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INSTUTUTE OF SOCIAL SCIENCES

MODELLING RELATIONS BETWEEN INNOVATION AND CONTINUOUS IMPROVEMENT AND THEIR IMPACT ON FIRM PERFORMANCE

Neslihan BEYHAN YAŞAR
DOCTORAL DISSERTATION
DEPARTMENT OF BUSINESS ADMINISTRATION

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Thesis Advisor

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GEBZE TEKNİK ÜNİVERSİTESİ	**DOKTORA JÜRİ ONAY FORMU**

GTÜ Sosyal Bilimler Enstitüsü Yönetim Kurulu'nun 14/09/2017 tarih ve 2017/24 sayılı kararıyla oluşturulan jüri tarafından 26/09/2017 tarihinde tez savunma sınavı yapılan Neslihan Beyhan Yaşar'ın tez çalışması İşletme Anabilim Dalında DOKTORA tezi olarak kabul edilmiştir.

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ÖZET

Bu çalışmanın amacı inovasyon, sürekli iyileştirme ve finansal performans arasındaki ilişkileri araştırmaktır. Özellikle bu çalışma sürekli iyileştirmenin inovasyon ve finansal performans üzerinde bağdaştırıcı bir etkisi olup olmadığını inceler. Bu kapsamda araştırma modeli ve ilgili hipotezler geliştirilmiştir. Araştırma modelindeki hipotezleri test etmek için CATI yöntemi kullanılarak saha çalışması yapılmıştır. Saha çalışması toplamda Türkiye içerisinde 384 firmadan oluşmaktadır. Geçerlilik ve güvenililirlik testleri keşifsel doğrulayıcı faktör analizleriyle ortaya konmuştur. Veriler yapısal eşitlik modellemesi kullanılarak korelasyon ve regresyon analizlerine tabi tutulmuştur. Bu çalışma sürekli iyileştirme ve inovasyon arasında anlamlı bir ilişki olduğunu ortaya koymuştur. Ayrıca sürekli iyileştirme, inovasyon ve finansal performans arasındaki ilişkide bağdaştırıcı etki görev üstlenmektedir. Şirketlerde yöneticilerin inovasyon ve sürekli iyileştirme konularının her ikisine de önem vermeleri gerektiğini ortaya koymaktadır.

Anahtar Kelimeler: Sürekli İyileştirme, İnovasyon, Finansal Performans, Yapısal Eşitlik Modellemesi, Türkiye

SUMMARY

The purpose of this study is to investigate the relationships between innovation, continuous improvement and financial performance, and especially to search for the existence of a mediating effect of continuous improvement on the relationship between innovation and financial performance. In this context, a research model and related hypotheses have been developed. In order to test the hypotheses in the research model, a field study was carried out using the Computer-aided Telephone Interview method with 384 manufacturing firms in Turkey. Validity and reliability tests of the developed model are realized through exploratory and confirmatory factor analyses. Data has been analyzed using correlation and regression analysis with Structural Equation Model (SEM). Our study showed that the relationship between continuous improvement and innovation is significant. Furthermore, continuous improvement has a full mediating effect on the relationship between innovation and financial performance. The main implication of the study for managers is that continuous improvement and innovation are both driving force for companies

Keywords: Continuous Improvement, Innovation, Financial Performance, Structural Equation Modelling, Turkey

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ABBREVIATIONS

Abbreviations	Definitions
AGFI	: Adjusted Goodness of Fit Index
AVE	: Average Variance Explained
CFA	: Confirmatory Factor Analysis
CFI	: Comparative Fix Index
Df	: Degrees of Freedom
EFA	: Explanatory Factor Analysis
GFI	: Goodness of Fit Index
IFI	: Incremental Fit Index
KMO	: Kaiser-Meyer Olkin Value
L0 90	: Lower limits of a 90% confidence interval
H0 90	: Upper limits of a 90% confidence interval
NCP	: Non centrality parameter.
NFI	: Normed Fit Index
PGFI	: Parsimony Goodness-of-Fit Index
PNFI	: Parsimony Normed Fit Index
PRATIO	: Parsimony Ratio
RFI	: Relative Fit Index
RMR	: Root Mean Square Residual
RMSEA	: Root Mean Square Error of Approximation
SD	: Standard Deviation
SE	: Standard Error
TLI	: Tucker-Lewis Fit Index
TQM	: Total Quality Management

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1. INTRODUCTION

A vital question for today's companies is about how they can survive under increasing levels of competitiveness. In order to have a sustainable growth in this competitive environment, innovation is the key factor. The term innovation has been used in the literature to describe both the process that uses new knowledge, technologies and processes to generate new products as well as new or improved products themselves (Porter, 1998). Permanent changes are an integral part of the success and competitiveness, because those who do not integrate innovation become less competitive, and usually disappear from the market (Porter, 2007). Timely response to changes is the basis for successful management and training organizations for the successful functioning of the market.

As competition intensifies and the acceleration of technological change increases, firms need to renew themselves. The challenge is not only offering new products and services, but also changing the nature of management within companies. Adapting organizational structures, processes, and practices to generate a valuable source of competitive advantage will be the main issues (Teece, 2007).

Despite many problems of managing innovation, it actually has a simple goal: improve processes, products, services, and outcomes through a change in manufacturing, delivery, planning, or implementation (IBM Research Report, 2014). Research activities show that companies should understand the importance of innovation and make their way through this journey. General Electric, for example, made a research interviewing 3,200 senior business executives conducted by telephone across 26 countries. According to this GE research; 92 percent of executives said that innovation is the main factor for a more competitive economy, and 86 percent agreed that innovation is the best way to create jobs in their country.

Although the importance of innovation is obvious in today's competitive environment, still a few questions arise in managers' minds. These are:

- Does innovation oriented strategic decision taking always bring permanent success?

- How should companies set up their strategic and operational structure in order to have sustainable competition?
- Does innovation always make a good financial performance?

In that point of view there is unsuccessful innovative ventures have been observed sometimes in business life. As an example, NeXT computer developed by Steve Jobs had experienced relatively limited sales, with, their innovative object-oriented NeXTSTEP operating system and development environment. Although Steve Jobs tried to spin NeXT computer as an ultimate success, the company struggled from the beginning to find the right markets and customers so the company was not successful to get the financial performance (Wikipedia, 2016). It can be seen here that innovation is not the only factor for companies to be successful. Another recent innovative business model development case comes from Tesla Motor innovative products. Tesla developed the world's first premium electrical car. Although it seems a very promising car, we still do not know if this innovative product will be successful or not. Another innovative example from the automotive industry is hybrid cars from Toyota. Toyota developed hybrid technology and became successful with this investment. We know that Toyota does not only focus on innovation but also focus on continuous improvement under its innovative Toyota Production System (Liker, 2004).

Based on this true business experiences, it can be said that innovation is not the only factor for companies to be successful. Continuous improvement should be considered as a key factor for company success as well (Harrington, 1995). Some other researches have pointed out the need for continuous improvement and innovation to be competitive (Delbridge and Barton, 2002). As can be seen from these examples, understanding the relationships between continuous improvement and innovation may explain the reasons for success. Without having the continuous improvement culture for individual organizations, the benefits of innovation could not be sustainable.

1.1. Scope of Thesis & Main Contribution

There are many arguments and research about innovation and continuous improvement (e.g. Martinez-Costa and Martinez-Lorente, 2008; Kim et al., 2012; Bon and Mustafa, 2013; Sanchez and Blanco, 2014). Innovation and continuous improvement are complementary to each other such that neither one can be ignored for sustainable performance. Innovative managers generally direct their efforts to radical innovations, but usually these breakthrough methodologies do not impact the bottom line as the management expects and they may not get the profit they expected. (Harrington, 1995). Thus, the effects of continuous improvement and innovation on the firm financial performance should be considered together.

Therefore, the main aim of this study is to see the effects of continuous improvement approaches on innovation and financial performance. We also investigate if one of the continuous improvement approaches (i.e. process management, lean, supplier quality management, top management support) dominates the others in terms of their effects on innovation. For this reason, this study survey was designed to test relationships empirically. Different then existing studies, our study takes continuous improvement as an umbrella and tries to analyse relationship between innovation and financial performance which is a more holistic manner. Moreover in this study, innovation is defined as not only product and process innovation but also as marketing and organizational innovation. This research is mainly focuses on the mediating role of continuous improvement approaches on the relationship between innovation and firm's financial performance. The hypothesized relationships are investigated with data collected from five different manufacturing sectors including white goods, metal, textile, chemical, and electronic sectors in Turkey.

1.2. Research Methodology

An empirical survey is conducted in Turkey to collect the data. A questionnaire was designed based on various related studies. Questionnaire form has been developed and finalized using a pilot survey to test the validity of the

questionnaire for the Turkish manufacturing industry in white goods, metal, textile, chemical, electronic sectors. In this survey target group includes production, sourcing, and quality managers in selected industries in order to assess continuous improvement and innovation activities and their structural relations to firm performance.

Computer Aided Telephone Interview (CATI) method was used for data collection. The survey response rate was 64% including 384 manufacturing firms. This response rate is acceptable when it is compared with other studies in this field (e.g. Paulraj and Chen, 2008). The sample consisted of 384 firms: 25% from metal sector, 21% from white goods sector, 18% from automobile sector, 12% from electronics, 15% from textile and 9% from chemical sectors. After data has been collected, the analysis is performed mainly using SPSS and AMOS. Meredith et al.'s (1989) suggested methodology for academic research is used in this study.

1.3. Design of the Thesis

This thesis includes six chapters. Chapter 1 includes introduction and scope of the thesis. In the second chapter, literature review is given with definitions of innovation and continuous improvement. Theoretical model and hypothesizes of this study are mentioned in Chapter 3. The fourth chapter includes methodology of the study. Analysis and findings are explained in fifth chapter. Finally last chapter explains conclusion and suggestions for future research.

2. LITERATURE REVIEW

Literature survey on innovation and continuous improvement are reported in Chapter 2.

2.1. Competitiveness

Porter Diamond Model, otherwise called the Porter Diamond hypothesis of National Advantage, has been given this name since all factors that are essential in worldwide business rivalry take after the purposes of a precious stone. It is accepted that the aggressiveness of organizations is identified with the execution of different organizations. Moreover, different variables are entwined in the esteem included chain in a long separation connection or a nearby or local setting. When a firm decides to invest in innovation, it must commit financial and human resources. The R&D effort is limited by availability of human and knowledge resources in the sector. The internal factors of a firm may be changed by the development of new products. Changes to organizational structure, corporate strategy, organizational culture and technological capabilities can be necessary for the development of the new product. The consistency of production depend on internal and external factors. These are technological capabilities, existence of market demand, the infrastructure that may affect the economical and distribution of the product. Sales of new products generate profit for the firm. Part of the profit is distributed to the firm's shareholders and another part is reinvested in the innovation process. The level of reinvestment depends on the strategy of the firm. Often, managers want to cut innovation reinvestment for shareholders. Here a balance is necessary in order to be competitive in the long term. Michael Porter considers the competitiveness of a country as a function of four major determinants:

- factor conditions;
- demand conditions;
- related and supporting industries; and,
- firm strategy, structure, and rivalry.

Even though these factors effect the existence of competitive advantage of an entire nation, their nature suggests that they are more specific of a particular industry rather than typical of a country. The reason for this is that according to Porter's theory industry is the basic unit of analysis for understanding competition. So, seeking to isolate the competitive advantage of a nation means to explain the role played by national attributes such as a nation's economic environment, institutions, and policies for promoting firms' ability to compete in a particular industry.

2.1.1. Factor Conditions

Factor conditions being the inputs which affect competition in any industry comprise a number of broad categories:

Human resources: the quantity, skills, and cost of personnel (including management).

Physical resources: the abundance, quality, accessibility, and cost of the nation's land, water, mineral, or timber deposits, kind of power sources, and other physical traits.

Knowledge resources: the accumulated scientific, technical, and market knowledge in a nation in the sphere of goods and services.

Capital resources: the stock of capital available in a country and the cost of its deployment.

Infrastructure resources: the characteristics (including type, quality) and the cost of using infrastructure.

2.1.2. Demand Conditions

The importance of demand conditions as a factor influencing competitive advantage stems from the fact that in a market economy the direction of production, which is, the kinds of goods which are produced, is determined by the needs of buyers. This explains regardless of the state of the other determinants in the "diamond", competitiveness in an industry is impossible to be achieved if demand conditions do not allow for the successful realization of firms' products. Emphasizing this dependence is the dynamic influence of home demand which

changes the rate and character of improvement and innovation by a nation's firms. The sources of this influence within the context of home demand are divided into three main attributes: the composition of home demand, the size and pattern of growth of home demand, and the mechanisms by which a nation's domestic preferences are transmitted to foreign markets.

2.1.3. Related and Supported Industries

When trying to determine the sources of competitive advantage in an industry, the latter should not be considered differently but rather in the context of the whole economy. Special account should be taken of the industries which are directly related or support the one whose competitiveness is a subject of investigation. The reason for this requirement is that, provided supplier industries possess an international advantage, downstream industries could benefit from it in many ways. One of them refers to the access that competitive supplier industries provide access to cost-effective inputs. Given the increasingly significant globalization process, which makes inputs available on global markets, importance should be put not on the availability of the inputs but on their effective utilization.

2.1.4. Firm Strategy, Structure, and Rivalry

Closing the circle of factors which determine the existence of competitive advantage it is necessary to consider the context in which firms are created, organized and managed as well as the nature of domestic rivalry. The goals, strategies, and ways of organizing firms in industries are widely influenced by national situations. The achievement of national advantage depends on the degree to which these choices correspond to the sources of competitive advantage in an industry. Firm strategy and structure reflect company goals and individual goals as well as national prestige and national priority. Company goals are generally strongly determined by ownership structure, the motivation of owners and holders of debt, the nature of the corporate governance, and the incentive processes that shape the motivation of senior managers.

2.2. Innovation

Competitiveness has become critical with the increased globalization of the economy. The Organization for Economic Cooperation and Development defines innovation more broadly as “the implementation of a new or significantly improved product (that is, a physical good or service), process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations.” Companies should develop new organizational and work structures and invest in innovation to confront this challenge (Ulusoy et al., 1999). Innovation represents the core renewal process for all organizations. If it does not change what it offers the world (product/service innovation) and the ways in which it creates and delivers those offerings (process innovation) it risks its survival and growth prospects.” (Bessant et al., 2005). Change is the key concept for innovation. Change management includes many parameters such as the existing structure of a company, company culture, resistance to change and many other aspects. The effectiveness of managing change and innovation will be limited to organization's learning and decision making processes. General strategy of a company should adopt with the innovation strategy. Innovation has been consistently defined as the adoption of an idea or behaviour that is new to organization (Daft and Becker, 1978). An innovation in the economic sense is accomplished only with the first commercial transaction involving the new product, process system or device. Drivers of innovation are: Technological innovations, intensified customer needs, shorter product life cycles and increased world competition. Porter (1998) built up a monetary model for organizations to enable them to comprehend their focused position in worldwide markets.

Innovation has many definitions and sub elements. We can divide innovations as radical and incremental innovations. It might be anything but difficult to part the expression "innovation" into two classifications, "incremental innovation" and "radical innovation." Incremental innovation has risen to thought/idea with continuous improvement, concentrating on enhancing a piece of business process. A radical innovation is one that significantly affects a market and on the financial action of firms in that market, while incremental innovation concerns a current

product, benefit, process, association or technique whose execution has been altogether improved or redesigned. This can take two structures: For instance, a basic product might be enhanced (as far as enhanced execution or lower cost) through utilization of higher execution segments or materials, or a perplexing product including various incorporated specialized subsystems might be enhanced by fractional changes to one of the subsystems.

Incremental innovation is the predominant type of development. The idea of development and the rate of innovative change incredibly contrast from area to division and crosswise over nations and eras. This idea concentrates on the effect of developments instead of their curiosity. The innovation could, for instance, change the structure of the market, make new markets or render existing products out of date. In any case, it won't not be clear that an innovation is problematic until the point that long after it has been presented, and the cut-off point amongst incremental and radical development may be set at various levels. This makes it hard to gather information on problematic innovation inside the period looked into in a development overview, ordinarily two years. In Schumpeter's view "radical" innovations make major problematic changes, while "incremental" innovations constantly propel the procedure of progress (Schumpeter, 1942). Incremental innovation is the overwhelming type of development. Radical innovation is by and large a mind boggling process, as opposed to a discrete occasion, and by and a troublesome, extensive and hazardous process. Littler firms, or new market participants, can assume essential parts in presenting radical advancements. The dissemination of radical innovations almost dependably relies upon incremental innovations, refinements and adjustments, the improvements, and authoritative changes and social learnings. The commitments of incremental innovations to address financial difficulties are considerable and might be significantly more critical in an improvement setting. For example, Puga and Trefler (2010) give proof of the ascent of incremental innovation in low-wage nations.

Innovation contrasts by division. However, the nature of development and the rate of mechanical change extraordinarily contrast from segment to segment. A few divisions are portrayed by quick change and radical innovations, others by incremental changes. In high-innovation segments, R&D assumes a focal part, while

different areas depend to a more prominent degree on the selection of existing information and innovation. Low-and medium-innovation ventures are frequently for incremental improvements. In that capacity, development exercises are regularly centred on creation, product differentiation. (Von Tunzelmann and Acha, 2005). Innovation action in administrations likewise has a tendency to be a constant procedure, involving a progression of incremental changes in products and processes. This may infrequently muddle the recognizable proof of developments in administrations regarding single occasions, i.e. as the usage of a noteworthy change in products, forms or different techniques.

Since developments are of various sorts, happen in a wide range of ways, and have shifting impacts, they call for various approach reactions. For instance, investigations have shown that strategies that address the last part of the product innovation cycle and empower interest for development will probably animate incremental innovation than to cultivate radical innovation. (Nemet, 2009). Narvekan and Jain (2006) studied a framework from the knowlegde management point of view. The aim is to provide a conceptual framework to understand the technological innovation. Schon (1967) made the distinction of innovation an invention. Inventors create new technology but innovators bring the invention into use. Van de Ven (1986) defines innovation as the development and implementation of ideas by people. Organizational knowledge is an intangible asset of the company which creates the core competence of the company. In a traditional business management context land, labour, money are considered resources. Innovation is viewed as an outcome of numerous organizational iterations in the technology push market. The distinction between knowledge and technology is a central discussion. It is certain that intellectual capital provides the organization a competitive advantage. There are many components of intellectual ability. It is defined as a set of organizational routines and process by which firms acquire, assimilate transform exploit knowledge to produce a dynamic organizational capability. Researchers have used this term to explain organizational learning and innovation. Intuition is defined as the integration of immediacy, reasoning and sensing of relationships. Intuition also finds mention in market decision, hiring personnel and consulting. When absorptive capacity and intuition are thought together, the improvement for firm performance by intellectual capacity can be understood better. This framework presents an interactive

three staged innovation process. These are ideation, incubation and demonstration. This concept has the potential to provide for explanations to the senior management. The individual components of intellectual capital have been independently examined for their impact innovation. Technological innovation has pushed forward the growth curves of organizations. Organizations could initiate management interventions to improve the stock of intellectual capital. A combination of the analytical and synthetic processes are needed to convert intellectual capital to intellectual property including new products and services. Innovation is first split into administrative and technological innovation. Administrative innovation refers to the application of new ideas to improve organizational structures and systems, and processes pertaining to the social structure of an organization (Weerawardena, 2003; Damanpour, 1987). In contrast, technological innovation is defined as the adoption of new Technologies that are integrated into products or processes. There are also definitions as management innovation. Management innovation has been defined as the 'generation and implementation of a management practice, process, structure or technique that is new to the state of the art and is intended to further organizational goals' (Birkinshaw et al., 2008). This is related with changes in what managers do and how they do it which have been argued to be very ambiguous and hard to replicate, hence more likely to lead to sustainable competitive advantage and increased competitiveness (Birkinshaw and Mol, 2006; Teece, 2007). Administrative innovation is often lead by internal needs for structuring and coordination, while technological innovation mainly deals with environmental factors, such as uncertain market conditions or technical knowledge (Daft, 1978; Gaertner et al. 1984). Administrative innovation uses a top-down approach where upper level managers commit to relevant activities, whereas technological innovation applies a bottom-up approach where lower level technicians are involved (Daft, 1978).

Innovation activities vary in their nature from firm to firm. Some companies engage in well-defined innovation projects, such as the development and introduction of a new product, whereas others primarily make continuous improvements to their products, processes and operations. Both types of firms can be innovative: an innovation can consist of the implementation of a single significant change, or of a series of smaller incremental changes that together constitute a significant change. According to Oslo Manual (2005), it is seen that four different innovation types are

introduced. These are product innovation, process innovation, marketing innovation and organizational innovation:

2.2.1. Product Innovation

Product innovation is the introduction of a good or service that is new or significantly improved. Product innovation includes significant improvements in technical specifications, components and materials or other functional characteristics.

These are goods and services that vary fundamentally in their attributes or expected uses from products already created by the firm. The principal microchips and computerized cameras are cases of new products utilizing new technologies. The principal compact MP3 player, which joined existing programming norms with scaled down hard-drive technology was another product consolidating existing technologies. Product innovations in services can incorporate huge changes by the way they are given (for instance, regarding their effectiveness or speed), the expansion of new capacities or attributes to existing services, or the presentation of totally new services. Cases are critical changes in internet banking services, for example, enormously enhanced speed and usability. Design is a vital piece of the development and execution of product innovations. In any case, design changes that don't include a huge change in a product's practical attributes or planned uses are not product innovations, in spite of the fact that they can be marketing innovations. Routine updates or regular changes are additionally not product innovations. Product innovations can enhance new knowledge or technologies, or can be developed on new uses or combinations of existing knowledge or technologies. Significant changes to existing products can occur through materials, components and other characteristics that increases performance. The introduction of GPS (global positioning system) navigational systems, or other subsystem improvements in vehicles is an example of a product innovation consisting of incremental changes or additions to one of a number of integrated technical subsystems.

2.2.2. Process Innovation

A process innovation is the implementation of a new or significantly improved production or delivery method. Objectives of the process innovation are decreasing unit costs of production and increasing quality. This includes critical changes in procedures. Process innovations can be expected to diminish unit expenses. The development process alludes to the change procedure in innovation direction. Along these lines, process innovation stresses either the re-innovation/reinvent (Rothwell and Gardiner, 1988) or change of a current procedure through lessening costs and additionally expanding the adaptability and execution of the procedure (OECD, 2005). In most examines, process innovation is related with the groupings and nature of the generation process that enhance the profitability and the effectiveness of creation exercises (Garcia and Calantone, 2002; De Propris, 2002). It intends to present another component underway materials, forms, work process components (Damanpour, 1991).

2.2.3. Marketing Innovation

A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. The recognizing highlight of a marketing innovation contrasted with different changes in an association's promoting instruments is the execution of an advertising technique not already utilized by the firm. It must be a piece of another marketing idea or system that speaks to a huge take-off from the association's current marketing techniques. The new marketing strategy can either be created by the innovating firm or received from different firms or associations. New advertising techniques can be executed for both new and existing products. An example from French beauty care products organization with a solid toehold in the makeup business everywhere throughout the world. One path in which restorative organizations advertise their products is by having displays where individuals get the chance to test cosmetics and in addition different makeup for nothing. Keeping in mind the end goal to achieve a more extensive client base in this computerized world, L'Oréal built up an app called the L'Oréal cosmetics. This application enabled

clients to do an advanced makeup and by doing as such they could test the best cosmetics that suited their skin tones. The application was an immense achievement, being downloaded more than seven millions times. The importance of the marketing innovations can be explained by the terminology “diffusion of innovation”. OECD (2005) explains diffusion as the way in which innovations spread, through market or non-market channels, from their first global implementation to different countries and regions and to different industries, markets and firms. An innovation will not have economic impact and thus will not add value to the firm, unless diffusion of innovation is managed successfully. Examples of the marketing innovations may be switching the distribution channels of the firm such as a change from direct sales to internet sales or to dealers’ sales.

2.2.4. Organizational Innovation

Organizational innovation is the implementation of a new organizational method in the firm’s business practices, workplace organization or external relations. Organizational innovation alludes to new ways work can be composed, and achieved inside an association to empower and have competitiveness. It includes how associations, and people particularly, oversee work forms in such territories as customer relationships, performance of employees, and knowledge management. In promoting a culture of innovation associations should cultivate:

- Cross functional group building
- Independent, inventive speculation to see things from another point of view and putting oneself outside of the parameters of work
- Risk taking by employees while decreasing the status quo

The esteem and significance of knowledge and learning inside authoritative development is vital. On the off chance that development is about change, new thoughts, and looking outside of oneself to comprehend ones condition, at that point consistent learning is a necessity of organizational innovation achievement.

Innovation may take place at different stages of a supply chain such as manufacturing, product and process design, marketing and logistic services. At each stage, innovations have social, economic and technological impacts. Depending on the characteristics of the company and at which stage the innovation is taking place, innovations can be grouped. Innovation is defined as a way to create new forms of value for customers, which helps to reduce internal costs, creates efficiencies (Samson and Gloet, 2014). Innovation is the most valuable asset but how could a firm can survive under this competitive environment? Firms can efficiently operate if continuous improvement exists as a base structure (Wu and Chen, 2006). If an organization is not mature, then they first focus their efforts on continuous improvement so that they can have a safe base and then they should include breakthrough improvement. It is also clear that managers should balance breakthrough innovation strategy with the continuous improvement strategy so that they can achieve differentiation and cost leadership together (Harrington, 1995).

2.3. Steps to Innovation

Innovation is critical to sustaining business competitiveness and improving productivity. Creating an environment where others can apply innovative thinking to tackle issues and develop new ideas. It’s about growing a culture of innovation. In order to decide how steady of a company's present condition below questions should be answered.

1) Is an atmosphere of development supported by top management?

2) Do directors routinely recognize those people more arranged toward innovation those ready to think new thoughts and follow up on them?

3) Is there a process which monitors innovation groups and recognizing what has and hasn't functioned because of them?

a. Keeping up and observing innovation is essential. This requires governing rules that recognizes how innovation is produced and overseen and forms that catch what did or didn't work. Keeping in mind the end goal to have the capacity to keep on innovating in an evolving situation, constantly checking the inside and outside condition to figure out what backings or ruins advancement is vital.

4) How can an association be key and centred around it objectives yet construct and build up a creative culture?

a. The estimation of a key concentration stays essential to an organization's prosperity. An innovative culture makes a harmony between key concentration, and the estimation of new thoughts and procedures in contacting them.

5) Is there a solitary most imperative variable or fixing that energizes an association toward a creative culture?

a. Like different triumphs of an association, what drives development are the general population of the association. In the first place, management must set the desire of innovation and imagination and after that "working together" is about how to enhance procedures, products and client connections on an everyday premise. This mentality itself will make a continuous culture of development.

2.4. Continuous Improvement

The concept of continuous improvement comes from the Japanese term Kaizen that was initially developed by Masaaki Imai (Imai, 1986) who is known as the father of continuous improvement. Over the last several decades, the business environment has numerous changes such as globalization, dramatic technological changes, the emergence of a more demanding customer and the emergence of quality as a key business concept (Bayraktar, Jothishank, Tatoglu, & Wu, 2007). The main idea is to remove non value added activities for every activity. None value added leads to waste as a concept. Hicks (2007) defined waste which creates cost although value is not produced. In this study firstly a generic model is shown to provide a methodology for waste management and to analyse supply chain. The model explains physical material flow and waste destinations. Also it is seen that the cumulative cost curve is related to physical and non-physical waste. After analysing the supply chain, it is realized that supply chain relationships can be managed in more effective way. Short term and long term approaches have been defined. In the short-term, secondary supply chains can be developed to recover maximum value from waste. In the long-term, product, process improvements can be analysed in order to decrease amount of waste This study showed that analysing the process could be an effective method.

Continuous improvement, or *Kaizen,* is a method in order to analyse opportunities for reducing waste. It is being used by many companies all over the world to examine savings opportunities. Many of these methodologies can be combined for excellent results. Kaizen and Kanban techniques are parallel methodologies to enable continuous improvement. While many organizations rehearse a formal version of a lean, agile technique, different organizations appreciate the adaptability of continuous improvement.

Continuous improvement can be seen as a formal practice or a casual arrangement of rules. Many organizations have moved concentration to project and process management for example, Lean/Agile strategies (Kanban, Kaizen). For instance, Kaizen and Kanban can be incorporated together to take into consideration continuous improvement through representation of work process. In all Lean/Agile procedures, continuous improvement is an essential concentration in addition to high customer service results and the decrease of waste in the types of cost, time and rework.

Many organizations have received lean improvement methods as a standard by which all undertakings and work is done, while others avoid it as much as possible. While continuous improvement helps to save money for organizations by distinguishing non value added aspects, different organizations may see continuous improvement in an unexpected way. Following quite a while of continuous improvement being touted as the most gainful approach to save money on generation cost, a few organizations say the this method has set sudden imperatives on development and innovation

While organizations look for approaches to reduce waste, the less formal, here ideation may hold more an incentive over the long haul than sparing a couple of dollars on a specific process. It is difficult to put a price on innovation, in this way an organization's choice regarding how much time to give to continuous improvement can be difficult. Whether or not a company chooses to make continuous improvement a part of its everyday culture depends on the particular requirements of the company and the potential cost savings that may come as a result.

Organizations consist of systems of inter-related processes, and typically involves efforts to map, improve, and adhere to organizational processes. **Process management** focuses on variation reduction and efficiency, and therefore is consistent with an improvement or exploitation orientation. Benner and Tushman (2003) suggest that process management activities encourage incremental improvements that lead to efficiency cost reduction. In manufacturing operations, statistical tools and techniques play an important role in monitoring production processes. These techniques are integral component of process management (Benner and Tushman, 2003). The complexity and size of the current systems to support the business of organizations has grown in recent years that's why management has become more difficult. Business Process Management is increasingly important for those organizations which require to gain a better insight into the way their business processes are implemented. Process management helps organizations to manage their processes, assisting them in checking that their outputs are ongoing in the range defined as successful in accordance to the business goals of the organization. (Delgado and Weber, 2014)

Continuous improvement philosophy focuses on the people and the success of the organizational team. It requires all employee's engagement, commitment. It is therefore culture driven and will help the company grow for years. Lean is actually a by-product of Continuous Improvement philosophy. Lean manufacturing is production which focuses on eliminating waste in order to reduce and control manufacturing and production costs to increase efficiency, profitability. Ultimate target is to create value for customer. It really means that companies are trying to generate ways to lead improvement through improved flexibility, removing non value added activities in production processes, and increasing output all while reducing costs.

Table 2.1. Definitions for Continuous Improvement

Author	Definition
Deming, 1982	Improve constantly and forever the system of production and service (Principle 5 of transformation)
Imai, 1986	Progressive improvement involving everyone in the company (including both workers and managers
Sanchez and Blanco, 2014	A company-wide process of focused and continuous incremental innovation
Juergensen, 2000, Bhuiyan and Baghel 2005	Improvement initiatives that increase successes and reduce failures
Boer and Gertsen, 2003	The planned, organised and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance

Lean production is defined in the literature as a bundle of practices "JIT-TQM-HRM" (Shah and Ward, 2007; Moyano-Fuentes et al. 2012). Because of, the construct of lean production is considered to be the relative deployment of lean techniques with the exclusion of the HRM context. Supply chain integration is considered by virtue of a supplier integration factor, meaning long-term agreement-based strategic partnership. Finally, information technology is considered as an integrating factor and from the perspective of sharing information in a timely manner.

Another study from the literature is about to create change and drive innovation in lean organizations which was developed by Lindeke et. al (2009). The

size of the company is not important. In this approach, management let their staff aside from routine work and encourages them in order to find new ideas for the success of the company for future. These are building a culture that employees can suggest creative ideas, enlarge employees' talents. Techniques are used in order to filter ideas. One of them is Simple Rank Ordering. Also Delphi technique is used for group decisions by answering a questionnaire several times. In summary Temporal Think Thank is a way which takes employees away from their routine work in order to refresh their mind with new idea generation exercises. Management support is vital for this application. Alpkan et. al (2010) revealed that an internal supportive environment providing especially management support and tolerance for risk taking to their entrepreneurs contributed to innovative performance.

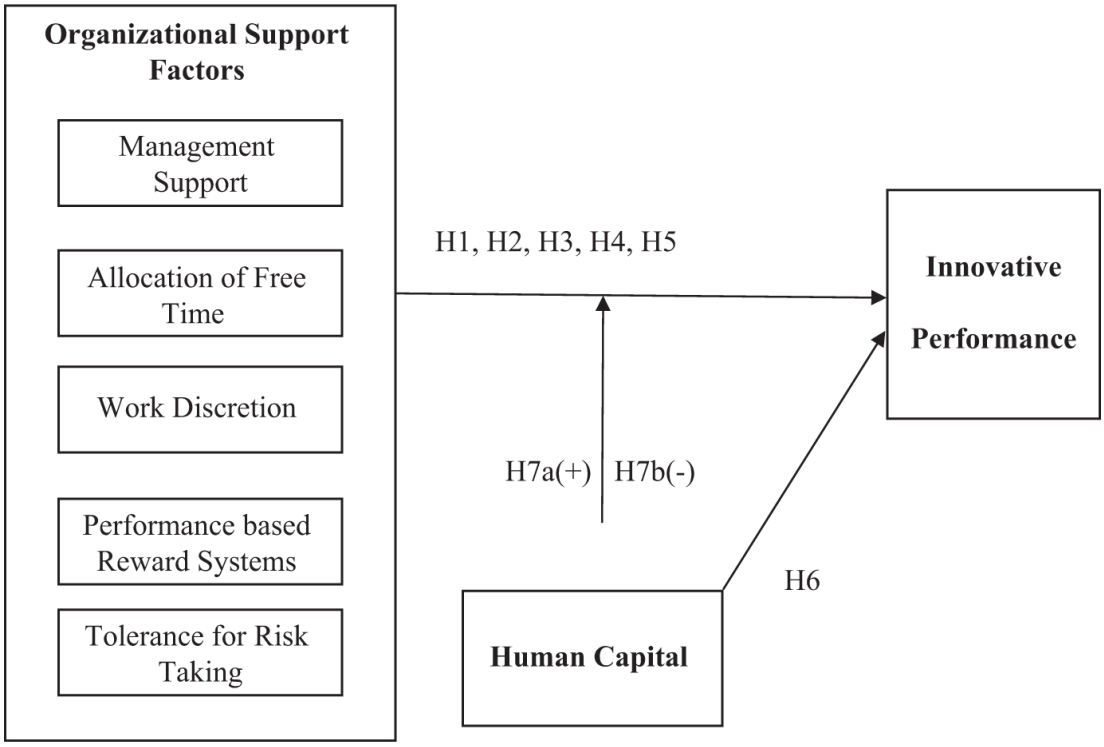

Figure 2.1. Model for innovative performance

2.5. Innovation and Continuous Improvement

Innovation includes improvement however improvement is only a little part. Development is substantially more. Innovation is tied in with making that breakaway separation; it's tied in with making prevalent financial returns.

At the point when Toyota presented the Toyota Production System (TPS) and drastically changed the way assembling and supply coordination were beforehand sorted out via car makers, the organization exhibited innovation. More than some other part of the organization, TPS enabled Toyota to rise from its unassuming beginnings in Japan to end up noticeably perceived as a pioneer in the car assembling and generation industry. All endeavours today by other vehicle makers to copy the Toyota Production System are essentially a procedure of playing make up for lost time.

Moreover, when Southwest Airlines changed the current carrier demonstrate in the 1970s by concentrating on point-to-point round-trip flights to keep away from the limit wasteful aspects of the centre point and-talked show utilized by whatever remains of the business, and after that adapted that new model into turning into the business benefit pioneer, which was innovation. At the point when JetBlue attempted to copy that same model years after the fact, it was a decent business procedure yet it wasn't innovation. When Sony presented the principal Walkman in the late 1970s, they changed the music-listening propensities for many individuals worldwide and turned into the business leader making countless dollars all the while. That was improvement.

Imai (1986) defined the continuous improvement as progressive improvement involving everyone in the company (including both workers and managers). Continuous improvement takes place daily for all departments (Dombrowski and Mielke, 2014). It is also defined as the planned, organized and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance (Boer and Gertsen, 2003).

Continuous improvement is a cornerstone under the lean thinking and it can be built under management leadership (Holtskog, 2013). Otherwise lean implementations may stagnate. Meanwhile continuous improvement is seen as one of the main element of TQM approach (e.g. Martinez-Costa and Martinez-Lorente, 2008; Kim et al., 2012; Bon and Mustafa, 2013). Therefore in this study continuous improvement philosophy is considered as an umbrella of many management approaches such as lean, supplier quality management, process management and top management support.

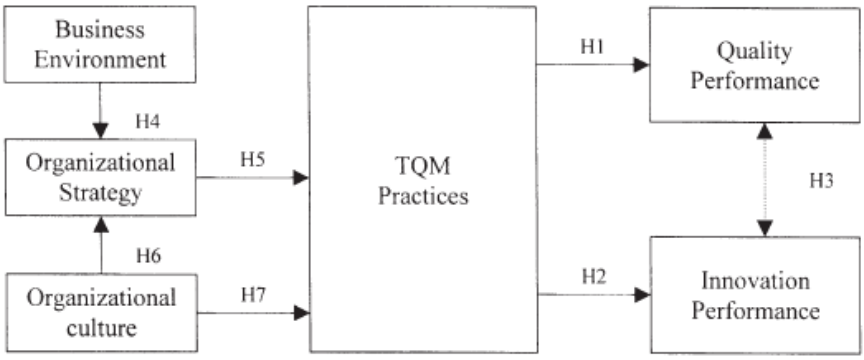

Figure 2.2 TQM practises

Prajago et. al (2001) examined total quality management (TQM) practices in mediating the relationship between organization strategy and organization performance which is shown in Figure 2.2.

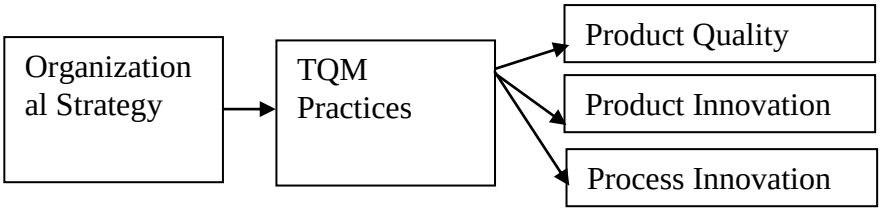

Figure 2.3 Research framework in organizational strategy

Anand et. al (2009) examined the content of continuous improvement strategies in Figure 2.3. In this paper organizational structure is emphasized. For managers, research provides two broad lessons. First, it shows that implementing continuous improvement simply by training people in new process improvement methods. Secondly research reveals how organizational learning theory informs a theory of

continuous improvement, and enables us to view continuous improvement as a potential dynamic capability.

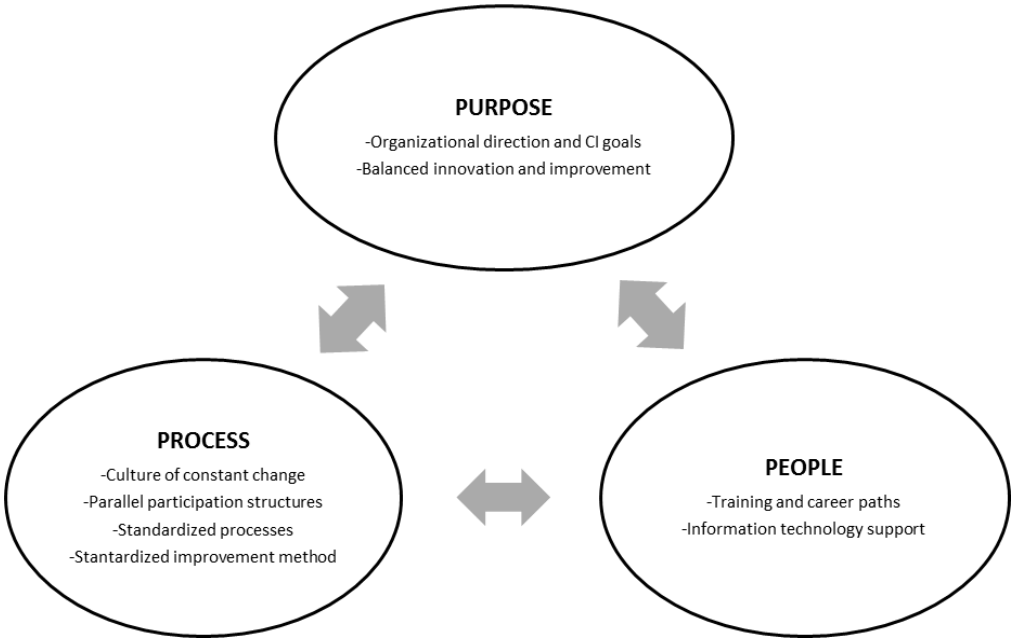

Figure 2.4 Continuous improvement infrastructure framework

According to Kim process management directly and positively relates to all types of innovation. These are radical product, radical process, incremental product, incremental process and administrative innovation. The conceptual model is below. Proposed model comprises eight QM practices and five types of innovation. To test the proposed model, data were collected from a sample of ISO 9001 certified manufacturing or service firms. The analysis shows that QM practices are linked with innovation directly or indirectly and that the importance of individual QM practices is tied to other practices. In particular, the results indicate that process management directly and positively relates to all types of innovation.

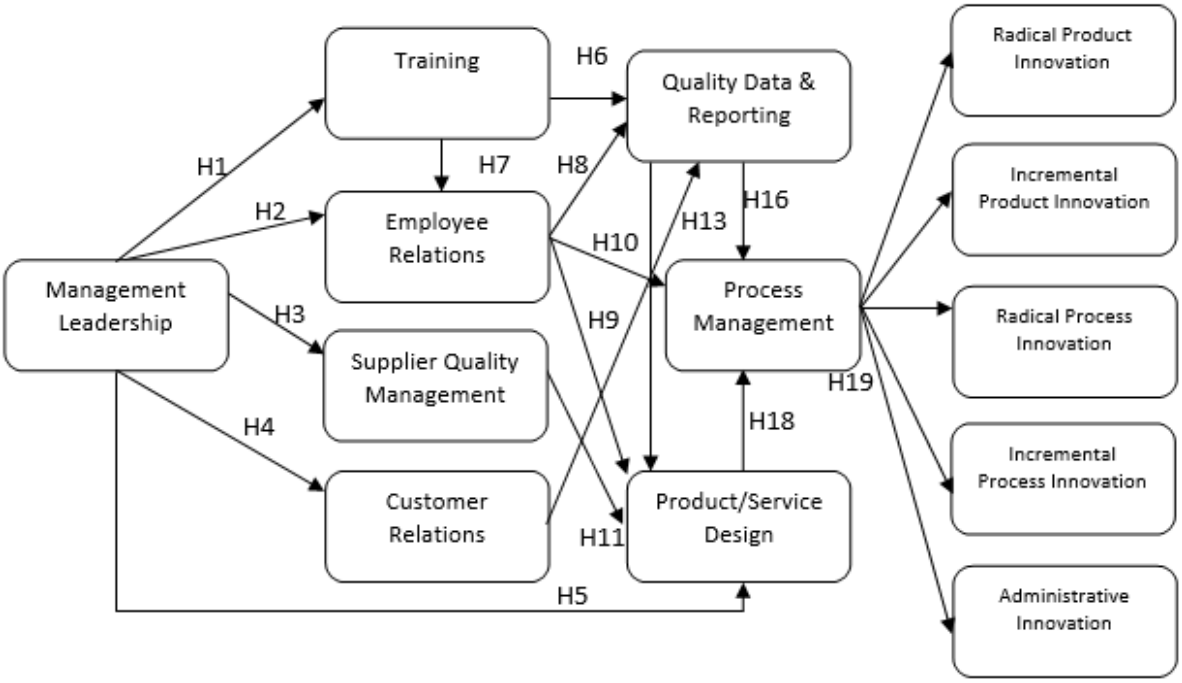

Figure 2.5 Innovation and management leadership

Improvement of existing products/processes and new product/processes can both be considered manufacturing innovation (Moore and Tushman, 1982). Schroeder et al. (1989) suggest that innovation in manufacturing includes implementation of new ideas or changes. Small and large ideas are accepted which have the capability to contribute to organizational objectives. However, managing small-scale, incremental changes requires considerably different processes and resource management than executing radical changes. This is the reason why small changes are accepted as improvement and and large-scale, radical changes as innovation.

3. THEORETICAL BACKGROUND AND MODEL DEVELOPMENT

Theoretical model for this study is shown on Figure 3.1.

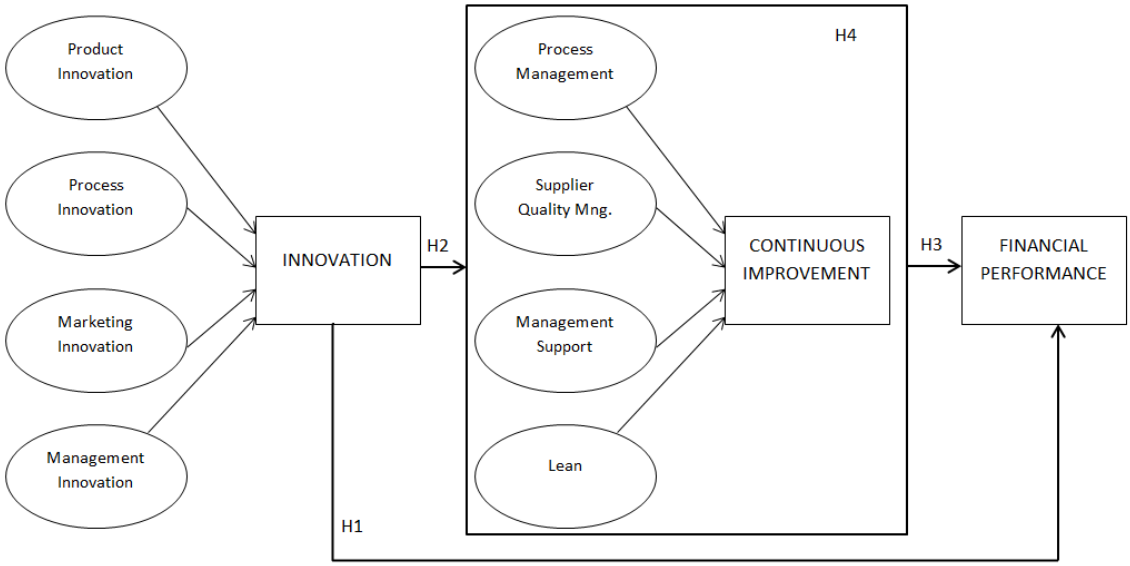

Figure 3.1 Theoretical model

Innovation may take place at different stages of a supply chain such as manufacturing, product and process design, marketing and logistic services. At each stage, innovations have social, economic and technological impacts. Depending on the characteristics of the company and at which stage the innovation is taking place, innovations can be grouped. Innovation is defined as a way to create new forms of value for customers, which helps to reduce internal costs, creates efficiencies (Samson and Gloet, 2014). According to Oslo Manual (2005), four different innovation types are introduced. These are product innovation, process innovation, marketing innovation and organizational innovation. In that context, there are many studies in the literature which indicate the positive relationship between innovation and firm performance in manufacturing sectors (e.g., Lööf et al., 2002; Cheng et al., 2010).

*Hypothesis 1***.** There is a significantly positive relationship between “innovation” and “financial performance”.

Innovation is the most valuable asset but how could a firm can survive under this competitive environment? Firms can efficiently operate if continuous improvement exists as a base structure (Wu and Chen, 2006). If an organization is not mature, then they first focus their efforts on continuous improvement so that they can have a safe base and then they should include breakthrough improvement (Harrington, 1995). It is also clear that managers should balance breakthrough innovation strategy with the continuous improvement strategy so that they can achieve differentiation and cost leadership together (Harrington, 1995). Therefore:

Hypothesis 2. There is a significantly positive relationship between “innovation” and “continuous improvement” activities.

In this study, the concept of continuous improvement is taken into consideration as: lean, process management, top management support, and supplier quality management. Continuous improvement can be defined as a company-wide focus to improve process performance (Deming, 1986; Imai, 1986). Also it is widely known as ``kaizen'' and it is an important component of the ``lean thinking'' (Imai, 1986; Womack and Jones, 1991). Continuous improvement and innovation are closely connected by their very nature and they can be considered parallel to each other. According to Imai (1986) there is one significant difference between Kaizen and innovation. Kaizen does not need to have large investments but it needs continuous effort and commitment from all levels of management (Imai, 1986). Lean production as a concept was originally developed by Toyota in Japan. The term “lean” was used by Womack and his colleagues to denote a system that uses less, in terms of all inputs, to create outputs (Womack et al., 1991). Thus the operational efficiency gained by lowering the inputs should have a positive effect on the financial performance of the firm.

Hypothesis 3. There is a significantly positive relationship between “continuous improvement” and “financial performance”.

Continuous process improvement means analysing the way it carries out its business aiming to find improvement opportunities for the performance of the organization (Delgado and Weber, 2014). First step is to gain better insights into how the business processes are executed.

Firm's capability is hidden in its processes (Das and Joshi, 2012). This brings the importance of the process management which deals with minimizing sources of variability in internal and external activities A review of recent literature on the critical success factors of business process management is studied by Trkman (2010) with a case study in a bank. It is proposed that a combination of processes, IT and continuous adaptations is needed to have competitive advantage for companies. According to Kim et al. (2012) there is a significant relationship between supplier quality management and process management. Supplier quality topics can have substantial impact on the bottom line of a company. Companies are increasingly focusing on understanding these challenges and addressing them with a proactive and collaborative approach towards supplier quality management. All supplier quality issues can be avoided if the customer in each case has a fuller understanding of its suppliers' knowledge, quality assurance processes and manufacturing capabilities. In order to gain such an understanding requires companies to move to a model where supplier quality is managed using a proactive and collaborative approach, which should be early in the product design and supplier selection process and continues through the entire lifecycle of a product and for the duration of their relationship with that supplier.

When we consider external side of the company, development of a strong partnership with suppliers enables a buying company to exchange innovative ideas on new products and improve development processes incrementally. Empirical studies have proven that if a company has a strategic partnership with suppliers, the company may generate a positive performance enhancement in product design and process management (Zu et al., 2008; Kaynak, 2003; Flynn et al., 1995).

Samson and Terziovski (1999) studied the relationship between quality management practices and operational performance with empirical analysis. According to their study, leadership, people management, has significant effect on

firm performance. Top management establishes long term collaboration with suppliers in order to obtain high quality materials (Lemke, 2003). Researchers have proven the significant relationship between management leadership and supplier quality management (Flynn et al, 1995). Therefore, the support of managers is also necessary for idea generation. The employees, who feel the top management support, have a higher willingness to take risk in order to be more creative and innovative (Tatikonda and Rosenthal, 2000). It is widely accepted that management needs to support continuous improvement activities across all levels of management. Human resources have taken on a strategic role in carrying out the continuous quality improvement plans which are the basis for success in the lean production model (Panizzolo, 1998). An important feature of continuous improvement methodology is the feedback of some form of recognition to motivate the employee and to reinforce the behaviour which the organisation is trying to generate. Evidence suggests that direct financial rewards in proportion to the value of the suggestion the basis of many "traditional" suggestion schemes is not effective because it tends to encourage the creation of "big" ideas only (since these are seen to have high potential reward). Most recognition systems have a goal to reward the behaviour itself rather than the suggestion, and often involve giving a token reward for every idea no matter how basic and whether or not it is implemented. For these kind of ideas which do have a larger impact, and for those which have a major impact it is appropriate to link the size of the reward to the scale of the saving or benefit. This culture has to be supported by top management. Otherwise it cannot be sustainable.

Continuous improvement has been measured under process management, lean, top management support and supplier quality management. According to a major study which was done by the Australian Manufacturing Council (1995), Leading The Way, continuous improvement and innovation have a positive impact on business performance. Several authors such as Bateman (2005), Jager et al. (2004), Garcia-Sabater and Marin-Garcia (2011) highlight the importance of organizations to focus on the implementation of continuous improvement.

Another research hypothesized and conceptualized the relationship between TQM practices and innovation in a model comprised of top management leadership, employee involvement, employee empowerment, customer focus, training,

information analysis, and continuous improvement as independent variable, and radical product innovation, incremental product innovation, radical process innovation, incremental process innovation, administrative innovation, and marketing innovation as dependent variable (Bon and Mustafa, 2013). Martinez-Costa and Martinez-Lorente (2008) defined continuous improvement as one of the main elements of TQM. They argue and empirically show that the process of continuous improvement will lead to a change in the organization and this change will have a direct effect on innovation. Kim et al. (2012) examined the relationship between quality management practices and innovation. Their model analysed the relationship between management leadership, training, process management, supplier quality management, product design and radical product innovation, radical process innovation, incremental product innovation and incremental process innovation. The results showed that there are positive relationships between quality management practices and innovation with an empirical study.

As mentioned above, there are many studies which deal with continuous improvement, lean and relationships between innovation dimensions separately. In this study, under the name of continuous improvement the concepts of lean, top management support, supplier quality management, and process management will be analysed together. And specifically, we will look for the existence of a mediating effect of continuous improvement on the relationship between innovation dimensions (i.e. product; process; marketing; organizational) and firm financial performance.

Hypothesis 4. Continuous Improvement activities mediate the effect of Innovation on Financial performance

4. METHOD

An empirical survey is conducted in Turkey to collect the data. A questionnaire was designed based on various related studies. In Table 4.1 below, main sources of the scales are given.

Table 4.1. Research model items references

Variable Name	References
Process Management	Kannan, 2005; Samson and Terziovski 1999; Anand and Ward, 2009
Supplier Quality Management	Kannan, 2005; Saraph et al., 1989
Lean	Kannan, 2005; Sezen et al., 2011
Management Support	Vaccaro, 2012
Financial Performance:	Günday et al., 2011
Management Innovation	Vaccaro, 2012
Product Innovation	OECD, 2005
Process Innovation	OECD, 2005
Marketing Innovation	OECD, 2005

Questionnaire form has been developed and finalized using a pilot survey to test the validity of the questionnaire for the Turkish manufacturing industry in white goods, metal, textile, chemical, electronic sectors. This survey target group includes production, sourcing, and quality managers in selected industries in order to assess continuous improvement and innovation activities and their structural relations to firm performance.

Computer Aided Telephone Interview (CATI) method was used for data collection. The survey response rate was 64% including 384 manufacturing firms. This response rate is acceptable when it is compared with other studies in this field (e.g. Paulraj and Chen, 2008). The sample consisted of 384 firms: 25% from metal sector, 21% from white goods sector, 18% from automobile sector, 12% from electronics, 15% from textile and 9% from chemical sectors. After data has been

collected, the analysis is performed mainly using SPSS and AMOS. Meredith et al.'s (1989) suggested methodology for academic research is used in this study.

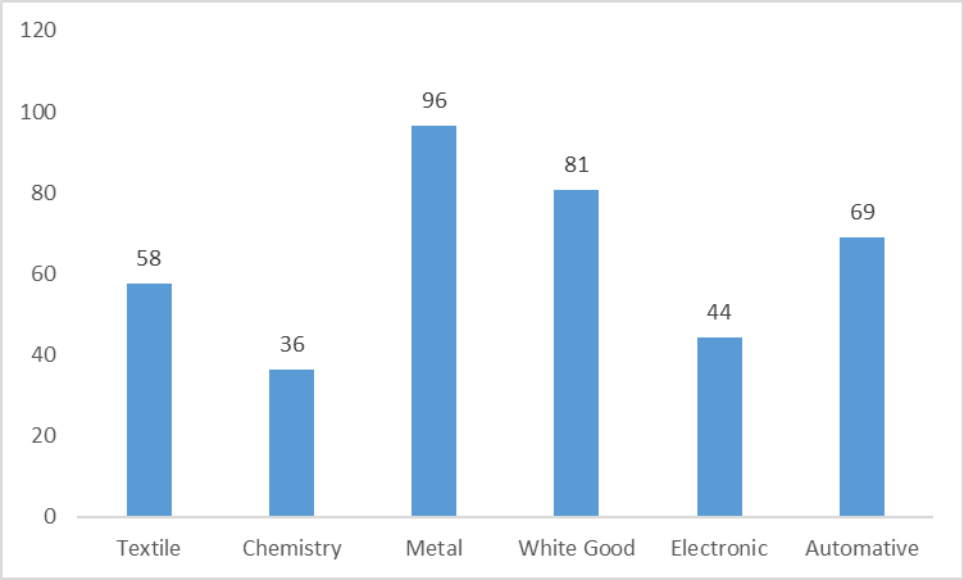

Figure 4.1: Company distribution according to sector

4.1. CATI Method

CATI methodology (Computer Assisted Telephone Interview) was designed to improve and simplify telephone interviewing process. In fact this method includes a software which automatically support and lead the interviewer during data collection. Questions are displayed on the computer followed by possible answers that respondents may give. This methodology has several advantages:

1. High quality of collected data: Any interviewer misinterpretation or incorrect question administering can be avoided.
2. Time reduction: Call back is automatically can be managed by the system. The interviewer can also directly insert the data with no use of paper.
3. More accuracy: Being a questionnaire displayed on a computer and completely automated, there's no room for mistakes or unclear compiling.
4. Complete control on interviews progress: a recap allows to check in real time how many interviews are completed and how many are incomplete or dropped.

4.2. Demographical Information about Companies

There are 384 companies in this research. Distribution according to sub regions is shown below in Table 4.2.

Table 4.2 Distribution according to sub region

Sub Region	Quantity
Marmara	238
Aegean	56
Mediterranean	15
Central Anatolian	8
Black Sea	8
West Anatolia	51
South eastern Anatolia	8
Total	384

Distribution according to number of employees and turnover is given in Table 4.3 as below:

Table 4.3 Distribution according to number of employees and turnover

# of employees	Percentage	Turnover	Percentage
0-49	25%	<1M	9%
50-250	41%	1M-8M	47%
>250	34%	8M-40M	22%
		>40M	22%

5. ANALYSIS AND FINDINGS

The survey has been completed and retrieved, collected firm responses are organized and converted into computer stage for data analysis involving statistical softwares SPSS (Statistical Package for Social Sciences) and AMOS.
In this chapter the results of the statistical analyses have been reported such as factor analysis, reliability analysis, means and variances of the factors, correlation analysis to test the one-to-one relationship of factors, and also regression analysis, structural equation modelling.

5.1. Exploratory Factor Analysis

In order to extract the relationships, multi-variate data analysis is performed in two stages. First stage is exploratory factor analysis. Principal Component Analysis (PCA) with "varimax rotation" is conducted to find out the underlying dimensions of innovation and continuous improvement methodology (Flynn et al., 1995; Saraph et al., 1989).

Exploratory factor analysis origin is based on early twentieth century (Spearman, 1904), and it is integral statistical method in the social, health, biological, and, sometimes, physical sciences (Cudeck, 2007). Exploratory factor analysis is a statistical technique that is used to reduce data to a smaller set of summary variables and to explore the underlining theoretical structure of the phenomena. It is used to identify the structure of the relationship between the variable and the respondent. According to Hair et al. (2010) there are two purposes for EFA. These are summarization and data reduction. Data summarization can be defined as simplifying the complex structures of variables and evaluating these under general and comprehensible concepts. On the other hand data reduction refers to reducing the number of the observed variables under the much smaller number of dimensions in terms of some statistical indicators (i.e. factor loadings, eigenvalue) and theoretical logic. We performed a preliminary factor analysis with SPSS. We used principal component factor extraction with maximum likelihood estimation.

Factor loadings were rotated with oblique rotation to make the results more interpretable. Exploratory factor loadings and reliability results are given in Table 5.1. The aim is to get a minimum number of factors that contain the maximum possible amount of information contained in the original variables used in the model, and with the greatest possible reliability (Hair et al., 2010; Johnson & Wichern, 2007; Netemeyer et al., 2003).

Table 5.1. Exploratory factor loadings and reliability analysis results

Factors	Factor loading scores									Alpha
INNOVATION										
Product Innovation 1	.710									α 0,684
Product Innovation 2	.774									
Product Innovation 3	.410									
Process Innovation 2		.525								α 0,669
Process Innovation 3		.670								
Process Innovation 4		.740								
Marketing Innovation 1			.680							α 0,761
Marketing Innovation 2			.732							
Marketing Innovation 3			.792							
Management Innovation 2				.720						α 0,767
Management Innovation 3				.765						
Management Innovation 4				.725						
CONTINUOUS IMPROVEMENT										
Process Management 2					.715					α 0,703
Process Management 5					.745					
Process Management 6					.695					
Supplier Quality Management 4						.685				α 0,664
Supplier Quality Management 6						.766				
Supplier Quality Management 7						.683				
Lean 2							.561			α 0,646
Lean 3							.787			
Lean 4							.680			
Management Support 1								.733		α 0,830
Management Support 2								.814		
Management Support 3								.839		
FINANCIAL PERFORMANCE										
Financial Performance 1									.864	α 0,840
Financial Performance 2									.840	
Financial Performance 3									.834	

Exploratory factor analysis is performed with SPSS using principal component analysis with varimax rotation. Mostly, eigenvalue over 1 criterion is taken into consideration to set the number of extracted factors. According to our data set total variance explained is 68% for firm's financial performance. It is followed by reliability analysis via Cronbach alpha. Cronbach's alpha is the most common

measure of internal consistency ("reliability"). It is most commonly used when you have multiple Likert questions in a survey/questionnaire that form a scale and you wish to determine if the scale is reliable. Cronbach's alpha is computed by correlating the score for each scale item with the total score for each observation (usually individual survey respondents or test takers), and then comparing that to the variance for all individual item scores. The resulting α α coefficient of reliability ranges from 0 to 1 in providing this overall assessment of a measure's reliability. If all of the scale items are entirely independent from one another (i.e., are not correlated or share no covariance), then α = 0; and, if all of the items have high covariance, then α will approach 1 as the number of items in the scale approaches infinity. In other words, if there is the high α coefficient, the more the items have shared covariance and probably measure the same underlying concept. According to Shin et al. (2000), to have the internal consistency, this value should be at least greater than 0.60 (see Table 5.1). Also relations between dual combinations of the factors give information about the reliability of internal consistency (Hair et al., 2003). Construct correlations, descriptive statistics for the scales, and reliability estimates are shown in Table 5.2.

Table 5.2. Descriptive statistics and correlations coefficients

Scale	Mean	(s.d.)[a]	1	2	3	4	5	6	7	8
1 Process Management	4.12	(0.59)	-							
2 Supplier Quality Mng.	3.93	(0.54)	.53	-						
3 Lean	4.05	(0.53)	.60	.59	-					
4 Management Support	3.96	(0.59)	.52	.47	.60	-				
5 Product Innovation	3.89	(0.58)	.37	.35	.48	.41	-			
6 Process Innovation	3.99	(0.54)	.43	.37	.58	.41	.58	-		
7 Marketing Innovation	3.59	(0.79)	.36	.37	.45	.40	.67	.60	-	
8 Management Innovation	3.92	(0.59)	.46	.34	.52	.54	.51	.61	.51	-
9 Financial Performance	3.69	(0.66)	.35	.30	.29	.26	.20	.25	.27	.28
Composite Reliability			.72	.67	.66	.69	.77	.76	.77	.84
Variance Extracted			.46	.40	.40	.43	.42	.52	.54	.64

Notes: [a]Standard deviation

5.2. Confirmatory Factor Analysis

In the second stage, the relationships between the factors are analysed by using structural equation modelling. Confirmatory factor analysis (CFA) is used to check the goodness-of-fit of measurements scales; this method also provides the correlations between factors (Fornell and Larcker, 1981). Confirmatory Factor Analysis (CFA) was used to assess the overall model fit and the reliability and validity of each multi-item scale (first-order factor) for measuring various routines. CFA involves estimation of an ***a priori*** measurement model, where the observed variables are mapped onto the latent constructs according to theory. Since measurement items are selected on the basis of prior conceptual and empirical studies, CFA is an appropriate technique for our analysis. Confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) are similar techniques, but in exploratory factor analysis, data is simply explored and provides information about the numbers of factors required to represent the data. In exploratory factor analysis, all measured variables are related to every latent variable. But in confirmatory factor analysis (CFA), researchers can specify the number of factors required in the data and which measured variable is related to which latent variable. Confirmatory factor analysis (CFA) is a tool that is used to confirm or reject the measurement theory. We specified a second-order factor model to make a holistic approach. The second order CFA is a statistical method employed by the researcher to confirm that the theorized construct in a study loads into certain number of underlying sub-constructs or components. For example, the theory says that service quality construct consist of five underlying sub-constructs and each sub-construct is measured using certain number of items using a questionnaire. The researcher might want to estimate the effect of main construct on its sub-constructs. Here, the main item has become second order construct while the sub-constructs become the first order construct. Figure 5.1 shows CFA model as below.

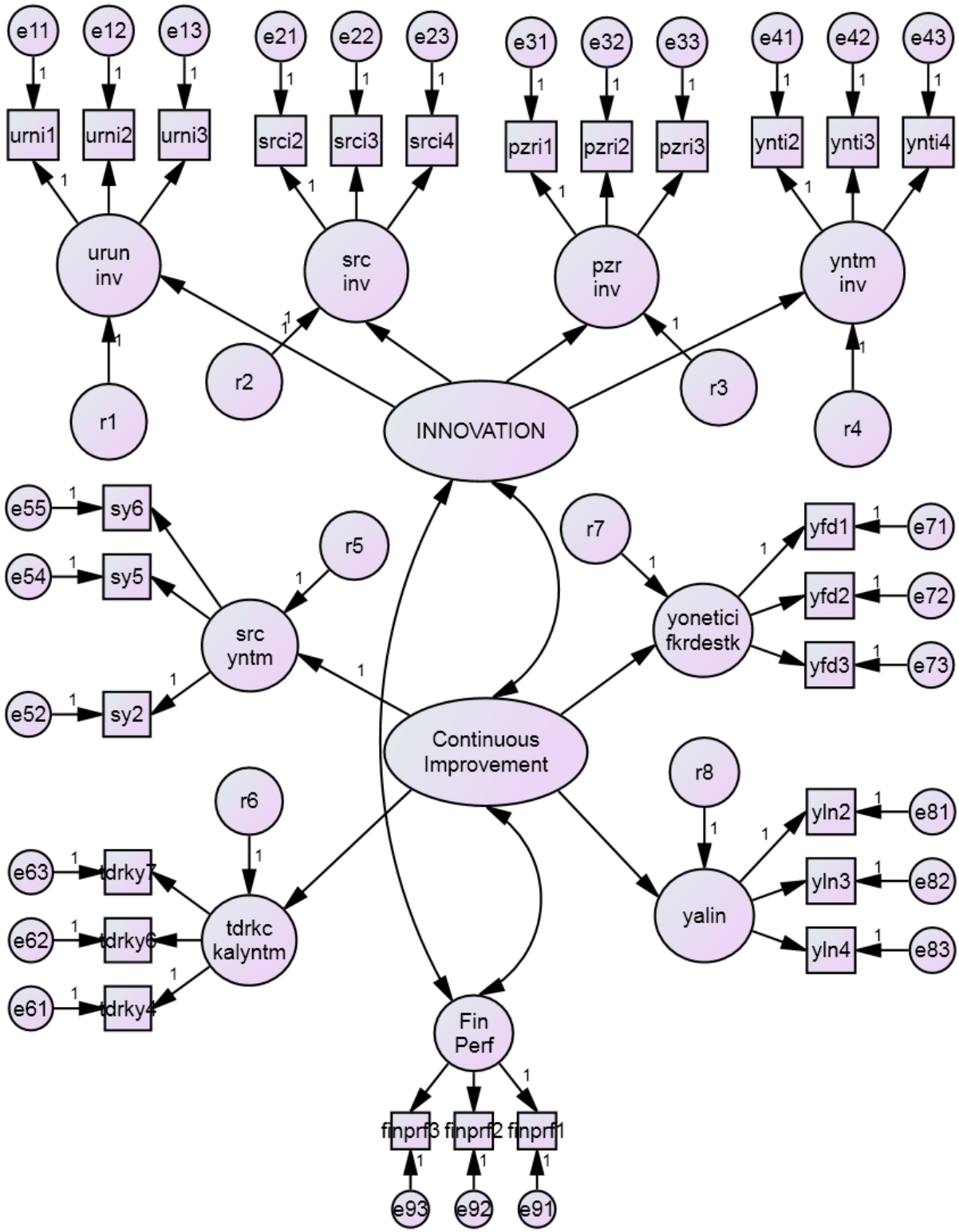

Figure 5.1 CFA model

The statistical fit of the overall model (chi-square/df=1, 66; goodness of fit index (GFI) = 0, 91; comparative fit index (CFI) = 0, 94; root mean square error of approximation (RMSEA) = 0,044) corresponds reasonably well according to acceptable threshold values in the literature.

Table 5.3 Results for CFA model

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	65	517,934	313	,000	1,655
Saturated model	378	,000	0		
Independence model	27	3575,438	351	,000	10,186

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	,032	,904	,884	,748
Saturated model	,000	1,000		
Independence model	,173	,333	,282	,309

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	,855	,838	,937	,929	,936
Saturated model	1,000		1,000		1,000
Independence model	,000	,000	,000	,000	,000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	,892	,763	,835
Saturated model	,000	,000	,000
Independence model	1,000	,000	,000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	,044	,037	,050	,940
Independence model	,164	,159	,169	,000

5.3. Unidimensionality

Unidimensionality ensures that each measurement item is represented by only one variable (Garver and Mentzer 1999). Generally the results constitute proof of unidimensionality as suggested in the literature (e.g. Li et al., 2005; Paulraj et al., 2008). Conditions for unidimensionality can be listed as below: (i) an item should be significantly associated with the empirical representation of a specific construct and (ii) each item should be loaded onto one component (Paulraj and Chen, 2008). To test the unidimensionality condition, overall model fit results are investigated with all variables in the research model. Our research model items also prove these conditions.

5.4. Convergent Validity

Convergent Validity is a sub-type of construct validity. Construct validity defines that a test designed to measure a particular construct is actually measuring that construct. Convergent validity takes two measures that are supposed to be measuring the same construct and shows that they are related. Conversely, discriminant validity shows that two measures that are not supposed to be related are in fact, unrelated. Both types of validity are a requirement for perfect construct validity. The extent to which convergent validity has been demonstrated is establish by the strength of the relationship between the scores that are obtained from the two different measurement procedures and research methods that it is used to collect data about the construct. The idea is that if these scores converge, despite the fact that two different measurement procedures and research methods are used the same construct must be measured. Convergent validity is set up through all the measurement items, which are strongly stacked onto relevant factor groups (Modi and Mabert, 2007). In order to show this, confirmatory factor analysis (e.g. CFI, GFI, RMSEA) results are used as a proof of the convergent validity as mentioned above (Carr and Kaynak, 2007; Humphreys et al., 2008; Bayraktar et al., 2009; Fullerton and Wempe, 2009). Convergent validity is connected with similarity, or convergence between individual items measuring the same underlying latent variable. First order factor model and second order factor model should follow the same process (Chin, 1998). Anderson

and Gerbing (1988) indicated that evidence of convergent validity for first-order models is valid if all manifest variables load significantly on their respective latent variables. In second-order models, there is a second condition which must be met for convergent validity: the first-order factors must load significantly on their respective second-order factors.

5.5. Discriminant Validity

Discriminant validity was examined by average variance test. If measurement items designed to measure different variables are not loaded onto other factor groups, discriminant validity is provided (Garver and Mentzer, 1999). Another proof of discriminant validity can be explained as below: Correlation values between the variables in the research should be lower than the square root of the AVE values calculated for each variable (Camison and Lopez, 2010). The average variance extracted for all constructs are around the recommended threshold which is 0.5 with recommendation of Fornell and Larcker (1981). Composite reliability of each construct was calculated. CR values can be seen in Table 5.2. These values are all in the acceptable range (Li et al., 2005). Discriminant validity refers to the degree to which measures of different latent variables are unique and distinct from each other.

5.6. Structured Equation Modelling Results

After the measurement model was validated, structural equation modelling (SEM) via AMOS was used to test the hypothesized relationships. Innovation and continuous improvement dimensions are formed as a second order factor model in order to be able to measure unobserved capabilities. Research model standard estimates and t-values are shown in order to demonstrate relationships between model variables in Table 5.4. Results show that relations are positive and significant according to path analysis. The squared multiple correlation coefficient was 0,31 which indicates the constructs in the model accounted for thirty-one percent of the variance.

Table 5.4. Summary of hypothesis test results

Hypothesis test path	**Standardized Regression Weight**	**Unstandardized Regression Weight**	**t-value**	**R^2**
H1: Innovation → Financial Performance	,348	,711	4,88***	
H2: Innovation → Continuous Improvement	,799	1,049	7,35***	,31
H3: Continuous Improvement → Financial Performance	,422	,581	5,55***	

To test the mediating effects of Continuous Improvement activities on the relationship between Innovation and Financial Performance, path analysis is applied through AMOS (Hair et al., 2010). It is revealed that there is a significant correlation between innovation and financial performance.

According to Baron and Kenny (1986), the mediating effect exists under the following conditions:

1) There is a significant effect of independent variable (Innovation) on the mediator variable, Continuous Improvement.

2) The independent variable (Innovation) has a significant effect on the dependent variable (i.e. Financial Performance).

3) After including the mediator variable, the previous significant relationship between the independent variable and the dependent variable becomes insignificant.

It is found that all the mediating conditions set by Baron and Kenny (1986) is satisfied for our data set. In the first stage, chi-square value is calculated as 518,151.

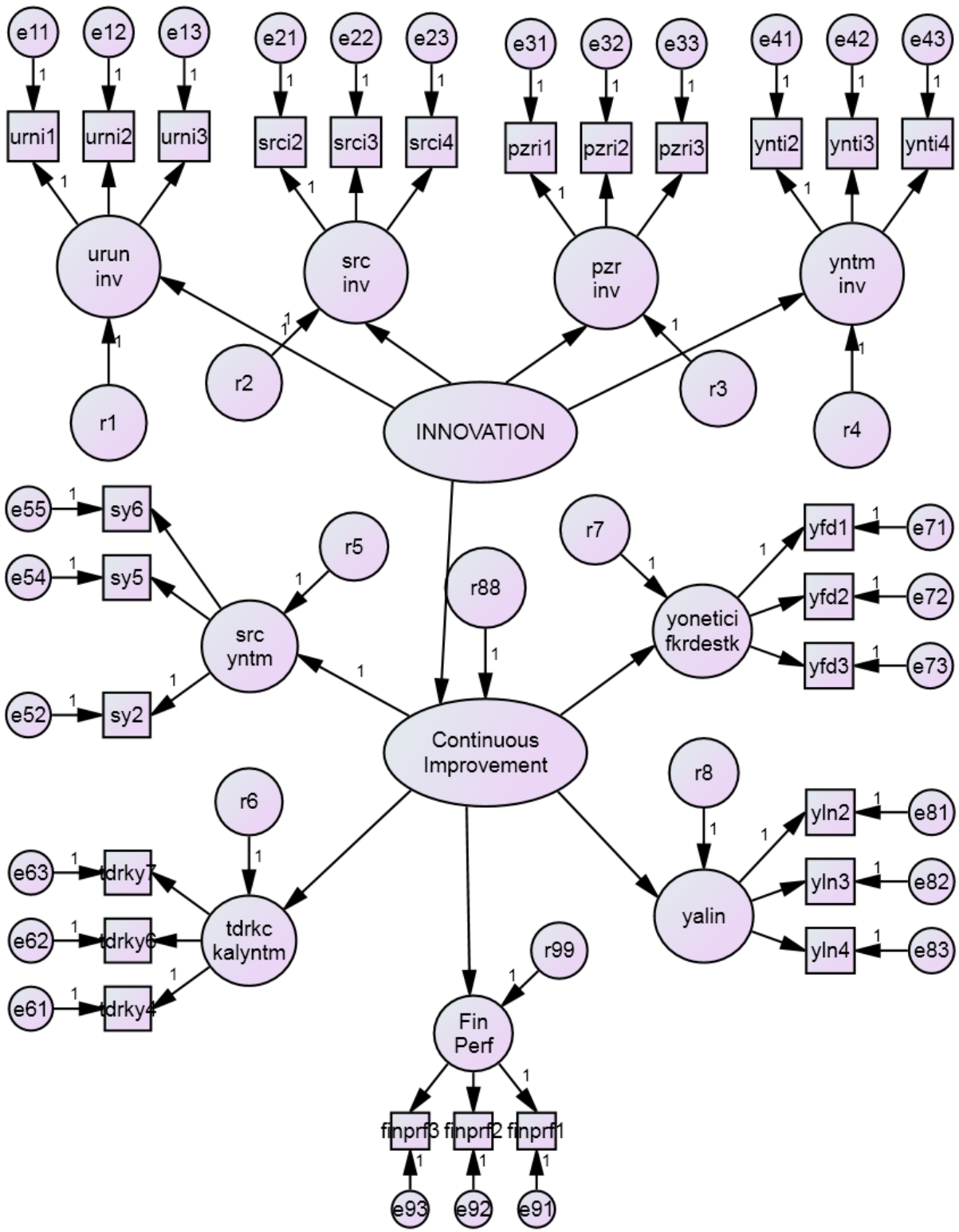

Figure 5.2 Mediating effect 1.stage

Table 5.5 Mediating effect 1.stage AMOS results

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	64	518,151	314	,000	1,650
Saturated model	378	,000	0		
Independence model	27	3575,438	351	,000	10,186

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	,032	,904	,884	,751
Saturated model	,000	1,000		
Independence model	,173	,333	,282	,309

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	,855	,838	,937	,929	,937
Saturated model	1,000		1,000		1,000
Independence model	,000	,000	,000	,000	,000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	,895	,765	,838
Saturated model	,000	,000	,000
Independence model	1,000	,000	,000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	,044	,037	,050	,944
Independence model	,164	,159	,169	,000

Chi-square = 518,151
Degrees of freedom = 314

After including direct effect of innovation dimensions on the financial performance, this relation is found insignificant (p=0,636). This result indicates a mediating effect of Continuous Improvement on the relationship between Innovation and Financial Performance. It is also realized that chi-square values are quite similar (i.e. 518,151 – 517,934=0,214), which proves that there is a full mediating effect.

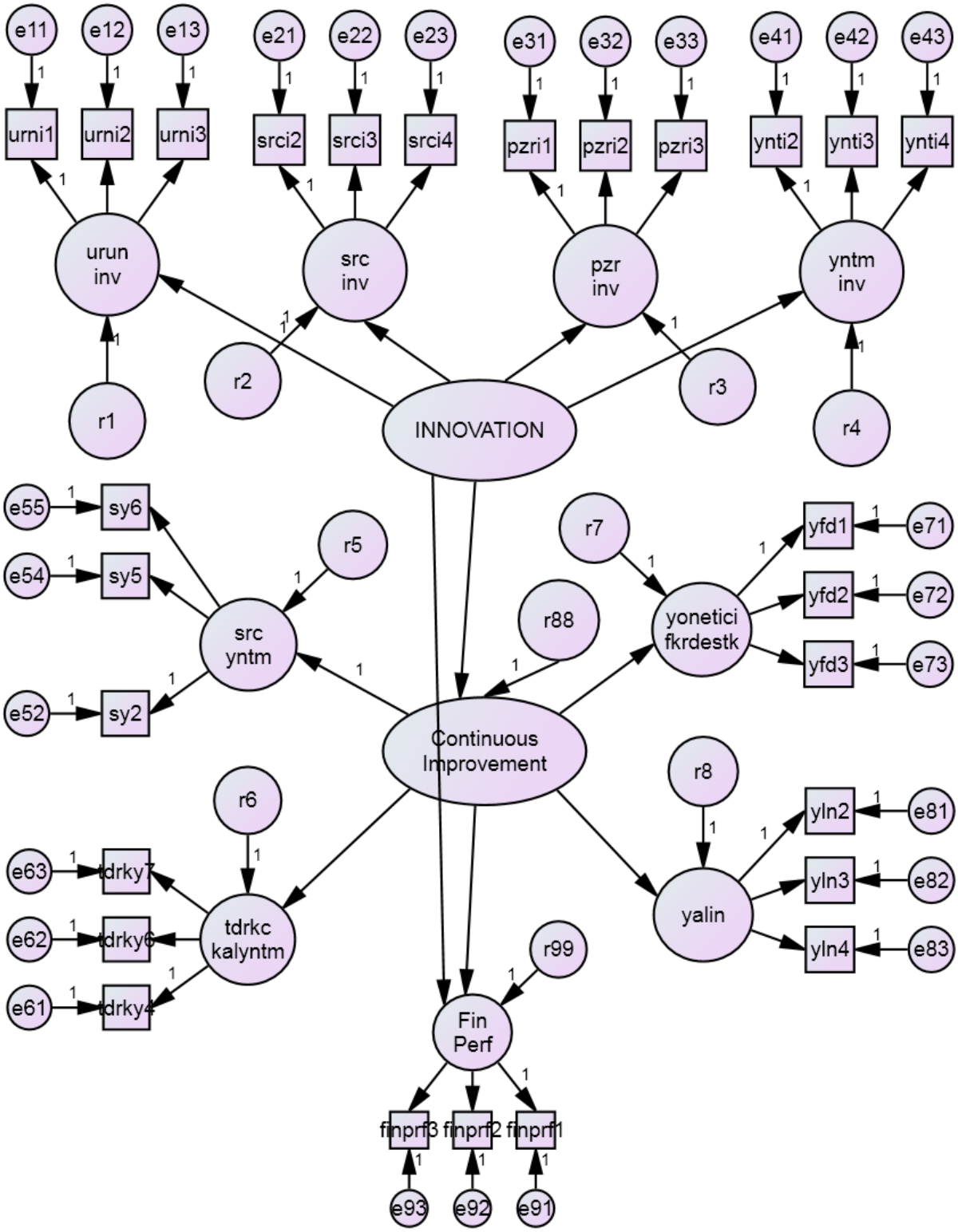

Figure 5.3 Mediating effect 2.Stage

Table 5.6 Correlation and mediating analysis results of proposed model

Correlation Scores	Innov'	Cont' Imp'	Fin' Perf'
Innovation	-		
Continuous Improvement	,795***	-	
Financial Performance	,352***	,414***	-
Mediating Analysis Results (H4)	**Stage-1**	**Stage-2**	
	Fit Indices Scores	Fit Indices Scores	
Chi-square	518,151	517,934	
GFI	,904	,904	
CFI	,937	,936	
RMSEA	,044	,044	
	t-values	t-values	
Innov' →Cont' Imp'	7,444***	7,417***	
Cont' Imp' → Fin' Perf'	5,757***	2,448*	
Innov' →Fin' Perf'	n/a	**0,474** N.S.	

Notes: Correlation significance at ***p<0.001, *p<0.05, N.S.not significant. n/a=Not Available

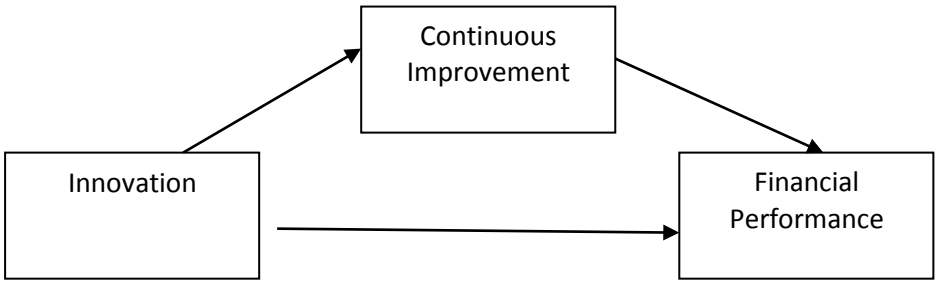

Figure 5.4 Mediating model

Mediating model is shown in Figure 5.4. Regression weights are shown in Table 5.8.

Table 5.7 Regression weights for mediating model

1.Stage	**Standardized Regression Weight**	**Unstandardized Regression Weight**
Innov' →Cont' Imp'	0,798	1,072
Cont' Imp' → Fin' Perf'	0,423	0,609
2.Stage	**Standardized Regression Weight**	**Unstandardized Regression Weight**
Innov' →Cont' Imp'	0,795	1,069
Cont' Imp' → Fin' Perf'	0,361	0,520
Innov' →Fin' Perf'	0,066	0,128

6. DISCUSSION

One of the most important results of our study is that continuous improvement has a full mediator role between innovation and financial performance. This shows that a company cannot be financially successful by concentrating only on innovation. Focusing only on continuous improvement may also result in financial weakness because it can decrease the chances of introducing radical innovations (Prajogo and Sohal, 2001). Firms and managers should not put excessive emphasis on one or the other. Too much focus only on the continuous improvement or too much focus only on innovation may harm the firms.

Harari (1993) argue that if there is a managerial pressure on implementing incremental improvement, this could lead people to work on unambitious goals and derive solutions that are not novel. Harari (1993) further suggests that, from a strategic perspective, incremental improvement may help businesses to catch up to their competitors, but it cannot help companies to achieve breakthrough performance. Therefore, it is suggested that any business culture that emphasizes catch-up strategies, without consideration of the need for breakthrough change, will soon be outdated (Fuchs, 1993; Jha et al., 1996). Organizations that are just starting their improvement journey should first focus on continuous improvement activities to establish a working base. Then they should expand their improvement effort to include innovation. Innovation and continuous improvement are based on the company's ability to be creative and learn (Martensen and Dahlgaard, 1999). As an example, 3M is a global innovation company that made contributions to the health care, communications and office. 3M focuses on developing disruptive innovations outside of the current existing portfolio which shows that strategy is for long-term, sustained innovation. On the other hand, a research made for Australian and New Zealand manufacturing firms showed that continuous improvement strategy is the preferred strategy to improve customer satisfaction and productivity (Terziovski, 2006). Considering the main contribution of our study, in addition to the above mentioned existing literature findings, our study shows that innovation cannot be sustainable without a continuous improvement approach for companies which have not reached a stage of systems integration.

In the course of recent years, Japan has molded the world's innovation scene. Taking a gander at the huge worldwide effect made by organizations like Sony and Toshiba. We can see a fascinating correlation with the idea of technology developments in Silicon Valley and the United States. While Silicon Valley is populated by organizations that have risen up out of new companies over the previous decade or somewhere in the vicinity, Japan's innovation scene is still exceptionally top-overwhelming with little to show of 'thought to-organization' examples of overcoming adversity. The substantial partnerships charge such an impact over the ability pool, advertise channels, and a thousand different parts of the economy that what is less well observed and discussed is the Silicon Valley-style new businesses that could be changing and forming the innovation and social scene

As a matter of fact, continuous improvement once controlled Japan's economy. Japanese makers in the 1950s had a notoriety for low quality, however through a culture of scientific and deliberate change Japan could go from most noticeably bad to first. Beginning in the 1970s, the nation's capacity to make minimal effort, quality items helped them rule key ventures, for example, cars, media communications, and shopper hardware. To rival this extraordinary turnaround, Western organizations, beginning with Motorola, started to embrace Japanese techniques. Presently, practically every expansive Western organization, and numerous littler ones, advocate for consistent improvement. Looking past Japan, famous six sigma organizations in the United States, for example, Motorola and GE, have battled as of late to be innovation leaders. 3M, which put intensely in continuous improvement, needed to release its sigma system with a specific end goal to expand innovation. As innovation mastermind Vijay Govindarajan says, "The more you hardwire an organization on add up to total quality management, it will hurt radical innovation. The outlook that is required, the capacities that are required, the measurements that are required, the entire culture that is required for irregular innovation, are on a very basic level unique

In 2012, Japan's significant gadgets firms lost an amassed $17 billion and have been routinely uprooted by contenders from China, South Korea, and somewhere else. As Fujio Ando, senior overseeing executive at Chibagin Asset Management recommends, "Japan's customer gadgets industry is confronting rout."

Similarly, Japan's vehicle industry has been tormented by a progression of humiliating quality issues and reviews, and has lost piece of the overall industry to organizations from South Korea and even the United States. Looking past Japan, notorious six sigma organizations in the United States, for example, Motorola and GE, have battled lately to be innovation leaders. 3M, which put intensely in continuous improvement, needed to release its sigma strategy keeping in mind the end goal to expand the stream of innovation. The outlook that is required, the abilities that are required, the measurements that are required, the entire culture that is required for discontinuous innovation, are in a general sense extraordinary.

Customization of how and where continuous improvement is applied is important. One size of continuous improvement doesn't fit all parts of the association. The sort of meticulousness required in an assembling domain might be pointless, or even dangerous, in an exploration or configuration shop. Beyond any doubt it's critical to have discipline into product and service development, however less that it debilitates creativity. It should be questioned whether processes should be improved, eliminated, or disrupted. An excessive number of continuous improvement ventures concentrate such a great amount on picking up efficiencies that they don't challenge the essential suppositions.

One final note can be said about social and economic aspects. Our data was collected from the companies in a developing country where innovation performance is fairly lower than highly developed countries. Social and economic dynamics in a developing country may be different from a developed country. More developed nations and societies may be demanding more innovative products since they have a higher prosperity level. For this reason, companies in such developed nations may have a different balance between innovation and continuous improvement. By this token, in a more prosperous and highly developed country, the relationships between innovation, continuous improvement and financial performance may be argued to be hypothesized differently. However, it is believed that our finding about the mediating role of continuous improvement is eventually true for all globalizing companies because innovations are not intended to stay only in a limited region and they always need the support of continuous improvement to grow into all regions of the world. In

summary, innovation and improvement should always be considered together, and support each other, regardless of the social or economic conditions of the countries.

6.1. Limitations and Further Research

As with all empirical studies, this study also has some limitations and also presents some new opportunities for future studies. Generalizability is a critical concern for all studies. The results can be generalized to other countries which show cultural similarities. Hofstede's (1980) research reveals the cultural similarities across Turkey, Argentina, Spain, Brazil, Iran, and Greece. For example, a study which was done in Spain also showed that there is a positive relationship between continuous improvement activities and innovation. Manager implications explain that continuous improvement is a way to facilitate innovation process (Martinez-Costa and Martinez-Lorente, 2008).

Another limitation is about the sector selection which provides opportunities for future research. This study has been done in only manufacturing sector, however service industry can also be targeted since improvement and innovation can vary significantly. To overcome this limitation a cross-industry study should be done which includes a larger set of industries. In future studies, theoretical model can also be enlarged by additional variables, such as sustainability to discover the long term effects of continuous improvement on innovation and sustainability.

Despite these limitations, this study contributes in the following ways. Data has been collected for five different manufacturing sectors. Moreover relations were investigated between continuous improvement and with four different type of innovation such as product, process, marketing, management innovation.

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7. CONCLUSION

This paper reports the results of an empirical model which includes innovation, continuous improvement and financial performance for the Turkish manufacturing industries with a sample of 384 companies. Theoretical framework has been empirically tested and main purpose of the study was to investigate the mediator role of continuous improvement between innovation and financial performance.

Results from hypothesis testing shows that there is a significant relationship between continuous improvement and firm performance. There is a positive relationship between four innovation types and firm performance (Günday et al., 2011). There is also a significant relationship between innovation and continuous improvement. These findings substantiate our conceptual model and offer several managerial implications that companies should focus on these methodologies in order to be successful in a competitive environment.

This study has also showed that there is a mediating effect of continuous improvement between innovation and financial performance. Existence of this mediating effect is important for decision makers because it provides a clear path for financial success. That is, companies focusing on innovation may become profitable only if they first improve their processes and quality through continuous improvement.

Continuous improvement is a major driving force for companies. Business units need to expand continuous improvement across all functional areas, not just manufacturing and production (Samson et al., 1999). This will also further provide cross-national learning to facilitate innovation.

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