming the recent economic downturn. Consequently, this research is focused on the findings of what's happening in the innovation project management world, the analysis of data disclosing whether the first assumption is true or not, and in to which extend applied strategic innovation consists an enhancing tool in resisting the economic downturn.

Therefore, following the step by step path of figure 3.1 combined with research's objectives, the quantitative path seemed to be more suitable. Specifically, an extensive literature review plays the major role required by the chosen methodology, as it has been the main means to identify the concept of innovation as a strategy, along with its significance when applied strategically. The sample was carefully selected so as not to inhibit the European scope of the research, while restricting it to the manufacturing sector, as intended initially. Finally, the questionnaires' structure and their findings, which were statistically analysed, helped, through their comparison, to evaluate the competitive advantage given to organisations and finally led – without any personal preferences – in analysing its aid in overcoming the economic recession.

3.3 - Research Method Adopted

Following the method path description above, in this sub-section a more in depth presentation of the research development process will follow.

3.3.1 Development of Research instrument

As it was briefly described above, in order to identify to what extent innovation is applied in organisations, as well as to discover if it comprises a competitive advantage and how it helps in overcoming the economic recession, close-ended questions were selected. More specifically binary-scale and option-available were used for research's fulfilment.

Some general questions were used at first to reveal the sample's background and to provide a demographic analysis later.

The binary-scale questions (yes/no) were used to reveal the notion behind the purpose of this analysis and to lead the respondent to follow a certain path that was used later to the specified outcome. These types of questions were applied in respect to the innovation usage within the organisations. On the one hand, this examined how widely strategically innovation is applied and, on the other hand, the significance it had related to the economic recession.

Option available questions were used more, as they provided a more clear picture of sample's perspectives on the meaning of innovation in PM, the reasons why organisations choose to apply innovation or not, the applied types of innovation management and finally what kind of advantages did innovation provide when applied.

The developed questionnaire can be found attached on Appendix 3.

3.3.2 Piloting

For the completion of the research, a pilot questionnaire was sent at the beginning to four people based in Greece and United Kingdom. These people were selected specifically because of their experience in the subject, as they all had an over ten year's job experience in their industries. Furthermore, they are all managers in important industry sectors of their countries and the personal relations with the author enhanced the communication in order to have an insight of how a respondent perceives the selected questions. Their comments were generally positive as they outlined the questions as easy to understand, and the questionnaire appropriately short and to the point of the research. There was only one quite negative response, proposing that the academic nature of question 1 in 'Innovation Related Questions'

section, should be avoided and a more ‘business approach’ could be used instead. However, after discussions with the supervisor, the question remained as it was, as its original terminology considered being highly important, linking the literature review with the subject. The modified questionnaire can be found on Appendix 4.

3.3.3 Choice of Sample

The developed questionnaire was sent to project managers and managers in general with long experience and in key factor industries and most importantly all of them is holding positions in organisations’ strategic policy making. Research’s key issue is to identify the range of strategic innovation’s application and the competitive advantage it gives. For these reasons, the sample’s relevance and involvement in strategic policy was the main choosing factor, as well as covering a European scale. Thus, a sample of 54 people was collected consisting of managers in strategic policy making, coming from different European countries.

3.3.4 Data Collection and Recording

Questionnaires were sent to sample with different ways. E-mail survey, hand by hand and online surveys were applied.

Questionnaires were given hand by hand to 15 people, given a 2-week respond period with 100% percent responding. The personal interaction played a major role to have such a success. The e-mail sent questionnaires were given to 50 people given a 2-week respond period. After the 2-weeks period the response was 20% and an extension period of 2 extra weeks was given. After that, the response rate was 50%. This was considered as very successful as the usual rates in such surveys vary between 20–25% (Kaplowitz et al., 2004). Finally, social media were used by uploading the developed questionnaire in relative social groups as ‘The Project Manager Network’, ‘PMI Project, Programme and Portfolio Management’ and ‘Innovation Management Group’. From this survey an outcome of 14 responses was selected, but the success rate is difficult to be identified, as it wasn’t sent to units but in social media groups covering a wide range of people.

3.3.5 Data Analysis

After the data collection, an Excel and SPSS analysis was implemented and descriptive statistics comprised the main analysis method tool. Under descriptive analysis mainly mean frequency analysis was used to acquire the main findings. In

addition, multiple responses were evaluated, and potential correlations between the findings were explored. The outcome of this analysis can be found in the next chapter.

3.4 - Data Validity and Reliability

As it was thoroughly described above, the survey's sample was chosen with having a large experience in the subject. This was specified to give a wide view on how strategical innovation was used before and after the economic downturn and to provide an in-depth analysis of its usage outcome. Furthermore, it was highly important that the responders hold a strategic policy making position as it was the main factor needed for valid sample analysis. Additionally, for the European character of this survey, the responders selected to be part of key-industries covering a wide range of organisations based in different countries, within the manufacturing industry, though, which is the dissertation's area of research.

The questions were formed in such way to provide clearly the main purpose of this survey. Moreover, as it was reaffirmed by the piloting process, they were short - in respect to the busy schedules of such people and not time consuming - easy to understand and not creating confusions, and understandable so as the outcome could be reliable.

3.5 - Summary

This research was carried out using a quantitative approach to achieve the aim and objectives described in Chapter 1. Questionnaires were developed and distributed to a reliable and valid 54-respond sample and they were further statistically analysed using Excel and SPSS. The findings and the analysis of this survey can be found in the next chapter.

CHAPTER 4 – ANALYSIS AND INVESTIGATION

4.1 - Introduction

In this chapter, the main findings extracted from the questionnaires are being examined. As mentioned in the previous chapter, all the information gathered from questionnaires was investigated using Excel and SPSS/content analysis, the outcome of which is presented in 3 main parts. The first part inspects the general features of the participants and the organisations they work for. The second part demonstrates and analyses the main findings of the questionnaire, in accordance with the examination questions displayed. The last part displays a combination of the acquired data, bringing literature's findings and the questionnaire's analysis outcomes together.

4.2 - Details of the participants and the organisations they work for

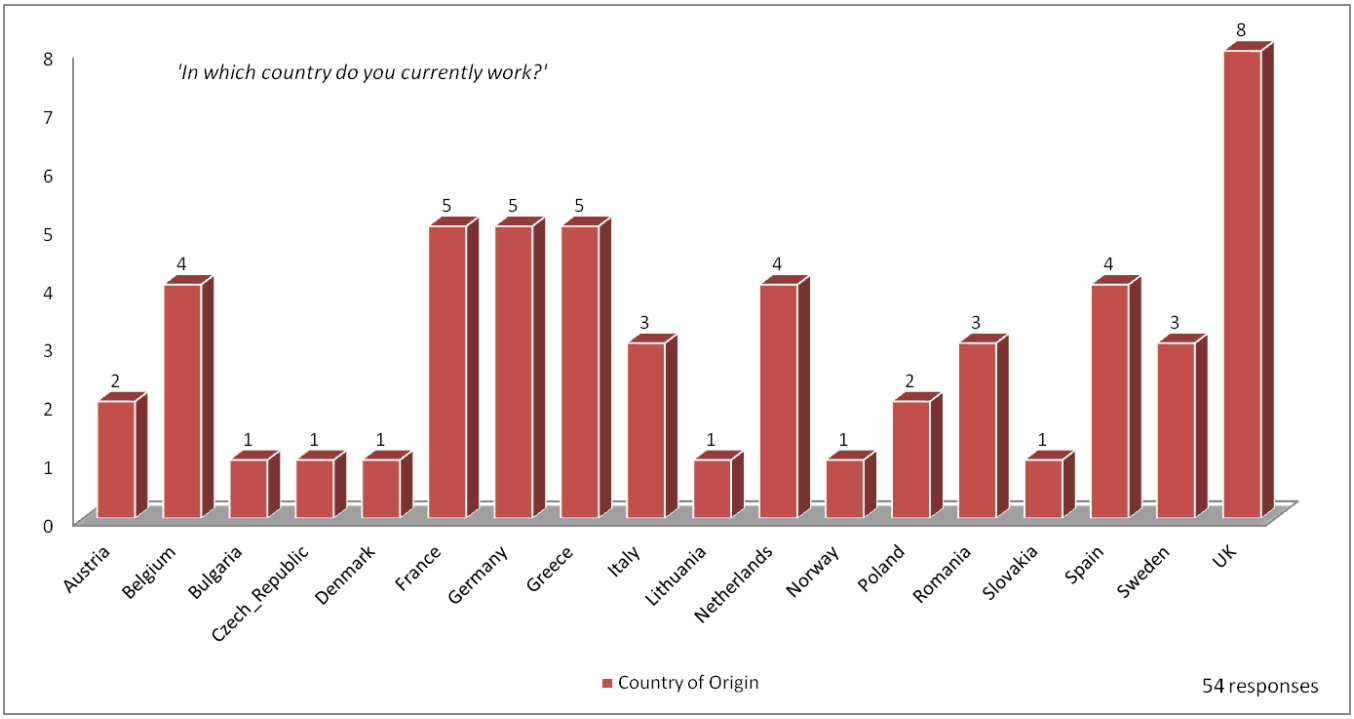
In order to examine the full details of the participators, the data record sheet created for the questionnaire's study was used. This can be found in the Appendix section, as Appendix 1. According to that, the unit of analysis can be identified, consisting of the participants':

1. Educational level,
2. Years of relevant experience,
3. Job role/position,
4. Industry type they're occupied in, and
5. Size of the organisation they work for.

In addition, the same data record sheet demonstrates the country in which they work so as the European scope of the research is ensured, whereas the type of projects they deal with is shown in Appendix 2. This choice of separate demonstration was made due to the nature of the asked question, giving the participants the option of multiple choices, as shown below, where the in-depth analysis of these findings will take place.

To be more specific, the intended European scope of this study can be illustrated in graph 4.1 below:

Graph 4.1: Country of Origin

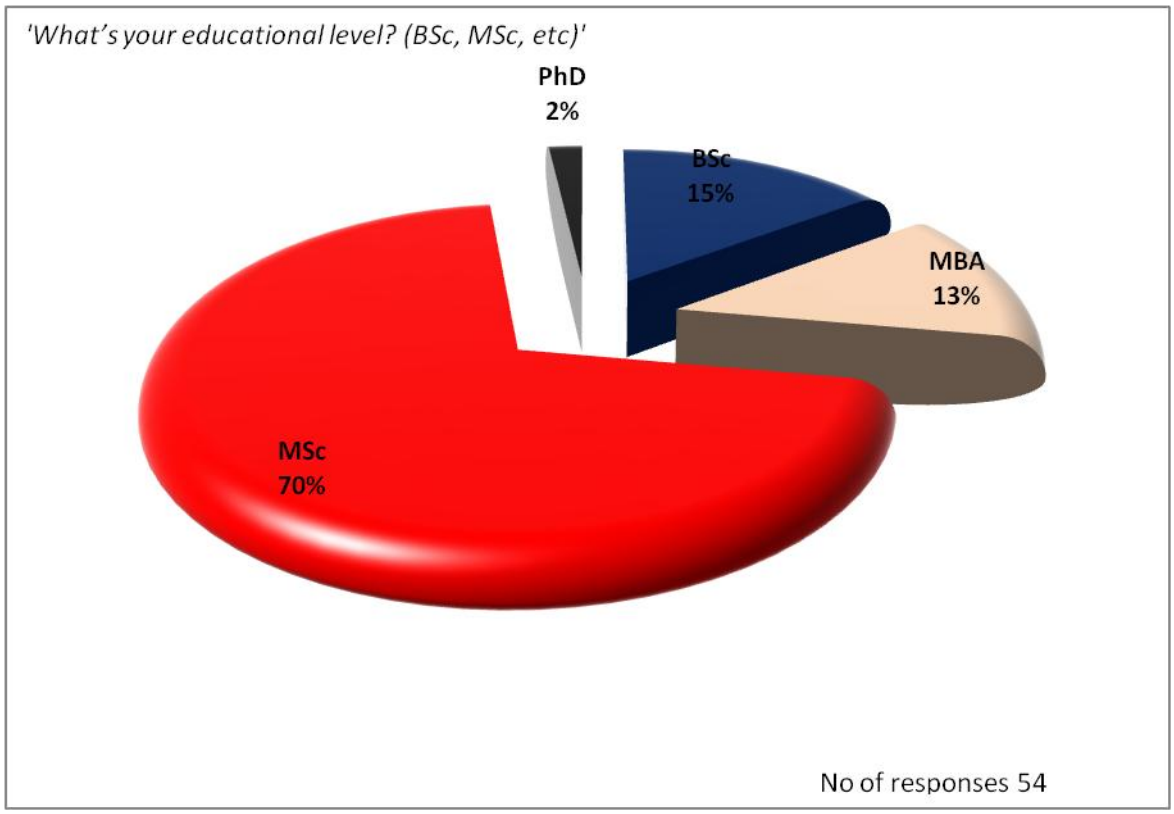


Source: Author's own, (2016)

According to this, respondents from 18 different European countries have participated in this study validating its initial intention. The higher frequency of appearance for countries like the UK, Germany and France can be justified by their high population and business activity, whereas Greece's frequency is related to the author's origin and questionnaire's targeted distribution. Thus, the data are valid contributing to a well-founded outcome.

Moreover, regarding the participants' educational level, the analysis of data demonstrates their background, as all of them are at least BSc graduates, while more than 70% of them have an MSc degree. Consequently, they're highly educated people with deep comprehension of the discussed topic. These data are illustrated on graph 4.2 below:

Graph 4.2: Educational level



Source: Author's own, (2016)

In addition, their years of relevant experience vary between 7 and 30, as shown on table 4.1 below. It is referred earlier in the methodology chapter, that the participants' requirements, regarding their experience, were at least 10 years; however, after discussion with the supervisor and since the less experienced respondents' percentage was low (3.7%), it was chosen not to exclude them. This choice was made because their experience in combination with their educational background (analysed above) and their job role was considered adequate in fully understanding the examined subject, as well as taking part in the decision making process of the organisation they work for.

Table 4.1: Job position held and years of experience

Job Role	Code	Number of responses	Years Average
Finanace Manager	FM	3 (5.5%)	11.3
General Manager	GM	4 (7.4%)	24.5
Operational Manager	OM	7 (13%)	11.3
Production Manager	ProdM	12 (22.2%)	11.6
Project Manager	PM	17(31.5%)	13.8
Purchasing Manager	PUM	6 (11.1%)	17.7
Quality Control Manager	QCM	5(9.3%)	13.6
Total		**54 (100%)**	**14.8**

Source: Author's own, (2016)

Apparently, participants have different job roles in the companies they work for, covering a broad spectrum of the decision making process, as initially intended. Taking into additional consideration their years of experience, the sample is considered to authenticate the study's findings.

Furthermore, the type of projects for which participants work is shown on table 4.2. In this question, inquired people could choose any of the three provided options, or add a type of their own, having, hence, the option of multiple responses. As evident, the number of responses involved into new, routine, or refurbishment projects are somewhat similar, whereas only five (5) participants added a project type of their own. It should be emphasized though, that in all these cases the added project type was process improvement (see Appendix 4, questionnaire 3). Thus, respondents were occupied in all types of projects and their answers are not heavily biased towards one type only.

Table 4.2: Project types

Project type Frequencies				
		Responses		Percent of Cases
		N	Percent	
Project type[a]	New	46	35.90%	85.20%
	Routine	44	34.40%	81.50%
	Refurbishment	33	25.80%	61.10%
	Other	5	3.90%	9.30%
Total		127	128	100.00%

a. Dichotomy group tabulated at value 1.

Source: Author's own, (2016)

At last, table 4.3 below, demonstrates the type of industry the participants are occupied in, along with the size of their organisations.

Table 4.3: Industry type and organisation's size

Industry Type	Number of Responses	Organisational Size (number of employees)			
		a<50	50<**b**<150	150<**c**<250	250<**d**
Manufacturing	24 (44.4%)	2 (8.3%)	7 (29.2%)	5 (20.8%)	10 (41.7%)
Dairy	8 (14.4%)	0 (0%)	2 (25%)	2 (25%)	4 (50%)
Brewery	6 (11.1%)	0 (0%)	1 (16.7%)	3 (50%)	2 (33.3%)
Food	8 (14.8%)	2 (25%)	0 (0%)	2 (25%)	4 (50%)
Pharmaceutical	3 (5.6%)	0 (0%)	0 (0%)	0 (0%)	3 (100%)
Automotive	5 (9.3%)	0 (0%)	0 (0%)	0 (0%)	5 (100%)
Total	**54 (100%)**	**4 (7.4%)**	**10 (18.5%)**	**12 (22.2%)**	**28 (51.9%)**

Source: Author's own, (2016)

According to this table, the sample is occupied in several industry sectors and organisations (depending on their size). However, there's a tendency towards the manufacturing sector, as well as towards big companies. This was expected though, as the manufacturing sector covers a vast amount of firm types, whereas, taking also into account the countries of origin, big firms are addressed mainly in most of the so-called developed countries, and especially within some of the sectors demonstrated above like the automotive and pharmaceutical. Thus, the sample is well distributed, providing valid findings, analysed and discussed in the following section.

4.3 - Main findings

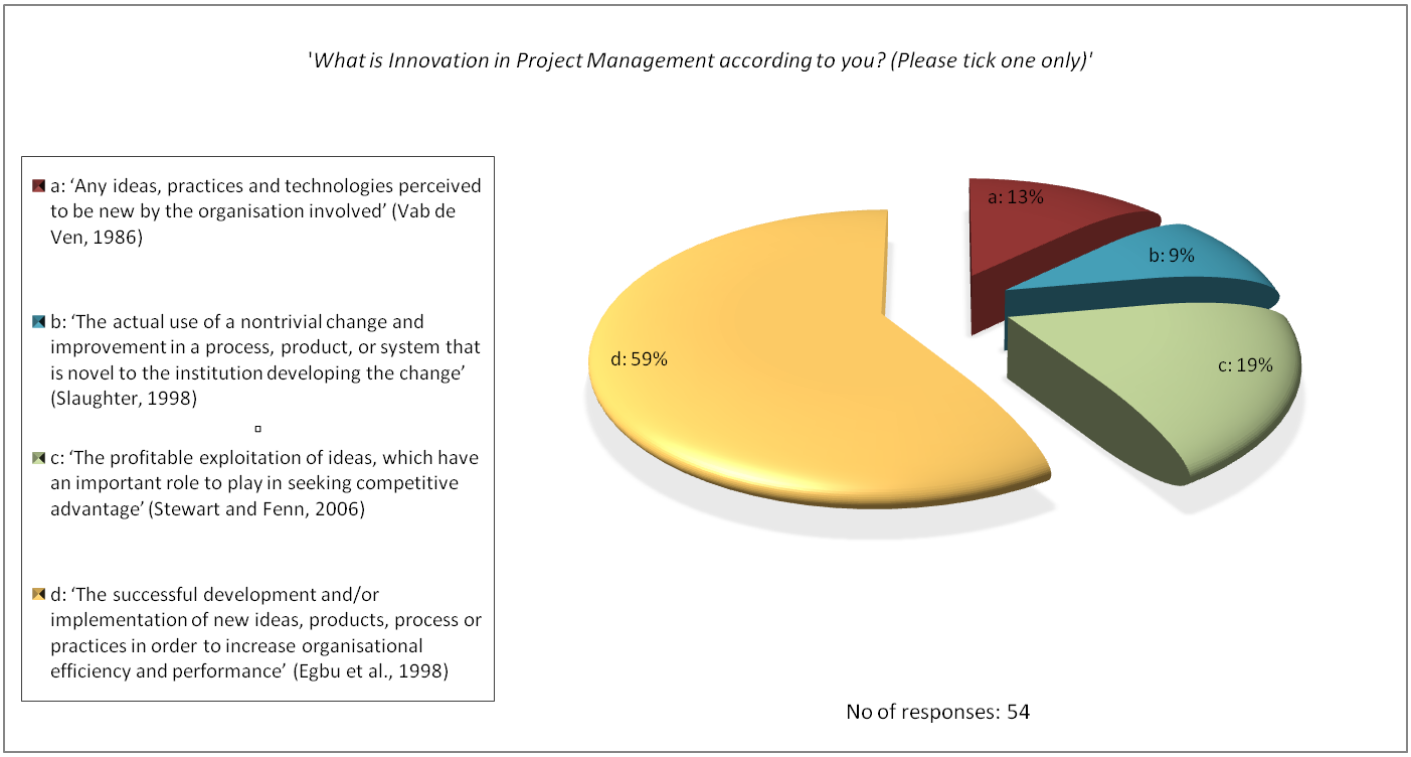
In consequence to the general findings shown in the previous section, regarding the participants' characteristics, the main conclusions of the research are examined, related to innovation and the recent economic crisis. As shown on Appendix 4, this section of the questionnaire was called '*Innovation related questions'* so a clear distinction is made, between these questions and the general ones analysed above. Thus, the specific questions asked are going to be quoted, according to the questionnaire's development, so an overview of the answers received to each of them can be achieved. In addition, the need to continuously refer to the Appendix section where the full questionnaire is cited can be evaded saving time and focusing on the actual findings of this survey.

4.3.1 Question 1: Definition of Innovation in Project Management

Specifically, participants' were first asked to determine innovation. The question asked was: *'What is Innovation in Project Management according to you?'* and

respondents were given the option to choose among four (4) widely adopted definitions met within literature, as shown in figure 4.3 below.

Graph 4.3: Definition of Innovation in PM



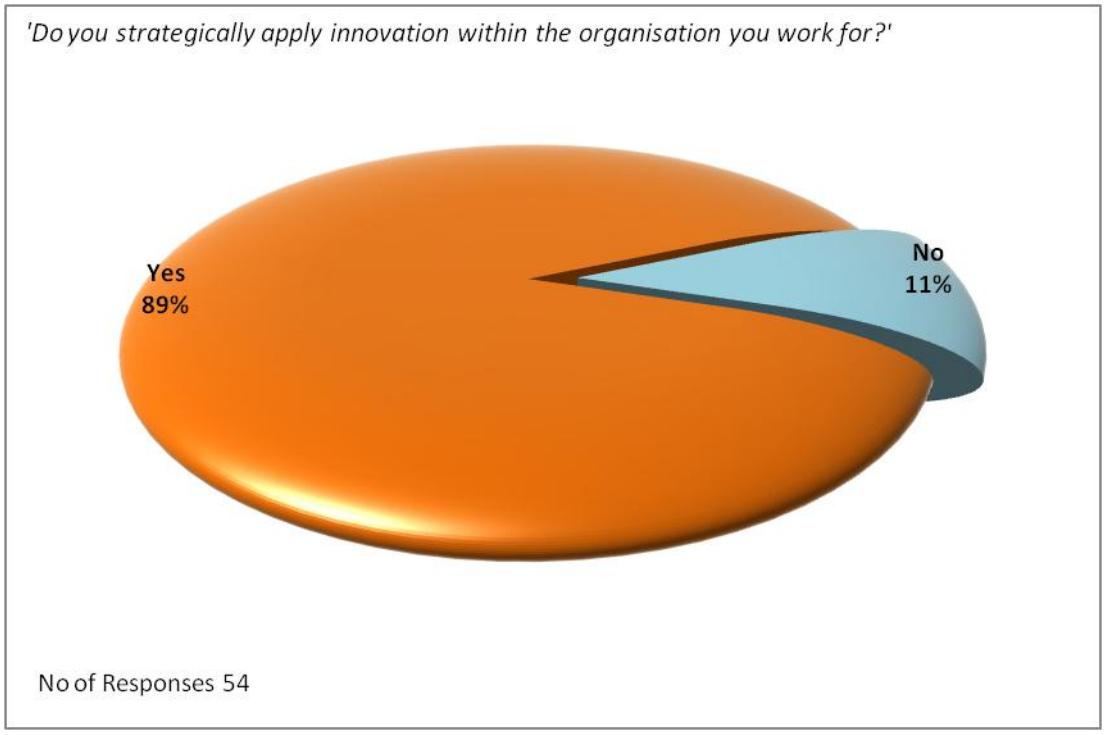
Source: Author's own, (2016)

The reason behind this question choice was first to make an introduction to the main theme inspected in this section and, moreover, to link these findings to current literature. As illustrated on the above figure, all provided definitions were chosen to some extent, however, the majority of inquired practitioners picked out the definition suggested by Egbu et al. (1998), which is the one adopted for the purposes of this research (see chapter 2).

4.3.2 Question 2: Strategic application of innovation

Having introduced the main research area of the survey, participants were then asked whether they '*strategically apply innovation within the organisation* they *work for*'. The results are illustrated in figure 4.4 below, and the outcome is evident of the broad application of strategic innovation within organisations nowadays. Hence, any further investigation is surplus, as almost 90% of the inquired managers are taking advantage of innovation's merits confessing its gravity in firms' survival and success.

Graph 4.4: Strategic innovation's application



Source: Author's own, (2016)

Depending on their answer, participants could then, either state the reasons of their non-application (question 3), or continue with the rest inquired information. In-depth research of these options follows below.

4.3.3 Question 3: Reasons of non-application of strategic innovation

Business practitioners working in non-innovative organisations have, obviously, little information to share in an innovation related survey. However, before ending their contribution to this study, the reasons behind this choice were asked, as: '*if not* (apply innovation within your organisation), *please state why*'.

Table 4.4: Reasons for no application of innovation

No application Frequencies				
		Responses		Percent of Cases
		N	Percent	
No application reason[a]	Time	5	50.00%	83.30%
	Money	4	40.00%	66.70%
	Never thought of	0	0.00%	0.00%
	Other	1	10.00%	16.70%
Total		(6) 10	100.00%	166.70%
a. Dichotomy group tabulated at value 1.				

Source: Author's own, (2016)

Although the sample of participants that didn't apply any innovation type within their working place was small (just 11.1%, as shown above), it is important to evaluate the explanation of this selection. It is evident and should be highlighted that not a single inquired practitioner chose the '*never thought of*' option, but instead identified time and money as the main obstacles in such an adoption (83.3% and 66.7% respectively). In addition, 'other' was chosen by one participant solely (see Appendix 4, questionnaire 2), justifying this choice because of the nature of the specific industry occupied in, which is traditional food production, and to which innovation couldn't be applied.

4.3.4 Question 4: Type of innovative management types adopted

For those that continued their contribution to this research, by answering 'yes' in question 2, the next information inquired was the type or types of innovative management approaches adopted in the company they worked for. The question was asked as: '*What type of Innovation management do you apply within the organisation you work for?*' and the respondents were given the option of multiple responses, as different management types can be used at the same time. Indeed, table 4.5 below, demonstrates the hypothesis validation.

Table 4.5: Innovative management approaches adopted

Innovative Management Types Frequencies				
		Responses		
		N	Percent	Percent of Cases
Management Types[a]	Lean	47	43.1%	97.9%
	Six Sigma	37	33.9%	77.1%
	BIM	5	4.6%	10.4%
	BSC	20	18.3%	41.7%
Total		**(48) 109**	100%	227.1%
a. Dichotomy group tabulated at value 1.				

Source: Author's own, (2016)

According to this table, Lean and 6 Sigma's wide adoption, nowadays, is highlighted once more (97.9% and 77.1% of the cases respectively), followed by a significant BSC implementation. However, it's important to underline the low implementation of BIM within the manufacturing sector. Moreover, as BIM can be used for buildings maintenance and other construction related activities, BIM's usage in organisations' actual production process might be even lower. Thus, manufacturing industry's low adoption of this type of innovation is shown (as initially expected), and the competitive advantages it provides are yet to be assessed by such firms.

4.3.5 Questions 5 and 6: Competitive advantages gained and their type

In consequence to question 4, participants were asked whether the exploitation of the aforementioned innovative management approaches gave the companies they work for a competitive advantage, or not. The absolute 100% addressed in this question makes any further analysis redundant and, hence, the type of this competitive advantage gained should be discussed.

The question asked was: '*What type of competitive advantage does it give you?*' and once more the respondents were given the freedom of choosing any of the five (5) provided options, along with an advantage of their own, should they identify any such. The findings of this enquiry are demonstrated in table 4.6 below:

Table 4.6: Competitive advantages gained by innovative management types' adoption

Competitive Advantages Frequencies					
		Responses		Percent of Cases	Percent of all responses
		N	Percent		
Competitve advantages[a]	**economic**	40	27.20%	83.30%	76.92%
	Time	36	24.50%	75.00%	69.23%
	organisational	34	23.10%	70.80%	65.38%
	sustainability	22	15.00%	45.80%	42.31%
	customer relationship	15	10.20%	31.30%	28.85%
Total		**(48) 147**	**100.00%**	**306.30%**	**100.00%**

a. Dichotomy group tabulated at value 1.

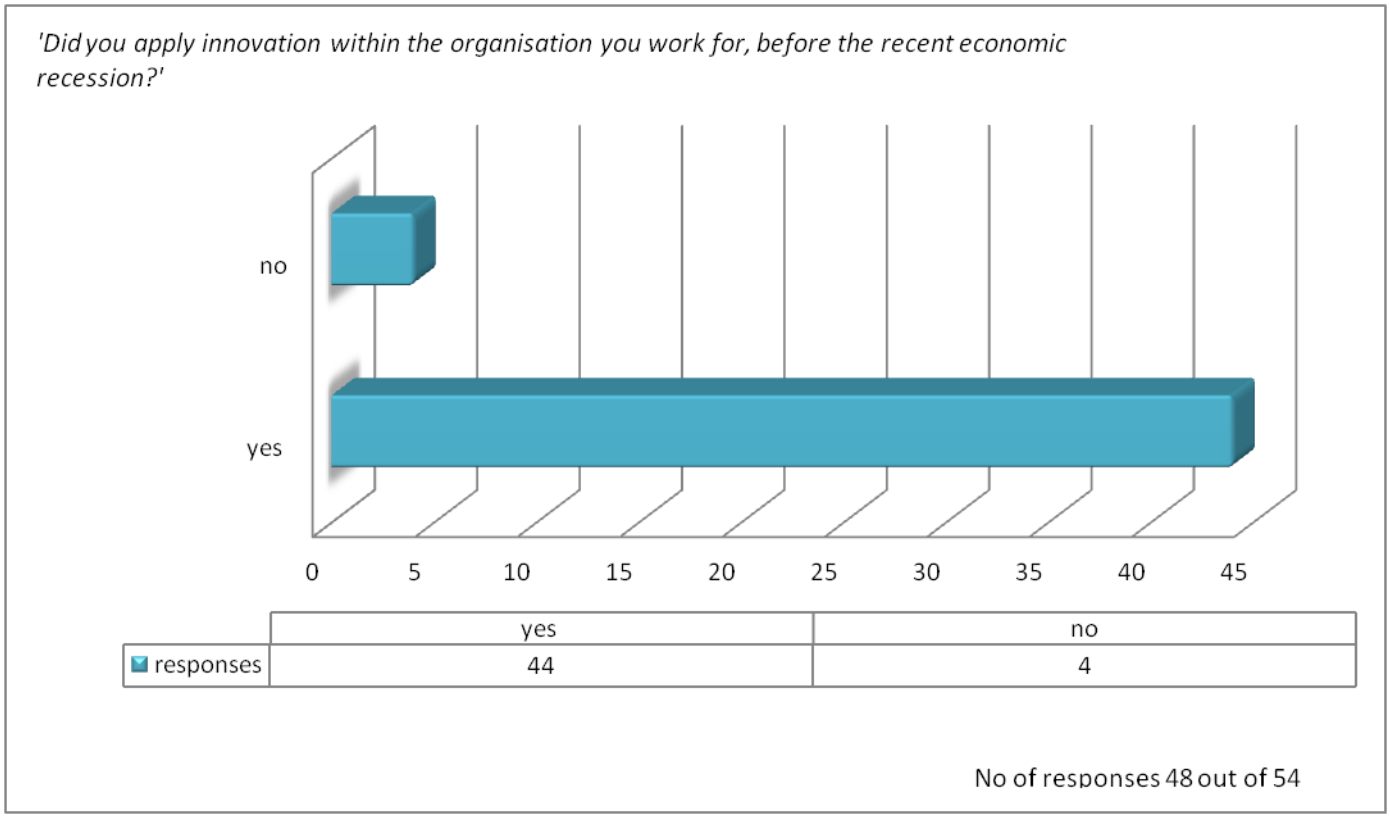
Source: Author's own, (2016)

Unfortunately, no participant provided additional competitive advantages gained. Still, Lean, 6 Sigma, BSC, and even BIM's significance is demonstrated clearly in the above table, benefiting firms in economic, time and organisational terms mainly (83.3%, 75%, and 70.8% of the cases respectively), followed by advantages related to sustainability and customer relationship. In this way, apart from literature, real-life managers, employed throughout Europe emphasize clearly on innovation's importance, interpreting it into specific benefits gained for organisations.

4.3.6 Questions 7, 8, and 9: Application of innovation before the economic crisis, its aid and changes

In question 7, participants were asked whether the adoption of the aforementioned innovative management approaches took place before the economic downturn, in an attempt to link innovation to the recent recession. The question asked to managers was set simply, as: '*Did you apply innovation within the organisation you work for, before the recent economic recession?*' and the respondents choosing 'yes' were the vast majority (91.7% of the cases, or 81.5% out of all responses). Thus, they manifested that innovation should be, and is for them a culture and the way of doing business, instead of a random or temporary action. These findings are illustrated in graph 4.5 below.

Graph 4.5: Innovation's application before the economic crisis



Source: Author's own, (2016)

Still, for those that didn't use innovation as a driving force of their organisation prior to the recent economic downturn, the choice to declare whether this adoption helped them, eventually, or not was given. In this way, managers were asked to validate their previous selections in questions 5 and 6. The categorical 100% given in this question (8) requires no further analysis. On the contrary, it highlights once more innovation's beneficial nature for firms that take advantage of it.

At last, affirmative respondents (of question 7) were asked to identify changes in the gained benefits, after the recession. These findings are shown in table 4.7:

Table 4.7: Changes in gained competitive advantages after the recent economic crisis

Changes in competitive advantage Frequencies					
		Responses		Percent of Cases	Percent of all Responses
		N	Percent		
Changes in competitive advantage	Economic	26	21.80%	59.10%	48.15%
	Time	24	20.20%	54.50%	44.44%
	Organisational	31	26.10%	70.50%	57.41%
	Sustainability	26	21.80%	59.10%	48.15%
	Customer Relationship	12	10.10%	27.30%	22.22%
Total		**(44)119**	**100.00%**	**270.50%**	**100.00%**

a. Dichotomy group tabulated at value 1.

Source: Author's own, (2016)

Specifically, participants were asked whether they noticed any such changes. However, each and every one of them did observe alterations, addressing an absolute 100% to this question. Therefore, analysis of the findings is required solely about the type of these changes and not about whether such changes were met or not.

The question asked for this case was: '*What type of changes did you notice?'* and respondents were able to select any of the given options, precisely as in question 6. As shown in table 4.7, innovation's significance in overcoming the recent economic crisis is emphasized. All provided competitive advantages retain their high percentages in participants' choices demonstrating innovation's beneficial aid for organisations. However, the evident economic and time merits of innovation seem to be declining in comparison to the answers given for question 6, whereas respondents seem to identify organisational gains and sustainability as the main improved aspects of their companies' activities. Therefore, even when organisations aren't benefitted in their profits or time saving by the adoption of innovative management systems, it's the fortification of their organisational structures and sustainability the merits they secure, which are extremely important in today's turbulent business environment.

4.4 - Discussion and synthesis

As analysed extensively in the literature review and supported by this study's findings, innovation is the way for organisations to survive and prosper. This is accomplished due to the significant competitive advantages gained by its adoption,

like those examined within this survey, as well as some more identified by literature. The objectives of this research, mentioned in chapter 1 are: the identification of 'innovation as a strategy' concept, the significance of strategic innovation's application, the evaluation of the gained competitive advantages by manufacturing organisations, and the analysis of innovation's aid in overcoming the recent economic recession. Thus, the main findings acquired by the questionnaire's examination are going to be inspected and discussed accordingly. However, the general findings of the survey need to be reviewed first.

As shown, the initial aim to cover the main subject in a European level is clearly fulfilled. Managers from 18 different European countries have contributed to this study, verifying strategical innovation's significance in modern European companies and economies, as stated by several authors like Hausman and Johnston (2014). According to the findings, innovation's adoption reached an impressive 89% by managers of different, though high, educational levels, years of relevant experience, and job roles. Moreover, these responding managers work in organisations within different industries, of different size and in different project types. Hence, the survey's focus on the manufacturing sector is ensured and innovation's importance as competitive advantage generator is validated, regardless of country, industry, or organisational size.

In addition, neither the educational level of the participants, nor their years of experience seem to play a role in the adoption's extent. However, it can be stated that since these individuals are highly educated people, they have deep comprehension of the subject and its importance, authenticated by its wide adoption in the organisations they work for.

Still, significant findings are acquired taking into consideration the organisational size. It's critical to highlight that all the participants working in big organisations (occupying more than 250 employees) apply innovation within the several projects they're involved in. This has potentially two meanings and validates literature findings in two ways. On the one hand, it is obvious that large, prosperous organisations adopt innovation of any type as a part of their culture and strategy. Thus, in complete accordance with the literature findings (Holtzman, 2008), business leaders have the means and the will to innovate constantly, identifying innovation as

the way to sustainable growth. On the other hand, though, it also validates the fact that some smaller firms tend to avoid innovation's adoption, considering it a time and resource consumer (table 4.4) as argued by Simpson et al. (2006). Thus, instead of investing in the long term benefits, such organisations exclude innovative endeavours of their activities. This is due to the enforced by the recent recession uncertain and turbulent market, which makes such firms adopt a defensive, fund-saving policy.

Moreover, a correlation between a firm's size and the gained advantages can be identified in table 4.8. Although this correlation exists with all provided benefits, its significance is greater in relation to the monetary earnings.

Table 4.8: Correlation between a firm's size and its economic advantage

Organisational size and economic benefits Correlation			
		Size	economic
Size	Pearson Correlation	1	.369**
	Sig. (2-tailed)		0.006
	N	54	54
economic	Pearson Correlation	.369**	1
	Sig. (2-tailed)	0.006	
	N	54	54
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Author's own, (2016)

According to this table, as innovative firms get bigger they tend to be more economically benefited. Thus, one of the main reasons promoting innovation within business leaders is the monetary upgrade it provides them, validating such arguments underlined in the literature review, by Archibugi et al. (2013) and Kerber and Laseter (2007) amongst others.

Regarding innovation's definition, although it was used as an introductory question for the main topic discussed, an important finding is noticed. According to this, innovation's definition suggested by Egbu et al. (1998) and adopted for the purposes of this research is also selected by the 59% of the participants. Thus, the survey's adoption of this particular definition is justified by managers around Europe choosing it as the most concise and analytical one.

Focusing on the main findings, though, strategic innovation's importance determined by several studies within literature is also underlined by its wide adoption within the inquired sample of this survey. This percentage validates in the best way literature's outcome, which suggested innovative endeavours as the driving factor of progress, prosperity and sustainable development.

In addition, innovative management systems like Lean, 6 Sigma, and BSC are evident to be implemented within the vast majority of modern, developed European organisations emphasizing their significance and beneficial usage. On the other hand, though, it also important to link the study's verdict about BIM's adoption by the manufacturing sector to literature's findings (see Chapter 1, Ezcan et al., 2013). In accordance, table 4.5 demonstrated in the main findings section, verifies the fact that BIM hasn't yet infiltrated this particular industry. Its 10% adoption by the inquired managers is a small percent to be safely assessed. Thus, the evident competitive advantages gained by its implementation, as highlighted in chapters 1 and 2, can't be properly examined by this survey due to the small sample that identifies it as a benefit generator. However, important findings can be confirmed by the rest selected management approaches.

First, it should be mentioned that all inquired managers that apply 6 Sigma within the company they work for, also apply Lean manufacturing. This was met in 21 cases (38.89% of all responses). Thus, the 100% acquired by these respondents authenticates literature's findings that, nowadays, Lean and 6 Sigma are widely adopted in combination, generating the LSS term and management system (Burton, 2011; Cook, 2013). Consequently, and since the sample that selected only these two innovative management techniques is adequate, LSS's combined adoption can be evaluated in relation to the competitive advantages given to organisations.

Table 4.9: Combined adoption of LSS and the competitive advantages gained

Lean Six Sigma and Competitive Advantages Frequencies					
		Responses		Percent of Cases	Percent of all Responses
		N	Percent		
LSS[a]	LSS	21	25.00%	100.00%	38.89%
	economic	18	21.40%	85.70%	33.33%
	time	20	23.80%	95.20%	37.04%
	organisational	12	14.30%	57.10%	22.22%
	sustainability	9	10.70%	42.90%	16.67%
	customer relationship	4	4.80%	19.00%	7.41%
	Total	(21) 84	100.00%	400.00%	

a. Dichotomy group tabulated at value 1.

Source: Author's own, (2016)

As shown in this table, the combined adoption of Lean and 6 Sigma offers essential competitive advantages to contemporary organisations, especially in monetary and time terms. The fact that more than 85% of the managers that exploit the combined merits of LSS identify economic and time benefits for their organisations (apart from the other significant advantages that shouldn't be underestimated) verifies literature's findings and shows the way forward to hesitant firms. In addition, it fulfils this survey's objective of evaluating the competitive advantages gained by LSS's combined adoption.

Furthermore, these findings' importance is emphasized to a greater extent when analysed in relation to the recent economic recession (see table 4.10 below). According to this, even after the economic downturn, LSS's advantages preserve their high percentages. Hence, firms are still benefited in their profit margins and time saving, while it's also important to underline organisational merit's stable percent before and after the recession. It can be deduced that no matter the external environment's affect, companies can always fortify their organisational structure when adopting an innovative management approach like LSS.

Table 4.10: Combined adoption of LSS and changes after the recession

Lean Six Sigma and Changes in Competitive Advantages Frequences					
		Responses		Percent of Cases	Percent of all Responses
		N	Percent		
LSSa	LSS	21	26.90%	100.00%	38.89%
	economic	16	20.50%	76.20%	29.63%
	time	18	23.10%	85.70%	33.33%
	organisational	12	15.40%	57.10%	22.22%
	sustainability	7	9.00%	33.30%	12.96%
	customer relationship	4	5.10%	19.00%	7.41%
	Total	**(21) 78**	**100.00%**		

a. Dichotomy group tabulated at value 1.

Source: Author's own, (2016)

Therefore, Chiarini's (2011) and Taghizadegan's (2006) emphasis on the beneficial combined adoption of Lean and 6Sigma is validated by the sample, while the analysis of innovation's aid in overcoming economic downturns is fulfilled.

Regarding the adoption of the BSC, although the sample choosing solely this innovative management type is very small (1.8% of all responses), its combined adoption with LSS is met 12 times amongst the responses giving similar to the aforementioned, interesting outcomes (22.2% of all responses, or 25% of the cases applying innovation). According to table 4.11 below, managers implementing simultaneously LSS and BSC are highly benefited in economic, time and organisational terms. In comparison to the previous findings though, regarding the implementation of LSS alone, the addition of BSC in organisations' management system upgrades vastly its sustainability and relationship to customers. It is, thus, clear that advantages suggested by current researchers (Luo et al., 2012; Norreklit et al., 2012) are verified by the inquired managers, fulfilling, at the same time this research's objectives.

Table 4.11: Combined adoption of LSS and BSC and the competitive advantages gained

Combined LSS with BSC and Competitive Advantages Frequencies					
		Responses		Percent of Cases	Percent of all Responses
		N	Percent		
LSS BSC advs[a]	LSS_BSC	12	21.80%	100.00%	22.64%
	economic	10	18.20%	83.30%	18.87%
	time	9	16.40%	75.00%	16.98%
	organisational	10	18.20%	83.30%	18.87%
	sustainability	7	12.70%	58.30%	13.21%
	Customer relationship	7	12.70%	58.30%	13.21%
	Total	(12) 55	100.00%		

a. Dichotomy group tabulated at value 1.

Source: Author's own, (2016)

Similarly to the above findings, table 4.12 below demonstrates the changes in the competitive advantages gained by firms when LSS is adopted in combination with BSC, after the recent recession. According to this, although time and customer relationship merits are decreased due to the crisis' impact, economical, organisational, and sustainability gains remain stable. Hence, inquired managers observed changes in the aforementioned aspects of their organisations' activities, gaining essential advantages in today's uncertain market environment.

Table 4.12: Combined adoption of LSS and BSC and changes after the recession

LSS_BSC and changes					
		Responses		Percent of Cases	Percent of all Responses
		N	Percent		
LSS_BSS2[a]	**LSS_BSC**	12	25.50%	100.00%	22.22%
	economical2	10	21.30%	83.30%	18.52%
	time2	4	8.50%	33.30%	7.41%
	organisational2	10	21.30%	83.30%	18.52%
	sustainability2	7	14.90%	58.30%	12.96%
	customer relationship2	4	8.50%	33.30%	7.41%
	Total	(12) 47	100.00%	391.70%	391.70%

a. Dichotomy group tabulated at value 1.

Source: Author's own, (2016)

At last, significant outcomes can be extracted out of the participants' answers when the competitive advantages and their changes after the economic crisis are assessed. As shown on table 4.13, a decrease is observed in the economic and time benefits of innovation, amongst other important conclusions.

Table 4.13: Competitive advantages before and after the crisis

Comparison of the competitive advantages before and after the crisis				
		Responses		Percent of Cases
		N	Percent	
Compared Competitive Advantages	economic (1)	40	15.00%	83.30%
	time (1)	36	13.50%	75.00%
	organisational (1)	33	12.40%	68.80%
	sustainability (1)	22	8.30%	45.80%
	customer relationship (1)	14	5.30%	29.20%
	economic (2)	26	9.80%	54.20%
	time (2)	24	9.00%	50.00%
	organisational (2)	32	12.00%	66.70%
	sustainability (2)	26	9.80%	54.20%
	customer relationship (2)	13	4.90%	27.10%
Total		266	100.00%	554.20%
a. Dichotomy group tabulated at value 1.				

Source: Author's own, (2016)

This was expected and mentioned in the literature review by Hruzova (2011), as the recent recession made an impact to firms' productivity, gross revenue and profits. However, organisational benefits remain stable after the crisis, whereas sustainability is increased significantly. Hence, current literature's findings highlighted in Chapter 2 are verified by the study's outcomes, and innovation's positive impact on organisational models (Oh et al., 2015) and sustainability (Milutnovic and Stosic, 2013) after an economic downturn is authenticated.

4.5 - Summary

As a summary, this survey contributes to existing literature by highlighting once again innovation's importance in providing organisations with competitive advantages, sustainable growth and assistance in overcoming economic downturns. According to these findings, the unit of analysis is determined ensuring the survey's European scope and its focus on the manufacturing sector. Moreover, it is manifested that the vast majority of European organisations strategically apply innovation in order to survive and prosper. The combined adoption of Lean manufacturing and 6 Sigma is emphasized, along with BSC's aid, identifying the essential, specific benefits gained

by organisations generally, as well as in particular, after the recent recession. Moreover, these merits are evaluated both on their own (before and after the crisis), as well as in relation to the aforementioned innovative management models, fulfilling the objectives developed for the purposes of this research. Still, even for those few that don't innovate, the reasons behind this choice are determined and explored, along with BIM's slow adoption by the manufacturing industry. In this way all the literature review's suggestions are validated and along with the objective's fulfilment, referred above, an efficient, in-depth analysis of innovation as a strategy in project management is achieved.

CHAPTER 5 - CONCLUSIONS

5.1 - Overall summary

In summation, this research used an extensive literature review, as well a questionnaire survey in order to explore in depth the concept of innovation as a strategy in PM. Its aim is to highlight innovation's significance for modern European organisations, evaluate the competitive advantages gained by the combined adoption of innovative management models like Lean, 6 Sigma, BSC and BIM, and aid firms' efforts in overcoming the recent economic downturn.

Therefore, in the broad literature review that took place in chapter 2, innovation was properly defined, drivers and inhibitors were inspected, and effective implementation's key ingredients were analysed. Moreover, innovation's strategies and types were inspected, leading to the analysis of the aforementioned management approaches, as well as the benefits they offer to the companies that adopt them. Finally, such advantages were explored systematically underlining their importance for economies and organisations, especially in relation to economic crises and how they can be dealt with.

Consequently, the merits and demerits of quantitative and qualitative survey approaches were analysed in chapter 3, justifying the adoption of a questionnaire for the purposes of this study. The development of the pilot and final questionnaire were described, along with the distribution techniques followed and the analysis methods used, like Excel and SPSS.

At last, in the main analysis section (chapter 4), the general findings extracted by the responses were used to ensure the European scope of the research and its focus on the manufacturing industry solely. Moreover, the main findings validated strategic innovation's importance and broad adoption by European firms. The combined adoption of Lean, 6 Sigma and BSC was highlighted, and their offered benefits were evaluated. In addition, BIM's scarce implementation in this specific industry was emphasized, along with the reasons that hinder innovation's adoption by some organisations. At last, the aforementioned competitive advantages were linked to the latest recession, showing the way forward to companies and managers.

5.2 - Overall conclusions

In conclusion, this study aimed and achieved to verify strategic innovation's importance in driving organisations that adopt it forward, giving them the required ingredients to survive, expand, and thrive. Specifically, using an extensive literature review and the findings of a quantitative method of analysis, this survey aimed to fill the existing gap regarding the competitive advantages gained by a combined adoption of different innovative management systems and the way these can aid firms to overcome the recent economic downturn. For this reason, specific objectives were set, according to which the concept of innovation as a strategy in project management was investigated.

The first developed objective for the purposes of this survey was the identification of strategic innovation's concept and a literature review was used for its fulfilment. According to it, innovation is defined appropriately, adopting the definition suggested by Egbu et al. (1998) as the successful development and/or execution of new ideas, products, technologies, or processes in order to increase efficiency and performance of organisations, validated by the questionnaire's inquired sample that chose it (instead of the other 3 provided options) to the extent of 60%. Moreover, the differences between radical and incremental innovation are determined, along with the strategies required to effectively implement them. Inhibitors of innovation are identified, with bureaucracy, stiff organisational structure, risk aversion and failure intolerance (amongst others) being the most important. On the other hand, innovation's drivers are determined, highlighting the importance of leadership, culture and team's climate. Types of innovation are now made clear as product, process, marketing and organisational (OECD, 2005), along with characteristics and implementation strategies for Lean, 6 Sigma, BSC and BIM and their benefits for organisations regarding mainly productivity, profitability, time and cost saving, and overall performance. At last, specific competitive advantages provided by innovation are described, as well as its importance for modern economies and European firms, especially in relation to the recent recession and how it can aid them overcome it. Thus, the concept of innovation as a strategy is covered in all its aspects and is regarded fulfilled.

Consequently, the second developed objective was the exploration of strategically applied innovation's significance, fulfilled mainly by the literature review, and validated by specific questionnaire's findings. According to literature findings, innovation is the only sustainable way forward for organisations on the long term (Applegate and Harreld, 2009; Hausman and Johnston, 2014; Holtzman, 2008; Milic, 2013; Oh et al., 2015). This statement alone proves innovation's importance, verified by managers and organisations around Europe that innovate to the extent of 89%, according to the survey's findings. Moreover, several researchers around the world have identified specific benefits for innovative firms, analysed in chapter 2, like upgrades in their profitability, organisational structures, sustainability, relationship with customers, and time management amongst others, validated by the participants' responses. In addition, this study's finding that all business leaders (100%), it terms of their size, apply innovation within their activities, verifies its importance and beneficial impact to organisations. At last, the fact that all the inquired managers (100%) that do, apply innovation in their working environment identify competitive advantages of different kinds by this adoption validates beyond any doubt innovation's significance. Thus, strategic innovation's significance is highlighted, fulfilling the aforementioned objective.

Furthermore, the third objective developed for the purposes of this research was the evaluation of the competitive advantages given to firms by the combined adoption of several innovative techniques. This is fulfilled by the survey's findings, assisted, though, by some theoretical, literature arguments analysed in chapter 2. According to this study's findings, all managers adopting Lean and 6 Sigma in combination (LSS) identify significant gains for their companies, especially in economical and time terms (85.7% and 95.2% respectively). Moreover, the combined exploitation of LSS and BSC also provides organisations with important economic and time benefits (83.3 % and 75% respectively), with additional gains in their organisational structure (83.3%), sustainability and customer relationship (58.3% for both these merits). These findings, thus, assisted by several researchers' suggestions of the combined adoption of such innovative management approaches, due to benefits offered like the aforementioned, fulfil this specific objective. However, it should be mentioned that, in accordance to literature, BIM's adoption by the manufacturing industry is still slow, as just 10.4% of the innovative respondents use it (or 9.2% of all the participants). Hence, its combined

adoption with the rest innovative models, and the competitive advantages it offers couldn't be properly assessed, requiring further research.

At last, regarding the final developed objective, and the analysis of how innovative approaches can aid firms in overcoming the recent economic crisis, the questionnaire's findings are used in order to achieve its fulfilment. For this reason, the competitive advantages given to organisations before and after the recession are compared and evaluated, demonstrating important outcomes. Specifically, 91.7% of the respondents were using innovation before the economic crisis and all of them noticed beneficial changes in their activities. According to them, although a decrease is observed in their monetary and time gains (as expected due to the crisis' impact), organisational gains still remain stable (66.7% after the crisis and 68.8% before it), whereas sustainability is upgraded (54.2% instead of 45.8% before the crisis). This is enhanced by the findings extracted when LSS's beneficial impact is investigated before and after the crisis (slight drop in economic and time benefits after the crisis, but stable outcomes for organisational benefits). Similarly, the combined adoption of LSS and BSC provides stable benefits before and after the crisis in economical, organisational, and sustainability terms. Thus, even after the economic crisis, organisations are highly benefited by the adoption of innovative approaches, and the way in which this is accomplished is evaluated as intended. Therefore, this objective is fulfilled, leading, in summation, to the overall fulfilment of this study's primary aim.

5.3 - Recommendations

5.3.1 To the industry

Regarding the manufacturing industry, it is highly recommended that innovation of all kinds should be promoted and adopted (by the companies that still don't). However, its implementation shouldn't be just a matter of saying so, but establishing the appropriate leadership, culture, environment and strategy that encourages innovative endeavours and persists for an efficient outcome. In addition, BIM's importance and the competitive advantages it provides are clearly demonstrated within literature and are already exploited by the construction sector. It is, hence, recommended that the manufacturing sector should also take full advantage of this innovative approach, sooner rather than later, amplifying its benefits generators, in order to grow and

progress. Today's continuously changing and turbulent business environment requires adaptation, and this could be one of the ways to lead manufacturing companies to the new era. At last, even during or after the recent economic recession, organisations should invest in innovative minds, products, processes, and marketing and organisational models instead of constantly trying to save funds that only benefit them in the short term. On the contrary, it's the long term on which they should focus and innovation's adoption is the only sustainable way forward.

5.3.2 To Academia

Regarding academia, it is highly recommended that innovation's exploration, evaluation and, consequently, promotion should be continued and enhanced. This is due to its key significance in assisting organisations survive, grow and prosper, highlighted both by existing research and this study's findings. Moreover, the innovative management types investigated in this research, as well as others explored by researchers, should be analysed in combination, encouraging, thus, companies to implement them simultaneously for better outcomes. It is also recommended that their combined competitive advantages given to organisations should be quantified, so as their outcomes can be substantiated, assessed and exploited by firms. This can be achieved by specific type of surveys, aiming to make the evident benefits of innovation measurable, giving organisations all the required data for such an adaption. In addition, BIM's adoption by the manufacturing industry should be described accurately and promoted. Specifically, manufacturing innovators that already use this model should be investigated, evaluating their gained merits and showing the way for the rest to follow. Especially in relation to the recent economic downturn, innovation shouldn't be treated as its victim because of the defensive, fund-saving policies implemented by firms, but on the contrary should be promoted as the only sustainable way out of it. Finally, innovation's research should be enhanced leading to potential new discoveries, aiming to expand existing options and sources of benefit. After all, the aforementioned innovative management approaches are not so new anymore, and it's academia that should lead innovation to the next level and drag industries to it, as academia has always been, and should always be the pioneer and innovator of such cases.

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APPENDIX 1: Data Record Sheet

Country	Education	Years of experienc	Job positio n	Industry type	Size of organisatio	Innovation Definition	Application Innovation	Competitive Advantage	Before Crisis Innovation	Help If Not	Changes If Yes
Austria	MSc	14	QCM	Manufactur	d	d	1	1	1		1
Austria	MSc	12	PM	Manufactur	d	d	1	1	0	1	
Belgium	MSc	15	PM	Dairy	d	c	1	1	1		1
Belgium	MSc	20	PUM	Dairy	d	d	1	1	1		1
Belgium	MSc	13	QCM	Manufactur	d	d	1	1	1		1
Belgium	MSc	11	PM	Manufactur	d	d	1	1	0	1	
Bulgaria	MSc	25	GM	Brewery	c	d	1	1	1		1
France	MSc	20	GM	Manufactur	b	d	1	1	1		1
France	MSc	10	ProdM	Food	a	c	0				
France	MSc	12	ProdM	Dairy	b	d	1	1	1		1
France	MSc	23	GM	Manufactur	c	d	1	1	1		1
Germany	MSc	10	PM	Manufactur	b	a	1	1	1		1
Germany	MSc	11	PM	Manufactur	c	d	1	1	1		1
Germany	MSc	10	ProdM	Pharmaceu	d	d	1	1	1		1
Germany	BSc	18	PM	Food	d	b	1	1	0	1	
Greece	MSc	10	OM	Pharmaceu	d	d	1	1	1		1
Greece	MBA	30	GM	Food	a	c	0				
Greece	MSc	25	PUM	Dairy	d	d	1	1	1		1
Greece	MSc	7	ProdM	Dairy	b	d	1	1	1		1
Italy	MSc	18	PM	Automotive	d	d	1	1	1		1
Italy	MBA	12	PUM	Manufactur	c	d	0				
Italy	BSc	16	ProdM	Food	d	a	1	1	1		1
Lithuania	MSc	10	PM	Manufactur	b	a	1	1	1		1
Netherlanc	MSc	11	ProdM	Dairy	c	d	1	1	1		1
Norway	PhD	12	PM	Manufactur	d	d	1	1	1		1
Poland	BSc	13	PM	Brewery	b	b	0				
Poland	BSc	10	OM	Manufactur	a	a	1	1	1		1
Romania	MSc	11	OM	Dairy	c	d	1	1	1		1
Romania	MSc	15	PM	Brewery	c	a	1	1	1		1
Romania	MSc	12	ProdM	Manufactur	b	d	1	1	1		1
Spain	MSc	12	ProdM	Manufactur	c	d	1	1	1		1
Spain	MSc	15	PM	Automotive	d	d	1	1	1		1
Spain	MSc	12	OM	Pharmaceu	d	b	1	1	1		1
Spain	MSc	13	PM	Manufactur	b	d	1	1	1		1
Sweden	MSc	14	OM	Manufactur	b	b	1	1	1		1
Sweden	MSc	10	PM	Food	c	c	1	1	1		1
Sweden	MSc	18	PM	Brewery	c	c	1	1	1		1
UK	BSc	12	F	FMCG	d	a	1	1	1		1
UK	MBA	7	F	FMCG	c	d	0				
UK	MBA	15	F	Manufactur	d	d	1	1	1		1
UK	BSc	19	PM	FMCG	d	b	1	1	1		1
UK	MBA	18	PUM	Manufactur	c	c	0				
UK	MSc	13	PM	Brewery	d	c	1	1	1		1
UK	BSc	10	PM	Automotive	d	c	1	1	1		1
Denmark	MSc	13	ProdM	Dairy	d	d	1	1	1		1
Czech_Rep	MSc	11	ProdM	Manufactur	a	a	1	1	1		1
France	MBA	16	PUM	Manufactur	d	d	1	1	1		1
Germany	MSc	15	ProdM	Manufactur	d	d	1	1	1		1
Greece	BSc	15	QCM	Manufactur	b	c	1	1	0	1	
Netherlanc	MSc	14	QCM	Automotive	d	d	1	1	1		1
Netherlanc	MSc	12	QCM	Electronics	d	c	1	1	1		1
Netherlanc	MSc	14	PM	Brewery	d	d	1	1	1		1
Slovakia	MSc	10	ProdM	Manufactur	d	d	1	1	1		1
UK	MBA	15	PUM	Manufactur	d	d	1	1	1		0

Appendix 2: Type of Projects Record Sheet

New	Routine	Refurbishment	Other
1	1	1	0
1	0	0	1
1	1	1	0
1	1	1	0
1	0	0	1
1	1	1	0
0	1	1	0
1	1	1	0
1	1	1	0
1	1	1	0
0	1	0	0
1	1	0	0
1	1	1	0
1	1	1	0
0	1	0	0
1	1	1	0
1	1	1	0
1	0	1	0
0	1	1	0
1	1	1	0
1	1	1	0
1	1	1	0
1	1	1	0
1	1	1	0
1	1	1	0
1	1	0	0
1	0	1	0
1	1	0	0
1	1	1	0
1	1	1	0
1	1	0	0
1	0	0	1
1	1	1	0
1	1	0	0
1	1	0	0
1	1	0	0
1	0	0	0
1	1	1	0
1	1	0	0
1	1	0	0
1	1	1	0
1	1	1	0
1	1	1	0
1	1	0	0
1	1	1	0
1	0	1	0
0	1	0	0
0	1	0	0
0	0	0	1
0	0	1	0
1	1	0	0
1	1	1	1
1	1	0	0
1	0	0	0

Appendix 3. Pilot Questionnaire

Innovation as a strategy in Project Management

General Questions:

1. In which country do you currently work?

Greece

2. What's your educational level? (BSc, MSc, etc)

MSc

3. How many years of (relevant) work experience do you have?

25

4. Which position do you have in the organisation you work for?

Purchasing manager

5. What's the type of Industry you work for?

Dairy

6. What's the size of the organisation you work for? (no. of employees)

a) <50

b) 50~150

c) 150~250

✓ d) 250<

7. What type of projects have you dealt with? (Please tick all that apply)

✓ New

✓ b) Routine

✓ c) Refurbishment

d) Other ……

Innovation Related Questions

1. What is Innovation in Project Management according to you? (Please tick one only)

a) *'Any ideas, practices and technologies perceived to be new by the organisation involved'* (Vab de Ven, 1986)

b) *'The actual use of a nontrivial change and improvement in a process, product, or system that is novel to the institution developing the change'* (Slaughter, 1998)

c) *'The profitable exploitation of ideas, which have an important role to play in seeking competitive advantage'* (Stewart and Fenn, 2006)

d) *'The successful development and/or implementation of new ideas, products, process or practices in order to increase organisational efficiency and performance'* (Egbu et al., 1998)

2. Do you strategically apply innovation within the organisation you work for?

✓ Yes No

If not:

3. Please state why? (Please tick all that apply)

a) time

b) money

c) never thought of

d) other ……

If yes:

4. What type of Innovation management do you apply within the organisation you work for? (Please tick all that apply)

✓ Lean

✓ b) 6 sigma

c) Building Information Modelling (BIM)

✓ Balanced Scorecard (BSC)

e) other…..

5. Did it give your organisation a competitive advantage?

✓ Yes No

6. What type of competitive advantage does it give you? (Please tick all that apply)

✓ economic

b) time

c) organisational

d) sustainability

✓ customer relationship

f) other…..

7. Did you apply innovation within the organisation you work for, before the economic recession?

✓ Yes No

8. **If not,** did it help?

Yes No

9. **If yes,** did you notice any changes?

✓ Yes

What type of changes did you notice? (Please tick all that apply)

✓ economic

b) time

c) organisational

d) sustainability

✓ customer relationship

f) other…..

No

Appendix 4.Final Questionnaires

Questionnaire 1

Innovation as a Strategy in Project Management

General Questions:

1. In which country do you currently work? Netherlands

2. What's your educational level? (BSc, MSc, etc) **Msc**

3. How many years of (relevant) work experience do you have? **12**

4. Which position/job title do you have in the organisation you work for?
   Quality Control Mgr

5. What's the type of Industry you work for? **Electronics / Manufacturing**

6. What's the size of the organisation you work for? (no. of employees)

   a) <50

   b) 50~150

   c) 150~250

   d) 250< **YES**

7. What type of projects have you dealt with? (Please tick all that apply)

   a) New **YES**

   b) Routine **YES**

   c) Refurbishment **YES**

   d) Other .....

Theofilos Rizos (trizos@uclan.ac.uk)

Innovation Related Questions

1. What is Innovation in Project Management according to you? (Please tick one only)

a. *'Any ideas, practices and technologies perceived to be new by the organisation involved'* (Vab de Ven, 1986)

b. *'The actual use of a nontrivial change and improvement in a process, product, or system that is novel to the institution developing the change'* (Slaughter, 1998)

c. *'The profitable exploitation of ideas, which have an important role to play in seeking competitive advantage'* (Stewart and Fenn, 2006)

d. *'The successful development and/or implementation of new ideas, products, process or practices in order to increase organisational efficiency and performance'* (Egbu et al., 1998) **YES**

2. Do you strategically apply innovation within the organisation you work for?

Yes No

If not:

3. Please state why? (Please tick all that apply)
   a) time

   b) money

   c) never thought of

   d) other .....

Theofilos Rizos (trizos@uclan.ac.uk)

If yes:

4. What type of Innovation management do you apply within the organisation you work for? (Please tick all that apply)

   a) Lean **YES**

   b) 6 sigma **YES**

   c) Building Information Modelling (BIM)

   d) Balanced Scorecard (BSC) **YES**

   e) other…..

5. Did it give your organisation a competitive advantage? (see question 6 for examples)

   Yes No

6. What type of competitive advantage does it give you? (Please tick all that apply)

   a) economic **YES**

   b) time **YES**

   c) organisational **YES**

   d) sustainability

   e) customer relationship

   f) other…..

7. Did you apply innovation within the organisation you work for, before the recent economic recession?

   Yes No

8. **If not,** did it help?

   Yes No

Theofilos Rizos (trizos@uclan.ac.uk)

9. **If yes,** did you notice any changes?

Yes

What type of changes did you notice? (Please tick all that apply)

a) economic **YES**

b) time **YES**

c) organisational **YES**

d) sustainability

e) customer relationship **YES**

f) other…..

No

Innovation as a Strategy in Project Management

General Questions:

1. In which country do you currently work?
   Greece

2. What's your educational level? (BSc, MSc, etc)
   MBA

3. How many years of (relevant) work experience do you have?
   30 years

4. Which position/job title do you have in the organisation you work for?
   General Manager

5. What's the type of Industry you work for?
   Traditional Food Production

6. What's the size of the organisation you work for? (no. of employees)

   a) <50

   b) 50~150

   c) 150~250

   d) 250<

7. What type of projects have you dealt with? (Please tick all that apply)

   a) New

   b) Routine

   c) Refurbishment

   d) Other .....

Theofilos Rizos (trizos@uclan.ac.uk)

Innovation Related Questions

1. What is Innovation in Project Management according to you? (Please tick one only)

a. *'Any ideas, practices and technologies perceived to be new by the organisation involved'* (Vab de Ven, 1986)

b. *'The actual use of a nontrivial change and improvement in a process, product, or system that is novel to the institution developing the change'* (Slaughter, 1998)

(c.) *'The profitable exploitation of ideas, which have an important role to play in seeking competitive advantage'* (Stewart and Fenn, 2006)

d. *'The successful development and/or implementation of new ideas, products, process or practices in order to increase organisational efficiency and performance'* (Egbu et al., 1998)

2. Do you strategically apply innovation within the organisation you work for?

Yes (No)

If not:

3. Please state why? (Please tick all that apply)

a) time

b) money

c) never thought of

✓ d) other: Our Industry is a traditional food production, so our traditionality is what gives us the competitive advantage.....

Theofilos Rizos (trizos@uclan.ac.uk)

If yes:

4. What type of Innovation management do you apply within the organisation you work for? (Please tick all that apply)

   a) Lean

   b) 6 sigma

   c) Building Information Modelling (BIM)

   d) Balanced Scorecard (BSC)

   e) other…..

5. Did it give your organisation a competitive advantage? (see question 6 for examples)

   Yes No

6. What type of competitive advantage does it give you? (Please tick all that apply)

   a) economic

   b) time

   c) organisational

   d) sustainability

   e) customer relationship

   f) other…..

7. Did you apply innovation within the organisation you work for, before the recent economic recession?

   Yes (No)

8. **If not,** did it help?

   Yes No

Theofilos Rizos (trizos@uclan.ac.uk)

Innovation as a Strategy in Project Management

General Questions:

1. In which country do you currently work?
   Belgium

2. What's your educational level? (BSc, MSc, etc)
   MSc

3. How many years of (relevant) work experience do you have?
   11 years

4. Which position/job title do you have in the organisation you work for?
   Project Manager

5. What's the type of Industry you work for?
   Medical Devices Manufacturing

6. What's the size of the organisation you work for? (no. of employees)

   a) <50

   b) 50~150

   c) 150~250

   d) 250<

7. What type of projects have you dealt with? (Please tick all that apply)

   a) New

   b) Routine

   c) Refurbishment

   d) Other .....Process Improvement.....

Theofilos Rizos (trizos@uclan.ac.uk)

Innovation Related Questions

1. What is Innovation in Project Management according to you? (Please tick one only)

a. *'Any ideas, practices and technologies perceived to be new by the organisation involved'* (Van de Ven, 1986)

b. *'The actual use of a nontrivial change and improvement in a process, product, or system that is novel to the institution developing the change'* (Slaughter, 1998)

c. *'The profitable exploitation of ideas, which have an important role to play in seeking competitive advantage'* (Stewart and Fenn, 2006)

(d.) *'The successful development and/or implementation of new ideas, products, process or practices in order to increase organisational efficiency and performance'* (Egbu et al., 1998)

2. Do you strategically apply innovation within the organisation you work for?

(Yes) No

If not:

3. Please state why? (Please tick all that apply)
   a) time

   b) money

   c) never thought of

   d) other .....

Theofilos Rizos (trizos@uclan.ac.uk)

If yes:

4. What type of Innovation management do you apply within the organisation you work for? (Please tick all that apply)

   a) Lean

   b) 6 sigma

   c) Building Information Modelling (BIM)

   d) Balanced Scorecard (BSC)

   e) other…..

5. Did it give your organisation a competitive advantage? (see question 6 for examples)

   Yes No

6. What type of competitive advantage does it give you? (Please tick all that apply)

   a) economic

   b) time

   c) organisational

   d) sustainability

   e) customer relationship

   f) other…..

7. Did you apply innovation within the organisation you work for, before the recent economic recession?

   Yes No

8. **If not,** did it help?

   Yes No

Theofilos Rizos (trizos@uclan.ac.uk)