INNOVATIVE PROJECT MANAGEMENT: A CASE STUDY IN ELECTRONICS INDUSTRY

ALİCAN SADIÇ

IŞIK UNIVERSITY

2019

INNOVATIVE PROJECT MANAGEMENT: A CASE STUDY IN ELECTRONICS INDUSTRY

ALİCAN SADIÇ
Faculty of Engineering, Electrical and Electronics Engineering, Işık University, 2015
Graduate School of Social Sciences, Executive MBA, Işık University, 2019

Submitted to the Graduate School of Social Sciences in partial fulfillment of the requirements for the degree of Master of Business Administration

in

Innovative Project Management

IŞIK UNIVERSITY
2019

IŞIK UNIVERSTIY
GRADUATE SCHOOL OF SOCIAL SCIENCES

INNOVATIVE PROJECT MANAGEMENT:
A CASE STUDY IN ELECTRONICS INDUSTRY

ALİCAN SADIÇ

APPROVED BY:

Prof. Dr. S. Saygın EYÜPGİLLER, (Thesis Supervisor)	IŞIK UNIVERSITY
Assoc. Prof. Aslı TUNCAY ÇELİKEL, (Member)	IŞIK UNIVERSITY
Assoc. Prof. Gaye ÖZÇELİK, (Member)	ISTANBUL BİLGİ UNIVERSITY

APPROVAL DATE: 15 / 04 / 2019

INNOVATIVE PROJECT MANAGEMENT: A CASE STUDY IN ELECTRONICS INDUSTRY

Abstract

Management of economic units is as old as the history of civilizations; however, the formation of the project management methodology and the determination of its rules have been established rather recently. The most important historical examples of project management in the construction and architecture area happened especially in the period between the 18th and 19th centuries. The most beautiful and the oldest historical reference project may be the construction of Egyptian Pyramids. Nowadays, project management has also become a distinctive way to manage business activities. Most of accomplished companies in all industries are using project management techniques, and the companies using project management for the operations.

On the other hand, the importance of innovation in our life has increased in daily life with the increasing global competitive environment. Innovation has also become a distinctive part of management theory. The increase in innovation performance of countries has a key role on business economic and social development, prosperity, and growth in our time. For this reason, project-based firms have started to apply innovation techniques more than ever. These firms started to become a more vital and important organizational context, as examples many current managerial challenges. Innovative Project Management techniques should use owing to the effect of technology and its influence on organizational processes. It is an essential aspect of any growth strategy. Society gains much greater benefits from the same source with the value added of the innovation. Therefore, innovation is not only economic and business system but also it is a social system. Innovation is located within a dynamic environment which is especially affected by the following elements; technology firms, market uncertainties, rapid change, shortened product life cycle, and globalization. Therefore; it is inevitable for organizations to be innovative for sustainability, for competition, for being able to grow and leading their market.

This thesis, with a case study and research about Innovative Project Management examines the functioning of an innovative based company about UPS – (Uninterrupted Power Supply) project in electronics industry. The study also strives to discover the added value to the UPS project through Innovative Project Management.

Keywords: project, innovation, project management, UPS, electronics industry, innovative project management

YENİLİKÇİ PROJE YÖNETİMİ: ELEKTRONİK ENDÜSTRİSİN'DE BİR VAKA ÇALIŞMASI

Özet

Yönetim medeniyetlerin tarihi kadar eskidir. Ancak, proje yönetimi oluşumu ve kurallarının belirlenmesi daha yakın geçmişte olmuştur. Özellikle 18. ve 19. yüzyıllar arasındaki dönemde, proje yönetiminin en önemli örnekleri inşaat ve mimarlık alanında gösterilebilir. Buna bir örnek vermek gerekirse, eski projelerden biri olan Mısır Piramitlerinin yapımını görebiliriz. Günümüzde, proje yönetimi iş faaliyetlerini yönetmek için ayırt edici bir yol haline gelmiştir. Şirketlerin çoğu sektörde giderek artan bir şekilde proje yönetimi tekniklerini kullanıyor. Şirketlerden bazıları, operasyonları için de proje yönetimini kullanıyor.

Diğer bir taraftan, artan küresel rekabet ortamı ile hayatımızda inovasyonun önemi artmıştır. Bu noktada inovasyon yönetimi teorisi ayırt edici bir rol haline gelmiştir. Bu günlerde, ülkelerin inovasyon performanslarındaki artış; ekonomik ve sosyal kalkınma, refah ve büyüme alanın da kilit bir role sahiptir. Bu nedenle, proje bazlı firmalar yeniliği daha çok kullanmaya başlamıştır. Bu firmalar mevcut yönetimsel zorlukları örnek göstererek, daha hayati ve önemli bir organizasyon yapısı oluşturmaya başlamıştır. Yenilikçi Proje Yönetimi teknikleri, teknolojinin etkisi ve örgütsel süreçler üzerindeki etkisinden dolayı kullanılmalıdır. Bu teknikler herhangi bir büyüme stratejisinin önemli bir yönüdür. Toplum, inovasyon ile aynı kaynaktan çok daha fazla fayda sağlar. Bu nedenle, yenilik sadece ekonomik ve ticari değil; ayrıca sosyal bir sistemdir. İnovasyon, takip eden unsurlardan özellikle etkilenen dinamik bir çevrede yer alır; teknoloji firmaları, pazar belirsizlikleri, hızlı değişim, kısaltılmış ürün yaşam eğrisi ve küreselleşme. Bu nedenle; organizasyonların yaşamlarını sürdürebilmeleri, rekabet edebilmeleri, büyüyebilmeleri ve piyasaya liderlik edebilmek için yenilikçi olmaları kaçınılmazdır.

Bu tez çalışması elektronik endüstrisinde Yenilikçi Proje Yönetimi üzerine bir örnek vaka incelemesi niteliği taşımaktadır. Proje tabanlı bir şirketin KGK – (Kesintisiz Güç Kaynağı) projesi ile ilgili yenilikçi proje yönetimi süreci incelenmektedir. Ayrıca Yenilikçi Proje Yönetimi ile UPS projesinin sağladığı katma değerin ortaya çıkarılması amaçlanmaktadır.

Anahtar Kelimeler: proje, yenilik, proje yönetimi, KGK, elektronik endüstrisi, yenilikçi proje yönetimi

Acknowledgements

There are many people who have been evaluating my years in the best way during my graduate education and helping to make them valuable.

First of all, I would like to thank my master program professor and master thesis supervisor Prof. Dr. S. Saygın EYÜPGİLLER. I am really fortunate that having the opportunity from his experience beneficially was promising forward and intellectually satisfying in that period. I perceive this opportunity as a big milestone in my career development.

It is my radiant sentiment to place on record my best regards, deepest sense of gratitude to Assoc. Prof. Aslı TUNCAY ÇELİKEL and Assoc. Prof. Gaye ÖZÇELİK for their careful and precious guidance which were extremely valuable for my study both theoretically and practically.

I would especially like to express my special thanks of gratitude to my father Can SADIÇ, my mother Nevin SADIÇ and my sister Dilay SADIÇ for their continuous support in this period.

Finally, I also express a deep sense of gratitude to all the employees of ABC Company for presenting as such amazing experience. They are all really wonderful people, and I will never forget these days of mine at ABC.

To my Parents
Can Sadıç &
Nevin Sadıç
and my sister
Dilay Sadıç

Table of Contents

List of Figures

List of Graphs

List of Tables

Abbreviations

AC	: Alternative Current
BOM	: Bill of Material
CNC	: Computer Numerical Control
CAGR	: Compound Annual Growth Rate
CPM	: Critical Path Method
DC	: Direct Current
EC	: European Commission
EU	: European Union
Ex-Work	: Factory Delivery
FAT	: Factory Accepted Test
GDP	: Gross Domestic Product
IGBT	: Insulated Gate Bipolar Transistor
ISO	: International Standardization Organization
IUS	: Innovation Union Scoreboard
OECD	: The Organization for Economic Co-operation and Development
PERT Chart	: PERT (Project Evaluation and Review Technique) diagrams are tools for documenting and analyzing activities in a project
PO	: Purchase Order
PMI	: Project Management Institute
RAM	: Responsibility Assignment Matrix
RACI	: Responsible Accountable Consult and Inform
R&D	: Research and Development
RFQ	: Request for Quotation
SAT	: Site Accepted Test
UPS	: Uninterrupted Power Supply
WBS	: Work Breakdown Structure

Introduction

Developing pure power and energy saving solutions has been a modern rising trend in the electronics industry. UPS – (Uninterrupted Power Supply) products are probably one the most important parts of the energy sector. These products work for the energy saving with the pure output power. Due to savings in high energy prices and limited energy resources, industrial UPS products are indispensable and mostly preferred in the world. One of the disadvantages of Industrial UPS products is the requirement of a larger place to build those products in the site and high costs of these products. These issues clearly show the importance of Innovative Project Management for the Industrial UPS, and application on energy sector.

Innovation is an extensively reviewed and well-developed area of management theory for economic grow of the countries and use of efficient energy resources in the electronics industry. The simplest meaning of the innovation involves the processes of making new product or having a solution with the new way. Innovation desired because of sector requirements or it can occur with the limited resources of the countries. Innovation generally occurs due to exigences and necessities of the projects in business life. Despite a lack of engineering studies about project based firms, the study preferred a case company in electronics industry in Turkey. The study aims to show the importance of innovative project management in project based companies to show that new management techniques are important and interesting. Generally companies which concentrate on innovation strategy are more successful than companies which do not have innovation strategy. The innovation strategy consists of financial objectives and growth areas related to a new product or service. Innovation emerges not only through innovative products, but also through Innovative Project Management, too. The limited

budget and competitive environment in the projects led to the emergence of innovative project management.

Some of UPS projects start with an innovative idea in the Electronics Industry. It can be on a final product, a service, an outcome or something which will be the result of the project. Therefore, innovation may help to skip the next step of the project when someone gets an innovative idea to increase the benefits of the project. The idea should be connected to some real-time objective or something which is possible to make and place it on the market. When the leader of the entity evaluates the innovative management in terms of micro scale companies and the conveniences it will provide, it becomes among the most basic and vital functions to maximize the profitability for enterprises. Along with innovation, many company functions may be directly and indirectly effected on their projects. Firms gain competitive advantages in the market through innovation where similar products are expanding gradually. The companies gain advantages in competition with the innovation, and they produce the innovative products and improved services to their customers or they manage the projects with innovative perspective.

This case study research aiming to explore and understand how the innovative project management process has been executed with the collected data from interviews in the ABC Company. The custom made solution company examined is located in Turkey. The company provides solutions in the Industrial UPS sector since 2006. The second objective of the study is to put for forward the benefits / contributions achieved by the company through the execution of innovative project management process. The case study explores benefits such as; enhancing of quality, increasing customer satisfaction, utilizing efficiency and effectiveness, providing value added, increasing profitability rates, and expending markets and products. Data collected from interviews and also secondary data has been presented in the last part of the thesis.

Chapter 1
Literature Review of Innovation Management

1.1 The Concept of Innovation Defined

In recent years, innovation concept is one of the fastest rising concepts in academic area and business life. Besides to the fields related to economic policies and strategies, innovation has become a main concept in operating fields as diverse as fashion. This widespread result is both extends the scope of the concept and transforms it into a mysterious tool that can solve almost any problem. Innovation, as it is decisive for business, economic and social development, so public policy is being implemented in many countries to encourage innovation. For this reason, the theoretical background of innovation policies and policy instruments are summarized after approaching innovation policies.

"Innovation is derived from the word "innovare" in Latin. It means making a new product or developing a service activity. Innovation refers to renovating as a process, and it is a reform as a result of this process. Also according to the OECD - The Organization for Economic Co-operation and Development literature, innovation is a marketable thought, product or service for a new and improved manufacturing or distribution method for a social service management. Innovation is the best way to grow up the economy. Those who do not speed up the innovation are doomed to disappear"[1]. Innovative companies make an impact on the market as Samsung, Apple, Socomec, ABB, Eaton, Schneider, and so on. The companies know where their businesses are strategically located, having a very good insight, emphasizing co-operation, speeding up

[1] OECD (2015), "Frascati Manual - Guidelines for Collecting and Reporting Data on Research and Experimental Development"

their processes, and managers know that the innovation is the highest level which is known by them. Innovation is a sustainable success story in design, service, marketing, sales, after sales support, redesign and business.

1.2 Emergence of Innovation

It is possible to state that the history of innovation is as old as humanity. Human beings meet their requirements with innovations and inventions in spite of all kinds of negative conditions in order to be able to sustain their life since ancient times in the historical process.

After World War II, economists' work on entrepreneurship and innovation has increased. It was determined that the most important effect on innovation in this period was industrial R&D - Research and Development studies. This occurred to significant technological developments such as radar, aviation, rockets, and new weapons. However, there have been examples of Germany and Japan showing significant technological and economic development without military expenses after the war. That's show that there is no exact linear correlation between military expenses and R&D expenses with economic growth in these countries, and it shows the relationship requires a more complex structure. Companies are shown as a source of innovation and economic growth. In this new approach, it happen technological learning and renewal based on the organization of the production within the company, and result of the technical work sharing[2].

In Adam Smith's classical sense of concept, he explained how the improving and work sharing of the machines led to inventions and innovations. He stated in 1770s that the most important source of productivity increase is innovation. Also, the main reason of innovative developments in the machines are talents of employees who develop these machines and these employees chosen the job own self. Thus, he pointed to a new class of specialists who encouraged the production of useful economic information and were

[2] EGIAD (2012), "*Yenilik - Yenileşim - İnovasyon Dünyasına Bir Yolculu*k"

involved in speculative activities. As a source of the wealth, he has seen in the increase of capital stock, and the specialization of labor[3].

The neoclassical economics aroused with Adam Smith dominated until the 1980s; however, left its place to the evolution economics because it was insufficient in technology and innovation. While examining the neoclassical approach, firms' sources and technological capabilities with source allocation processes, the evolutionist approach examines how firms develop new technologies and how they adapt to technological innovations[4].

"Schumpeter examined the economic periods with four stages in 1900s: prosperity, stagnation, depression and revival. According to Schumpeter, innovations come up at various times in the economy and the stimulus effects of these innovations in their areas of investment are different. According to Schumpeter, economic fluctuations are in fact the process of adapting the economy to innovations, and the process of emerging a new product in the economy consists of three stages. First one called as involving new ideas. The other one is the phase of innovation which is transformed into marketable products and processes of new ideas. Innovation is the first commercial implementation phase of the invention. The last one is the expansion stages which are spread across potential markets for the new products and processes"[5].

Historically, innovation and economic growth have been handled together from the economist Schumpeter who the first mentioned the importance of innovative products for economic growth, till the Trott who is describe the innovation as creating idea, developing technology, a new or improved product, production of the manufacturing process or equipment, and management of all activities including the marketing process.

[3] Er, P. H. (2013), "*Girişimcilik ve Yenilikçilik Kavramlarının İktisadi Düşüncedeki Yeri: Joseph A.Schumpeter"*, p. 75-85
[4] Paul T. (2008), "*Innovation Management and New Product Development*, Pearson Education Limited"
[5] EGIAD (2012), "*Yenilik - Yenileşim - İnovasyon Dünyasına Bir Yolculuk"*

On the other hand, the difficulty of measures related to innovation is another important issue because of the complex, multi-dimensional and unpredictable results.[6]

Innovation, as one of the main factors of economic growth, brings collective benefits too. Ideas and discoveries offered to consumers through innovation, while improving our life standards; such as higher security standards, better service solutions, preferable quality products, and beneficial innovative products in terms of the environment. The world which is rapidly changes creates opportunities for the organizations. In this case, innovation helps organizations to keep up with these changes in the most proper solution. Changing customer expectations, competition market, technologies, and legal regulations present important opportunities for the innovation. Profitability of the firms, and effectively supports of economic growth by creating employment is rose by the innovation perspective.

Companies which are implementing different types of innovations are able to develop new products / services that will enable them to increase the market share and participate the new markets. In that reason they will have better respond to the customer requirements in existing products or services. They apply developments in preference to a larger segment. Companies plan methods which will enable products and services to manufactured and sold faster with increasing profitability. All those factors are inevitable to increasing the innovation methods in the companies, and those factors increase the competitive power of the companies for their innovation strategy regardless the size and sector.

1.3 Innovation Management

Innovation management is not a single process action. On the contrary, innovation management is the continuous action that affects the whole organization. This action affects with external and internal factors that will have the opportunities. It also aims to

[6] Er, P. H. (2013), "*Girişimcilik ve Yenilikçilik Kavramlarının İktisadi Düşüncedeki Yeri: Joseph A.Schumpeter"*

increase the market share of companies. For this reason, firms that set up a system with incentive and manage the innovation have the chance to produce, develop and market their products / services with superior features. Since the key words of innovation are change and innovation, the most important problem in the innovation management process is managing change. The most important components of the innovation management are human, business processes and technology. In that point, success depends on the integration of innovation activity with the firm's corporate strategy. The companies that manage innovation successfully have leadership and risk taking features. The top level of responsibility is given to everyone working in the firm. Personnel who are in all levels take on new roles with the high responsibilities. Project managers can collect collaborative team together instead of groups that have limited relations with each other. In that way, a more efficient and effective working area is created.

A company requires sectorial knowledge, know-how and capacity in order to successfully manage innovation. Innovation is the most significant part of manager's corporate strategy which aims the collection of company know-how. The innovation strategy creates as helping deal with the rapidly changing complex external environment that allows evaluating, existing and expected developments, threats and market demands in technology. The innovation strategy creates the project manager deal with the rapidly changing complex outdoor environment that allows the manager to evaluate, existing and expected developments, threats and market demands in technology. Potentially conflicting requirements are balanced by internal structures and processes. This requirements aim to identifying and developing specific information within technological areas, product groups and business functions. Successful management of innovation takes place through a continuous learning process. The manager establishes mechanisms for sharing experiences and failures as well as experience sharing. The project manager should learn and apply developed tools and techniques for innovation management to accelerate and make the learning process faster. The project manager develops different approaches to innovation management through simple trials. If the project manager is already an innovator, the manager analyzes and reviews the inputs and outputs of the innovative project. In addition, the use of benchmarking techniques

also contributes the innovation management. For this reason, the project manager can compare the innovation management applications of the company with similar companies in the sector or the manager can compare the applications in different sectors which have similar business processes. On the other hand, benchmarking is a technique that allows the project manager to systematically examine and present the current performance of the company. In this respect, it is not necessary to compare with a company similar in the sector. Using good application samples and previously prepared models to compare the company will also display to much more useful results.

Problems which are faced in the different stages of innovation process have an active role in the management of innovation. There are operating stages of the firms in the electronics industry, such as innovative idea, development, and research. The stages use effectively the followings; having strong knowledge about the new technologies, supporting the creativity, determining the needs as much as correct, building strong communication dialogue and using that network, encouraging the creation of new ideas, and the talented personnel selection. The project should well define and structure in the development and testing stages. A clear and comprehensive definition of the innovation can answer the requirements of the clients. Also, the know-how of the project manager on the innovation management fulfills the well analysis of the quality, cost and quickness factors, the coordination of project activities, resource management of the project, planning, controlling, communication and leadership requirements. Application and production stages involves as defining and implementing suitable process to the new product, the quality of human resources, trustable personnel, and providing cost management. In the stage of commercialization; marketing, promotion, advertising, pricing, sales, after-sales service and monitoring of competitors gain the importance. To sum up, innovation management contains all types of innovation areas which are technological, organizational, and marketing, and it covers all scientific, technological and administrative processes.

1.3.1 Evolution of Innovative Project Management

The removal of the boundaries between countries and in parallel this opinion, innovation involves the rapid and free movement of information, technology and human power, quick development of the information and technology, the acceleration of the changes in the lifestyles of the consumers, and the increase in their expectations have inevitably led the firms to innovate. In addition, innovation provides the customer satisfaction, better delivery time of the project, create value added in the sector, being practical for the customer needs, and increasing the market share. Innovation has become one of the most important competitive tools of companies; however, the main problem for companies is the question of how they can achieve those innovations that will provide them a sustainable competitive advantage, increase their profitability, and create new market opportunities. Nowadays, although the importance of innovation is frequently emphasized, it is not emphasized how innovation can be realized effectively and efficiently. There are two main problems with innovation when observed in terms of firms. The first problem is innovation management, which includes the innovation processes. The other one is the marketing problem that will enable the innovations to be effectively commercialized and placed on the market. Innovation movements may transform to the social, business and economic value by marketing it effectively. A new product / service or business model cannot be considered as innovation unless it is subjected to an effective marketing process. In this respect, companies need to have an innovation strategy that will enable them to succeed in the process of both producing innovation and commercializing them.

For the companies, the innovation process brings along important uncertainties, making the control of the process, and difficult manageability of the process. Financial, technological, organizational and market uncertainties are at the top of these uncertainties. In the process of innovation, it is quite difficult to estimate how much financial resources will be consumed alongside resources such as raw materials and personnel. This is an important barrier that prevents innovation activities especially for the companies that do not have strong financial background and do not risk company. The companies increase the speed of the technology movement, and this movement can

create a significant cost for them, while the speed of change in the technology forces to work with newer technologies. In that context, a new product while produced with company know-how by a small company may place in the market with the imitation technology. On the other hand, in the process of getting adjustment with some of the innovations is adopted by the companies, and the possible resistance of a significant part of the employees is also among the common risks in practice. Finally, the risk of unaccepting new products and services by customers in the market should also be considered as uncertainty areas that will create significant handicaps in the innovation process for the firms. Considering the fact that the success rate of new products and services offered to the market is around 10-15 percent, this reveals the size of risks.

The uncertainties which are mentioned above also bring serious risks for the companies. These risks can play a role that prevents many of the companies from being significantly innovative movement. For this reason, it is necessary to have a business structure and culture that will reduce those uncertainties. It state that other institutions fulfill their supportive and regulatory roles in some areas where companies cannot overcome will help to make this process more dynamic and active.

Christensen emphasized that "innovation is compulsory due to the technology of imitation and the power of big firms against the small companies. The imitation products may locate in the market more efficiently and widely by big capacity companies which have wider technology, higher human power capacity and larger distribution network. Therefore, small companies which produces innovation technology by considering the rise of market may loss the market share with own innovation technology. On the other hand, big or another firms which don't make any effort in the innovation may benefit from innovative product with imitation technology. The most important sample for that think is China. This asymmetric situation specially makes undefended in protecting their innovations for the innovative and creative small and medium-sized companies"[7].

[7] Christensen C.M. & Clayton M. (1997), "*The Innovator's Dilemma. Boston: Harvard Business School Pres"*

Christensen suggested that "innovation companies should present their produced new products to the lower level firms, which are not much developed, and ignored by the large firms to present their products. Also, he state that the innovative firms can compete in the markets where large firms are located after having a certain size"[8].

Undoubtedly, the way to produce innovations with high level of competition is culture of innovative project management in the company. This culture, which companies should have it or possess, is closely related to the level of innovation of the society they are in. Since, the creative and innovative workforce employed will have a direct impact on the innovative project management culture of the companies. For this reason, the emergences of innovative business cultures may be organized with the creation of creative and innovative society activities. In fact, this is not an easy task to change the cultural structures of companies in a short time, and make an innovative structure. As a matter of fact, it will not be easy for an employee who has been doing business with the same technology for many years to adapt a new technique after years, and having a creative structure that produces continuous innovations.

In order to generate an innovative project management culture, and establish an innovative structure in the companies is possible to list as following; forward-thinking, strategic and cultural leadership skills, emphasis on innovation and success, a strong customer focus, giving importance to total quality management, a flexible and harmonic organizational structure, top-level collaborations, teamwork and trust, participatory management style and authorization of the workforce, giving importance to human resources, continuous learning, change and progress, effective information, communication, decision making systems, giving importance to process management, and giving importance to product, process and market development[9].

Innovation is going to be more sustainable and effective in a culture that supports it. For this reason, the development of an innovative culture with the above characteristics is

[8] Christensen C.M. & Clayton M. (2003), "*The Innovator's Dilemma. Boston: Harvard Business School Pres"*
[9] Oden, W.H. (1997), "*Managing Corporate Culture, Innovation and Intrapreneurship"*

inevitable in the companies. It is necessary to build a culture that enables particularly employees to easily reach new ideas and information, also that culture must encourages and support on innovation. In that why, companies will have contribution about innovative ideas and it will generate project management technique via innovation.

1.4 Classification of Innovation

When the literature is searched in innovation, it uses the different identification models. However, it is enough to mention two defining models that stand out. The first identification model is according to extent of charge. The second identification model involves according to object of innovation.

1.4.1 According to Extent of Change

The classification of innovation is based largely on the extent of the scope of innovation, and it focuses more on the effect of innovation on firms in the electronics sector. In this model, innovation is described under three headings which are incremental innovation, radical innovation, and disruptive innovation.

1.4.1.1 Incremental Innovation

These types of innovations occur frequently. It can be described as the development of current technology in an incremental and conscious manner. Incremental innovation is usually done by well-known and strong firms in the electronics sector. "Incremental innovation is defined as creating opportunities for the improvement or development based on existing markets, products or services. The advantages of incremental innovation are rapid adaptation to competition, rapid commercialization of ideas, and accessible and more affordable product / service"[10]. For example; "Although Fiat has a large number of production subsidiaries in emerging markets, only three of its emerging

[10] Er, P. H. (2013), "*Girişimcilik ve Yenilikçilik Kavramlarının İktisadi Düşüncedeki Yeri: Joseph A.Schumpeter"*

market subsidiaries undertook any R&D. And, only one of them (in Brazil) came close to possessing the characteristics of a competence-creating subsidiary - i.e., becoming a strategic leader with more product development responsibilities, and exhibiting dual embeddedness. This suggests that rise of competence-creating subsidiaries in emerging markets is difficult."[11]

1.4.1.2 Radical Innovation

It is large comprehensive, and leads/direction determining innovation. It results in the discovery of a breakthrough technology or method. Radical innovations usually start outside the sector and result in the industry. Radical innovations usually start outside of the sector, but it gets result in the sector. The main reason for this thinks it develops technology in the sector. Incremental innovation cannot go beyond certain thought patterns, because firms have invested heavily in developing existing technologies, and they are focused on incremental innovation. In addition, the development of the technology used by older staffs and managers who have spent a great deal of time may block the development of the idea. Measurement / evaluation methods and cash flows focus on existing technology, the adoption and implementation of radical innovation becomes virtually impossible[12].

1.4.1.3 Disruptive Innovation

According to the company degree, innovations break down in the short, medium or long term in terms of commercial sense and competitiveness of other companies in the sector. Since the destructive innovation changes the performance parameters in the sector, it is difficult for other firms to respond as soon as possible. For example, when a disruptive innovation takes place in the sector where the performance parameter is the cost, and it

[11] Tuncay-Çelikel A., Athreye S., Ujjual Vandana (2014) *"Internationalisation of R&D into Emerging Markets: Fiat's R&D in Brazil, Turkey and India"*

[12] Adam J. (2008), *"The Innovation Handbook : how to develop, manage, and protect your most valuable ideas"*

can bring new parameters such as capacity, power, distribution network, and etc. to the forefront by making the cost insignificant.

It is never enough to assess the innovation realized by the ratios based only on the "magnitude" that is based on extend of change. The "impact" based should be focused on according to object of innovation. The objective of innovation takes the appropriate position. It especially faces with new performance parameters that industry is not accustomed, and it is important for innovation to meet the respond with another innovation[13].

The other example of disruptive innovation is Netflix. When Netflix started the business activity in 1997, it wasn't attractive to many customers of Blockbuster. Customers of Blockbuster could instantly rent movies. However even though Netflix had a comprehensive interface and a large movie collection, the distribution by cargo caused the long delivery days. When Netflix started to present movies on the internet, they started to connect with the customers of Blockbuster. This competitive action caused the end of the Blockbuster.[14]

1.4.2 According to Object of Innovation

This model is the simplest description model to narration and understanding. This model is a model that assesses innovation in terms of its content. In this model, innovation is described under six headings which are product innovation, service innovation, marketing innovation, organizational innovation, process innovation and business model innovation.

[13] Adam J. (2008), *"The Innovation Handbook : how to develop, manage, and protect your most valuable ideas"*
[14] Christensen C.M., Michale Raynor, Rory McDonald (2015), *"Disruptive Innovation"*

1.4.2.1 Product Innovation

"Product innovation is the presentation to the market of the products which are new, new features, or a significantly improved to intended use. Product innovation includes exclusive developments of the technical specifications, materials and components, the built-in software, simplicity of usage or other functional features"[15]. To give an example, according to a newspaper which published in the Technology Department of the Hürriyet newspaper presents an innovation that is shaped by consumer needs. According to the news, Prof. Dr. Cevdet Işık from Istanbul Technical University discovered an innovative curtain which swallows and reflects the electromagnetic radiation. Professor Işık states that a mother from Denizli in Turkey is the reason of this discover. She had seen that setting up a base station against her home when she is living with her three children. She was worried about the radiation, so she contacted with the university[16]. After that Mr. Işık discover the innovative technology, and the product will produce by several textile companies. It will present to foreign markets with extra 30-50% price difference according to standard products.

1.4.2.2 Service Innovation

Service innovation is the presentation to the market of the service which are new, the new features, or a significantly improved to intended use. This includes significant improvements on usage, access to service, or other functional features[17]. For example, a customer has bought an industrial product like UPS - Uninterrupted Power Supply for a power plant. They can contact with the industrial product which is connected with the internet via smart phone application. The application is shared by the supplier company. In that why, they can see all data of products all around the world, and the application can share alarms with user in any problem. Technical personals, customer or supplier

[15] Xavier P. & Eva H. & Hanns J. T. R. & Raquel O. T. (2013), "*How to Define and Analyze Business Model Innovation in Service"*

[16] Işık, Cevdet. (2010), *"Hürriyet, Teknoloji 17.11.2010"*, [Online], Available At: http://www.hurriyet.com.tr/teknoloji/radyasyonu-yutan-perde-16307092

[17] Xavier P. & Eva H. & Hanns J. T. R. & Raquel O. T. (2013), "*How to Define and Analyze Business Model Innovation in Service""*

can see that alarms. They can quickly try to solve that problem with remote control system or they can transfer the technical worker to the side. The system save time, it means saving money for the customer. This kind of systems has not existed in the past. Customer was losing time and money, when occur any problem at side. Such a system was developed on customer demands, and the companies that have this service innovation product have taken a step forward.

1.4.2.3 Marketing Innovation

"Marketing innovation is the execution of a new marketing technique in the product design or package, product placement, promotion or that contain significant changes in pricing"[18]. An example of marketing innovation is McDonald's that is the world's most well-known fast-food brand. The packaging of the products, especially the fancy boxes of children's menus, and the gifts given with the menus are marketing innovations.

1.4.2.4 Organizational Innovation

"Organizational innovation is the implementation of a new process in the company's business practices, workplace organization or external relations. It includes innovations or improvements in the workplace organization or relationships with other firms and institutions"[19]. The implementation process involves development of new applications to ensuring internal information sharing, collecting in-house trainings in a database & making to everyone open source, organizing training activities to reducing inequalities among employees, or practices such as quality circles. To give an example, Japan has begun the implementation it. After that, it may become widespread throughout the world can be seen as examples of organizational innovation. Such as the matrix organization model, organizational structure and hierarchical structures can be considered as organizational innovation.

[18] Xavier P. & Eva H. & Hanns J. T. R. & Raquel O. T. (2013), "*How to Define and Analyze Business Model Innovation in Service"*
[19] Ibid

1.4.2.5 Process Innovation

"Process innovation is the application of new or significantly improved production or distribution methods. Process innovation involves significant changes in techniques, equipment, or software. The most known process innovation is the realization of the production band method developed by Ford. The use of CNC - Computer Numerical Controls machines like this can also be considered as process innovation"[20].

Aras Cargo's use of hand terminals at every step of the operation is a good example of process innovation. With the use of the hand terminals utilized at every point of the work like the receipt of the cargo from the sender to the delivery of the cargo to receiver the customer satisfaction and the operational efficiency were improved. All information is transferred instantly to the network due to hand terminals that can be connected online to the Aras Cargo network.

1.4.2.6 Business Model Innovation

Business model innovation, what the management and the customer's needs, how they want them, it includes assumptions about how to generate income by meeting the needs in the best possible way. Business model innovation arises when a business adopts a unique approach to commercializing its capital assets[21]. The "Simit[22] Sarayı" business model that carries and diversifies the "Simit Benches" on the streets into the palaces is a perfect example for innovation. Also, the "www.deliveryhero.com", or "www.yemeksepeti.com" change our eating habits. Recently, there is another nice business model innovation. "Uber" is taxi service application. It has more safety (information about driver), easy (call the closest taxi driver via application), comfortable (VIP cars), and pre-informed costing policy.

[20] Xavier P. & Eva H. & Hanns J. T. R. & Raquel O. T. (2013), "*How to Define and Analyze Business Model Innovation in Service"*
[21] Ibid
[22] It is in the small ring form bread, and it has on sesame.

1.5 The Contribution and Importance of Innovation

1.5.1 The Contribution of Innovation to Business, Society, and Economy

There are many companies which are willing to protect their position in the market with the developing global competitive environment. These companies have to present suitable product and services owing to changing customer requirements. They also have an understanding, which leads the customer ahead, about produced product and service requests. This situation has an important role in determining the current competitive strategies. In that why, companies have to present better service and new products. Thus, importance of innovation concept becomes stronger with the increasing competitive market.

Some of findings show that the increase in innovation performance of the countries has an important role on economic growth, social development and prosperity in these days. Countries that systemize innovation with effective policies may rise to the top level in terms of growth or development. Studies conducted in Turkey in terms of innovation shows that innovation has begun to be discussed in the mid-1990s, and that policies and targets were set in this regard. However, when compared to the EU - European Union countries in terms of innovation performance, Turkey performance is low and the demand for innovative products and services is quite high.

In this century, innovation is important both for strong economies and the success of organizations and competitiveness. Innovation is located within a dynamic environment which is especially affected by following elements; technology firms, market uncertainties, rapid change, shortened product life curve, and globalization. Therefore; it is inevitable for organizations to be innovative to sustaining people lives, competing, being able to grow and leading the market. The realization of innovation that takes place at the organizational level is directly connected to having an innovative organizational culture. Project managers are shown as the most important factor that constitutes organizational culture.

"Innovation has become an indispensable source of dynamism for both today's national economies and businesses. In this respect, it is possible to define the importance of innovation for businesses, society and economy under three main topics"[23].

To begin with, the research defines about importance of innovation for business. The structure emerging of globalization and global competition is forced to continue of companies for their operations in intense and a dynamic competitive environment. Today, this situation shows that; the determinant of competitive advantage is no longer just costs saving. Innovation brings importance of many factors such as the speed of feedback to market needs, decreasing of product life, quality of product and service, product and service production according to customer requirements, new management and organization models, time saving, development of new design products / services, and manufacturing practical products. As a plus, innovation creates value added in the industry. All these factors require to having innovation. Thus, innovation is the main source of competitive advantage for many nations and businesses. The rules of the global economy require two conditions for a company to survive in competitive market conditions. One of them is adapting innovations with suitable way to their organizations by following the innovations closely to the firms. The other one is the development of innovations by themselves.

Secondly, the research defines the importance of innovation for society and economy. "Competitiveness should increase in order to raise prosperity and life standards in a country. For competitiveness, productivity needs to be increased. The most significant component is innovation to improve productivity. That's why; innovation is the most important model for the economic growth, increased employment and quality of life in countries. Moreover, it is possible to transform the resources of country and society into the products and services, and to create economic and social value from those products

[23] OECD (2007), *"Innovation And Growth Rationale For An Innovation Strategy"*

and services. Society gains much greater benefits from the same source with innovation. Therefore, innovation is not only economic, it is a social system"[24].

1.5.2 The Importance of Innovation in the Global Market

In the business world full of uncertainty, the way to overcome uncertainty is through "Innovation". Innovation is the creation of new sources of customer satisfaction. Innovative marketing strategies can provide the opportunity to pass on different solutions and applications in order to gain competitive advantage over business. At the beginning of the concepts that deeply affect the globalizing world of business are the phenomenon of change and process. In established businesses, administrators often talk about innovation, but the real problem is who can make this innovation and when they can push the market. There are many obstacles to enforce innovation. The most obvious of these is the performance evaluations done at the enterprises. Nowadays, companies do not only want to see plans, they also want administrators to implement these plans. Firms usually reward executives who fulfill the tasks expected of them in the current system, but they do not show the same attitude and even discourage the changes. They think that they are making. For example, the quota systems implemented in enterprises stands as a great obstacle to the creativity and change efforts of employees. Newly established companies have to determine well how to structure their cultural conflicts and contradictory agendas in order to survive. The weakness of the links between the different departments in companies, as well as the fact that the distinctions are very distinct and sharp, managers who are poor leadership skills, and the lack of communication is hampering innovation. It is a widespread mistake that companies make less investment or underprice in human resources. In recruitment of senior executives, while technical people are generally preferred; their leadership skills are rarely considered. Some of these technically strong managers may be weak in terms of communication. Hence, the presence of the people who are strong in both characteristics will give the advantage that companies can continue their existence and growth in the dynamic business environment.

[24] Nathan R. (2004), *"Innovation and Economic Growth"*

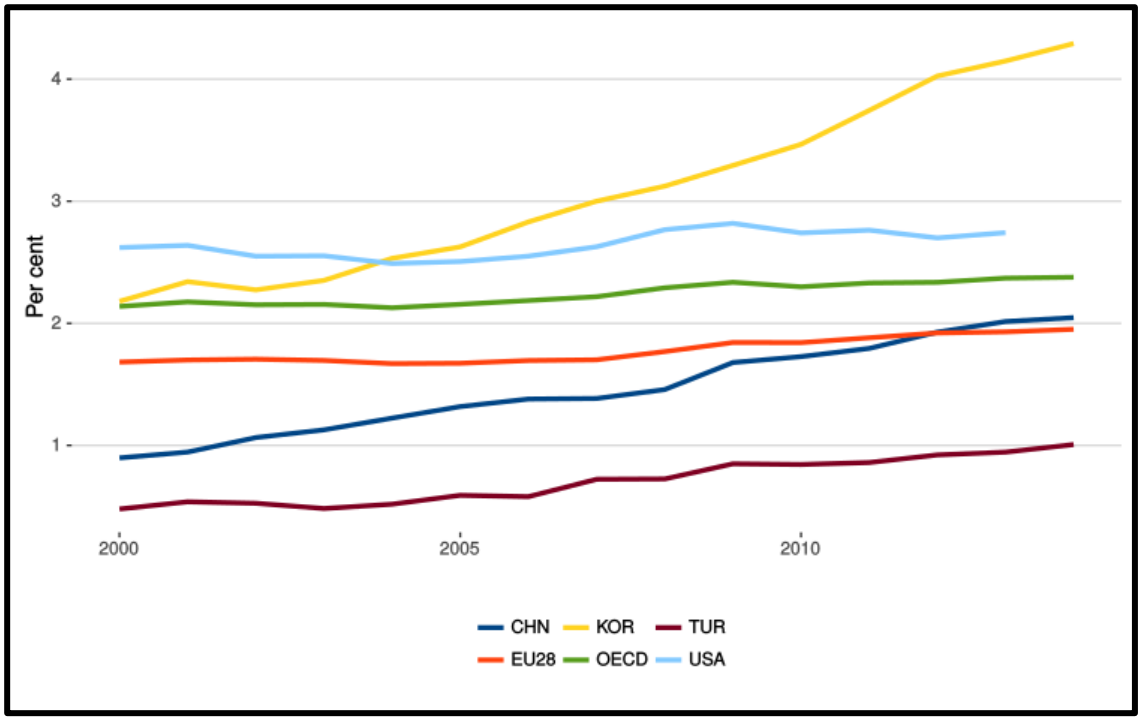
Innovation is a social phenomenon and is based on co-operation. Strengthening communication among employees will lead to diversity turning into advantage and implicit knowledge becoming more open. At this point it is important to recognize the importance of managing knowledge. The knowledge management's contribution to learn, to cooperate, and to innovate is too high to deny. The sharing and development of unregistered information within the team will speed up the creativity and change. This will lead to more rapid and effective research and development activities in particular. Remember the fact that time is money for business activities; the prospect of communication once again manifests itself. Time can also be achieved through innovation projects.

To give an example for the importance of the innovation, Finland has the highest competitiveness in recent years according to the competitiveness research conducted by the World Economic Forum[25]. The country has managed to create a strong economy and a society of high living standards by investing in innovation. About 25 years ago, the Finnish government began to create a climate of innovation and incentives to devote great resources to innovation. These investments did not decrease even during periods of economic stagnation. The effects of the crisis, which occurred in the early 1990s and caused unemployment to rise to 20 percent, were also quickly surpassed with innovation investment. Immediately after the crisis, a comprehensive national education and research program was launched. As a result of this program, a strong network was established between universities and companies. Thus, the economy based on forestry and agriculture has quickly left its place to the industrial economy. After that it left its place to the innovation economy. In the 2000s, the information technology sector became the driving force of the Finnish economy. In addition, innovation in the metal, and engineering sectors and the forest products industry continued to be supported by the state. As a result, per capita national income, which was $ 10,470 in 1985, reached $ 29,000 in 2004[26].

[25] An international foundation in Geneva, Switzerland
[26] Elçi Ş. (2006), "*İnovasyon: Kalkınmanın ve Rekabetin Anahtarı"*

Another example of innovation benefits, innovation activities are extremely important in terms of long-term economic growth and competitive power. Since innovation is a multi-dimensional concept and different metrics have both some advantages and disadvantages. The research simply used two basic indicators of innovation: R&D and patent statistics.

Graph 1.1 Share of R&D expenditures in GDP



Source: OECD (2015), "*Frascati Manual*[27] *- Guidelines for Collecting and Reporting Data on Research and Experimental Development".*

The ratio of R&D expenditures (R&D intensity) in GDP - Gross Domestic Product in Turkey, Republic of Korea, China, USA, EU (28 countries) and OECD (34 countries) between the 2000-2014 years is observed. Turkey is R&D intensity increased gradually with the reached about from 0.5% to 1.0%. This increase is still very low compared to other countries. In EU, USA and OECD countries this ratio is between 2-2.8%. In order to compare Turkey, Korea and China may be considered more meaningful. Korea,

[27] Frascati Manual is a document setting forth the methodology for collecting statistics about research and development.

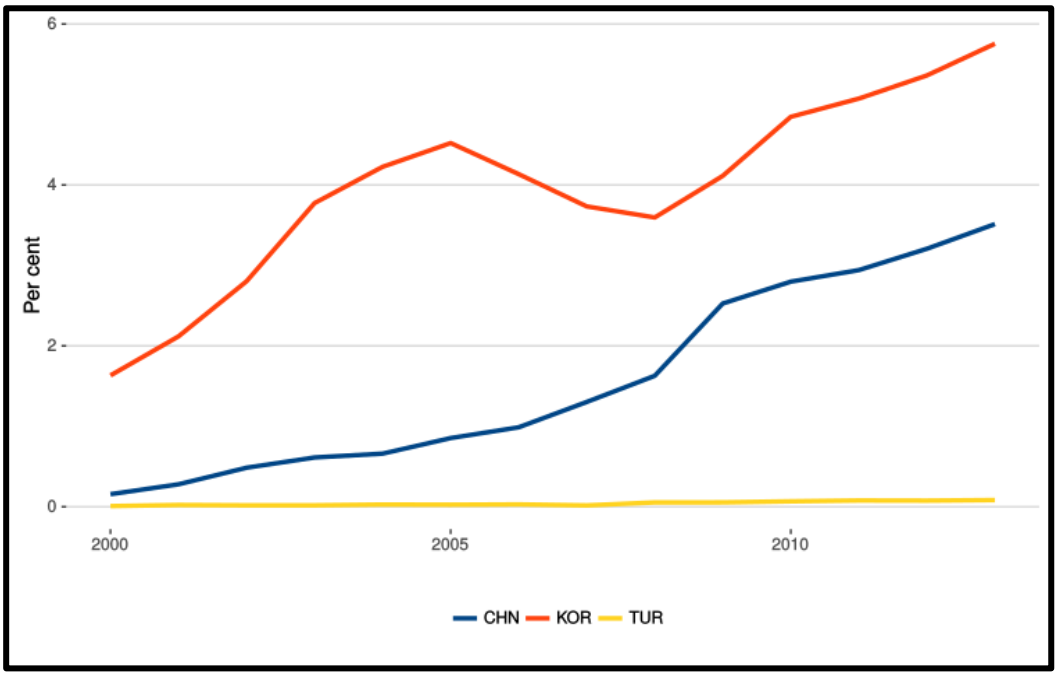
which has been experiencing rapid growth since the late 1960s, has also rapidly increased its R&D intensity and has exceeded 4% in 2012. In this success of Korea, one of the fastest-growing countries in the world in the last 50 years, it has played a crucial role in achieving a rapid structural transformation towards the medium and high-tech sectors and in parallel, increasing the R&D intensity[28].

The share of R&D spending in 2000 is below 1% in China and Turkey. After 2010, Turkey moved to the level of 1%, but China surpassed the level of 2%. Above the Graph 1.1 shows the importance of R&D on innovation.

R&D activities are important entries of the innovation; however, the main purpose of the R&D is not creating innovative idea. That's why; patent statistics of the countries are more effective way to understand the innovation in the global market. Triple patent data are compiled by the OECD for cross-country comparisons. Firms usually make patent applications in countries which they operated before. They apply to the regions / countries where they want to get the patent rights within one year by using the right of priority. In this respect, the patent protection period is actually increased to 21 years. "Triple Patent" describes innovations that have been patent application in the EU and Japan. It also means patent processes are completed in the United States. Since these three regions constitute which are largest economies in the world, it is assumed that "important" innovators will have patent applications in those three regions. For this reason, "Triple Patents" show that the innovation which is under protection is "important". It also decreases the "home bias"[29] that created by innovation firms. The reason of that, patent offices of countries primarily register the applications in own country.

[28] Elçi Ş. (2006), "*İnovasyon: Kalkınmanın ve Rekabetin Anahtarı"*
[29] Country Bias

Graph 1.2 Country shares in triple patents



Source: OECD (2015), *"Guidelines for Collecting and Reporting Data on Research and Experimental Development"*.

Graph 1.2 shows that country shares regarding to the triple patents which are originally from Turkey, China and Korea (The share of the US and the EU was about 30% in 2000, and it decreased to about 25% in 2014, as records of the OECD). Graph 1.2 shows that the share of Korea and China increased rapidly and they reached 5.5% and 3.5% in 2014, respectively. Despite the partial rate increase, the share of Turkey is still negligible. (OECD, Main Science and Technology Indicators)

As a result of that graphs, although R&D expenses are not enough for innovative products but it helps to manufacturing new products. See Table 1.1.

Table 1.1 The world's Most Innovative Countries in 2018

Country	Place change from 2017	Total score
1 South Korea	0	89.28
2 Sweden	0	84.70
3 Singapore	+3	83.05
4 Germany	-1	82.53
5 Switzerland	-1	82.34
6 Japan	+1	81.91
7 Finland	-2	81.46
8 Denmark	0	81.28
9 France	+2	80.75
10 Israel	0	80.64

Source: Bloomberg's Innovation Index, 2018, [Online], Available at: https://www.weforum.org/agenda/2018/02/south-korea-and-sweden-are-the-most-innovative-countries-in-the-world/

"OECD Frascati Manual states that Research and Experimental Development (R&D) is defined as creative projects which are carried out on a systematic basis to increasing the knowledge saving which comes from human, culture and society information, and using this knowledge saving to design new applications. In addition, applied research is primarily directed to a specific practical goal or target"[30].

"The Frascati Manual states that the term of R&D covers three activities which are basic research, applied research and experimental development. The basic research is theoretical and experimental studies which are without any special application or usage area in real life, and mainly it conducts to obtain new information on the bases of facts and observable facts. Applied research is the original research conducted to obtain new information. Experimental development is the systematic operation to creation of new

[30] OECD (2015), "*Frascati Manual - Guidelines for Collecting and Reporting Data on Research and Experimental Development"*

materials, new products or devices using existing knowledge obtained from research and/or practical experience; and it is a useful study to establish new process, systems and services, or to significantly improve what is currently produced or established projects"[31]. Science and technology is an important input of innovation; R&D is one of the activities that support innovation. However, if R&D workers don't have entrepreneurial qualities, they cannot create value added in the sector. In addition, R&D results cannot transform to the innovation. For that reason, innovation cannot turn to the economic and social benefits.

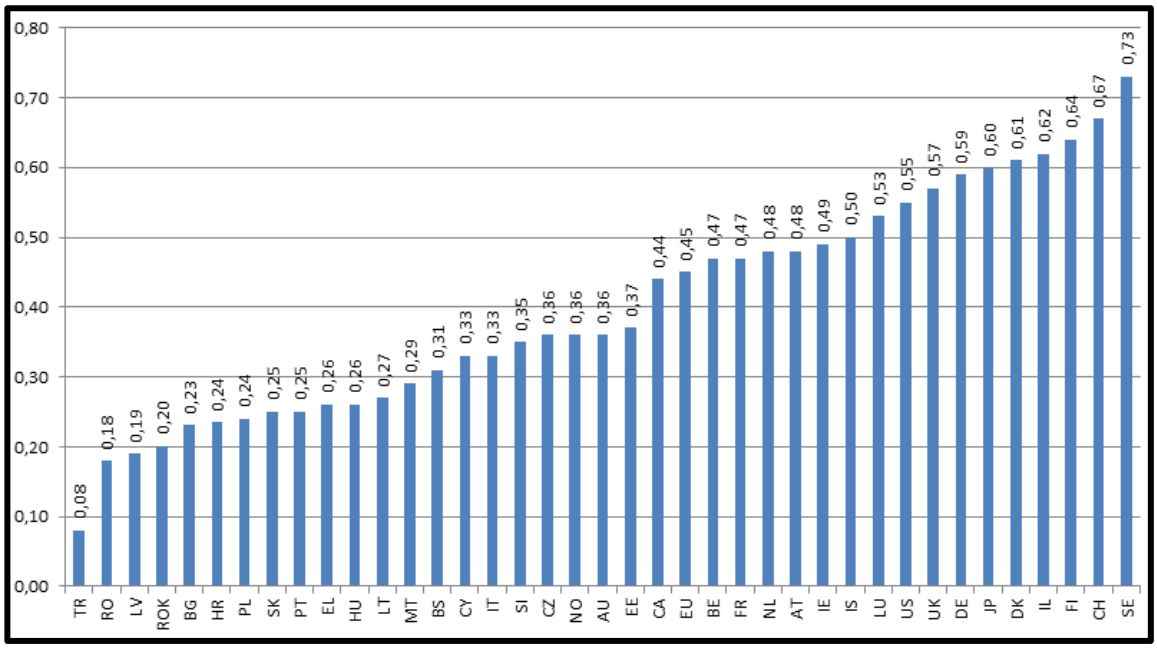
One of the mistakes made on the subject of innovation in Turkey and in many parts of the world is calling the innovation as only a R&D action, and it is only focused on the uncovering/production of new things. As a matter of fact, Europe has seen that they have more R&D investment than America; however, when Europe saw that they were behind of America in terms of R&D response in 2006, and they realized importance of innovation. After that, Europe decided that the commercialization of innovation is as important as the least realization. This situation, also known as the "European paradox", clearly shows that innovation is not just about R&D.

According to IUS - Innovation Union Scoreboard statistics which is researched by the EC - European Commission[32], Turkey's position among other European countries is shown in the Graph 1.3 below.

[31] OECD (2015), "*Frascati Manual - Guidelines for Collecting and Reporting Data on Research and Experimental Development"*

[32] The Commission of the European Communities is the designer and coordinator of European Union policies, which is composed of 28 commissions and is supported by approximately 16,000 staff, in other words the executive body of the European Union.

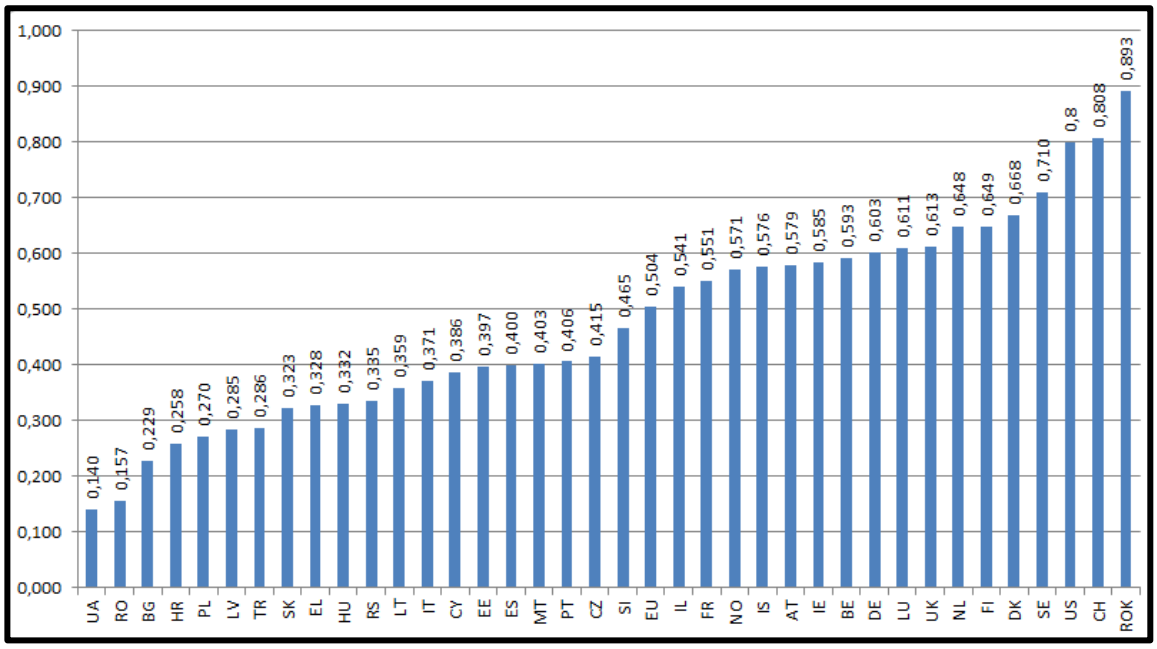
Graph 1.3 Innovation Union Scoreboard (IUS) in 2006



Source: Collected data from Innovation Union Scoreboard for 2006, [Online], Available at: "https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en"

Above the Graph 1.3 shows that score as 0.08 of Turkey is really low compare to other countries. Also, "Share of R&D expenditure in GDP" as show Graph 1.1 is really low in 2006. According to records of USA on Graph 1.3 in 2006, their score is 0,55. It shows that they have large innovative idea capacity compare to Turkey. In the Graph 1.1, America was stable R&D expenses 2000 to 2014. If R&D directly effects the innovation, America could be in the same score in those years. R&D is not a main point for Innovation as stated before. R&D expenses may increase in years for any country. Those investments will not a most significant action for the innovation. In addition, Republic of Korean (ROK) has a score as 0,2 in 2006 as seen in the graph of Innovation Union Scoreboard. It clearly shows that Korea have high innovation potential with R&D expenses and patent statistics. In the following, 2017 figures will be illustrated in the below Graph 1.4.

Graph 1.4 Innovation Union Scoreboard (IUS) in 2017



Source: Collected data from Innovation Union Scoreboard for 2017, [Online], Available at: "https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en"

According to Graph 1.3, Turkey was behind of all countries at 2006 in terms of number of innovative ideas. However, Turkey increased the number of innovative ideas at 2017 as show Graph 1.4. The score was 0,08 at 2006, so it increased to the 0,286 at 2017. It means there are really strong increasing score of innovative ideas between 2006 to 2017 years, but when the graph controlled to other countries; Turkey position is still not very well. Also, the records show that Turkey is started R&D investments at 2007 in the Graph 1.1. Those Graphs show that while Turkey increases expenses of R&D, they also increased their innovative perspective in that years. America was stable graph 2000 to 2015 at Graph 1.1 for the R&D investments. Graph 1.3 shows the innovation score as 0,55 for America. Now, Graph 1.4 shows innovation score of America as 0.8. It means America created innovative projects with R&D investments. The idea brings more innovative products and better life standards. Strong economy of America proofs importance of innovative ideas. According to Graph 1.3, EU scores is 0.45 at 2006, and their new score is 0.504 in 2017 on Graph 1.4. The gap shows that although EU countries increase R&D investments, it is not enough for the innovation score in those

years. That's why; increasing of the innovation score is so less regarding the manufacturing and R&D investments capacity of EU countries. It shows that despite the European paradox, EU Countries still didn't change effectively innovative approach on manufacturing part. When EU Countries are increasing the R&D investments as show Graph 1.1, the innovative ideas mostly occur from America as shown Graph 1.3. The last example of the innovation is Korea, score of the country was 0.2 in 2006, but they are leader on the Innovation Union Scoreboard in 2017. It shows that they applied investments in the right direction. The graphs show that Korea has a significant position on the innovation in the world. To sum up, Innovation and R&D are not same organizations even they are connected each other. R&D can improve a product or create new products; however, innovation can use every area like a management style or a creative idea to minimize the costs, less labor hours, better delivery time, transforming information to the economic values, creating market, increasing market share and etc.

1.6 Sustainability of Innovation

It is an innovation that fuels competition between companies in the sector and leads firms to innovate. It could be incremental or radical innovation. As the performance parameters of the existing technologies do not change, the continuity of the innovation process in the sector is maintained. For instance, in a sector where cost-driven competition is the topic, sustainability of innovation will improve performance parameters by reducing costs. In the industry, other companies will work to develop the same performance parameters; it means they will be in an effort to respond to sustainability of innovation[33].

[33] Adam J. (2008), *"The Innovation Handbook : how to develop, manage, and protect your most valuable ideas"*

Chapter 2
Literature Review of Project Management

2.1 The Concept of Project Defined

PMI - Project Management Institute states that "Project is a temporary group activity designed to produce a unique product, service or result"[34].

According to the definition of the EU-European Commission "A project is a series of activities aimed at bringing about clearly specified objectives within a defined time-period and with a defined budget"[35].

Project is a temporary effort that is done with limited resources to produce a unique product, and service. There are beginning and closing. Projects are often confused with operation. Although the operational activities are continuous operations, they are closed in the end of the project. If the project manager cannot define the beginning and closing of a job, it shows that it is a daily operational activity of the project. A unique-original product, service or result occurs in the end of the project. For example, although "production" is an operational activity with continuity; setting up a new production band is a project. The next process after production band activity is called operation. New projects may arise after the operation phase. For example, increasing the capacity of the production band may lead to the emergence of a new project. The project will bring out a result, service or product that has not been done before. For instance; if the project manager develops a new mobile application for the client requests, or building a bird

[34] PMBOK (2013), "*Quality Management Systems, Guidelines for Quality Management in Projects",* p. 5
[35] European Commission (2004), *"Project Cycle Management Guidelines",* p. 8

house in a garden, it is a project. However, mowing the grass at the garden once a month is an operation, so it is a routine activity.

Financial, human or physical resources are needed for the realization of the project. In the end, this project could be done by some, somewhere, using something and spending money. The resources required for the implementation of the project must be clearly defined. To sum up, project is the whole of the planned activities such as in a time schedule and certain budget, reaching a certain point and producing certain results in this direction, and the necessary financial, physical and human resources are brought together".

2.2 Scope of Project Management

"Project Management is the action of planning, executing, supervising and evaluating results of the projects that take place in the process from the presentation of the innovation projects as an idea to the emergence of the final product. As stated in the ISO - International Standardization Organization Standards, Project Management is a process that covers planning, organizing, monitoring and auditing of all aspects of the project to achieve the specified objectives"[36].

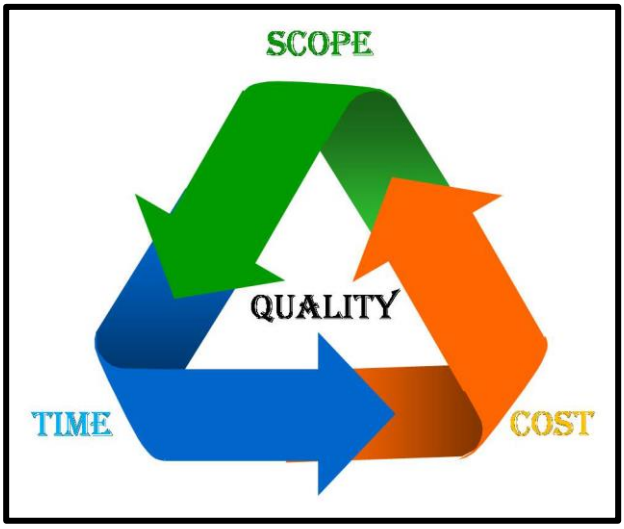
Project management has become an increasingly important area, with the acceleration of technological development and the importance of innovation. When people talk about innovative projects for Electronics Industry, they normally mean the huge capacity, expensive cost, and dozens of projects that normally characterize system development. Some of them argue that these do not require management at some level.

"Basically project management is application of knowledge, tools, techniques, and skills to projects operations to find project objectives and requirements. Before the preparation of the project, it is necessary to carry out a situation analysis in order to obtain the necessary information, solving the problems, and defining the objectives of the proposed

[36] ISO (1997), "*Quality Management Systems, Guidelines for Quality Management in Projects",* p. 3

works. This preparation is mainly through project management triangles. This triangle is determined by scope, time, and cost. Quality should be at the center of this triangle"[37]. See the Figure 2.1.

Figure 2.1 Project Management Triangles



Source: Unknown, [Online], Available At: https://www.kisspng.com/png-project-management-body-of-knowledge-project-manag-1573662/

Those key features include that identifying what kind of requirements needed or achieved in the project. Also, they identify requirements, expectations, and worries. The last think is balancing competing constraints, and they can be listed as schedule, risks, and resources.

2.3 Components of Project Management

To begin with, the research will explain the role of project manager in a project, before the observe components of Project Management. Project manager is assigned to manage a project. Also the manager is responsible for carrying out the project with the highest possible productivity, lowest uncertainty and risk. First of all, Project manager is

[37] Olaf P. & Ventus P. A. (2009), *"Project Management"*, p. 28-29

providing communication between client and project. Secondly, prior to the start of the project, the manager aims to observe of the contract, business, and reach consensus with the client about the requests. After that, the manager organizes the project team, while the manager performing the project. Project manager is responsible for determining which talents will have in the team, and researches talented people for the team. The manager provides the necessary coordination for team who will work in the project, and the manager decides the components to use in the project. The manager repots the tasks and responsibilities of the employees. The manager ensures to the team reaches the necessary resources and provides the necessary training. After that, directing technical & administrative activities and ensuring integration. The manager shares project information and the problems encountered with the client and top management about the development of the project. The project manager observes the conformity of the project activities with the contract and plans. The manager ensures the answers to the customers' problems which are adequately, correctness, and timeliness. The project manager reports the changes in time of labor force, time schedule, and new materials to the top management or other affected departments. The manager follows and applies the following knowledge areas of the project while s/he does those actions.

Project management covers the most significant knowledge areas of a project to be successfully completed, and this is a mixture of various management areas. These areas are “Integration Management”, “Scope Management”, “Time Management”, “Cost Management”, “Quality Management”, “Human Resources Management”, “Communication Management”, “Risk Management”, and “Procurement Management”. See Figure 2.2.

Figure 2.2: Components of Project Management

Source: Unknown, 2014, [Online], Available At: http://project-management-sj.blogspot.com/2014/09/project-management-process-groups.html

2.3.1 Integration Management

Integration Management is a process that defines the coordination of project members. Project manager applies in project planning, execution of the plan, change control methods. The processes involve in the integration management to provide synchronization for all process groups. It enables for better coordination in the work to successfully complete it. Integration Management is the main task of Project Manager. It is a management approaches to enable the project, or it realize in five main processes. The process defines as following; preparation of project charter, development of project management plan, managing the execution of the "Project", "Monitoring and Control of Project Works", "Integrated Change Control", and "Closing the Project or Phase"[38].

[38] Patrick W. (2008), "*Industrial Project Management, Concepts, Tools, and Techniques",* p. 6-11

2.3.2 Scope Management

Scope management basically defines what is included or not included in the project. Scope Management is scope definition, scope planning, confirmation of scope, and scope change control methods. Scope management is a process carried out to ensure that project which is completed successfully (neither less nor an excess), and it states which requirements to be done in study. Scope Management has main processes, and the can be listed as following. Requirements Collection, identification and documentation of stakeholder needs overlapping project objectives. Also, it works with the following processes. Scope Definition is the phase of building a written statement that will form the basis for future project decisions. Creating WBS - Work Breakdown Structure involves the division of the project delivery phases (product, service phases, documents, events that will occur during the project) into small phases that can be easily managed. Scope Verification is the formal acceptance of completed project delivery phases. Scope Control is controlling the changes in scope of the project. Scope Control ensures that each requested change and suggested corrective actions are evaluated through the Integrated Change Control process. Uncontrolled changes are called "creep". The change is inevitable and absolutely requires control[39].

2.3.3 Time Management

Time Management defines as the processes that will enable the project to be completed on time. The definition of work consists of time estimates, milestones, timelines development and supervision. Time management is another component of the project management. It has some process which stated as following definitions. Task Description is determination of the tasks required to form various project outputs specified in the WBS. Task Attribution / Ranking is the identification / classification and documenting of inter-task relations. Task Resource Estimate is an estimate of the type of resources and amount required to complete each task. Task Time Estimate is estimated time of work required to complete each task. Timing Improvement is resolution of

[39] Olaf P. & Ventus P. A. (2009), *"Project Management",* p. 28-35

timing, the relations of tasks to each other, and resource requirement to make a project timing plan. Timing Control is observing deviations from the project timing plan and taking corrective measures[40].

The project manager basically have the following before the scheduling plan which is established; a WBS, estimation of labor force for all kind of task, and a resource list with usage suitability. A document may prepare as similar the timing plan, if there is no resource list. Important points in the time estimates are each event is handled independently, labor and materials are assumed to be used at the normal level, normal working time (assuming no overtime), the predetermined contract completion time is not considered, compatible time periods are used, and for similar tasks, old event timing can be used as a directional indicator.

While there are many techniques for creating timing plans, there is no standard for their implementation in the industrial applications. In the "ISO 21500 - Guidance on Project Management" document published in January 2013, the names of the Network Diagram and the Critical Path Method were not clearly specified or foregrounded[41].

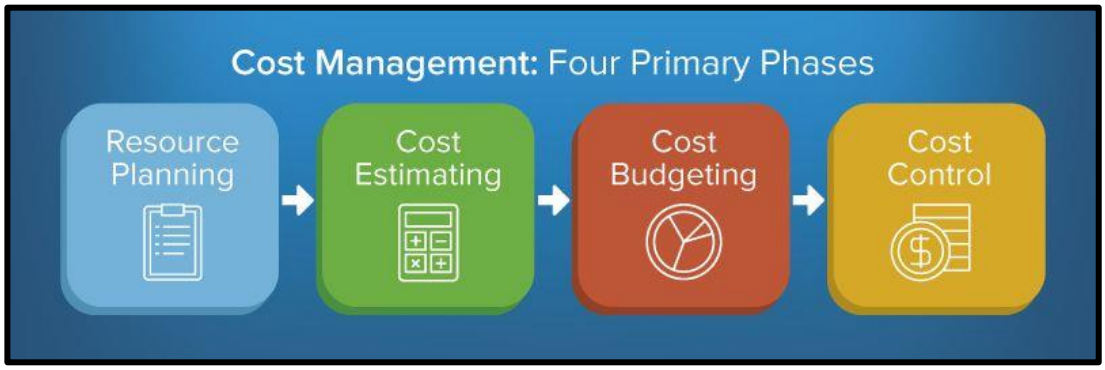
2.3.4 Cost Management

"Cost Management refers to the processes that will ensure completion of the project with approved budget of the project. The project manager is applied cost planning, cost estimation, budget and cost control methods in that classification. Scope management has three main processes, and these processes create cost management plan. Firstly, cost estimation is an analysis of the project costs. It also estimates the project resources required to complete the project activities. Secondly, cost budgeting is the allocation of the overall project cost estimation to various business items. Thirdly, cost control checks

[40] Olaf P. & Ventus P. A. (2009), *"Project Management",* p. 35-36
[41] ISO 21500 Guidance on Project Management, (2013), p. 81

of the factors that create disputes of the project cost, and controlling the changing project budget"[42]. See Figure 2.3.

Figure 2.3 Cost management process



Source: Unknown, 2016, [Online], Available At: https://www.smartsheet.com/ultimate-guide-to-cost-management-and-templates

2.3.5 Quality Management

"Quality Management defines as the processes that will meet the requirements of the project. The components of project management apply quality planning, quality assurance and quality control methods. Quality Management is a process that will meet the needs of the project as defined by the ISO - International Organization for Standardization. In this reason, the result of product data in a project should be based on modern quality management approaches and conforms to ISO. Some methods such as quality assurance, control and planning are applied. The fist process is quality planning. It includes determining which quality standards are relevant to the project and how the quality standards will meet in the project. Secondly, quality assurance includes protection from possible faults. Thirdly, quality control covers finding and correcting faults"[43].

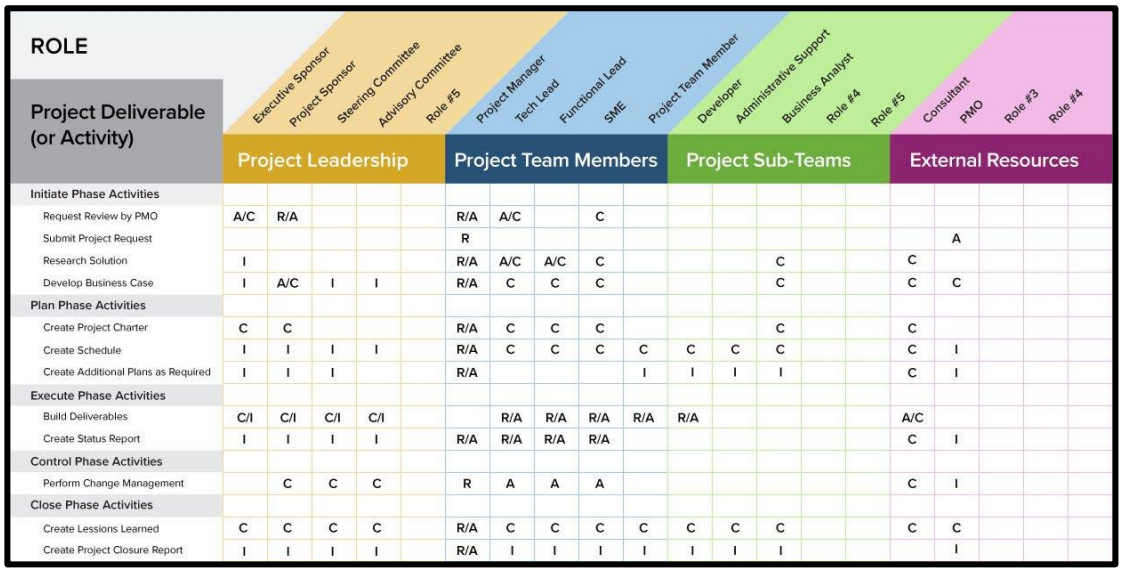
[42] Olaf P. & Ventus P. A. (2009), *"Project Management"*,p. 36-41
[43] PMBOK, (2013), *"A Guide to the Project Management Body of Knowledge"*, p. 227-231

2.3.6 Human Resources Management

Human Resources Management is the process which is related to the more efficient use of labor force in the project. The manager applies organizational planning, staffing, and team formation methods in that component. Human resources management has mainly four processes, and these are developing human resource plan, creating project team, developing project team, and project team management. Developing human resource plan is assignment of project responsibilities, project tasks, reporting relationships, and documentation. Also, it is the creation of the personnel management plan. Creating project team is the provision of the necessary human resources that are working on the project and allocating to the project. Developing the project team means the development of the skills and interactions of the team members in order to improve the project performance. Project manager monitors the performances of team members, providing feedback, solving problems, and making changes in order to improve the project performance. The last but most significant other process is responsibility assignment for a project[44]. See Figure 2.4.

[44] PMBOK, (2013), *"A Guide to the Project Management Body of Knowledge",* p. 255-266

Figure 2.4 Responsibility Assignment Matrix (RAM) (RACI[45] Format)



ROLE / Project Deliverable (or Activity)	Executive Sponsor	Project Sponsor	Steering Committee	Advisory Committee	Role #5	Project Manager	Tech Lead	Functional Lead	SME	Project Team Member	Developer	Administrative Support	Business Analyst	Role #4	Role #5	Consultant	PMO	Role #3	Role #4
	Project Leadership					Project Team Members						Project Sub-Teams				External Resources			
Initiate Phase Activities																			
Request Review by PMO	A/C	R/A				R/A	A/C		C										
Submit Project Request						R											A		
Research Solution	I					R/A	A/C	A/C	C				C			C			
Develop Business Case	I	A/C	I	I		R/A	C	C	C				C			C	C		
Plan Phase Activities																			
Create Project Charter	C	C				R/A	C	C	C				C			C			
Create Schedule	I	I	I	I		R/A	C	C	C	C	C	C	C			C	I		
Create Additional Plans as Required	I	I	I			R/A				I	I	I	I			C	I		
Execute Phase Activities																			
Build Deliverables	C/I	C/I	C/I	C/I			R/A	R/A	R/A	R/A	R/A					A/C			
Create Status Report	I	I	I	I		R/A	R/A	R/A	R/A							C	I		
Control Phase Activities																			
Perform Change Management		C	C	C		R	A	A	A							C	I		
Close Phase Activities																			
Create Lessions Learned	C	C	C	C		R/A	C	C	C	C	C	C	C			C	C		
Create Project Closure Report	I	I	I	I		R/A	I	I	I	I	I	I	I				I		

Source: Mark Weeks, 2016*, "A Comprehensive Project Management Guide for Everything RACI",* [Online], Available At: https://www.smartsheet.com/comprehensive-project-management-guide-everything-raci

2.3.7 Communication Management

Communication Management defines the processes of producing, compiling, distributing, storing and organizing project information in a timely and appropriate manner. Project manager applies communication planning, dissemination of information, and reporting of performance methods. Basically the project manager can ask flowing questions for communication management understanding: - Who needs information? - When do they need it? - Should everyone have every piece of information? - How should information be distributed? The information is needed for success, and provides a critical relationship between idea and personnel.

There are some processes in communication management as previous the management components. Those are involves stakeholder determination, communication planning, distribution of information, management of stakeholder expectations, and performance

[45] Responsible Accountable Consult and Inform

reports. Stakeholder determination is identification of effect, interests and participation by identifying the people and groups that can affect the goals and objectives of the project. Communication planning is determinates the requirements of stakeholders' information to the communication approach. Distribution of information provides information according to the stakeholder needs. Management of stakeholder expectations establishes communication with stakeholders to meet their needs, and identification of the problems. Performance reports are collection and distribution of the performance reports, which is including situations, developments, and estimations.[46]

2.3.8 Risk Management

Risk Management is determination of the project risks. The process defines analysis and implementation of solutions. The processes of risk management involves the planning of risks, determination of risks, risk analysis of the qualitative & quantitative, planning risk response, and monitoring & controlling of the risks. Risk planning identifies the risk status which may arise during the project management and it decides the risk status approach and plan. Risk determination identifies the risks which are likely affect in the project. It also documents the specifications of each risk. The qualitative risk analysis is qualitative assessment of risks, and it prioritizes the effects of the risks on the project objectives. The quantitative risk analysis measures the realization possibilities of risks, and impacts of them, estimating the effects on the project objectives. Planning risk response develops opportunities, and improves the methods and techniques to reduce threats. Risk monitoring and control follows the risk residuals, identify new risks, implement risk reduction plans and evaluate the impacts throughout the project life"[47].

2.3.9 Procurement Management

Procurement Management is external processes of procurement stage for the products and services which are confirmed with sides in the project details. Procurement

[46] PMBOK, (2013), *"A Guide to the Project Management Body of Knowledge"*, p. 287-308
[47] Ibid , p. 309-354

management involves the planning of the purchase, planning of demand, supplier selection, contract management, and signing of the contract. There are a few significant questions in procurement management, and the project manager can ask following questions to have correct results in that process: - What is the necessary equipment and force to procure in the project? - Does the project manager describe the requirements correctly for the project? - Does the project manager know exactly what the client needed? - Does the project manager explain needs to the supplier correctly? (Technical and Administrative Specification) – Does the project manager choose the right supplier? - Does the project manager agree with the supplier according to the contact? - Is there any plan B for extraordinary situations? Mainly Procurement Management covers the following elements purchasing plan, management of purchasing, administrative purchasing (Contract Management), and closing contract[48].

2.4 Development of Project Management

Recently, project management is placed in the business and daily life of people. Project management trainings and certificated managers are professional in the project management; however every human use the management projects in all areas of the life.

Management theory is as old as the first history of civilizations. Therefore, project management mentality had been more recently such as the formation of this methodology and the determinations of its rules. Especially in the 18th and 19th century, the most important examples of project management are the construction and architectural area. For example; the construction of Egyptian pyramids is the most beautiful and oldest project. Other examples are the Great Wall of China, Machu Picchu City (Peru) and Petra City (Jordan) which were built during certain periods of civilization.

"As the first Project Management Advisor, Frederick Taylor brought scientific approaches in the early 20th century. Taylor concentrated on increasing the productivity

[48] PMBOK, (2013), *"A Guide to the Project Management Body of Knowledge"*, p. 355-390

more in his work. Taylor has made business planning more efficient by analyzing the business process components one by one. He is father of scientific management"[49].

Henry Gantt (1861 - 1919) adopted Taylor's approach and developed modern project management. He developed the famous GANTT Scheme in 1917 as it is understood from his surname. The exercises include Gantt Diagram, Taskbar and Milestone, which are planning control techniques tools. In addition, PERT[50] and CPM - Critical Path Method techniques and methods were also developed by Gantt[51].

The work of Gantt was mostly on naval shipbuilding during World War I. Gannt's diagrams visualized the sequence and duration of all the work in a process. It can state that this tool has not been changed for almost one century until MS Project developed[51].

In the 1930s and 1940s, project management began to be used in defense and weapons industries. However, it is assumed that the first modern project management began with the Manhattan Project, designed in 1941, when the US military forces developed the atomic bomb[52].

Prior to the 1950s in America, projects were usually conducted using Gantt Charts[53], without using a standard methodology. The 1950s were the starting point of the modern Project Management era[51].

Modern project management techniques have been achieved in the late 19th century by changing business life and developing management principles. Especially large-scale state projects carried out during these periods also played a significant role in the development of project management techniques.

---

[49] Turcu, O.L. & Mironescu, R. & Drob, C. & Simionescu Gh. & Feraru, A. & Stan, A. (2008) "*Management, Ed. Alma Mater, Bacău",* p. 15

[50] PERT (Project Evaluation and Review Technique) diagrams are tools for documenting and analyzing activities in a project

[51] Patrick W. (2012), *"Henry L Gantt, 1861 – 1919: Debunking the myths, a retrospective view of his work"*

[52] Dr. Tom J. S. (2014), "*The History of Project Management"*

[53] A specific type of chart showing time and tasks

When analyzing the word origin of the project, it is formed in conjunction with the Latin words 'pro' and 'jectum'. 'Pro' means "front & forward", 'Jectum' means 'throw & eject'. 'Projectum' means throwing forward and ejecting. Academic means; project is the whole process of the only applied once, having specific start and deadlines, having the goals and target, being unique works, and planning all processes, execution, monitoring, controlling and closing.

2.5 Project Management and Industrial Systems

Project management techniques reduce project time and cost of mistakes while improving customer satisfaction, organizational learning and effective teamwork. Successful project management techniques emerge from the experience of successful and unsuccessful projects and by observing them over time. Learning these techniques at the personal level increases the productivity of the person's workplace. "These techniques are learned by the organization with a well-defined and organization-friendly project management system beyond the personal training of employees. In the industrial system this management techniques supports top management in the decision making, a single responsibility center to determine, and it defines clear targets, strengthens planning, control and coordination processes. Also it supports strong communication infrastructure, provides a dynamic and stimulating work environment. In addition it gives authority and responsibility to team members, provides the opportunity to learn and increase communication. The management system is also enabled higher business capacity with less time and resources. It also increases profitability, makes the organization more efficient, provides a closer working environment with internal and external customers, provides methods for solving problems, improves quality, enables employees to make corporate decisions, produces solutions, and develops business"[54]. As a result, in scientific studies conducted by PMI, it has been proved that project management system increases project success rate and reduces the cost of mistakes. That's why; project management plays a key role in the Electronics Industry.

[54] Adedeji B. B. & Olufemi A. O. (2008) *"Industrial Project Management, Concepts"* p. 6-11

2.6 Project Management and Industrial UPS Systems

There are many project based firms in the electronics industry which has producing industrial UPS - Uninterrupted Power Supply systems. The project management and industrial UPS systems begin with requirements analysis. In the energy sector, Manufacturer Company defines the requirements of the client for the industrial UPS project. Also, manufacturer company which aims to complete the engineering process in less time compare to achieving previous project by using the project management techniques. The important point is project manager should be close contact with the clients. In that way, financial and energy resources are dramatically reduced. The manager should focus on the new solution with the sufficient manpower, equipment and resources. Correct understanding of customer requirements is very important for the project success.

In the industrial UPS projects, it is necessary to stop and think about followings: - How may the project achieve, - What are the alternative solutions, - Who need to involve the team, - What is the estimated cost, - Is it worth doing, and - What is the objective? When the project manager has a plan for the project, it is necessary to sharing experiences for the ensuring the project plan successfully. The project manager should find solutions to progress for the design and implementation of the project. The manager can set meetings with the team, and define the deadlines. In the beginning, these can be intermediate stages but it will keep the progress of the project. It means the manager could establish a procedure to keep the project. Nevertheless, the manager can set a status and brainstorming meetings for the rethinking of the project to avoid possible mistakes in the project planning before to start the designing and implementation of the project. The manager should consider not only the planning process but also the methodology. The following questions can show a direction for the project planning in the industrial UPS systems: - How should set up the meeting?, - Who may have creative contribute for the project?, - What is the best way to creating ideas?, - What criteria are involved in the decision to the maximize customer satisfaction?, - Is there a better way of achieving the same solution, and is it able to implement the project?, and etc. There is no a single answer of these decisions. However, they need to have an answer to the task

is performed correctly. There are three main roles of the project manager against to the project team. These involve provider, protector and planner.

In addition, the testing is toward the end of the implementation process for manufacturing industrial UPS systems. The project manager should create a testing plan on the design stage depending on the inputs of the Industrial UPS project. The manufacturing team could perform preliminary testing in the implementation stage. The testing team could need to fix issues, when the team faced the mistakes and missing. It means the product should be back to the manufacturing line. These issues bring time loss. The manufacturing team needs to design changes of the product. The project manager can face with the encounter major mistakes that could impact the requirements in that situation. For example, the error can be on the power stage owing to unsatisfactory power capacity of the Industrial UPS. Manufacturing team has to disassembly the huge part of the product. Also, R&D team should find the correct capacity solution with the cost satisfying. Procurement department should manage the process to have right component as soon as possible. This process is very troubled considering the delivery time.

Moreover, professional installation team follows a set of procedures when they set up the Industrial UPS systems. The project team provides technical drawings with the Industrial UPS system, and identifying how the products will install in which parts of customer facility. Technical manager ensures the training of the vendor about Industrial UPS system. Also, this manager provides the vendor's technical team actual on new trouble shooting techniques, product changes, and upgrades. This is most important side of the Industrial UPS projects. Each team member should have detailed information about products details. Technical personnel hold a series of certifications, licenses, and specialty training. Trained staffs ensure the Industrial UPS projects to installed on-time, and perform as expected.

2.7 Innovative Approach in Project Management

The way to overcome uncertainty is innovative approach in the business world which is full of uncertainty. Innovative means creating new resources for customer satisfaction. Innovative marketing strategies can provide companies with the opportunity to realize different solutions and applications in order to achieve superiority in the market race. The concept of change and its process takes place at the beginning of the concepts that affect the globalizing business world. In established firms, managers often mention innovation; however, the other issues are applying the innovation in project management. There are various obstacles to make the innovation happen. The most obvious of these is performance evaluations in companies. Nowadays, companies not only want to have plans, but they also want to have managers who can realize these plans. Firms often reward managers, who perform the tasks expected in the current system, but they don't show the same attitude for their willing to change something with innovative approach in the projects, and even they are discouraged. For example, the quota systems implemented in companies stands as a major barrier to the creativity and change efforts of the employees. New established companies must determine the cultural conflicts within their organizations to ensure their progresses. Also, companies determine that how they structure their conflicting agendas. The weakness of the relations between the different departments in the companies is also being very clear and sharp distinctions. The other weakness is the managers who have weak leadership skills, and the skills can prevent the innovative approach. The research establishes bridges between two distinctive disciplines which are project management and innovation. Although both subjects appear interrelated to each other, these two research areas develop relatively isolated from each other.

“The simplest definition of innovation is different perspective, creative idea, and implementing them. These ideas can be developed to solve previously unresolved problems or respond to needs that have not been met before; beside it may aim to make many existing products & services more beautiful, and useful. These ideas are passed on to the imagination and the emergence of new products, services or methods of doing business, and then innovating with the introduction of those products and services into

sales or business methods"[55]. Innovative approach in project management mostly needs experience. If the manager doesn't have enough experience or innovative approach, the company may fail in the innovative project. There are numerous processes in industrial Uninterrupted Power Supply manufacturing in power electronics sector. The processes can be common thinks for most of projects; however, the manager can push an innovative approach for the project, and create unique innovative products.

Firstly an innovative project is needed to make a concept of product, it is necessary to know how it will look like at the end. This is a vision of the project manager. Project manager cares about the project direction, and the manager knows the right direction; however, whole process of making the product starts from the first innovative idea in a project. That's why, the team members care that the idea should convert into the prototype. Projects can be divided into teams or sub-teams that are small enough to foster effective communication. Cross-functional communications are very important between engineering, manufacturing, assembling, testing, servicing, documenting, reporting, and etc. Power electronics projects in industrial UPS manufacturing are pretty complex because of lots of different engineers working together on the same mission. They are divided into groups with strict goals, objectives and results. To accomplish the project goals, it is necessary to assemble the right team and leader. To select one empowered "mad person on a mission" who will be the leader of the project. The team leader has to believe that project, and be ready to drive it forward! S/he is technically experienced person who have done on several similar projects before and can recognize the right way to find solution when it is needed.

Most of company uses the terminology which is "Project Leader" to emphasize how important it is to exert leadership, not just managing a set of tasks. The project leader ensures that the Concept/Planning and innovative approach phase of results in a project supported by a sound business case for the company. The leader leads the team in developing the innovative project definition. The leader chooses the right team members which may have different perspective mentality involved. It's important to realize that

[55] Slobodan N. V. (2006) *"Project Management and Leadership Skills in Power Electronics Research Engineering"*

leadership is called for in many different positions. One may not be the overall project leader, but may be the leader of a technical sub-team. In that case, one's main objective leads own sub-team to a strong design that meets the already streaked defined requirements.

In different perspective, innovative approach in the project management can bring new innovation management ideas. Normally, companies don't share company know-how with rival firms. This was perfectly smart think because of the competitive market in the sector until Tesla Motors shares all patents. Tesla Motors shared all patens about electric vehicle technology on their web page at June 12, 2014. Elon Musk who is CEO of Tesla Motors, announced on "www.tesla.com/blog" under "All Our Patent Are Belong to You" title. It is prove that know-how sharing improves the competitive world. They aim that increasing innovation capacity, and decreasing the cost in the competitive market. In that patent sharing all electric vehicle manufacturers will use those data, and they will increase the development of the innovation. Also, it will affect the costs owing to competitive market for providing components for the electric vehicle. A project leader may create better innovative approach with Tesla Motors patents[56].

To sum up, a project leader have an important place in an innovative project. The leader must have innovative approach to the project management. This approach may bring portable products, more useful systems, hot swap as modular UPS systems, easy to fix of the product, ergonomic structure, easy commissioning, and less cost. Also, the leader may push the project members up and the team may solve the previous unresolved problems.

2.8 Innovative Oriented Project Organization

Generally there is no single project in an organization, so a project includes sub details and operations. Power electronic projects like power plants need to have innovative oriented organizations, because these projects converting energy and costs of those

[56] Elon M. (2014), "*All Our Patent Are Belong to you"*, [Online], Available At: https://www.tesla.com/BLOG/ALL-OUR-PATENT-ARE-BELONG-You

plants are much more. Every minutes of the power plants means money, so owner of the power plant don't would like to lose money. That's why, R&D team should play an active role in innovative oriented project organizations to minimize the cost and find better solutions with innovative equipment's. In that way, project managers may reduce risks of power plant. Also, the team must acquisition of knowledge about current technology. Project managers have limited time to commissioning industrial type of UPS systems at side. Project managers aim to use time effectively. It means if the process is regular they need to have simplification of project organizations. The manager should chose the correct plan regarding to the project inputs. The inputs generally define in the RFQ - Request for Quotation that is sent by the client. The manager should note the project inputs for the next innovative projects. In that why, the project manager may save time in the future innovative projects. Entire innovative project may create problems in electronics engineering. Previous experiences show the direction for the better solution of the project. For example, a project manager can face an issue in the project, and the manager can need to find innovative solution to solve the issue in the project. These issues can be in the costing and designing phase of the project, manufacturing of the product, and delivery time of the project. In that point, the project manager can benefit from previous project solutions. The manager can save time and money in the project costing.

Also, "Different parts in the portfolio may sometimes not be directly related; however they are compatible with strategic plans and relationship between them should be managed to achieve the company's main objectives"[57]. "Innovative projects require monitoring, identifying the resources, and accompanied resources like traditional projects within an organization. It is particularly important to match innovation and organizational context with the portfolio management form"[58]. "Each project needs to

[57] Abrantes, R & Figuiredo, R. (2014), *"Feature Based Process Framework To Manage Scope In Dynamic Npd Portfolios"*
[58] APQC (2005), "*Open Innovation: Enhancing Idea Generation Through Collaboration"*

select a correct plan or organization to focus on the innovation. This affects every stakeholder's commitment to the innovative project"[59].

The important point is how do transfer the project outputs into the all organization with innovative approach for more beneficial to customer wishes. These outputs should be managed through the re-organization of internal organization structures in order to improve efficiency, and effectiveness. The most significant part should inspire the customer with innovative oriented project. "According to the Buganza, it can be successful with the re-organization of the existing units or with the establishment of completely new units focused to this new approach. The former usually applied in industries characterized by low turbulence and the latter in industries with high turbulence"[60]. In addition, prototypes and new practices are plays key role with innovative oriented project organization to being an innovative company. The manger is significant part of the innovative project to create innovative solution with the innovative team. The manager performs the innovative project needs with the team to maximize customer satisfaction.

"Vega-Jurado J. states that innovation as a potential source of competitive advantage. Also, he emphasized that technology capability, which is generally measured by research and development, is a determinant of innovation"[61]. Companies need to competition with technology and technology-based capabilities in order to be successful and achieve continuity. Companies with technology and technology-based capabilities will create effective innovative oriented project organization. This efficient organization will increase both the company's innovation performance and competitiveness in general.

"The critical point of an innovative projects consists of different stages which is entirely is mostly limited time and control points. The stages are used form the lifecycle in

[59] McFarthing (2013), "*Managing Innovation Portfolios – Strategic Portfolio Management"* [Online], Available At: http://www.Innovationmanagement.se/2013/09/16/Managing-Innovation-Portfolios-Strategic-Portfolio-Management
[60] Buganza T. & Verganti, R. (2009), "*Open Innovation Process to Inbound Knowledge"*
[61] Vega-Jurado, J. (2008), "*Gutiérrez-Gracia, A., Fernández-de-Lucio, I., & Manjarrés-Henríquez, L.*" p. 616–632.

specific aspects of the organization, market, industry, and technology. These activities and deliverables modify between to different projects. An innovation project may be separated to the any stage which is composed of particular amount of related activities. The number of phases depends on the dimensions, complexity, and potential effect of the innovative project"[62]. Innovation project stages are usually adopted with the major deliverables of the project. Each innovative project organization is aligned and interlinked with other organizations to facilitate coordination, since a diversity in the organization typically affects at least one other process. Innovation organization in project management starts with innovation sourcing and it takes days. In that phase, the project manager can seek ideas, technology and problems of the innovative project. To have innovative idea in the project, the project manager may set meetings with right team and client. Top managers, mid-level managers and specialists set meetings for the brainstorming and sharing individual know-how of the previous innovation project. This creative communication generally brings new ideas for the innovative projects. The innovative organization follows problem curation, and it also takes days and sometimes weeks. Basically, mid-level managers and specialists work for market survey, problem statement and use cases of the project.

The innovation oriented projects need prioritization. Project managers can call the process as coordination of the innovative project. The coordination plan directs the innovative project management. The innovative oriented project organization follows the solution exploration / hypothesis testing. The innovative oriented project organization takes weeks and maybe it takes months. The solution exploration/hypothesis testing is hard and the team should find right direction to keep the project alive. If the project manager doesn't have the right solution for the innovative oriented organization, the project can fail in that part.

The project manager organize the followings to grow up the innovative oriented project organization; hosting, training, coaching and mentoring commercialization, advanced business planning, and access to finance. It calls as incubation process of the innovative

[62] Bartezzaghi, E. (2010), "*L'organizzazione Dell'impresa. Etas*."

project. The last and heart of the innovative oriented project organization is integration. The innovative oriented project organization usually finalize with two options; disruptive solution or refactoring of the innovative project management with engineering team to integration of the project.

2.9 Innovation Process in Project Management

There are general process groups in the project management. The study used those processes in the last part of the research; however the case study managed sectorial problems with the innovative project management objectives. The process groups are shown on the Table 2.1.

Table2.1 Project Management Process Groups and Knowledge Area Mapping

Knowledge Area	Project Management Process Groups				
	Initiating	**Planning and Designing**	**Executing**	**Monitoring and Controlling**	**Closing**
Integration Management of Innovative Project	Develop innovative project charter, Develop preliminary project scope statement	Develop of innovative project management plan	Direct and manage project execution	Monitor and control project work, integrated change control	Close Project
Scope Management of Innovative Project		Scope Planning, Scope definition, Create WBS		Scope certification, Scope control	
Time Management of Innovative Project		Activity definition, Activity sequencing, Activity resource estimating, Activity duration estimating, Schedule development		Schedule control	

Table 2.1 Project Management Process Groups and Knowledge Area Mapping (Continued)

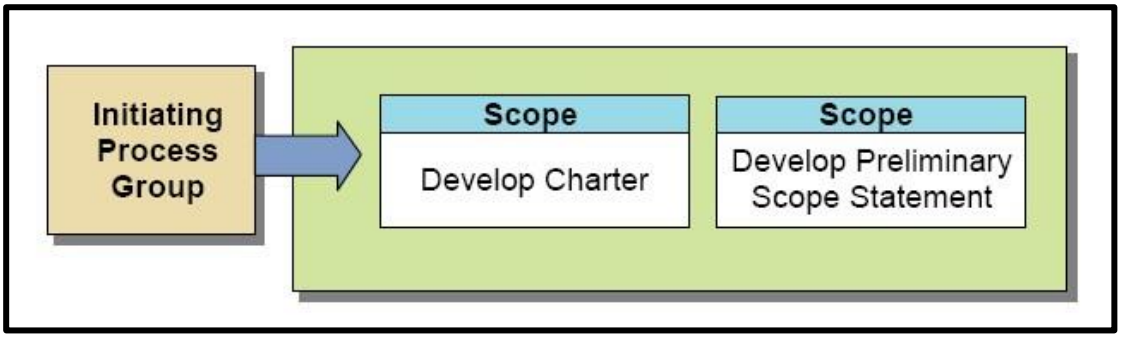
Knowledge Area	Project Management Process Groups				
Cost Management of Innovative Project		Cost estimating, Cost budgeting			
Quality Management of Innovative Project		Quality planning	Perform quality assurance	Perform quality control	
Human Resource Management of Innovative Project		Human resource planning	Acquire project team, Develop project team	Manage project team	
Communications Management of Innovative Project		Communications planning	Information distribution	Performance reporting, Mange stakeholders	
Innovative Project Risk Management		Risk management planning, Risk identification, Qualitative risk analysis, Risk response planning		Risk monitoring and control	
Innovative Project Procurement Management		Plan purchases and acquisitions, Plan contracting	Request seller responses, Select sellers	Contract administration	Contact closure

Source: PMI (2013), *"A Guide to the Project Management Body of Knowledge",* 5th edn, p. 61

The research map is the major activities of innovative project management process with the knowledge areas of innovative project management. There are five main project processes as stated PMI, 2013 in the project management process groups table. The process involves "initiating", "planning and designing", "executing", "monitoring and controlling", and "closing". The part of the research will explain the processes.

Initiating: This process is the first steps taken before the planning phase, and the superficial ideas are formed. The preliminary information is given and the project target, assumptions and expectations are specified. The sample process of initiating in the project management is seen as Figure 2.5. A project manager is also identified during this process.

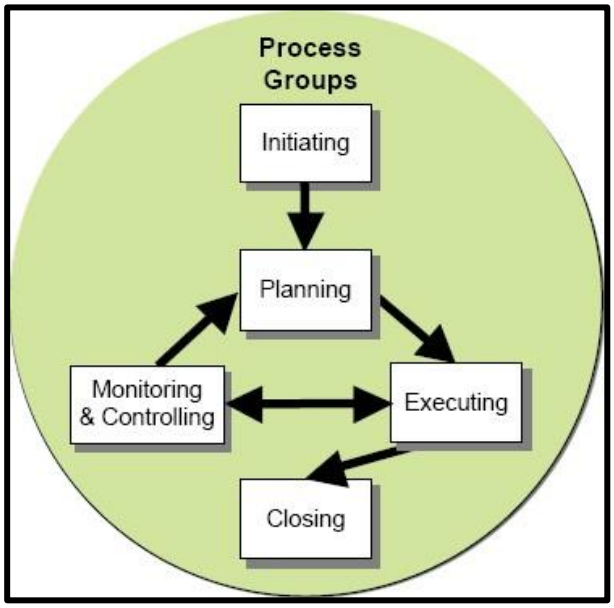
Figure 2.5 Initiating Process



Source: Department of Veterans Affairs (2005) *"Project Management Guide"*, VA Office of Information and Technology.

Planning and Designing: In the planning and design process, business plans will be prepared in detail with the participation of all innovative project contractors. A scope definition and planning is made according to these activities. In accordance with the content of the innovative project, the estimated end times of the activities are determined by considering the scope. Afterwards, the activities are planned and designed by considering the time limit. The innovative project program also is determined. Risk analysis is performed by defining the risks of the innovative project. Cost estimates and purchasing plans are made with those analyzes. All these stages are coordinated with each other. Although there is not a specific sequence of the outputs of this process, these outputs are used in the initiating, executing, monitoring and controlling, closing processes. See Figure 2.6.

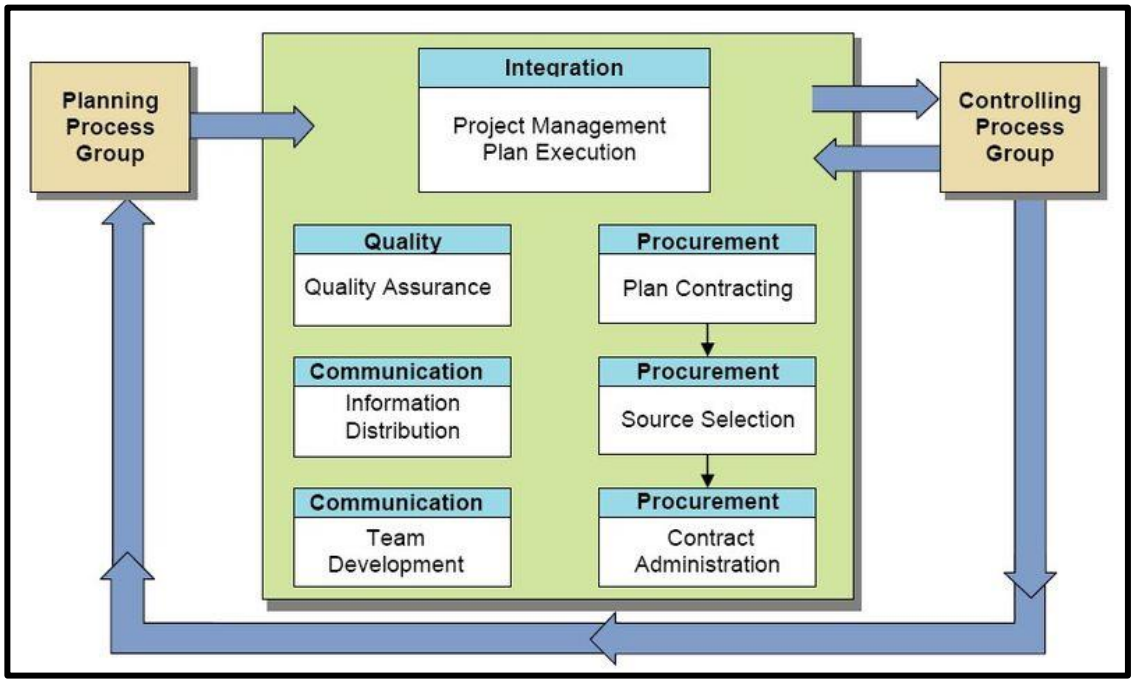
Figure 2.6 Process Groups



Source: Department Of Veterans Affairs (2005) *"Project Management Guide"*, VA Office of Information and Technology.

Executing: This phase includes the creation of the innovative project team, the implementation of business plans and activities, the continuous communication of the related contractors, and the supply of external resources. It is carried out in many processes such as providing quality assurance, supplier information and offers evaluation, evaluation and selection of suppliers, development of the innovative project team and the direction of the project. Overlooked details during the planning phase are reviewed at this stage. See Figure 2.7.

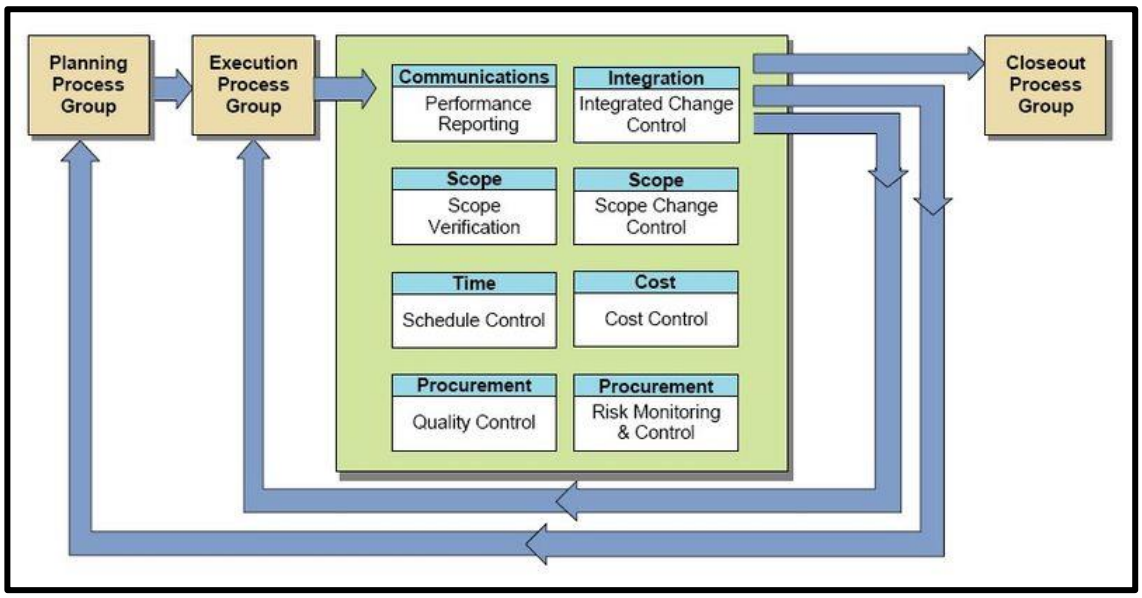
Figure 2.7 Executing Process



Source: Department Of Veterans Affairs (2005) *"Project Management Guide"*, VA Office of Information and Technology.

Monitoring and Controlling: Control actions are taken from the problems encountered during the execution process of the innovative project. Many sub-processes such as evaluation of risk analyzes, control of the innovative project program, control of changes in operation, performance reporting and cost control are carried out. See Figure 2.8.

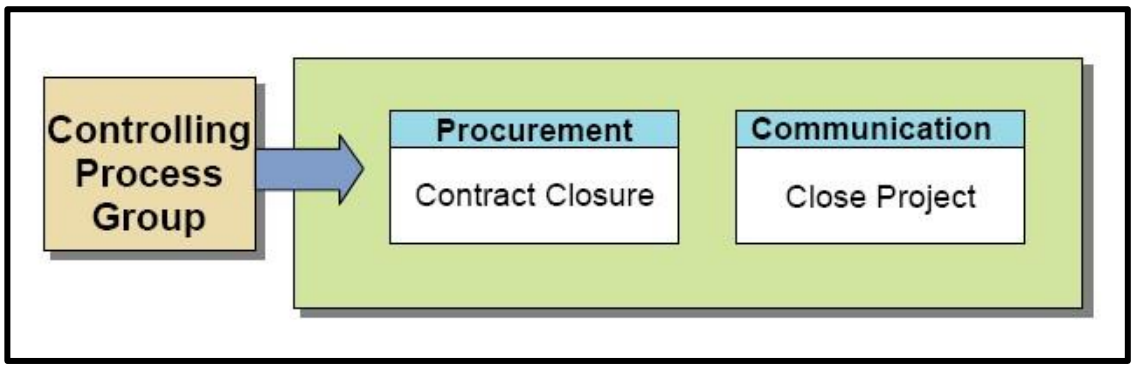
Figure 2.8 Monitoring and Controlling Process



Source: Department Of Veterans Affairs (2005) *"Project Management Guide"*, VA Office of Information and Technology.

Closing: It means closing the all processes in the innovative project. The closing of all the necessary activities and the formal closing of the innovative project will occur with the sub-processes of the innovative project in the closing process. Innovative project and stages of the project are closed regarding to the contract details that were signed with the client. See Figure 2.9.

Figure 2.9 Closing Process



Source: Department Of Veterans Affairs (2005) *"Project Management Guide"*, VA Office of Information and Technology.

One of the most important mistakes made by the companies are outsourcing services received from managers for the projects instead of assigning internal managers for the projects that are in the initiating phase or closing phase. For the innovative projects which are in process, the firms should create composite teams which can be chosen from the different department employees. In order to increase the number of innovative projects that will result in success and motivation, they should reward project employees with promotion or incentive systems in order to reveal innovative ideas. Innovative people don't like to be isolated while working. Instead of that mentality they would like to share their ideas, discussing in the meetings and getting support. Innovative projects that are kept secretly to prevent the opposition from other team members aren't often reach the conclusion. Since, an innovative project that is not supported by counter opinions is mostly a weak and incomplete project.

Chapter 3
Case Study Research: ABC Company

3.1 Company Information

This study analyzed ABC firm which is operating in the power electronics sector in Istanbul in Turkey. "The global UPS - Uninterrupted Power Supply masks market was worth 5.59 Billion USD in 2017 and it is estimated to grow to 8.62 Billion USD by 2023 with a CAGR[63] of 7.49% between 2017 and 2023"[64]. There is a sample figure for the 500kVA capacity UPS product manufactured by the ABC Company. See the Figure 3.1. This company aimed to local manufacturer of industrial products which needed in the power electronics sector and provide technical services. This company was founded thanks to the increasing needs of industrial uninterruptible power supplies in power electronics market at 2006. The company manufactures custom made solutions in Turkey. After that the company signed a partnership agreement with a group company that is rising in the Electronics Industry at 2007. Therefore, ABC has been a part of this group, which has a significant market share in the energy sector in Turkey. Today, this group has 21 companies. 18 companies are in electronics industry, and 8 companies are in the power electronics market. They have %30 of power electronics market in Turkey. Also, ABC was the first exporter of the rectifiers from Turkey to the America at 2009. According to the surveys conducted by "Interpromedya" in 2010, it became one of the top five companies in the market of Industrial Uninterruptible Power Supply. In 2012, ABC signed a legal distributorship agreement with an international company due to raising competition in the UPS market in Turkey. ABC realized the importance's of

[63] Compound annual growth rate
[64] TechNavio – Market Research Reports (2018), Global UPS Market 2018-2022.

innovation with products of that international company. Thus, the execution of the innovation project management approach was started for the power electronics projects in one year. In 2015, the company entrusted the export department to the engineers in order to increase their export operations. After that adaptation, company singed 20 partnership agreements with different companies all over the world, and that team increased the export operations 16 to 59 country in 2015-2019. One of those partnership agreements is signed with another international company in electronics industry at 2016.

Figure 3.1 Thyristor Based 500kVA Capacity UPS Project

Source: ABC Company Archive, 2018

3.2 Problem Definition

In the Electronics Industry, there are various problems about UPS systems in Turkey. The case company which is ABC located in Istanbul produce custom made Uninterrupted Power Supplies. Those products prevent the energy losses for the critical areas like factories, plants, datacenters, hospitals, military areas, and etc. The case study researches the problems about size, power factor, efficiency, delivery time, quality and costs of the UPS systems with the Innovative Project Management approach.

3.3 Research Objectives

To understand the role and importance of Innovative Project Management in the Company;

The case study research aims to explore and understand how the innovative project management process has been executed in the ABC Company. The second objective of the study is to put for forward the benefits / contributions achieved by the company through the execution of innovative project management process. The case study explores those benefits such as;

- Enhancing of quality,
- Increasing customer satisfaction,
- Utilizing efficiency and effectiveness,
- Providing value added,
- Increasing profitability rates, and
- Expending markets and products.

The following research questions can be formulated;

- How has the case study company executed the innovation project management process?
- What are the benefits / contributions provided to the company by this initiative?

The research questions which are stated above clarify the innovative solutions and sectorial problems in the case company in Turkey with using innovative project management technique.

3.4 Research Method

The case study research utilizes the qualitative research. “Qualitative research is used in scientific researches that collect data as more subjective and numerically through interviews, documents and observation”[65]. It is a method specially preferred where the data cannot degrade to the single data such as the sociology science. The qualitative research method is often used as case study. In this study was carried out qualitative research using case study method. “One of the common qualitative research designs is case analysis”[66]. “Case studies are one of the most well-known methods which are used for in-depth study of complex structures with many relationships and variables”[67]. “Case studies are experimental descriptions of rich and specific samples based on many data sources”[64].

Case studies generally answers the following questions “How?” and “Why?” instead of "How often?" or “How much?”. Case study has a very high potential to reveal causality in very complex situations for statistical or experimental methods[68]. Many project managers generally examine the correlation of data in a specific section. However, it is not possible to reach with which mechanism have emerged these results. In a case analysis, it is assumed that there is a more dynamic environment than other methods as distinct from. Thus, how innovative project management outputs are developed and how innovative change is experienced is questioned. For this reason, the case analysis approach is one of the approaches that are appropriate for analyzing this case study.

[65] Denzin, N. K., & Lincoln, Y. S. (1994) *“Handbook of qualitative research. Thousand Oaks*”
[66] Yin, R. (2009). “*Case study research, design and method*”
[67] Eisenhardt, K. M. (1989) “*Academy of Management Review”,* p. 532–550
[68] Edmondson, A. C. & McManus, S. E. (2007) “*Academy of Management Review”,* p. 1155–1179

Therefore, a qualitative case analysis study was performed in the study. This case study arranges the rich and diverse data sources, including interviews, archival data, project documents, customer documents and observations. "Interviews are one of the most effective directions to collect the rich experimental data, especially if the incident consists of irregular or piecemeal data cases"[69]. "According to the Creswell, collecting data from the multiple sources is necessary to exactly discover the central phenomenon in the qualitative research"[70].

3.5 Data Collection

In this study, various methods were used to collecting data related to company examined. Data was collected from top managers, mid-level managers, and specialists via one to one interview technique. See Table 3.1. In addition to the interviews, secondary data has been collected from archive documents of ABC Company, documents in the internal communication, the RFQ - Request for Quotation document which is sent by the customer, the examination of the previous projects reports, R&D studies, and the production planning sources.

The innovative project management process, outputs of innovative project management process, financial and competitive benefits of innovative project management process were examined by questions and documents. The company's competitive position and success story have been connected to the Innovative Project management process. In the end of the study, the findings and results are also included in the title.

Table 3.1 List of Interviewees

Interview Level	Respondents People
Top Managers	5
Mid-Level Managers	4
Specialists	7

[69] Eisenhardt, K. M. & Graebner, M. E. (2007). "*Academy of Management Journal*" , p.25–32.

[70] Creswell, J. W. (2005) *"Educational research: Planning, conducting, and evaluating quantitative and qualitative research".*

3.6 Implementation of Innovative Project Management on the Industrial UPS Systems in ABC Company

ABC Company works on the international projects with Innovative Project Management approach. The case study examines Innovative Project Management process on the basis of Project Management Process Group Mapping mentioned in the literature review. The processes are involves as “Initiating”, “Planning & Designing”, “Executing”, “Monitoring & Controlling”, and “Closing”. See blow the Figure 3.2.

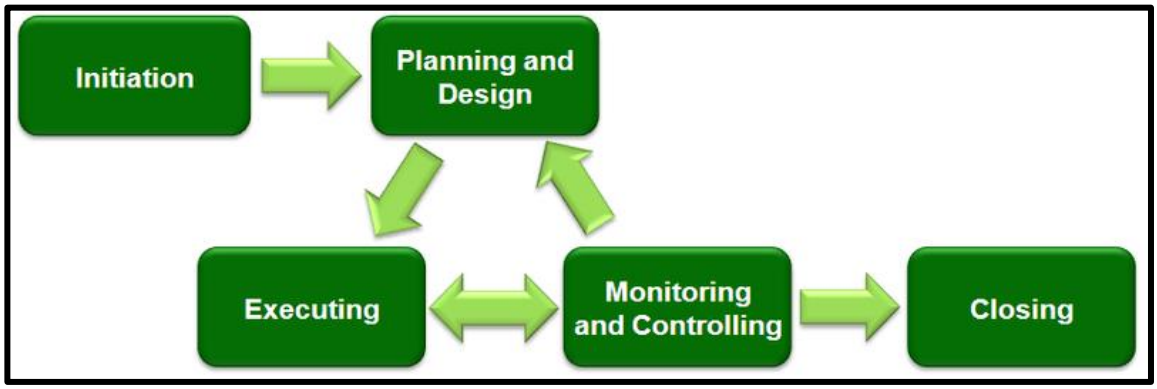


Figure 3.2 Development Phases of the UPS project

The study explains the details and stages of the Innovative Project Management process applied in ABC Company which is in Industrial UPS systems. ABC Company applies Project Management Process Group Mapping in the Innovative Project Management for the Industrial UPS project in Turkey. The research will elaborate the phases for the case study which concerns the experiences of a mid-size subcontractor in one of the major UPS projects in Turkey during the years 2016-2017.

3.6.1 Initiating

This phase examines Initiation of Innovative Project Management in the Industrial UPS project in ABC Company in Istanbul.

The research conducted in the case company. A top-manager state that innovation starts with the innovative leader and innovative team members. Human resource management is in the internal structure of the ABC Company. These management techniques use to set up an innovative team and finding an innovative leader. Regarding to that case study the top manager state that innovative leader has following characteristics; using information technologies, adopting team player understanding, friendly and dynamic character, self-improvement request, high level of communication skills, the ability to reading & researching like a hobby, creativity mentality, different perspective, finding solutions instead of the creating a problem, training the innovative team, making the equity method very well, and using time effectively.

The case company starts the innovative project management with the right leader who has above the features. The research was observed that a project starts with receiving RFQ – Request for Quotation form from the customer. According to inputs and outputs of the project, the leader makes decision to manage the innovative project. The document defines scope, resources, and main stakeholders for the project. In that way, project leader verifies ability to meet customer requirements with ABC Company resources. If the manager positives for the project details, the innovative project starts. The definition of plan starts with the preliminary documentation. The documents explain the objectives and needs of the client to be satisfied in the project. The main question is - What the innovative project will provide to the client? The RFQ that sent by the customer were examined by the project leader and company. Top-Managers, mid-level managers, and specialists attend the kick-off, decision making, and information sharing meetings the customer and project manager. The manager prepares MOM - Minutes of Meeting report after the meetings.

One of the most significant top sales manager state that problems of the project involves as following; the customer has limited space for the industrial products. It means the company has to provide smaller product compare to standard products. Also, they don’t would like to have any problem in the load, when any component is broken in the product. It means the product should have high quality and modular to fix it. They would like to have higher efficiency and power factor in the products. It means the

company must find the new technology or they must improve their technology. Also the client requests to decrease the cost of the project with limited delivery time. In these meetings, ABC Company's suggestions for innovation are shaped by the customer needs. Delivery time of the project is six months for the 4MVA capacity industrial UPS solution in the RFQ. The leader shares a forecast for the innovative project cost with the customer. The research detected that the project documents are started to prepare by the project manager. After the first agreement documents is approved by the customer, the customer mails a document which is called PO - Purchase Order form the service provider to formalize the process.

According a mid-level manager in the case company, the leader set up a team building meeting. In the innovative project, the leader defines the responsibilities for the team members. As our research, the company starts the WBS - Work Breakdown Structure. This method defines the inputs and outputs for the innovative project team, which elaborates the innovation project charter, the internal documentation of effects, objectives, engineering, organization, timing, costing, and risks.

Top managers explain those inputs about Industrial UPS project with the Innovative Project Management of ABC Company.

Effects: This input elaborates effects of the innovative project management. The goal of the leader is examining the outputs of the clients to affect available project with innovative approach. These outputs include information sharing and status meetings, and milestone reports to complete the Innovative Project Management within the approved budget and time.

Objectives: This input determine scopes of the Innovative Projects, and it schedules the followings Electronics & Mechanical Calculations, Technical Schematics, Cabinet Drawings, Material Collection, Manufacturing, Testing, FAT - Factory Accepted Test, Packing, Delivery on Time, and other process. To sum up, the research determines that the company starts the scope management to define objectives.

Engineering: The input prepares the project requirements regarding to the project schedule. These inputs are initiating of the Engineering Calculations, Preparing BOM - Bill of Material List, Manufacturing Plan, Programming, Testing, and so on. Also, specialist and mid-level managers decide the right components for the innovative project, and procurement department researches the innovative materials for R&D department needs from suppliers for the best customer support. However, these factors are handled with the collaboration of many other factors, in order to arrange the phase's purpose with the stakeholders' expectations in ABC Company. These inputs are handled in cooperation with many other factors to arrange the purpose of the project to the expectations of stakeholders in the ABC Company.

Organization: The project manager defines responsibilities of specialists in the team. If it is necessary, the manager trains this organization to increase effect of the innovation power. Also, brainstorming meetings is set up by the manager with the client and organizations for the innovative solutions. Those meetings generally provide the best innovative solution for the customers. In that input, according to the top manager, Communication Management starts by the innovative project leader in ABC Company.

Timing: Project leader is responsible for the timing. The leader controls objectives of the project. The project schedule is intervened by the project leader, if time management is necessary. The completion of the project is the most important goal at the delivery time.

Costing: R&D department plays active role in that input. Engineering department minimize the cost of the project for the company gain. The team members research the solutions to minimize the costs. Also, procurement department research the suppliers to find minimum cost of the needed materials in the project. In that input, the research observed Costing Management in the company.

Risks: Project manager and the organization determine and calculate possible risks in the innovative project. This study execute with coordination of R&D, manufacturing, testing departments, and project leader. Those risks minimize during the project to

protect any trouble. The study show that Risk Management starts in that input in the company.

The research show that initiating stage of the innovative UPS project starts and continues with the RFQ form, PO, WBS, kick-off, decision making, and information sharing meetings in ABC Company.

3.6.2 Planning and Designing

This phase examines Planning & Designing of innovative project management in the industrial UPS project in ABC Company.

The observation in the interviews of ABC Company shows that, the Planning & Designing phase of the innovative project management is the realization of the managerial business objectives in the substructure. At this stage, the innovative project management team models the innovation of the project at ABC. Project manager determines the corresponding innovation based parameters and to manage the design correctly. Upon our observation, project leader uses the Integration Management in the innovative project management. Status determination studies and meetings are a factor for the optimization of positioning, power and capacity of the innovative project according to our detection in ABC Company. A mid-level manager states in the stage of unsuitable planning, a project is encountered that does not meet the objectives of the innovative project manager, contains the studies that do not support each other. The mid-level manager has confronted that the company wastes the resources with the project. This situation caused the failure and delays of the innovative project, or caused many problems in the project process. This leads a risky investment that don't provide the desired value added, and cause great financial and time losses. The company is committed to creating added value for the innovative project in the sector. Therefore, ABC Company managers have stated that they attach importance to Integration Management.

According to the innovative project management system in ABC Company, employee factor is the leading cause of job discontinuity. Over half of this employee-based error is based on design and planning. Without sufficient time and resources for the design phase, job discontinuity can become the main problem before the innovative project begins. This situation can only be fixed with partly and large costs in the future. The company manages this risk with the different identification models. Project manager applies the literature for the innovative projects with respect to company structure.

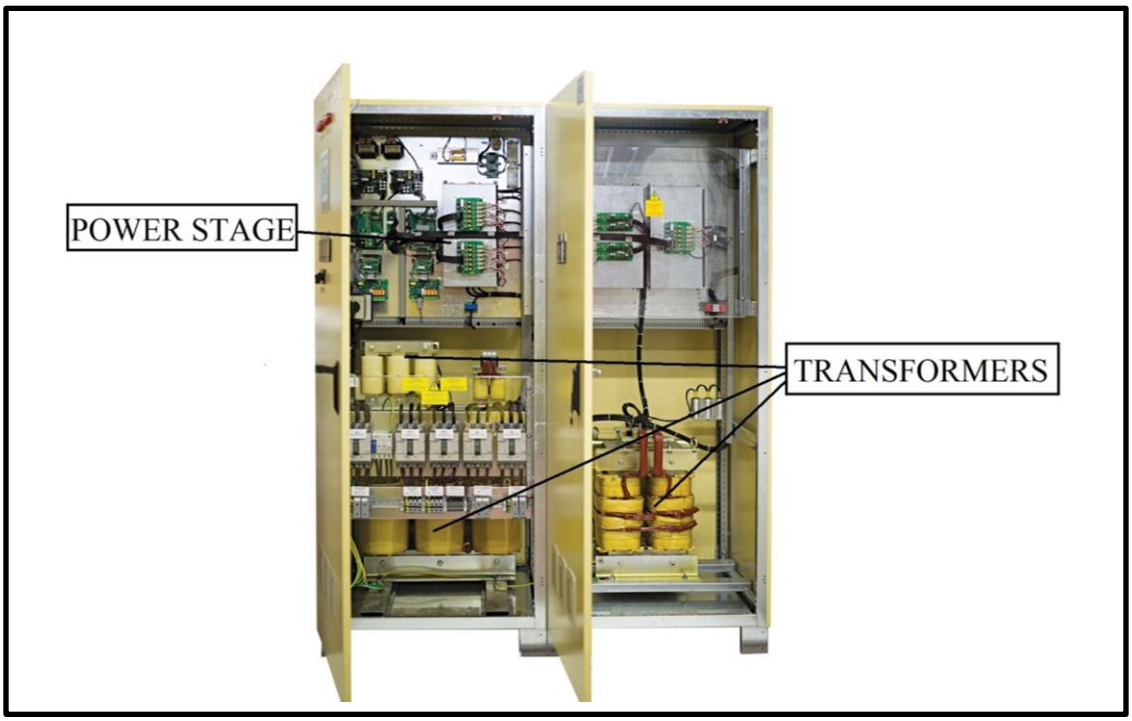
A top level manager states that the company uses a few classifications of the second innovation model which is according to object of innovation. Second innovation model is applied with product innovation, organizational innovation, process innovation, process innovation and business model innovation in the industrial UPS projects in ABC Company. Top managers state that this innovation model is the most important part of the innovative project management compare to standard project management techniques.

Top managers explain the product, organization, process and business innovation in the ABC Company as following. These explanations belong to project leader in the case study of ABC Company. Also, Top managers discuss the innovation models according to the project inputs and outputs with the team members in the problem solving, information sharing, innovation, and decision making meetings.

Product Innovation: In the competitive UPS market, it includes innovative improvements in the technical features, costs, materials, software, ergonomic structure, or other functional features in ABC Company. The research observed that project leader controls the previous innovative projects in that process. The leader finds innovative solution with the manufacturing specialists in the new product to decrease the cost of the UPS project. The R&D specialists and mid-level managers suggest the use of IGBT - Insulated Gate Bipolar Transistor based solution instead of the thyristor based solution in the power stage. The sample of the standard thyristor based industrial UPS size shown in the Figure 3.1. As seen in the figure it is has large size. The solution of the IGBT technology was going to increase the power factor, efficiency of the product, and

also it decrease the cost and size of the product as customer needs in the RFQ form. The company plans the decrease cable costs and work forces around 55% with the innovative solution. Also, the solution will provided modular product as customer needs in the RFQ form. According to research of the ABC Company, the solution also will increase the productivity. In industrial UPS sector, ABC Company will provide modular systems for the customer satisfaction. The system will be more useful compare to standard monoblock product. If a customer plans to buy a 500 kVA UPS system for the energy source, the sector was providing a monoblock system as Figure 3.1. In that way, when a small component is broken in the UPS, all system may shot down. Customers wouldn't like to have that problem in their critical loads as defined in the RFQ form. The innovative solution plans to provide good advantage for the customer requirements. The advantages of the modular system are connecting ten peace 50 kVA power modules. If one module (50kVA power capacity) is broken, the system will keep running because of the other modules (8 x 50kVA power capacity). See Figure 3.4 – 3.5. Technical service will have time to fix it, and customer will not stop the business as requested in the RFQ form. At the end, this innovative perspective created new market, and competition in the sector in Turkey.

Figure 3.3 Internal View of Thyristor Based 80kVA Capacity UPS Project



Source: ABC Company Archive, 2014

Organization Innovation: According to the organizational innovation in ABC Company is the implementation of a new organizational method in the company's business practices, workplace organization relations. It includes innovations or improvements in the workplace organization in the firm. It also covers development of new applications to ensure internal information sharing in the company. The leader is organizing training activities to reduce inequalities among employees and increasing innovative thinking. One of the objectives of ABC Company is to improve working conditions.

Process Innovation: The main objectives of process innovation are to save time or increase productivity by reducing costs in ABC Company. Project leader monitors the increasing in productivity with mid-level managers and specialists. It is an indicator of how profitable the company is according to its total assets. In addition, it gives an idea of how innovative project management uses it to gain revenue. Other distinguishing points of the innovative project management are providing flexibility in production, expanding the product line, and being practical for customer wishes. For example, ABC

Company designs electronics board by self. In that way, The Company uses same electronic boards for the most of the products in the factory. Inverter (DC – Direct Current to AC – Alternative Current Converter) and Rectifier (AC to DC Converter) are opposite products in the UPS industry. When an employee connects them together, Industrial UPS will occur. The Company uses same electronic boards with different program & changing jumpers on the boards. Customers are happy to buy less spare parts from ABC for their stock. In some cases, spare parts are expensive than product, but the customer has to buy it. Nobody would like to loss time with new product order. Most of company mainly would like to sell spare parts. Cost is so less. Profit is so high. ABC uses that system because they are decreasing the electronic component cost with using same boards. The system provides less stock expense. Also, employees are learning more quick to assembly that boards in manufacturing line. They always use same board, and board connection. It increases the adaptation for the new employees in the team.

Business Model Innovation: In ABC Company, the innovation model starts in the initiation phase. In that phase, the company managers note the customer needs, and what kind of solutions the client need in the kick-off and information sharing meetings. Those meetings shape the Innovation model in the project. The main target is maximizing the customer satisfaction in those meetings. Also, ABC Company aims to effective and efficient use of resources, and ensuring efficiency in the use of raw materials. In that why, ABC plans to increase profitability in the Innovation Project.

In ABC company the research detected that innovative project document is integrated to allow a satisfying innovative project management, thus often several loops applies to improve the analyses, maximize the scope achievement respecting time and cost constrains. Especially they use the previous hypotheses with more interactions and information in new innovation planning processes. Mid-level managers state that the planning phase is improved in the entire innovation project. That's why; project leader creates custom made planning. The planning & designing processes describe the strategy and identify the risks of the innovative project in ABC. The research observes that the sequential processes are much easier to fulfillment in the innovative management in that way. The project management plan & design changes many

materials or theorem. It provides greater precision to respect time, costs, and quality. The Company procures all necessary innovative material/hardware regarding these entries. However the research observed the process of collecting and associating information may slow the entire project. The initial planning seems acceptable the execution processes to start. In addition, mid-level managers determine that this process are technical drawings, power electronic calculations, battery selection & calculations, design of project entries, and planning of manufacturing and testing in the UPS project in ABC Company. The mid-level managers noted that depending from the innovative project nature, some risks occur until few time spent planning or designing. The risks are shaped in the executing phase in ABC Company.

3.6.3 Executing

This phase analyzes Executing of Innovative Project Management in the Industrial UPS project in the ABC Company.

The research observed that top managers choose the experienced innovative project leader in the execution of the innovative industrial UPS project in ABC Company. Project leader measures the team and project performance with the experience in the innovative project management. In that way, the company ensures that the project is delivered on time. Those measurements are provided with the status meetings, and milestone reports in the ABC. Also, the mid-level managers state that the leader responsible for the cost estimation and budgeting of the project. Estimating is the process of approximating how much it will cost to complete the innovative project activities in the ABC. The cost and budget measurements use other units in some situation, such as staff hours.

The study observed that the leader considers all of the resources that are labor, materials, equipment, services, facilities, and overtime use in the innovative project. For the budgeting, the leader estimates the all cost of the innovative project activities. The budget controls with the Planning and Designing phase outputs by the innovative project

leader in the company. In that way, the leader creates the project's cost baseline for the innovative UPS project in ABC. The approved cost baseline form is the budget for the innovative project. The cost baseline for the project is made by combining the cost estimates of the individual activities over the period of the innovative project in ABC. The project's expenses are measured against this baseline. The mid-level managers state that, the case company works on the baseline with the dollar and euro currency to stabilizing the project cost in the global market. Also, the mid-level managers state that the project leader saves the costs of the innovative UPS project in the company server to compare with the similar innovative projects in the future. The innovative project company has a company server to save all innovative UPS project details for the know-how sharing. This understanding is helpful costing of the next innovative UPS projects in ABC.

In the case study, one of the mid-level manager determined that the leader set up the status meetings with the innovative team during executing process. The meetings occurs some changes in the innovative project. The project leader performs the necessary actions to implement the approved changes. In the UPS project, these changes are on the manufacturing, testing, assembling, designing, planning, engineering, material selection, programing, and so on in ABC Company. The study observed that the leader takes care of those actions in the project to use resources more effective and efficient. Manufacturing manager state that designing and planning team has less experience on the manufacturing compare to the employees, because they generally work on the computer with simulation programs. Expert employees can choose better component or technique for the manufacturing line, so the company saves time, money, resources, and labor hours in innovative UPS project. Thus, the study realized that ideas of the employees about production would be beneficial in the innovative projects.

3.6.4 Monitoring and Controlling

This phase analyzes Monitoring & Controlling of innovative project management in the industrial UPS project in the ABC Company.

In the case study, a top manager state that project leader reveals variances from what has been planned in terms of time, cost, and quality. In the UPS project, the leader maximized the customer satisfaction and was practical for customer wishes with the innovative solution. The solution created value added in the sector. The study observed that the company not aims to profit between selling and buying. The perspective of the project leader in the UPS project; value added is to make the customer pay more than the market average to a product / service or it offers a value that can attract more customers at the same time. According to a mid-level manager, the innovation project found out what solutions are needed to make the customer's life easier. ABC Company aims to have positive results in the Monitoring & Controlling phase of the innovative UPS project.

Monitoring & Controlling measurement leads to re-planning processes and operating corrective or preventive actions to follow the initial desired results of the innovation project plan in ABC Company. The project leader controls the project plan with the innovative team in the milestones & status meetings. The meeting outputs show that the innovative modular UPS project is in accordance with the project plan in ABC Company.

The innovative ideas are selected correctly in the innovative UPS project by the project leader. The researches show that the innovative product creates new market in the sector. Also, the project brings value added in the UPS sector. ABC Company increased the market share with the innovative project management in Turkey. In that way, the company is ensuring sustainable economic growth in global market.

A specialist states that the case company has the enough opportunities and resources for the innovative project management. ABC Company has experienced on similar project before. Also, the company is custom made solution manufacturer since established. The result of the project shows that the company has enough opportunities and resources for the innovative project. The company was ensured efficiency in the use of raw materials. Also, it is provided efficient use of energy resources in the project.

One of the most important top manager state that the quality of the product increased due to innovative project management. Specialists changed the power stage in the UPS with this innovative approach. The sample of the old power stage of the UPS project is shown in the Figure 3.1 and 3.3. That's why; specialists increased the Power Factor and Efficiency in the product. The study observed that those are most significant quality parameters in the UPS sector. It means the project increased the quality of the UPS. Also, modular UPS products have ergonomic structure, so most of customer selects this solution in the UPS sector regarding to the mid-level managers. It means maximizing customer satisfaction. The sample of one unit modular 50kVA UPS solution which manufactured by the ABC Company in the case study is shown in the Figure 3.4.

Figure 3.4 One Unit Modular 50kVA Capacity UPS Project

Source: ABC Company Archive, 2017

The project delivered on time owing to innovative project management. The project delivery time was 6 months for the 4MVA UPS system (8 pcs. x 500kVA UPS systems and totally 80 pcs. x 50kVA UPS modules). The company decreased the labor hours, power stage size, cable works, costs and cabinet size with the innovative solution. A mid-level manager from manufacturing line state that employees were assembling all that components by self. The company eliminates the transformer in the modular solution. Transformer is heavy equipment in the UPS and has long delivery time. Previous project sample which manufactured with transformer is shown in the Figure

3.1. The company use electronics boards instead of the transformer. Also, modular UPS system (IGBT technology, as seen Figure 3.4) has more electronics board; however, old UPS system (Thyristor technology, as seen Figure 2.3) had more mechanical equipment. The sample of the modular UPS project (10 x 50 kVA = 500kVA Capacity) shows in the Figure 3.5. In the Thyristor based system, company workers were assembling all thyristors on the heat sinks. Now, 70% of the UPS systems design with the electronics boards according to the collecting data from interviews in the company. Also, the interviews show that the ratio was 30% in the manufacturing line. After that data sharing, a top manager state that the innovative idea improved the delivery time 45%.

Figure 3.5 Compact Solution of Modular 10 x 50kVA Capacity UPS Project

Source: ABC Company Archive, 2017

The marketing manager states that the innovative idea is basic and useful. This innovation has emerged from the need of customers in the ABC Company. It is basic and useful in the UPS sector. According to the research in the ABC company sales ratios in 2018 in the global market, the product has 41% higher sales capacity compare to the old system.

According to a top manager in the sales team, the innovative project management was necessary in the sector for the customer. The specialists used innovative solution to maximizing the customer satisfaction and transformation of information into an economic value in the project. The solution was created value added in the sector. ABC Company found out what solution is needed to make the customer's life easier. It shows that the case study solution is practical for customer wishes. The project had a limited time for this size of the manufacturing because the company produced 8 pcs. 500kva UPS. Also, the innovative management created the solution to delivery on time of the project.

In that case company, the study determined that the innovative project gives the correct answers in the Monitoring and Controlling as customer needs in the RFQ form.

3.6.5 Closing

This phase analyzes Closing of Innovative Project Management in the Industrial UPS project in the ABC Company.

In the case study, a mid-level manager stated that the project leader saves all documents of the innovative project in the company server. Closing is well-structured set of processes, from client's deliverable validation to contractual obligations in the innovative project in ABC. The leader confirms for per requirements of the customer, and completes the procurement closure. Also, the project manager completes the final performance reporting index, and archive records for future innovative projects. The leader is making specific that all documents and deliverables are up-to-date and that all problems are resolved. The study observed that the most important closing point is

Quality Control of the manufactured product. It is the last control of the modular UPS by the company after testing process. The authorized personnel follow a checklist to control quality procedure in ABC Company. The quality control completed successfully in the modular UPS project.

According to the interviews, the customer visited the ABC factory for the FAT - Factory Acceptance Test. FAT is another action of the closing phase in the innovative project management for the Industrial UPS industry. Participants involve as supplier (Manufacturer), customer (An expert authorized by the company.), and third party company which is approved by legal institution in this FAT. Third party company and customer confirm the project documents as stated in the technical specifications in the RFQ form. After, supplier (ABC Company) starts the testing process with customer and Third Party Company. The study observed that ABC Company completed the test successfully. The third party company confirmed the documents after the testing process, and the third party company prepared a certification about the modular UPS. The certificate is official document which is confirmed the international criterions by that company. The modular UPS project closed with the approved document.

In the same time, the leader transferred the project to the delivery team in the factory. They packaged and labeled the goods. The delivery type of the project was Ex-Work (Factory Delivery). The leader delivered the goods to the customer in ABC factory as shown in the Figure 3.6 and 3.7. The leader ensured that all costs are charged to the innovative project, and the leader directives to closing the modular UPS project accounts. After the closing the modular UPS project was reassigning the personnel. Depending upon the organization type the project personnel was assigned to another project in ABC Company.

Figure 3.6 Photograph of Delivery

Source: ABC Company Archive – 1, 2017

Figure 3.7 Photograph of Delivery

Source: ABC Company Archive – 2, 2017

3.7 Findings and Results

As the results of the case study in ABC Company with the Innovative Project Management on the industrial UPS project, the case study observed the following benefits / contributions;

i. Enhancing of quality,
ii. Increasing customer satisfaction,
iii. Utilizing efficiency and effectiveness,
iv. Providing value added,
v. Increasing profitability rates, and
vi. Expending markets and products.

Conclusion

The case study researched in our thesis is the innovative project management process in the Industrial UPS - Uninterrupted Power Supply sector with interviews in the ABC Company. Our study has explored the patterns of innovation, the mechanisms, and the application to traditional (hierarchical or functional) organizations in the innovative project. However, since innovative project management in the company studied has been increasingly organized in a project, it becomes extremely important to directly address the interplay between Innovative Project Management and Project Management. In addition, if the industrial UPS industry willing to mature an innovation where it can routinely perform what is needed solution, it need to work with creative, qualified, experienced, and professional project leaders. The leader should create value added in the sector. Also, the leader needed to discover and train a team who can deal with the uncertainties of the innovative project, and who can master the intricacies in innovation project planning and execution. In that way, companies expect to reach the solutions with the innovative projects.

One of the disciplines that distinguish an innovative project management from other methods of business activity is that delivering projects on time. Project delivery time must match with timeline of the client for the customer satisfaction. The time management generally is hard process to manage by the leader in the uncertain innovative projects. In the case study, the leader managed the project with a brilliant solution of specialists. Another important thing that should be done after the completion of the innovative project is a project review. The innovative project review is important for the problems after the implementation. The project can bring new mistakes and solutions. This could improve the innovative solution for the future projects. The

practical industrial UPS solution did not show high risk of fallacies on the site one year during the study.

Also, innovative project management in industrial UPS systems aiming to minimize the cost of the projects also tend to maximize customer satisfaction regarding to the customer needs. Minimizing costs can be accomplished with the improvement of the working conditions. Furthermore, minimizing cost also increased profitability.

In the context of this project, the company transformed the information into an economic value. On the other hand, the innovation proved to ensure sustainable economic growth with increasing the number of patents in the company as stated in literature review. Recently, development of countries is measured with the numbers of patents, and patent statistics for the economic growth of countries. The research shows that innovative project management can also connect with the patent statistics.

This thesis also has shown that effective and efficient use of resources, and ensuring efficiency in the use of raw materials play a key role in the innovative project management. In addition to all of these points, the study has shown the increase in productivity with the innovative project management. This perspective in management provided flexibility in production, expanding the product line, and being practical for customer wishes.

Innovation project management is also able to create a new market in the industry. Atari/Nintendo, Book.com/Amazon, Yahoo/Google, and Motorola/Apple or with another approach Alexander Graham Bell/ Steve Jobs are examples as the article has mentioned before. Atari, Book.com, Yahoo, and Motorola can be mentioned as first innovators in their areas; however, Nintendo, Amazon, Google, and Apple companies improved the technique with a different approach, and they have created new market in the sector. When the leader company creates a new market in the industry, the company will have a higher share of the market share. The case project has shown the increase in the market share as example companies. If a project cannot create a new market, the project leader should increase the market share of the company in the sector with the

contribution of innovative project management. Besides, if a project leader manages the project with innovative approach and ideas, the leader should also improve the quality of the end product to be competitive in the industry.

This thesis outlined the functional organization of innovation process and management of the innovative UPS projects in ABC Company operating in Turkey. Combination of managerial approaches of the innovative project management in this case study and the theoretical insights from the innovative UPS project will remain a promising research way. Innovation project management in the electronics industry starts with the leader and team. Project leader applies the techniques as the study stated innovation models and project management techniques. To sum up, the result of the case study has shown that companies needed innovative project management in the industrial UPS systems in order to be able to enhance of quality, increase customer satisfaction, ensure efficiency and effectiveness, provide value added, increase profitability, and expand their markets and products. On the other hand, due to the restrictions of our study the results may not be generalizable, although we hope our findings have provided important implications for its contribution to the industry, and to the economy.

Bibliography

Akalın, Şükrü Halûk (2007) Innovation, İnovasyon: Yenileşim, Türk Dili Dil ve Edebiyat Dergisi (93/666): 483-486.

Abrantes, R. & Figueiredo, R. (2014) Feature Based Process Framework To Manage Scope In Dynamic Npd Portfolios, International Journal of Project Management 32.

Adam Jolly (2008) The Innovation Handbook: how to develop, manage, and protect your most valuable ideas.

Adedeji B. Badiru & Olufemi A. Omitaomu. (2008) Industrial Project Management, Concepts, Tools, and Techniques, P 6-11.

APQC (2013) Open Innovation: Enhancing Idea Generation Through Collaboration.

Anbari, F.R. (2005) Innovation, project management, and six sigma, In Rahim, M.A and Golembiewski.

Anton Zandhuis, & Rommert Stellingwerf (2013) ISO 21500 Guidance on Project Management, A Pocket Guide, Page 81.

Archibugi, D. (1992) Patenting as an Indicator of Technological Innovation: A Review, Science and Public Policy (19): 357-368.

Bartezzaghi, E. (2010) L'organizzazione Dell'impresa. Etas.

Becker M. (2007) Coordinating Innovation In Networks: From Task Decomposition By Product Architecture To Replicating Template Platforms. Copenhagen, Cbs, Denmark.

Brady, T. & Söderlund, J. (2008) Projects in innovation, innovation in projects: Selected papers from the IRNOP VIII conference, Guest Editorial, International Journal of Project Management, 26(5): 465-468.

Buganza T. & Verganti, R. (2009) Open Innovation Process to Inbound Knowledge. European Journal of Innovation Management.

Christensen C.M. & Clayton M. (1997) The Innovator's Dilemma. Boston: Harvard Business School Pres.

Christensen C.M. & Clayton M. & M.E. Raynor (2003) The Innovator's Solution. Boston: Harvard Business School Pres.

Christensen C.M, Michale Raynor, Rory McDonald (2015), *"Disruptive Innovation"*

Creswell, J. W. (2005) Educational research: Planning, conducting, and evaluating quantitative and qualitative research, Second Edition, Upper Saddle River, NJ: Pearson.

Cook, P. & Uranga, M.G. & Etxebarria, G. (1998) "Regional Systems of Innovation: An Evolutionary Perspective", Environment and Planning A (30): 1563-1584.

Darroch, J. (2003) Knowledge management, innovation and firm performance, Journal of Knowledge Management, 9(3), pp. 101-115.

Davies, A. & Hobday, M. (2005) The Business of Projects: Managing Innovation in Complex Products and Systems. Cambridge: Cambridge University Press.

Davis, K. (2014) Different Stakeholder Groups and Their Perceptions of Project Success. International Journal of Project Management 32, 189–201.

Değirmencioğlu, Uğur. (2003) Yenilikçilik Üzerine MMO Kartal Temsilcilik Söyleşisi.

Denzin, N. K. & Lincoln, Y. S. (Eds.). (1994) Handbook of qualitative research. Thousand Oaks, CA, US: Sage Publications, Inc.

Department Of Veterans Affairs (2005) "Project Management Guide", VA Office of Information and Technology.

Edmondson, A. C. & McManus, S. E. (2007) Methodological fit in organizational field research, Academy of Management Review, Volume 32, Number 4, 1155–1179.

Edquist, C. (2015) Innovation-related Public Procurement as a Demand-oriented Innovation Policy Instrument, Papers in Innovation Studies No 2015/28, Lund: CIRCLE – Center for Innovation, Research and Competences in the Learning Economy, Lund University.

EGİAD (2012) Yenilik - Yenileşim - Inovasyon Dünyasına Bir Yolculuk.

Eisenhardt, K. M. (1989). Building theories from case study research. Academy of Management Review, Volume 14, p. 532–550.

Eisenhardt, K. M. & Graebner, M. E. (2007). Theory building from cases: opportunities and challenges, Academy of Management Journal, Volume 50, Number 1, p.25–32.

European Commission (2004), Project Cycle Management Guidelines.

Elçi Ş. (2006) İnovasyon: Kalkınmanın ve Rekabetin Anahtarı. İstanbul: Meteksan Bilişim Grubu, BT Haber.

Elon Musk (2014) All Our Patent Are Belong to you, [Online], Available At: https://www.tesla.com/BLOG/ALL-OUR-PATENT-ARE-BELONG-You.

Forcadell, J.F., & Guadamillas, F. (2002) A case study on the implementation of knowledge management strategy oriented to innovation, Knowledge and Process Management, 9(3), pp. 162-171.

Godin, Benoît (2008) Innovation: A Category, Project on the Intellectual History of Innovation Working Paper No. 1, Montreal.

Hong, S. & Oxley, L. & McCann, P. (2012) A Survey of the Innovation Surveys, Journal of Economic Surveys (26): 420-444.

Işık, Cevdet (2010) Hürriyet, Teknoloji 17.11.2010, [Online], Available At: http://www.hurriyet.com.tr/teknoloji/radyasyonu-yutan-perde-16307092.

International Standardization Organization (1997) Quality Management Systems, Guidelines for Quality Management in Projects.

Kerzner H. (2009) Project Management – A Systems Approach to Planning, Scheduling and Controlling, 10th edn, John Wiley & Sons Inc. P. 4.

Lazzarotti, V. & Manzini, R. (2009) Different Modes of Open Innovation: A Theoretical Framework and an Empirical Study. International Journal of Innovation Management.

Lundvall, B-Å. (der.) (1992) National Innovation Systems: Towards a Theory of Innovation and Interactive Learning, Londra: Pinter.

Lundvall, B-Å. & Nielsen, P. (2007) Knowledge Management and Innovation Performance, International Journal of Manpower, 28(3/4), pp. 207-223.

Nathan Rosenberg (2004) "Innovation and Economic Growth".

Mazzucato, M. & Perez, C. (2014) Innovation as Growth Policy: The Challenge for Europe, SPRU Working Papers 2014-13, Sussex: SPRU, University of Sussex.

McFarthing, K. & Ohr, K.R.C. (2013) Managing Innovation Portfolios – Strategic Portfolio Management [Online], Available At: http://www.Innovationmanagement .se/2013/09/16/Managing-Innovation-Portfolios-Strategic-Portfolio-Management/.

Meredith, J.R. & Mantel, S.J. (2006) Project Management: A Managerial Approach, 6th edition, John Wiley and Sons Ltd.

Mohnen, P. & Hall, B. (2013) Innovation and Productivity: An Update, Eurasian Business Review (3): 47-65.

Morris, P.W.G. (1994) The Management of Projects, London: Thomas Telford.

Oden, W.H. (1997) Managing Corporate Culture, Innovation and Intrapreneurship. USA: Library of Logress Cataloging in Publication Data.

OECD (2007) "Innovation And Growth Rationale For An Innovation Strategy".

OECD (2015) Frascati Manual - Guidelines for Collecting and Reporting Data on Research and Experimental Development, 6th edn.

Olaf Passenheim & Ventus Publishing Aps. (2009) Project Management, P. 28-41.

Patrick Weaver (2012) Henry L Gantt, 1861-191: Debunking the Myths a Retrospective View of His Work.

Slobodan N. V. (2006) “Project Management and Leadership Skills in Power Electronics Research Engineering”, University of Belgrade.

TechNavio – Market Research Reports (2018) Global UPS Market 2018-2022.

Tuncay-Çelikel A., Athreye S., Ujjual Vandana (2014) “Internationalisation of R&D into Emerging Markets: Fiat’s R&D in Brazil, Turkey and India”

Turcu, O.L. & Mironescu, R. & Drob, C. & Simionescu Gh. & Feraru, A. & Stan, A. (2008) Management, Ed. Alma Mater, Bacău, p. 15.

Trott, Paul (2008) Innovation Management and New Product Development. Pearson Education Limited.

Er, Perihan Hazel (2013) Girişimcilik ve Yenilikçilik Kavramlarının İktisadi Düşüncedeki Yeri: Joseph A.Schumpeter. Selçuk University Social Science Institute Magazine, P. 75-85.

PMI (2013) Project Management Body of Knowledge- PMBOK, A Guide to the Project Management Body of Knowledge, 5th edn.

PMI (2017) PMBOK Guide – A Guide to the Project Management Body of Knowledge, 6th edn.

R.T. (eds.) (2005) Current topics in Management, Vol.10, New Brunswick, NJ: Transaction Publishers, P. 101-116.

UNCTAD (2015) Technology and Innovation Report 2015: Fostering Innovation Policies for Industrial Development, Vienna: UNCTAD.

Uzkurt, C. (2008) Yenilik Yönetimi ve Yenilikçi Örgüt Kültürü, Beta Basım Yayın, Istanbul.

Vega-Jurado, J. (2008) Gutiérrez-Gracia, A., Fernández-de-Lucio, I., & Manjarrés-Henríquez, L. The effect of external and internal factors on firm's product innovation. Res. Policy, 37(4), P. 616–632.

Xavier Pavie & Eva Hsu & Hanns Justus Tillman Rödle & Raquel Orozco Tapia (2013) How to Define and Analyze Business Model Innovation in Service. ESSEC Working paper.

Yin, R. (2009). Case study research, design and method, 4th edition. London: Sage Publications Ltd.

Wheelwright, S. C. & Clark, K.B. (1992) Creating project plans to focus product development, Harvard Business Review, 70(2): 70-82.

World Bank (2010) Innovation Policy: A Guide for Developing Countries, Washington DC: World Bank.

Appendix A. Interview Questions

Interviewees Top Managers Mid-Level Managers Specialists	**Interviewee company** ABC Company
Place of date Istanbul, Turkey / Feb-Jun 2018	

General info

The main purpose of the study is discover the importance of innovative project management with analyzing the ABC Company which is customized UPS manufacturer in Turkey in Electronics sector.

Questions:

1. How do you think the quality of the product has increased with the innovative project management?

2. How do you assess the innovativeness of the ideas selected in the innovative UPS project?

3. How sufficient do you think company's opportunities and resources for the innovative projects?

4. Do you think the cost of the product decreased due to the innovative project management? If so how?

5. How successful was the timing of the innovative project?

6. What do you think about the new product features?

7. What is the importance of the project for the UPS industry in Turkey?

8. Has the innovative approach created new markets in the UPS sector in Turkey? If so, which markets?

9. To what extent has the power factor increased?

10. How do you think the innovative project increased the efficiency of the UPS system?

Curriculum Vitae

Alican SADIÇ was born on October 16, 1990 in Balıkesir. In 2010, he completed his Associate Degree in Industrial Electronics from Amasya University. In 2015, he graduated Electrical & Electronics Engineering from Işık University. After the graduation, he started professional life. He focused on international projects in energy sector in. In 2016, he started his master's degree in Business Administration at Işık University. He is still working for international projects in a company that makes domestic production on energy and power conversion systems. He plans to open own company in mid-2019.