TECHNOLOGICAL INNOVATION MODEL FOR PUBLIC SECTOR

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İBRAHİM ARPACI

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Approval of the Graduate School of Informatics

_____

Prof. Dr. Nazife BAYKAL
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

_____

Prof. Dr. Yasemin Yardımcı ÇETİN
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

_____

Dr. Ali ARİFOĞLU
Supervisor

Examining Committee Members

Prof. Dr. Nazife BAYKAL	(METU, IS)	_____
Dr. Ali ARİFOĞLU	(METU, IS)	_____
Assist. Prof. Dr. Erhan EREN	(METU, IS)	_____
Dr. Tarkan GÜRBÜZ	(METU, CEIT)	_____
Dr. Sevgi ÖZKAN	(METU, IS)	_____

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Surname: İbrahim Arpacı

Signature: _____

ABSTRACT

TECHNOLOGICAL INNOVATION MODEL FOR PUBLIC SECTOR

Arpacı, İbrahim
M.S., Department of Information Systems
Supervisor: Dr. Ali Arifoğlu

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Innovations in the public services have become mandatory to provide more efficient and secured services to the citizens. In today's fast changing technological environment, the sustained management of innovation is the most vital executive task for the organizations. Identification of the technological innovation process is required in order to manage innovation in the public organizations. This thesis study aims to build a technological innovation model for public organizations in Turkey identifying technological innovation process, stakeholders of the process, sources of innovation, obstacles of innovation and driving forces of innovation. In this research study, strategically important organizations, including all ministries and the pioneer public organizations that perform technological innovation projects are analyzed. In the research study, case study is used as a research strategy and interviews are used as data collection methods. Using collected data; data sets are produced and presented in tables. Data analysis results enable to identify technological innovation process, stakeholders of the process, sources of innovation, barriers of innovation, and driving forces of innovation. Consequently, in accordance with the findings of

the study, a new technological innovation model that may pave the way for technological innovation projects and enable successful management of innovation process is constructed. The proposed model lights the way of managers for their innovation projects by means of determining unclear innovation process and identifying the inputs and outputs of the process. Moreover, this study is a guide for managers in public organizations identifying possible obstacles and offering solutions, identifying driving forces to accelerate the innovation process, emphasizing the importance of interaction between the stakeholders.

Keywords: Innovation, Technological Innovation Model, Innovation Management, Public Sector, Turkey

ÖZ

KAMU SEKTÖRÜ İÇİN TEKNOLOJİK İNOVASYON MODELİ

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Vatandaşlara daha verimli ve güvenli hizmetler sunabilmek için kamusal hizmetlerde inovasyon zorunlu hale gelmiştir. Günümüzün hızlı değişen teknolojik ortamında, sürdürülebilir inovasyon yönetimi organizasyonlar için en önemli yönetimsel görevdir. Kamu kurumlarında inovasyonu yönetebilmek için teknolojik inovasyon sürecinin belirlenmesi gerekmektedir. Bu tez çalışması teknolojik inovasyon sürecini, bu sürecin paydaşlarını, inovasyonun kaynaklarını, inovasyonun önündeki engelleri ve inovasyonun itici güçlerini tespit ederek Türkiye'deki kamu kurumları için teknolojik inovasyon modeli oluşturmayı amaçlamaktadır. Bu çalışmada, tüm bakanlıkları ve teknolojik inovasyon projeleri gerçekleştiren öncü kamu kuruluşlarını kapsayan stratejik öneme sahip kurumlar incelenmiştir. Bu çalışmada, araştırma stratejisi olarak durum çalışması ve veri toplama yöntemi olarak ta mülakatlar kullanılmıştır. Toplanan veriler kullanılarak veri setleri oluşturulmuş ve tablolarda gösterilmiştir. Veri analizi sonuçları teknolojik inovasyon sürecinin, bu sürecin paydaşlarının, inovasyonun kaynaklarının, inovasyonun önündeki engellerin ve

inovasyonun itici güçlerinin tespit edilmesine olanak sağlamıştır. Sonuç olarak, bu çalışmada elde edilmiş olan bulgulara dayanılarak, teknolojik inovasyon projelerine ışık tutacak ve inovasyon sürecinin başarılı bir şekilde yönetimine olanak sağlayacak yeni bir teknolojik inovasyon modeli oluşturulmuştur. Önerilen bu model, belirsiz inovasyon sürecini ortaya çıkararak ve bu sürecin girdi ve çıktılarını saptayarak yöneticilerin inovasyon projelerinde yolunu aydınlatmaktadır. Bununla birlikte bu çalışma, inovasyonun önündeki olası engelleri ortaya çıkararak ve bu engellere çözümler sunarak, inovasyon sürecini hızlandıracak itici güçleri saptayarak, paydaşlar arasındaki etkileşimin önemine vurgu yaparak, kamu kurumlarında çalışan yöneticiler için bir kılavuz niteliğindedir.

Anahtar Kelimeler: İnovasyon, Teknolojik İnovasyon Modeli, İnovasyon Yönetimi, Kamu Sektörü, Türkiye

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ABBREVIATIONS

ACI: Ankara Chamber of Industry

ACT: Ankara Chamber of Trade

BPR: Business Process Reengineering

BSN: Business Support Network

CBS: Remote Sensing and Geographical Information Systems

CMMI: Capability Maturity Model Integration

CRM: Customer Relationship Management

SSO: State Supply Office

EU: European Union

ENEBIS: Ministry of Energy Information and Document Management System

ERP: Enterprise Resource Planning

ICT: Information and Communications Technology

ILSIS: The Provincial and District Directorates of National Education Management Information System

IPR: Intellectual Property Rights

IRC: Innovation Relay Centre

ISO: International Standards Organization

IT: Information Technology

JIT: Just in Time

SIMIDO: Small and Medium Industry Development Organisation

MERNIS: Central Population Management System

METU-TECH: Middle East Technical University Technopolis

MIS: Management Information System

MONE: Ministry of National Education

NDP: National Development Plan

NGOs: Non-governmental Organizations

OECD: Organisation for Economic Co-operation and Development

POGs: Product Opportunity Gaps

R&D: Research and Development

RTD: Research and Technological Development

SIT: Systematic Inventive Thinking

SPO: State Planning Organization

TQM: Total Quality Management

TSI: Turkish Statistical Institute

TDFT: Technology Development Foundation of Turkey

TUBITAK: The Scientific and Technological Research Council of Turkey

CHAPTER 1

INTRODUCTION

"Innovation is the implementation of a new or significantly improved product, service, process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD, 2005). In other words, "innovation is the process of making change, difference and novelty in the products, services and business manner to create economic and social benefit" (OECD, 1997).

"Firms innovate to defend their competitive position as well as to seek competitive advantage. A firm may take a reactive approach and innovate to prevent losing market share to an innovative competitor. Or it may take a proactive approach to gain a strategic market position relative to its competitors" (OECD, 2005). Innovation energizes existing people in an organization and attracts new ones. Organization's competitive advantage is provided by its people who create and implement new ideas. Organizations which do not innovate lose their innovative people. Innovation changes the organization from highest level to lowest levels. It also changes value chain of organization to support the product innovation (Maital and Seshadri, 2007).

Innovation is essential not only for private sector but also for public sector. “Technology and innovation are key drivers of increased growth performance. Innovation is critical to the success of organizations and ultimately the growth of economies. Countries reap the benefits of economic growth through innovation” (OECD, 2000).

Innovation in public sector is mostly seen as service innovation. “Service innovation is the introduction of a new or significantly improved service with respect to its characteristics or intended uses” (OECD, 2005). Service innovation provides significant benefits to the public organizations decreasing mistakes in the processes and providing easier, cheaper, quicker, and more secured services. In addition to this, offering a better service provides a competitive advantage.

1.1 Background and Rationale for the Study

Successful innovation occurs when an invention, related to a product, service or process in some part of the organization’s value chain, is joined with a business design, which in turn is implemented with discipline and skill through innovation management (Maital and Seshadri, 2007). Successful innovation management requires developing a strategic approach to innovation (Tidd et al, 2005). Howells (2005) claims that, an innovation model is essential to manage innovation process in the organization.

Importance of innovation management is obvious; however, there is no strategic approach to innovation in most of the public organizations and no comprehensive technological innovation model for Turkish public sector has emerged. This thesis study attempts to address this gap through the development of a new technological innovation model for public sector. It aims to detect technological innovation processes in the public organizations, inputs and outputs of the process, and stakeholders of the process. The new model will help effective management of

technological innovation processes in the public organizations and it will eliminate ad-hoc practices.

1.2 Methodological Considerations

The purpose of the thesis is to derive a new technological innovation model identifying technological innovation process in the public sector and stakeholders of the process. From the two approaches used in research studies, qualitative and quantitative, the qualitative approach is the most suitable to this research. This approach is more appropriate to this study because the problem focus is on understanding the full multi-dimensional, dynamic picture of the subject of study (Denzin and Lincoln, 2000). There are many qualitative research methods for different purposes. This thesis study used case study method as a research method and interviews are used as data collection technique.

1.3 Purpose of the Study

The purposes of this study are:

- To build a new technological innovation model for public sector to help successful management of innovation.
- To identify processes of technological innovation in the public sector.
- To identify stakeholders of the technological innovation process.
- To identify sources of innovation in the public sector.
- To identify obstacles to innovation in the public sector.
- To identify driving forces of innovation in the public sector.

1.4 Limitations

The following limitations are relevant to the study:

1. The number of organizations participated in this study is limited.
2. Validity of the study is limited to the reliability of the instruments used in this study.
3. Validity is limited to the honesty of the subjects' responses to the instruments used in this study.
4. This study is limited to strategically important public organizations in Turkey.
5. The sample size in this study is limited to the public organizations that perform technological innovation projects.

1.5 Plan of the Thesis

The thesis follows a sequential flow: literature review, methodology, case description and analysis, new technological innovation model for public sector, and discussion and conclusion.

Chapter 2 presents the results of the comprehensive review of relevant academic literature. The review investigates innovation related concepts such as characteristics of innovation, types of innovation, diffusion of innovation, innovation processes, types of innovators, importance of innovation, and existing models of innovation.

Chapter 3 presents the detailed rationale for the research methodology and describes the research process utilized in this thesis. The research process consisted of a six month continuous iterative and comprehensive literature study to develop a conceptual framework, a two month period of interviews with public organizations to collect data, and a three month period of to analyze the collected data and derive a new model.

Chapter 4 covers the qualitative inquiry findings from interviewing the public organizations. It includes case descriptions, case study questions, answers of the questions, and data analysis results of the cases.

Chapter 5 offers a new technological innovation model to the public interest and explains every stages and steps of the technological innovation model clarifying the technological innovation process in the public sector and stakeholders of the innovation process. Moreover, it explores sources of innovation, drivers, and obstacles to innovation in the public sector.

Chapter 6 presents the conclusion reached based upon this thesis study. Findings of the research are evaluated and discussed. Moreover, recommendations for further research are offered in this section.

CHAPTER 2

LITERATURE REVIEW

This chapter examines the relevant aspects of literature on invention and innovation concepts, characteristics of innovation, types of innovation, diffusion of innovation, innovation process, and types of innovators. Moreover, the concepts of importance of innovation, how organizations will innovate, and required components for successful innovation management are explained. Finally, the chapter ends explaining existing models of innovation. The literature review covers two main matters of the thesis study. First matter is forming an extensive review of relevant academic literature through continuous iterative and comprehensive literature study in order to develop a conceptual framework. Second, introduction of the existing innovation models to justify the new technological innovation model that will be offered.

2.1 Innovation

Innovation is the implementation of a new or significantly improved product, service, process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. The minimum requirement

for an innovation is that the product, process, marketing method or organizational method must be new to the firm (OECD, 2005). Innovation is solely what happens in the research and development centre. Innovation ought to be a process that pervades every single part of the organization's value chain, as oxygen pervades our atmosphere (Maital and Seshadri, 2007). An innovation is an idea, practice, or object perceived as new by an individual. If the idea seems new to the individual, it is an innovation (Rogers and Shoemaker, 1971).

Innovation has a different meaning from a management perspective, it is not a single action but a total process of interrelated sub processes. It is not just the conception of a new idea, nor the invention of a new device, nor the development of a new market. The process is all these things an integrated fashion (Myers and Marquis, 1969).

However innovation and invention are related concepts, they do not express the same meaning. Innovation is concerned with the commercial and practical application of inventions. It is the process of conversion of the invention into the economy. Whereas invention, as illustrated in Figure 2.1, is a process in which new idea is converted into a tangible product. Tidd (2005) claims that the following equation shows the relation between the two terms:

Innovation = theoretical conception + technical invention + commercial exploitation

Innovation depends on inventions but inventions need to be valuable for the growth of the organization. Innovation is the management of all the activities involved in the process of idea generation, technology development, manufacturing and marketing of a new product or process. Inventions are new discoveries, new ways of doing things, and new products. The process from new discovery to eventual product is the innovation process (Trott, 2002).

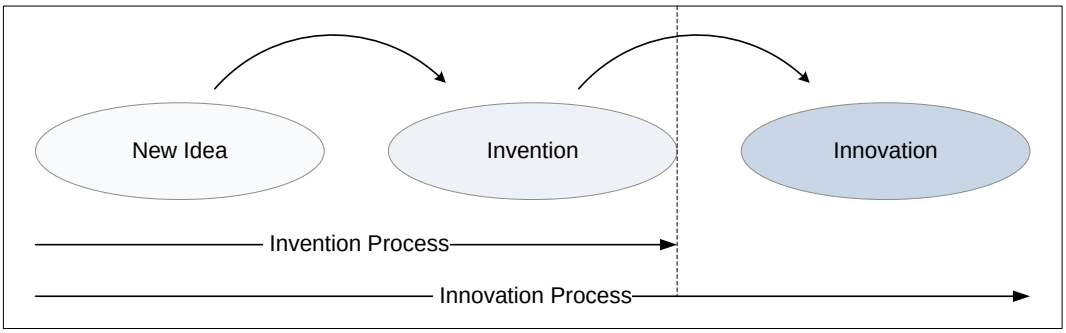

Figure 2.1: The Process from a New Idea to an Innovation (Trott, 2002)

Innovations have different characteristics that determine the rate of adoption. It may take a long time for an innovation to reach complete adoption and wide spread use. According to Rogers and Shoemaker (1971), the most important characteristics that affect the rate of adoption of innovations are:

- Competitive advantage is the degree to which an innovation is perceived as providing a better situation than competitors. The greater perception of competitive advantages of innovation the more rapid its rate of adoption.
- Compatibility is the degree to which an innovation is perceived as being compatible with the existing values, culture and user needs. An innovation that is not compatible with social values and culture will not be adopted easily in a social system.
- Complexity is the degree to which an innovation is recognized as difficult to understand and use. The degree of complexity of an innovation determines understandability and usability of it.
- Trialability is the degree to which an innovation is experimented. Innovations which can be tried by users will be adopted more quickly.
- Observability is the degree to which the results of an innovation are visible. The observable results of innovations increase the rate of adoption.

2.2 Types of Innovation

Innovations can be classified by their impact on product features as incremental innovation, standard innovation and radical innovation. “Incremental innovation is an innovation in which a new version of an existing product is created, by improving or altering some of its existing attributes. Standard innovation is an innovation in which one additional attribute is added to the product that did not exist before. Radical innovation is an innovation in which several significant new attributes are created which did not before exist, thus creating, essentially, a new product” (Maital and Grupp, 2000).

Innovation is at the hearth of economic change. Radical innovations shape big changes in the world, whereas incremental innovations fill in the process of change continuously (OECD, 2005). According to Trott (2002), innovations can be classified by their type as well. Table 2.1 illustrates classification of innovation according to types:

Table 2.1: Types of Innovation

Type of innovation	**Example**
Product innovation	The development of a new or improved product
Process innovation	The development of a new manufacturing process
Service innovation	The development of a new services
Organizational innovation	A new venture division, a new internal communication system
Management innovation	TQM systems, CRM systems, BPR
Production innovation	Just in time (JIT) manufacturing system, new production planning software
Marketing innovation	New financing arrangements, new sales approach

Source: Trott, 2002

The following definitions are adapted from OECD report (2005a). A product innovation is the introduction of a new or significantly improved product with respect to its characteristics or intended uses. This type of innovation includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. In the case of product innovation, the firm gets a monopoly position due either to a patent (legal monopoly) or to the delay before competitors can imitate it. This monopoly position allows the firm to set a higher price than would be possible in a competitive market, thereby gaining a rent.

A technological product innovation is the implementation or commercialization of a product which has improved performance characteristics such as to deliver objectively new or improved services to the consumer. A technological product is a source of competitive advantage for the innovator. Innovation is a key for creating and sustaining a competitive advantage. Moreover, the innovative firm gets a cost advantage over its competitors, which allows it to gain a higher mark-up at the prevailing market price or, depending on the depending on the elasticity of demand, to use a combination of lower price and higher mark-up than its competitors to gain market share and seek further rents.

A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products. Process innovation involves many small incremental improvements each of which is significant but together, leads to enormous productivity gains and cost savings. Process innovation requires participation of every worker and great persistence and patience (Maital and Grupp, 2000). OECD defines technological process innovation as the implementation of new or significantly improved production or delivery methods. It may involve changes in equipment, human resources, working methods or combination of these.

A service innovation is the introduction of a new or significantly improved service with respect to its characteristics or intended uses. Service innovation adds social and economical value and contributes to profit or addition to economic value.

An organizational innovation is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations. Organizational innovations can be intended to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction and labor productivity, gaining access to non-tradable assets and external resources or reducing costs of supplies.

OECD defines a management innovation as the implementation of a new management system in the firm's business practices. And it defines production innovation as the implementation of a new production system in the firm's business practices.

A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market, with the objective of increasing the firm's sales.

2.3 Technological Innovation

"Technology is knowledge applied to products or production processes" (Lefever, 1992). "Technology comes from employing and manipulating science into concepts, process and products" (Trott, 2002). "Technological innovation is the invention of new technology and the development and introduction into the marketplace of products, processes, or services based on the new technology" (Betz, 1998). According to Betz, technological innovation process includes some stages. First, a

new technology must be invented. Second, the new technology must be developed and embedded into new products, process, or services. Third, the technological innovation must be designed, produced, and marketed.

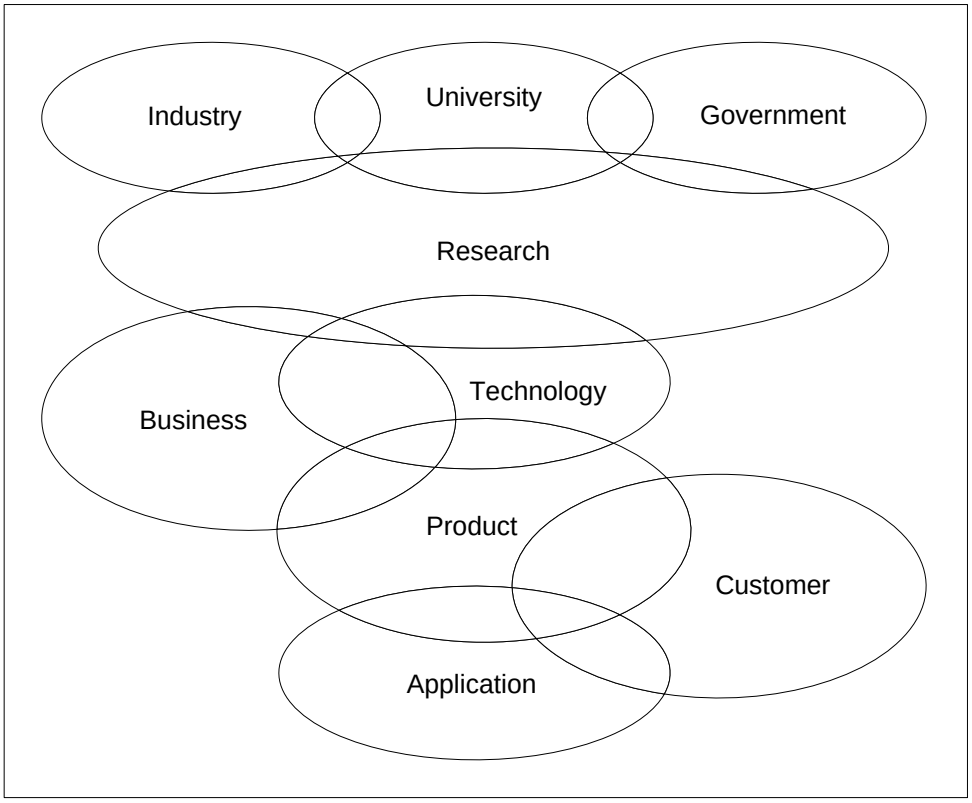

Figure 2.2: Interactions within Technological Innovation (Betz, 1998)

According to Betz (1998), there are many interactions within technological innovation among technology, business, industry, universities, government, product, customer, and application. As illustrated in Figure 2.2, technology is one of the knowledge bases that a business uses, and created in a business, university or public sector. Technological innovation activities of a business are bounded by research capabilities of industrial, university, and governmental R&D activities. Connection between technology, business and customer is through the product that business sells

to the customers. The research and technological capability of a business is known to a customer through the business product. The customer views the product from the context of the application in which the customer uses it. Research connects the industry, university, and public sectors to both a business and to technology. A business uses both research and technology in the design and production of products. Business and customers are connected through the products of the business. Customers experience both the product and application of the product. Business doesn't directly experience the customer's application, but it experiences the customer's application through its product.

2.4 Diffusion of Innovation

OECD (2005a) defines diffusion as, the way in which innovations spread, through market or non-market channels, from their first worldwide implementation to different countries and regions and to different industries, markets and firms. Without diffusion, an innovation has no economic impact.

Figure 2.3 illustrates stages of an innovation diffusion process; innovation, communication channels, time, and social system. New ideas, practices or objects communicate through channels, over time, among the members of a social system (Rogers and Shoemaker, 1971). S-M-C-R model developed by David Berlo (1960) consists of Source-Message-Channel-Receivers stages. S-M-C-R model stages correspond to stages of innovation diffusion process. The receivers are members of a social system, the channels are the way of innovation spreads, the message is a new idea, the source is the origin of the innovation, and the effects are changes in the social system regarding the innovation (Rogers and Shoemaker, 1971).

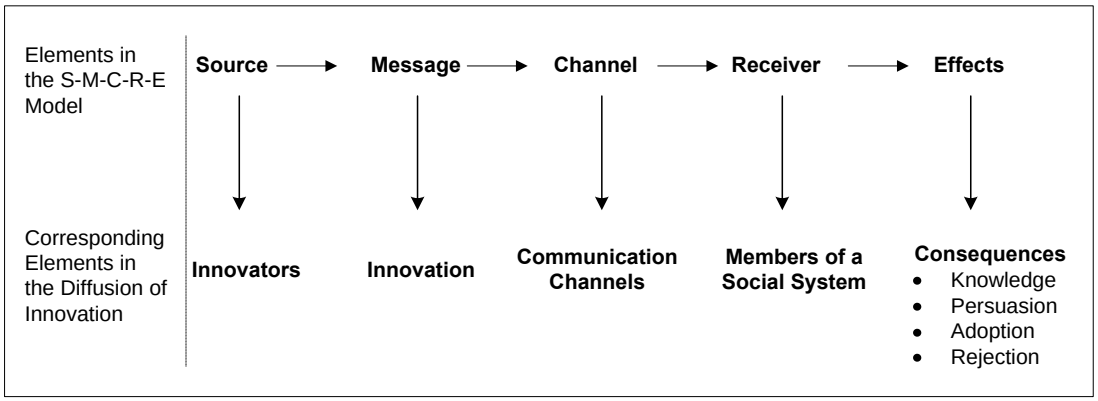

Figure 2.3: Elements in the Diffusion of Innovation (David Berlo, 1960)

Consequences of innovations are the changes that occur within a social system as a result of the diffusion of an innovation. Consequences of an innovation can be consciousness, persuasion, adoption or rejection (Rogers and Shoemaker, 1971).

2.5 Innovation Process

According to Trott (2002), a firm manages its resources over time and develops capabilities that affect its innovation performance. Figure 2.4 depicts stakeholders in the innovation process. Innovation process includes an economic perspective, a business management strategy perspective and an organizational behavior to manage internal activities. Firms form relationship with other firms and trade, compete and corporate with each other. Individuals within the firm affect process of innovation.

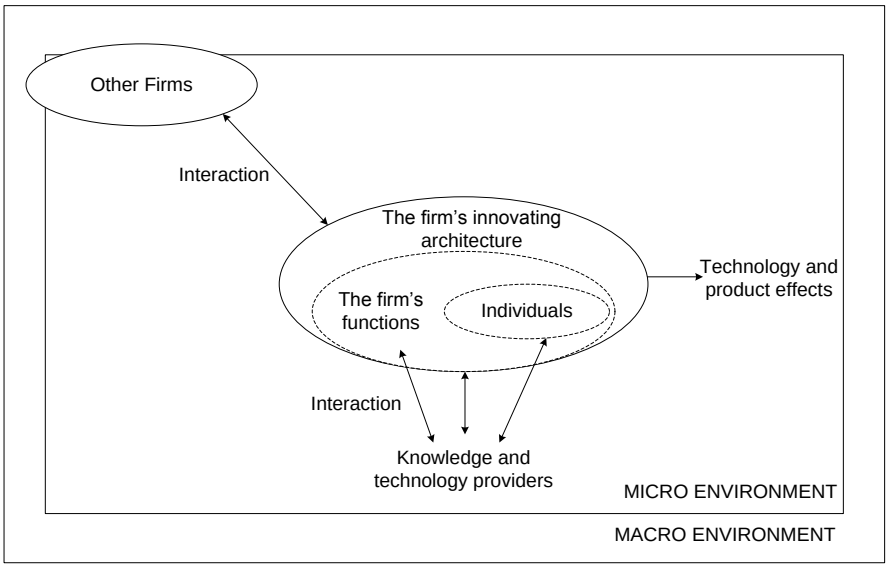

Figure 2.4: Stakeholders in the Innovation Process (Trott, 2002)

Firm's organizational architecture clarifies its way of innovation over time. The organizational architecture contains firm's internal design including its functions and relationship with suppliers, competitors and customers. All of these components consist of micro environment. Finally micro environment effects the macro environment.

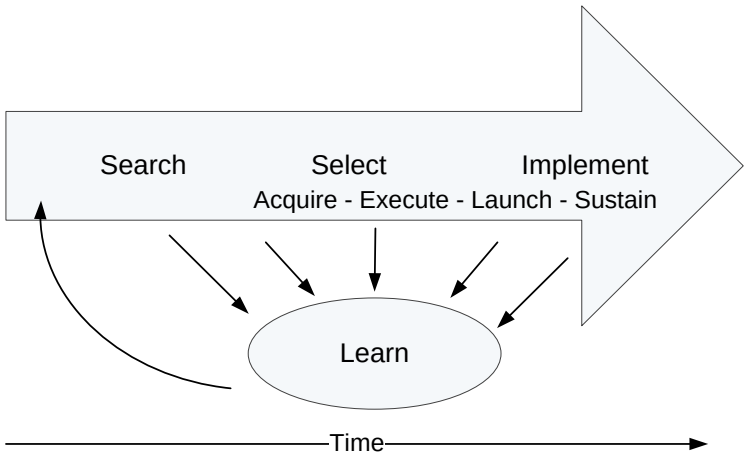

Figure 2.5: Innovation Processes (Tidd et al, 2001)

According to Tidd (2001), the innovation process includes four phases. Figure 2.5 illustrates innovation processes. The four phases are:

1. Searching the environment for signals about threats and opportunities for change.

2. Selecting which signals will be responded.

3. Implementing the new idea into product or service and launching it to the market. This phase involves four stages:
    - Acquiring knowledge resources to enable innovation
    - Executing the project
    - Launching the innovation and managing the adaptation process
    - Sustaining adoption and re-innovation

4. Learning the management of innovation process to improve the way of process management.

2.6 Sources of Innovation

Innovation can arise from individuals, universities, firms, private nonprofit organizations or public organizations. An important source of innovation comes from linkages between the sources. Figure 2.6 illustrates sources of innovation as composing a complex system where any innovation may emerge from one or more components of the system or linkages between them.

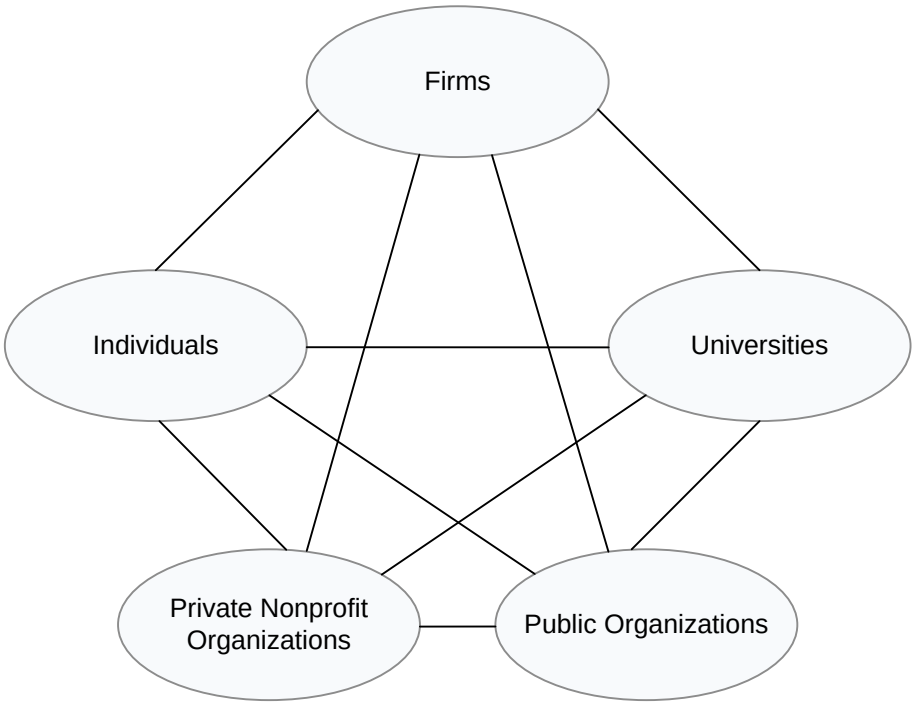

Figure 2.6: Sources of Innovation (Schilling, 2005)

“Creative people have some distinctive characteristics. Innovators are visionaries. Vision is an envisioned future or a photograph of the future. It is feasible, yet bold and audacious; it challenges to stretch and it excites and energizes them. Vision occurs at the intersection of three circles passion, excellence and resources. All innovations carry a vision at their core. And all great innovators are capable of envisioning the future boldly to inspire those around them” (Collins, 1996). According to Csikszentmihalyi (1996), innovators are independent thinkers. Most of the innovators occur in the area where studied science or engineering. Innovators like to remain in innovative company. Innovators are stubbornly persistent; they do not give up easily or at all until see their ideas implemented.

2.6.1 Individuals

According to Mihaly Csikszentmihalyi who is professor of Human Development in the University of Chicago, individuals are key components of the innovation process. Individuals create new ideas, associations and define problems to lead inventions. Individuals can learn to be creative and can innovate successfully. “Creativity is an acquired, learned skill, not an inherited skill come from genes. Innovation requires motivation to desire innovation and ability to innovate. Innovators want to create ideas and willing to spend effort when they motivated” (Csikszentmihalyi, 1996).

Csikszentmihalyi identifies nine main characteristics of innovative people:

- Clear goals at every step,
- Immediate feedback,
- Balance between the level of difficulty of a task and the skill required to accomplish it,
- Action and awareness are merged,
- All distractions are ignored,
- There is no fear of failure,
- Self consciousness disappears,
- The sense of time disappears,
- The creative activity is autolectic.

An individual’s creative ability is a function of his or her intellectual abilities, knowledge, personality, motivation, style of thinking and environment. The most important intellectual abilities for creative thinking include the ability to look at problems in unusual ways and the ability to analyze valuable ideas (Schilling, 2005).

Individuals have an important role in the innovation process. “The innovation process is essentially a people process and that organizational structure, formal decision making processes, delegation of authority and other formal aspects a so

called well run company are not necessary conditions for successful innovation" (Rubenstein et al, 1976). Table 2.2 illustrates key roles of individuals in the innovation process.

Table 2.2: Key Individual Roles within the Innovation Process

Individual	**Key role**
Technical Innovator	Generates new ideas and finds new and different ways of doing things.
Technical/Commercial Scanner	Researches vast amounts of information from outside the organization through networks to enhance market and technical information.
Gatekeeper	Keeps informed of related developments that occur outside the organization to keep knowledge of organization up to date.
Product Champion	Sells new ideas to others in the organization. Acquires resources.
Project Leader	Plans an organize innovation projects. Provides the team with leadership and motivation.
Sponsor	Provides legitimacy and organizational confidence in the project. Helps the project team to get needs and elevates constraints.

Source: Trott, 2002

2.6.2 Innovative Teams

Most of the time, innovation occurs within teams. The possibility of a technology driven stat up succeeding increases dramatically where there are teams rather than just one (Roberts, 1991). Google was founded by Sergey Brin and Larry Page; Intel, by Robert by Noyce and Gordon Moore. Successful innovation management requires

technological, social, business, administrative skills. Nevertheless there are few individuals who have all of the needed skills.

Successful teams select their members for skills and potential, establish urgency, set demanding performance goals and offer clear direction, set clear rules of behavior, challenge the group regularly with new facts and information, spend time together, and exploit feedback, reward and recognition (Katzenbach and Smith, 1993). Collaboration increases creativity. People are most creative when they cooperate and work together in teams. Successful innovations are performed when teams collaborate to explore diverse points of view, synergy, and complementary skills (Amabile, 1983).

2.6.3 Organizations

The creativity of the organizations is a function of creativity of the individuals within the organization and a variety of social process and contextual factors that shape the way those individuals interact and behave. The organization's structure, routines, and incentives could force or thwart creativity (Schilling, 2005). According to Schilling, one of the sources of innovation is the firm's research and development activities.

Firms that are successful innovators use multiple sources to innovate:

- In-house research and development
- Linkages to customers
- Linkages to an external network of firms such as competitors and suppliers
- Linkages to external sources of scientific and technical information, such as universities, government laboratories.

Organizations obtain competitive advantage because of innovation and new product development. Table 2.3 illustrates the main organizational characteristics that are necessary for successful innovation.

Table 2.3: Organizational Characteristics That Facilitate Innovation

Organizational Requirement	**Characterized by**
Growth orientation	A commitment to long term growth rather than shot term profit
Vigilance	The ability of the organization to be aware of threats and opportunities
Commitment to technology	The willingness to invest in the long term development of technology
Acceptance of risk	The willingness to include risky opportunities in a balanced portfolio
Cross-functional cooperation	The willingness to work together across functions
Receptivity	The ability to be aware of to identify and to take effective advantage of externally developed technology
Slack	The ability to manage innovation dilemma and provide room for creativity
Adaptability	A readiness to accept change
Diverse range of skills	A combination of specialization and diversity of knowledge and skills

Source: Trott, 2002

According to Trott, one of the main characteristics of innovative organization is being growth orientation. Organizations that are innovative have a long term plan to growth in the business whereas organizations that are established to exploit a short term opportunity have no chance to innovate. Vigilance is the ability of an organization to be aware of threats and opportunities. It requires continual scanning and extended period of time to research latest development to keep knowledge of organization up to date. Innovative organizations have a long term approach to invest development of technology. This approach fosters creativity and attracts good

scientists. Organizations include risky opportunities in their balanced portfolio of innovation projects to make risk assessment. Inter departmental relationships are arranged well and departments works together within a harmony in innovative organizations. Receptivity is the ability to be aware of to identify and to take effective advantage of externally developed technology. Technology based innovations involves a combination of several technologies. It is impossible for organizations to develop all of the technology. Organizations should be open to take beneficial technology.

Organization needs a strict and controlled environment to manage routines. But then the development of new ideas, product and services requires a creativity and flexible environment. Innovative organizations manage this dilemma by providing free rooms to think experiment and discuss ideas and be creative. Organizations need the ability to adapt to the changing environment for successful innovation process. Organizations require diverse range of skills and knowledge. Ability to manage this diversity of knowledge and skills is needed for a successful innovation process. Governments invest in research through their public organizations such as government funded research institutions, development and support organizations, and science parks. Private nonprofit organization, such as private research institutes, nonprofit hospitals, associations, societies, foundations contribute to innovation activities (Trott, 2002).

2.6.3.1 Propagating Innovation in the Organization

Innovation forms basics of many companies' activities. "Not to innovate is to die" (Christopher Freeman, 1982). In order to survive organizations should try to foster innovation activities in the organization. Figure 2.7 illustrates the role of organizational environment in the innovation process. Innovation occurs when people are encouraged, inspired by vision, provided free time and resources and an appropriate environment (Maital and Seshadri, 2007).

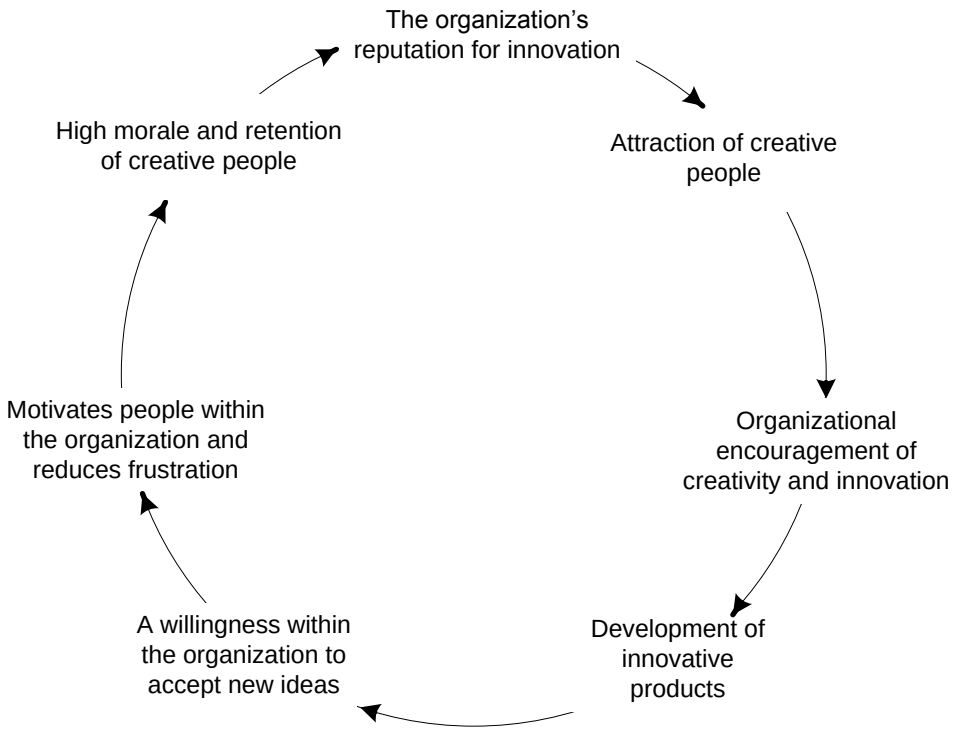

Figure 2.7: Propagating Innovation in the Organization (Maital and Seshadri, 2007)

The reputation of the organization is effected from several factors and takes many years. Investment rate on R&D, achieving new products or new research at the right time are important factors to shape reputation of the organization. Attraction of creative people is important for innovative organizations. Creative people seek for organizations which have a reputation for innovation and have accomplished successful innovation projects (Maital and Seshadri, 2007).

According to Maital and Seshadri, the organization should try to build slack in to the system to provide people with the time to be creative. Moreover, the organization should build a tolerant environment for mistakes to encourage people to try new ideas. Organizations work in bureaucratic, conservative and risk aware environment opposite innovative individuals and teams, so their work is much harder. But building slack in to the organization reduces negative impact of bureaucracy.

Fostering innovative and creative culture in the organization is the most important key factor of innovativeness. Development of new products in the organization leads to further success. Organizations should adapt new ideas and changes. Once a new idea has been accepted to implement it should be completed. Individuals want to see their ideas are appreciated and contributing the success of the organization. If new ideas are appreciated and are taken into consideration, individuals will be motivated and encouraged. On the other hand if good ideas are ignored this mistake will lead to frustration.

Organizations should create a rewarding and enjoyable working environment to contribute high morale within the organization. Such an environment helps to retain creative people and reinforce the company's innovative capabilities. People are least creative when they are unhappy, pressured, stressed, and depressed. They are most creative when they are under zero pressure and are given adequate time (Maital and Seshadri, 2007).

2.6.3.2 The Dilemma of Innovation in the Innovative Organization

Organizations are bureaucratic, conservative and risk aware workplace. They need to balance stability and creativity (See Figure 2.8).

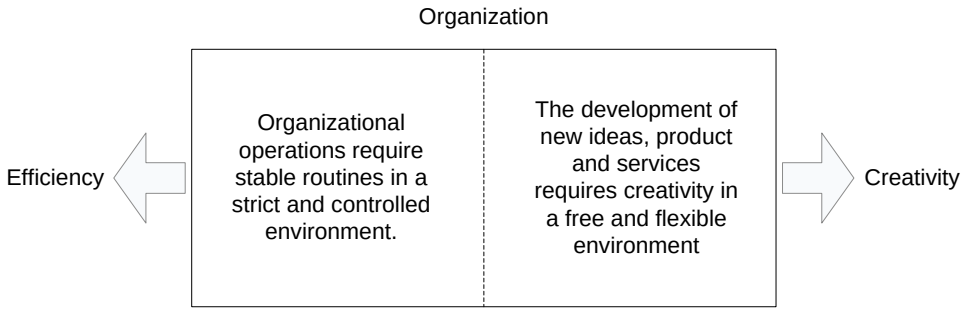

Figure 2.8: Balance between Efficiency and Creativity (Trott, 2002)

Organizations require stability to accomplish tasks efficiently and quickly. On the other hand organizations need to develop new ideas and new products to be competitive. Therefore organizations need to provide a creative environment where new ideas are created (Trott, 2002).

2.6.4 Universities

Universities encourage their faculty to make successful innovations. Universities contribute to innovation through the publication of research results and testing new products.

2.7 How to Innovate

Each year thirty thousand new consumer products are launched; over 90 percent of them fail after marketing professionals have spent massive amounts of money trying to understand what their consumers want (Christensen, 2005). Effective, applied creativity, the foundation of innovation, is structured, disciplined and systematic. Great innovators have a system (Maital and Seshadri, 2007). An innovator should observe and pay attention to four different areas to make profitable innovations:

- Product
- Customer
- Organization
- Inner voice

2.7.1 Product

According to Maital and Seshadri, innovators should deal with the product to change and improve it. There are two major approaches providing a systematic and structured method to develop new ideas: Systematic Inventive Thinking approach

and Product Profile method. Systematic Inventive Thinking (SIT) is a method for generating innovative ideas and it aims to create a systematic, algorithmic approach to the invention of new systems and reform old ones. The SIT approach suggests five patterns for products to guide successful innovations (Maital and Seshadri, 2007).

1. Subtraction: Adding new features on an existing product is assumed as mandatory to innovate. But this assumption is wrong because most of the products today are excessively complicated and hard to understand and use. SIT suggests subtraction of unnecessary features to provide powerful innovations.

2. Addition: Innovators should observe customers' usage of the product and find a way for strengthening the product's unique value. The most powerful ideas come from simply combining two existing ideas nobody else ever thought to unite (Pink, 2005). Moreover, combining two or more product features to generate only one product performing two different functions provides effective cost reduction.

3. Division: Divide product into its component parts according to its function, and then reconfigure them in an innovative way to create new benefits. The walkman is resulted by division of a tape recorders record/play component from its speakers to make it smaller.

4. Multiplication: Innovators can multiply an innovation benefiting from scale and scope. Today there are more than 200 different version of walkman created by multiplication of one innovative design.

5. Transformation: Innovators can transform a product by giving an existing feature a new role.

Maital and Seshadri declare that, similar to SIT approach, Product Profile method is used to profile your product in order to generate innovation. The Product Profile method consists of four steps:

1. Choose the major characteristics or attributes that capture how product, process or service creates value for customers. These attributes must be measurable and subjective.
2. Measure those attributes using your benchmark and do the same for competing products.
3. Taking into account all of the attributes analyze, the products' strengths and weaknesses.
4. Use the results of product profile for innovation by answering the following questions:
    - Can I create an innovative product by eliminating some features, using the saving and resources to strengthen others?
    - Can I create an innovative product by adding one or more completely new features?

2.7.2 Customer

Many successful innovations come from companies' major customers. Eric von Hippel has found in his research that 77 percent of innovations in scientific instruments are developed by users when they inform to company by saying "If you produce such a product, I will buy thousand of them" (Von Hippel, 1988). Closer contact with customers will help organizations to discover their customer's valuable innovations (Maital and Seshadri, 2007).

There are three useful approaches to observe customers: Emphatic Design, Democratizing Innovation, and Product Opportunity Gaps. For the first approach, Emphatic Design, observing customers to learn how they use products and services

in real word settings, during everyday routines is very important (Leonard, 1997). According to Leonard, Emphatic Design consists of the following four stages:

- Observe
- Capture data
- Reflect and analyze
- Brainstorm for solutions

Second approach to observe customer is democratizing innovation. "Democratizing innovation is one of the most powerful models of innovation involves using lead users, or key customers, as full-blown partners in the process of new product design starting with ideation" (Maital and Seshadri, 2007).

Third approach is Product Opportunity Gaps that is a useful approach to listen customers. "Product Opportunity Gaps is the gap between what is currently on the market and the possibility for new or significantly improved products that results from emerging trends" (Cagan and Vogel, 2002). Vogel says, this approach uses social, economic and technological factors that produce new trends and creates POGs.

2.7.3 Organization

Every organization needs an innovation system to create, develop, design, plan, produce and market innovative products, service, and processes (Maital and Seshadri, 2007). The innovation system of each organization must be defined, examined, and where needed altered. Where doesn't have such a system must be developed. Innovation mustn't be left to random forces. According to Maital and Seshadri, there is no one-size-fit-all innovation system that matches every organization's needs, culture, and values. Organizations must examine their culture, structure, values, resources, needs than build their own innovation system. One of the

determinants of an organizations innovation system is the search balance between inspiration and perspiration. Organizations try to balance between creativity and discipline during an innovation project. Many organizations focus on operational discipline and cost reduction. The discipline and cost reduction entails shouldn't obstacle creativity.

2.7.4 Inner Voice

Listening to yourself is about how un-conscious part of your mind knows things the conscious brain doesn't and how innovators consult with, and listen to it. Great innovators know when and how listen to the inner voice. Many ideas are born in brains (Maital and Seshadri, 2007).

2.7.5 Tools and Techniques for Innovation

Mind maps, 6 thinking hats, brain storming, and brainstorm software are common tools and techniques used to generate innovation. Wikipedia defines mind map, which is the most familiar technique, as a diagram used to represent words, ideas, tasks or other items linked to and arranged around a central key word or idea. It is used to generate, visualize, structures, classify ideas. Moreover, it can be utilized as an aid in study, organization, problem solving, decision making, and writing. Following list shows other techniques used for innovation:

- Random Word
- Random Picture
- False Rules
- Random Website
- SCAMPER
- Search & Reapply
- Challenge Facts
- Escape
- Analogies
- Wishful Thinking
- Thesaurus

2.8 Importance of Innovation

“Firms innovate to defend their competitive position as well as to seek competitive advantage. A firm may take a reactive approach and innovate to prevent losing market share to an innovative competitor. Or it may take a proactive approach to gain a strategic market position relative to its competitors” (OECD, 2005).

The organizations which can manage knowledge and technological experience and skills to create new products, process and services have a competitive advantage. Innovation contributes to create new products which increase and retain market shares and profitability (Tidd et al, 2001). The environment especially technology is constantly changing; new product development is an important capability in such an environment for the organization.

Process innovation provides a powerful competitive advantage by doing something in a better and new way no one else can. Similarly, offering a better service provides a competitive advantage. Citibank captured a strong market position by offering the ATM service, and become a technology leader developing this process innovation (Tidd et al, 2001). The fundamental goal of the innovation is sustained competitive advantage. Sustained competitive advantage requires sustained innovation. Figure 2.9 illustrates the process from invention through innovation to competitive advantage.

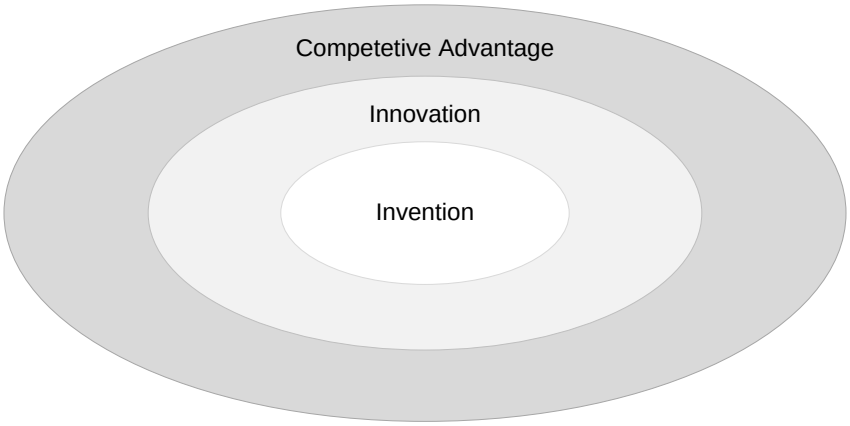

Figure 2.9: From Invention through Innovation to Competitive Advantage (Maital and Seshadri, 2007)

Maital and Seshadri (2007) define invention as, creation of novel services, products and production techniques. According to them, inventions become innovations when they are refined in a manner that brings them successfully to market. Innovation creates sustained competitive advantage when they are implemented in a manner that creates and sustains significant added value for customers above that created by competitors. They claim there are three key reasons to innovate:

- Energize your staff
- Build growth and profit
- Survive

Innovation energizes existing people in an organization and attracts new ones. Organization's competitive advantage is provided by its people who create and implement new ideas. Organizations which do not innovate lose their innovative people. Innovation changes the organization from highest level to lowest levels. It also changes value chain of organization to support the product innovation. Innovation provides high sustained growth and profit. Innovative products are achieved higher prices and higher profit. Innovation helps to organizations to build

market share. Innovating organizations follow three steps, illustrated in Figure 2.10, to provide growth and profit.

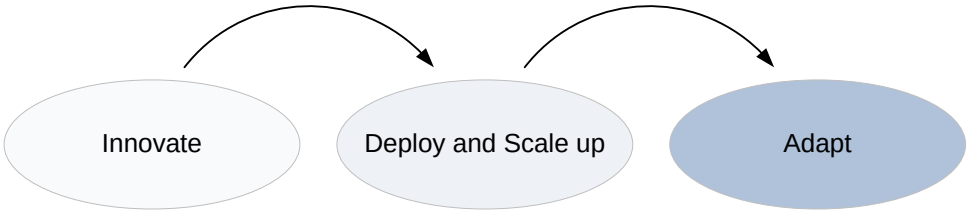

Figure 2.10: Three Steps for Growth and Profit (Maital and Seshadri, 2007)

After innovation organizations deploy; market, distribute, sell, and service the products. Adapt is a vital step after deploy. In this step local adaptation of the product is realized. Organizations best adapted to their environments, and best able to change in response to changes in that environment, are most likely to survive. Innovation is a necessity for survival for the organizations in global market. The organizations that lack of innovation are condemned to disappear (Maital and Seshadri, 2007).

2.9 Innovation Management

According to Tidd et al, (2001), successful innovation occurs when an invention, related to a product, service or process in some part of the organization's value chain, is joined with a business design, which in turn is implemented with discipline and skill through innovation management. Successful innovation management requires four main routines:

- Successful innovation is strategy based
- Successful innovation depends on effective external linkages
- Successful innovation requires developing and using effective implementing mechanisms and structures
- Successful innovation only happens in a supportive organization context

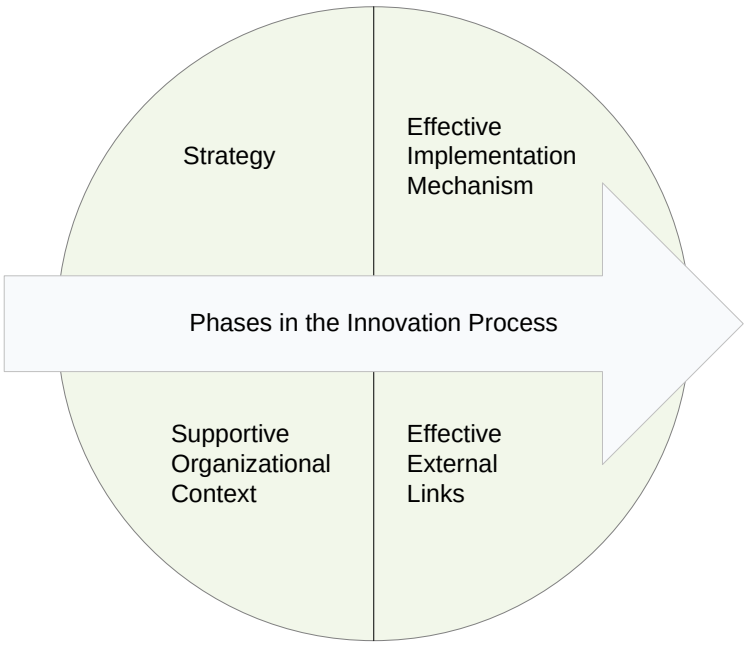

Figure 2.11: Components of Successful Innovation Management (Tidd et al, 2001)

Figure 2.11 represents four components of successful innovation management process. The arrow represents the innovation process which must be managed in any organization, while the circle contains the required components for successful innovation management (Tidd et al, 2001).

"Successful innovation management requires taking a strategic approach to innovation and the problem of its management. Effective linkages with external environment provide strong interaction with markets, competitors, suppliers and

customers. Effective implementation mechanism is needed to transform new ideas into new product, process or services. Innovation depends on having a supportive organizational context in which creative ideas can be emerged and implemented" (Tidd et al, 2005). All of these are requirements to manage innovation process within the organization successfully.

2.10 Models of Innovation

"Innovation occurs through the interaction of the science and technology based institutions such as, universities and techno parks, technological developments dominated by organizations and market needs" (Trott, 2002). Figure 2.12 shows interactions that form the conceptual framework of innovation.

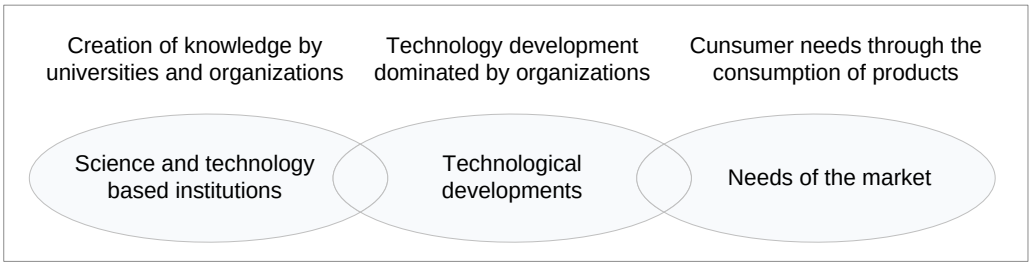

Figure 2.12: Conceptual Framework of Innovation (Trott, 2002)

Innovation models have changed in time. Table 2.4 shows the historical development of the innovation models.

Table 2.4: Models of Innovation

Date	Model	Characteristics
1950/60	Technology Push	Simple linear sequential process. Emphasis on R&D. The marketing is fed from R&D.
1970s	Market Pull	Simple linear sequential process. Emphasis on marketing. The market is source for directing R&D. R&D has a reactive role.
1980s	Coupling Model	Emphasis on integrating R&D and marketing.
1980/90	Interactive Model	Combinations of push and pull.
2000s	Network Model	Emphasis on external linkages.

Source: Trott, 2002

2.10.1 Linear Models of Innovation

The interaction between the science and technology based institutions, technological developments and market needs forms the basis of innovation models. At 1950s innovation has been viewed as a sequence of separable stages and activities. Linear model is developed with two variations for product innovation. First, Technology Push model that is technology driven is developed. The Technology Push model supposes that in order to make innovation scientist makes discoveries, technologists apply them to develop product ideas and engineers and designers produce them. As a last step marketing department promotes the product to the customers. This model lays emphasis on R&D. Marketing is fed from R&D (See Figure 2.13). This model can be applied to a few cases because it is not applicable for cases where innovation follows changeable route, not a linear sequential route (Trott, 2002).

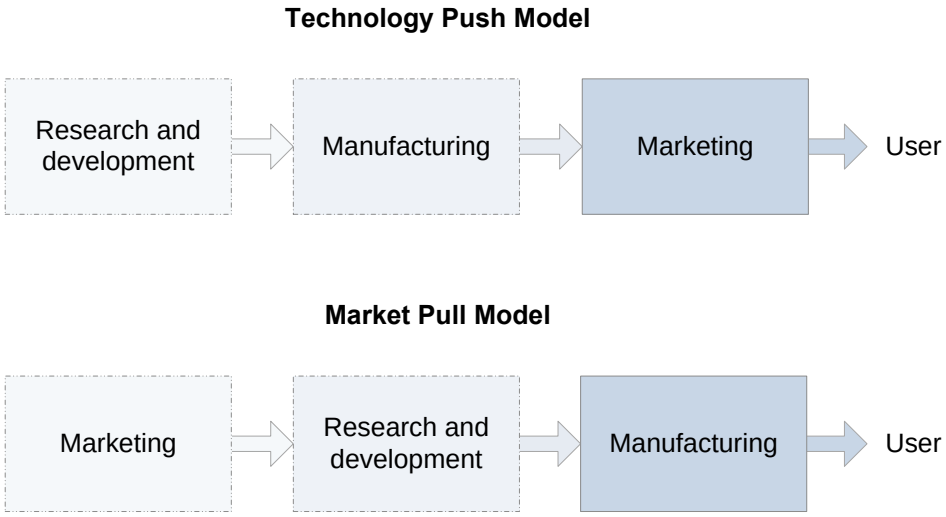

Figure 2.13: Linear Models of Innovation (Trott, 2002)

At 1970s marketing is started to influential in the innovation process. The second linear model of innovation Market Pull model is developed. Market Pull model lays emphasis on marketing and customer needs. Market needs determines R&D, engineering and manufacturing activities (See Figure 2.13).

2.10.2 Simultaneous Coupling Model

The linear models of innovation established on the idea of innovation processes follow a linear sequential route. Therefore the linear model is only able to show where the first idea for innovation is started and where the idea is transformed to a new product.

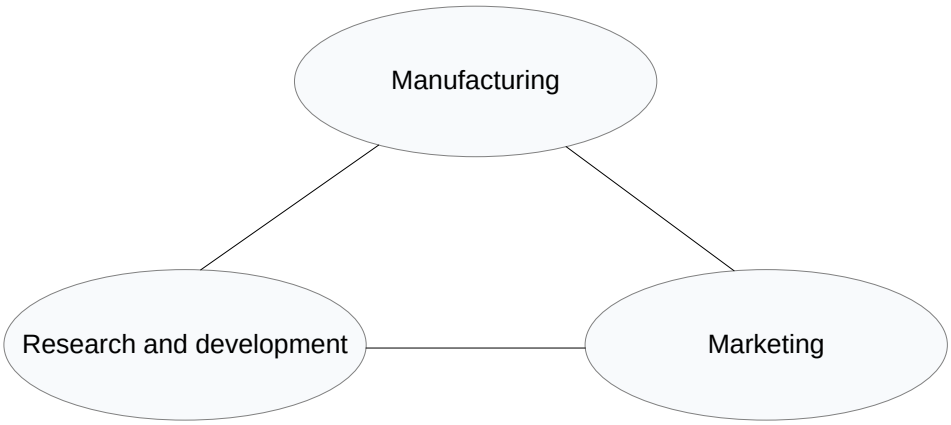

Figure 2.14: The Simultaneous Coupling Model (Trott, 2002)

The simultaneous coupling model shown in Figure 2.14 suggests that innovation is the result of the simultaneous coupling of the three functions; manufacturing, R&D, and marketing (Trott, 2002).

2.10.3 Interactive Model

The interactive model generates the idea and links in the combination of technology push model and market pull models. This model shown in Figure 2.15 suggests that innovation is the result of the interaction of the market needs, the science and technology based institutions and technology developments. There is no starting point, data flows used to indicate that innovation can occur on various points. Innovation process progresses on a complex set of communication path including internal and external linkages over that knowledge is transferred. Main organizational functions such as: R&D, manufacturing and marketing take part in the center of the model.

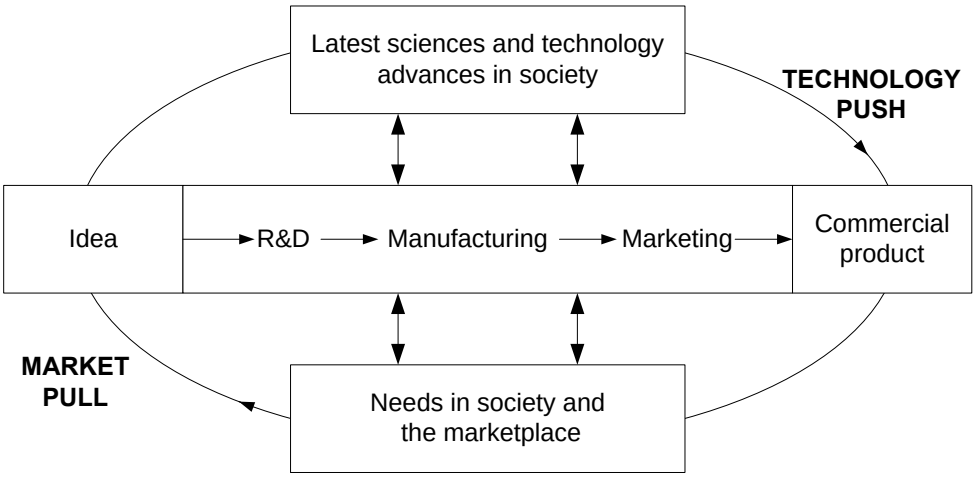

Figure 2.15: The Interactive Model (Trott, 2002)

There is a linkage between market place, science bases institutions and organizational functions. Generation of ideas is provided by feedbacks received from three basic components: organization capabilities, market needs, and science and technology base (Trott, 2002).

2.10.4 Network Model

Network model emphasizes on interaction of organization functions inside the organization and interaction of these functions with external environment. In the organization there may be several functions depending on the business processes of the organization. The network model, illustrated in Figure 2.16, identifies three main organizational functions: business planning and strategy, R&D and manufacturing, and marketing. Scientists and engineers in the organization interact with universities about scientific and technological development.

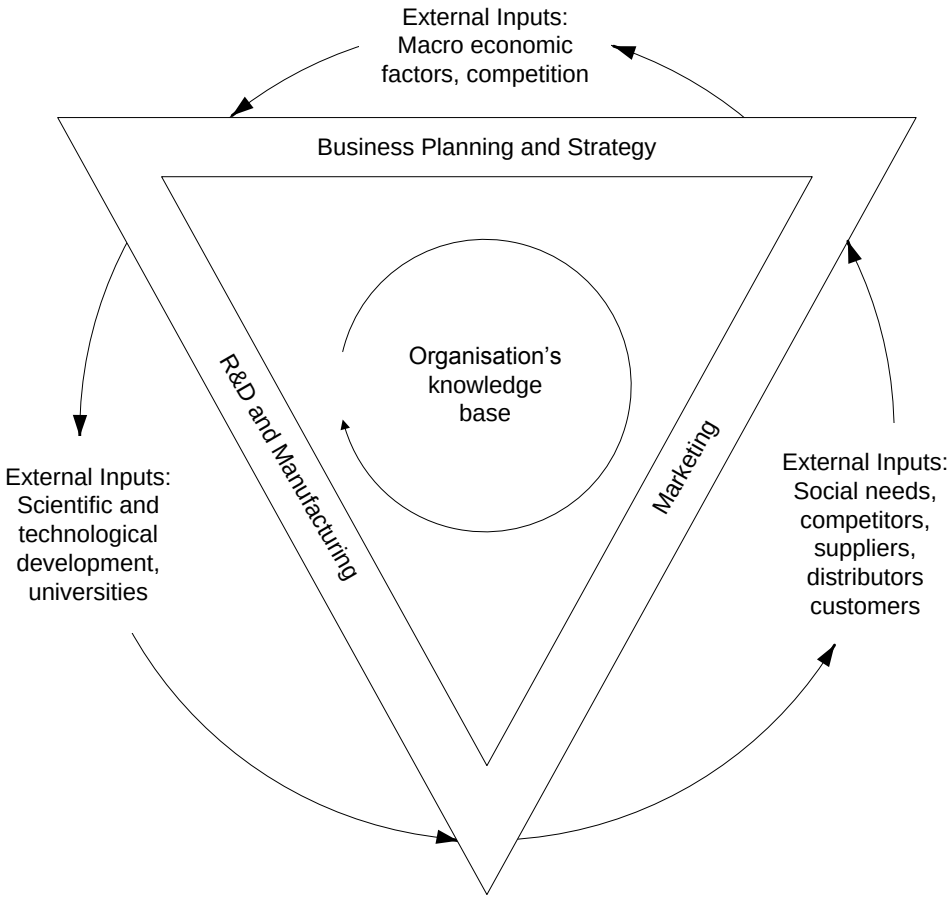

Figure 2.16: Network Model (Trott, 2002)

Marketing department interacts with competitors, suppliers, distributors and customers to understand social needs. Management interacts with a wide variety of external intuitions such as government units to determine business plan and business strategy. All of the interactions contribute the knowledge base of the organization to form successful innovation management (Trott, 2002).

CHAPTER 3

METHODOLOGY

This chapter provides the rationale for the methodology selection and explains the research process.

3.1 Methodology Selection

The purpose of the thesis is to derive a new technological innovation model identifying technological innovation process in the public sector and inputs and outputs of the process. There are two approaches of research study; qualitative and quantitative. The qualitative approach is more appropriate to this study because the problem focus is on understanding the full multi-dimensional, dynamic picture of the subject of study (Denzin and Lincoln, 2000). Qualitative research is appropriate when describing, understanding, and explaining complex phenomena, for example the relationships, patterns and configurations among factors; or the context in which activities occur (Smith and Dowling, 2001).

There are several qualitative research strategies for different purposes. Research strategy is developing the rationale for research by determining what questions to ask and understanding how they impact the purpose and objectives of the research. There are five major research strategies used in the social science; experiment, survey, archival analysis, history and case study. The suitable research strategy could be determined by looking three conditions: First, the type of research questions; secondly, the degree of investigator control possible; and finally, the degree of focus on contemporary events desired (Yin, 1994).

Case study is one of the major research strategies. “Case study is an empirical inquiry which investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used” (Yin, 1984).

Researchers from many disciplines use the case study method to build upon theory, to produce new theory, to dispute or challenge theory, to explain a situation, to provide a basis to apply solutions to situations, to explore, or to describe an object or phenomenon. The advantages of the case study method are its applicability to real-life, contemporary, human situations and its public accessibility through written reports. The case study is the most flexible of all research designs, allowing the researcher to retain the holistic characteristics of real-life events while investigating empirical events. Compared to other methods, the strength of the case study method is its ability to examine, in-depth, a “case” within its “real-life” context (Schell, 1992).

The case study method is best applied when research addresses descriptive or explanatory questions and aims to produce a first-hand understanding of people and events. The distinctive topics for applying the case study method arise from at least two situations. First and the most important, the case study method is appropriate when your research addresses either a descriptive question or an explanatory question. Second, you may want to illuminate a particular situation, to get a close

understanding of it. The case study method helps you to make direct observations and collect data in natural settings (Bromley, 1986).

The purpose of this study was to form a new technological innovation model for public sector understanding the processes of the technological innovation projects. Considering that, the case study emerges as one of the best research approaches to cover the purpose of this study. First this study is queried using how and why questions to find out the processes of the technological innovation. Secondly, researcher can exercise little control on the events through the research and finally, this research focuses on contemporary events.

According to Yin (1984), case studies can be classified into three categories: the exploratory, the descriptive and the explanatory. The research questions framed as "who", "what", "where", "how", and "why" determine the relevant strategy to be used. In the current study, the nature of the questions leads to an explanatory-exploratory case study. The unit of analysis in a case study could be "an individual, a community, an organization, a nation-state, an empire, or a civilization". The current study used the case study organization as the unit of analysis.

In summary, the purpose of this study is to derive a new technological innovation model for public sector identifying technological innovation process and inputs and outputs of the process. This model aims to help effective management of technological innovation and eliminate ad-hoc practices in the public organizations. This study used case study as a research strategy and data gathered through case studies are qualitative.

3.2 Research Process

Table 3.1 illustrates research process and used methods, tools and techniques during the research.

Table 3.1: Research Process

Research Process	Methodology	Tools & Techniques
1. Literature review	Literature research	E-databases, e-books, printed books
2. Setting the research questions	Pilot study	Problem solving
3. Case and interviewee selection	Field study	Perfection analysis
4. Data collection	Case study	Interviews
5. Data analysis	Pattern matching	Data sets
6. Derivation of the model	Integration	MS Visio
7. Justification of the model	Reviewing, evaluation	E-databases, e-books, printed books

3.2.1 Literature Review

Literature review provided a comprehensive review of relevant academic literature related to the innovation. During the study total 473 academic papers and articles are analyzed. On the other hand total 20 books related to subject are analyzed. Literature review helped to build a conceptual framework and obtained information is used during the study. Table 3.2 illustrates covered areas during the literature review.

Table 3.2: Covered Areas during the Literature Review

Theme	**Number of Papers Analyzed**
Innovation	74
Innovation Management	163
Technological Innovation	21
Innovation Models	15
Innovation in Turkey	32
Innovation in Other Countries	13
Innovation Reports	91
Innovation Indicators	16
Research Methods	43
Data Analysis Techniques	5
Total	**473**
Theme	**Number of Books Analyzed**
Innovation	5
Product Innovation	1
Innovation Management	9
Management of Technological Innovation	3
Case Study Research	2
Total	**20**

3.2.2 Setting the Research Questions

Research questions are prepared before interviews to meet the research problem. Appendix B contains questions asked to reach purposes to the research study. There are two types of questions in Appendix B. First type of questions that are called research questions contains the question that constitutes the basis of this research. Second types of questions are called interview questions. This type of questions

consist a set of questions that are expanded version of research questions asked to the interviewee.

A pilot study is conducted in the Ministry of National Education to test accuracy of the research questions. The results of the pilot study indicate that the research questions are suitable and correct to meet aim of the study.

3.2.3 Case and Interviewee Selection

Case selection depends on the purpose of the study. It is crucial to determine where to look for cases and evidence that will satisfy the purpose of the study and answer the research questions.

A case study can consist of single or multiple cases. Multiple case study designs have important advantages. First, you can practice the complete cycle of case study research (design, selection, analysis, and reporting) with more than a single case. Second, you would be able to respond to a common criticism of single case studies that they are somehow unique and idiosyncratic and therefore have limited value beyond the circumstances of the single case. Third, you will have a modest amount of comparative data, even if the cases were chosen to be confirmatory cases, helping you to analyze your findings (Yin, 2004). “The value of the case study is measured by the degree to which the incidents discussed can be generalized to other situations” (Schell, 1992).

Defining the unit of analysis is a major step in designing the cases. A case can have one unit of analysis or multiple unit of analysis. The multiple designs can be holistic or embedded type (Yin, 1994). There may be single or multiple sources of information. “A case with single source of information is described as holistic cases, and cases with multiple sources of information are described as embedded cases” (Yin, 1984). “Single sources of information provide a holistic overview of the

phenomena, while multiple sources allow for the usage of methodological triangulation" (Morgan and Smircich, 1980).

Twenty organizations have been conducted to participate in the study, however only fourteen of them were retained after consideration of the following criteria. In addition, twenty eight technological innovation projects were examined (See Appendix C). Fifteen ministries, two governmental organizations (Small and Medium Industry Development Organization, State Planning Organization), one nongovernmental organization (Technology Development Foundation of Turkey) and two private firms (METU-Technopolis, Technopolis Group) that are project partners of the public organizations were analyzed. The selection criteria for the organizations and projects are:

- The cases are public organizations located in Turkey
- Case study projects must contain a technological change at least for the organization
- Case study projects must contain an economic or social value

Appendix A describes the cases and case study projects that examined during the study. It includes case study questions that are asked to the interviewees and answers of the participants.

Research questions that meet objectives of the study were answered by top level IT managers during the research. Twenty one managers were interviewed during the study. The selection criteria for the interviewees are:

- They hold executive positions in the public organization
- They have experience in strategic management at business or technology level
- They are willing to allocate minimum of 45 minutes to discuss the matter

3.2.4 Data Collection

Case studies typically rely on multiple sources of information and methods. Documentation, archival records, interviews, direct observations, participant observation and physical artifacts are the most commonly used sources of evidences. Apart from what we decide to use as a dominant source of information, it is highly recommended to use multiple sources of evidence through different means in a process, which is called triangulation (Yin, 1994).

The researcher using case studies not only has the historian's primary and secondary documentation as resources, but can add direct observation and systematic interviewing. The case study's strength is thus its ability to deal with a full range of evidence documentation, artifacts, interviews and observations (Schell, 1992).

“Interviews are one of the most important sources of information in qualitative dominant studies. Although the interviews are major data collection techniques in the case studies, they have some problems such as: bias, poor recall, and poor or inaccurate articulation. Information collected from interviews should be verified by information gathered from other sources to solve these problems” (Yin, 1994).

In this study, interviews are used as data collection methods. For the purpose of this study, the researcher has conducted a series of semi-structured or open interviews. The interviews were recorded and transcribed. In addition, information related to the technological innovation projects performed in the public organizations was collected from documents, books, governmental reports, and booklets. The researcher took observation notes during the case study. Appendix B contains interview questions asked to reach purposes to the research study.

The main target of the research questions are:

- Identify technological innovation processes in the public sector
- Identify stakeholders of the technological innovation process
- Identify the sources and drivers of innovation in the public sector
- Detect the obstacles to innovation in the public sector

The interview process methodology was as follows:

1. The interview procedure was initiated by a telephone call or e-mail. The interview reason and purpose of the research were discussed, the time and place for the interview is set.
2. Interviews were performed face to face in the interviewee's office when the time comes. The interview was initiated with a short explanation of the topic. The interview was semi structured; questions were preplanned. All of the questions were asked to the interviewee.
3. The researcher throughout the conversation recorded the interview. The interviewee was aware of this.
4. The interview time range was from forty-five minutes to two hours. Only in one case a follow up meeting was arranged to complete the interview.

3.2.5 Data Analysis

Using the data (See Appendix A) obtained through the data collection; data sets are produced and presented in the tables.

The quality of the research is tested using construct validity, internal validity, external validity, and reliability tests. Table 3.3 shows reliability and validity tests, case study tactics and the phase of the tactics.

Table 3.3: Tests of Reliability and Validity

Test	Case Study Tactic	Phase
Construct validity	Multiple sources of evidence Establish chain of evidence Reviewing the report	Data collection
Internal validity	Pattern matching Explanation building Time series analysis	Data analysis
External validity	Replication logic in multiple case studies	Research design
Reliability	Case study protocol Case study database	Data Collection

Source: Yin, 1994

According to Yin (1994), there are three tactics to increase construct validity and reduce potential validity problems. First, triangulation increases the construct validity of the study because multiple sources of evidence provide multiple measures for the same phenomenon. In the study interviews, governmental documents, books, observations, and web sites are used while collecting the evidences. Moreover, construct validity is increased by performing interviews with multiple organization and multiple departments. Second, the chain of evidence that is explicit links between the research questions, the collected data, and the results, increases the construct validity. In the study, the research questions are guided to data collection and results of the research is prepared based on the collected data. Third, revision of the report by key informants increases the construct validity (Yin, 1994). In the study, researcher reviewed the report by participants to increase accuracy of the data.

“Internal validity is particularly important during the data analysis period, and may involve tactics which test the validity of inferences, like pattern matching,

explanation building or time series analysis" (Schell, 1992). In the study, the collected data were analyzed using the general analytic strategy of developing a case description (Yin, 2003). Case study evidences are analyzed using pattern matching analytic technique.

"External validity is the replication of the logic in the multi case studies" (Yin, 1994). In the single case design, there is obviously little scope for generalization, although replication, as in any experimental process, will lead to greater ability to produce general statements. "External validity is therefore most important during research design" (Schell, 1992). In the study, tactics commonly used to construct the external validity include replication logic in multi-case studies.

The reliability of the study is that anyone can reach the same results using data collection methods and procedures of the study. The case study protocol and case study data base are documentation instruments to provide reliability of the study (Yin, 1994). The case study protocol contains procedures and general rules followed during the study. Moreover, the case study protocol should contain an overview of the case study project, field procedures, case study questions, and a guide for the case study report. The case study data base contains the evidences apart from final case study report (Yin, 1994).

In this study, a case study protocol which contains an overview of the case study project, sources of the information, data collection procedures, and research questions is prepared. In addition, a case study data base is prepared containing all interviews performed during the case study and all of the documents. Finally, the case study protocols and the case study database are analyzed to reach results.

Table 3.4: Case Study Tactics Used in the Study

Test	Case Study Tactic	Phase
Construct validity	Multiple sources of evidence ▪ Interviews with multiple organizations and departments ▪ Governmental Documents ▪ Books ▪ Observation ▪ Web sites Establish chain of evidence ▪ Research Questions ▪ Data collection ▪ Findings Reviewing the report ▪ Revision of report by participants	Data collection
Internal validity	Pattern matching	Data analysis
External validity	Replication logic in multiple case studies	Research design
Reliability	Case study protocol Case study database	Data collection

Case study tactics used to increase reliability and validity of the study are illustrated in Table 3.4. In summary, multiple sources of evidence (interviews with multiple organizations and departments, governmental documents, books, observation, web sites) are used to increase construct validity.

Research questions are prepared to guide data collection, findings and results are derived from the collected data. The final report including data is reviewed by participants. For internal validity, pattern matching technique is used to analyze case study evidences. For reliability of the study, case study protocol and case study database are prepared.

3.2.6 Derivation of the Model

A new technological innovation model for public sector is constructed in accordance with the findings achieved by the study. The processes of the technological innovation in the public sector, stakeholders of the process, sources of innovation, driving forces of innovation, and barriers in front of the innovation are identified using the retrieved information after data analysis. This model aims to light the way for future technological innovation projects performed by the public organizations and provide successful management of innovation.

3.2.7 Justification of the Model

The proposed model and findings are evaluated according academic literature and existing models for validity. Accuracy of the processes and logic of the new technological innovation model is analyzed citing the academic literature. A comparison of the new model with existing innovation models is made. Moreover, evaluation of the findings is executed in the light of existing academic literature for justification.

CHAPTER 4

CASE DESCRIPTION AND ANALYSIS

This section contains the description and analysis of the case study. It contains data analysis results of the study. A range of information including technological innovation projects, technological innovation process, stakeholders of the innovation process, sources of new idea and innovation, obstacles to innovation in the public sector, and drivers of innovation in the public sector are provided in this chapter.

4.1 Case Description

Twenty organizations have been conducted to participate in the study, however only fourteen of them were retained after consideration of the selection criteria. In addition, twenty eight technological innovation projects were examined. Fifteen ministries, two governmental organizations (Small and Medium Industry Development Organization, State Planning Organization), one nongovernmental organization (Technology Development Foundation of Turkey) and two private firms (METU-Technopolis, Technopolis Group) that are project partners of the public organizations were analyzed. Look Appendix C to see detailed information about interviewees. In addition, a detailed case description is provided in Appendix D.

Looking Appendix B is highly recommended to see research and interview questions. During the study we try to find answers of the following questions.

- What are the technological innovation projects performed by organization?
- What are the processes of technological innovation in the public organizations?
- Is there any model used in the public sector for the management of the innovation process?
- Who are the stakeholders of technological innovation process?
- What are the sources of innovation?
- What are the obstacles in front of the innovation?
- What are the driving forces of innovation?

4.2 Analysis of the Cases

In this study, the unit of analysis is organizations. The analysis of data retrieved from the organizations is enabled to reach quantitative and qualitative results. At the end of the study, innovation process in the public sector, stakeholders of the process, sources of innovation, obstacles to innovation, and driving forces of innovation are identified.

The analysis results show that there is a unique technological innovation process for all of the public organizations. Each of the organization should follow this process in order to reach innovation. All of the ministries and other public organizations mentioned in the study reached a consensus about an identical technological innovation process.

4.2.1 Profile of the Organizations

According to the analysis results, organizations claim that they perform at least one technological innovation project. However, none of the public organizations analyzed in the study use a technological innovation model that shows innovation processes. Table 4.1 illustrates technological innovation projects performed by the organizations.

Table 4.1: Technological Innovation Projects

Organization	Technological Innovation Projects
Metu-Technopolis, ACI, SIMIDO	Innovation Relay Center Anatolia, Business Support Network Anatolia
Ministry of National Education	ILSIS, E-School
Ministry of Public Works and Settlement	Remote Sensing and Geographical Information Systems Project, Land Registry and Cadastre Information System, Disaster Information System
Ministry of Finance	Finance SGB.Net Project, Strategic Management Project
State Planning Organization	E-Transformation Turkey Project
Ministry of Transport	Land Automation Project, National Transport Portal
Ministry of Energy and Natural Resources	ENEBIS, Ministry of Energy Portal
Ministry of Agriculture and Rural Affairs	Farmer Registry System
The Ministry of Industry and Commerce	Electronic Commerce Project, SME Information Collection Project
SIMIDO	KOBI-NET Project, SIMIDO MIS
Ministry of Health	Health-NET Project, TELETIP
Ministry of Culture and Tourism	Turkey Tourism Portal, Turkey Culture Portal
Ministry of Justice	Better Access to Justice, National Judiciary Informatics System
Ministry of Labour and Social Security	Worker Entry and Exit Declaration Project, Work Inspection Project, Zone Automation Project

4.2.2 Technological Innovation Process in the Public Sector

The analysis results demonstrate that, in order to reach innovation all of the public organizations follow six identical steps: new idea generation, project study (project plan, feasibility study, and documentation), project approval, project implementation, new services, and innovation. Table 4.2 illustrates six steps of the technological innovation process in the public sector.

Table 4.2: Technological Innovation Process in the Public Sector

Step	**Process**
Step 1	Idea Generation
Step 2	Project Study
Step 3	Project Approval
Step 4	Project Implementation
Step 5	New services
Step 6	Innovation

4.2.3 Sources of Innovation in the Public Organizations

According to results of the study there are four major sources of innovation in the public sector personnel, legislation, other firms, and citizens. The analysis results demonstrate that the personnel of the organization and legislation are the most encountered sources of innovation. On the other hand citizens and other firms are the least encountered sources of innovation. As a result we can say that, most of the new ideas to lead innovations are generated by personnel and legislation. Table 4.3 illustrates sources of innovation in the public sector and participation of the organization to the related item.

Table 4.3: Sources of Innovation in the Public Organizations

	Metu-Technopolis	Ministry of National Education	Ministry of Public Works and Settlement	Ministry of Finance	State Planning Organization	Ministry of Transport	Ministry of Energy	Ministry of Agriculture and Rural Affairs	The Ministry of Industry and Commerce	SIMIDO	Ministry of Health	Ministry of Culture and Tourism	Ministry of Justice	Ministry of Labour and Social Security
Personnel	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Legislation		✓	✓	✓	✓		✓	✓		✓	✓	✓		
Other Firms			✓										✓	
Citizens			✓											✓

4.2.4 Obstacles to Innovation in the Public Sector

According to results of the study there are nine potential obstacles in the public sector in front of the innovation: legislation, lack of qualified staff, approval authority, low wages policy, bureaucracy, management hierarchy, work environment, government program, and financial constraints. Results show that, the most encountered obstacles in front of innovation are legislation, lack of qualified staff, approval authority, and bureaucracy. Table 4.4 illustrates obstacles to innovation in the public sector.

Table 4.4: Obstacles to Innovation in the Public Organizations

	Metu-Technopolis	Ministry of National Education	Ministry of Public Works and Settlement	Ministry of Finance	State Planning Organization	Ministry of Transport	Ministry of Energy	Ministry of Agriculture and Rural Affairs	The Ministry of Industry and Commerce	SIMIDO	Ministry of Health	Ministry of Culture and Tourism	Ministry of Justice	Ministry of Labour and Social Security
Legislation		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lack of qualified staff	✓		✓			✓	✓	✓	✓		✓	✓	✓	✓
Approval authority		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bureaucracy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Low wages policy							✓							✓
Management hierarchy							✓						✓	✓
Work environment		✓	✓				✓				✓	✓		
Government program									✓					
Financial constraints	✓								✓		✓	✓		✓

4.2.5 Stakeholders of the Technological Innovation Process

According to results of the study there are four stakeholders of the technological innovation process: public sector, private sector, university, and non-governmental organizations. Table 4.5 illustrates stakeholders of the technological innovation process and participation of the organization to the related item.

Table 4.5: Stakeholders of the Technological Innovation Process

	Metu-Technopolis	Ministry of National Education	Ministry of Public Works and Settlement	Ministry of Finance	State Planning Organization	Ministry of Transport	Ministry of Energy	Ministry of Agriculture and Rural Affairs	The Ministry of Industry and Commerce	SIMIDO	Ministry of Health	Ministry of Culture and Tourism	Ministry of Justice	Ministry of Labour and Social Security
Public Sector	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Private Sector	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
University	✓		✓	✓		✓	✓		✓		✓	✓	✓	
NGOs	✓					✓	✓				✓	✓		

Results show that, public sector, private sector, and university are the most observed stakeholders of the technological innovation process. Non-governmental organizations are the least participated stakeholder in to the technological innovation projects. They are observed only in four cases as a stakeholder of the process.

4.2.6 Results of the Analysis

The analysis of data retrieved from the organizations is enabled to identify technological innovation process in the public organizations, stakeholders of the process, sources, drivers of the innovation, and obstacles to innovation. Table 4.6 illustrates results that are obtained after the analysis of retrieved data. In the table, percentage shows frequency of the related item. The percentages are obtained from data tables using mathematical calculations.

Table 4.6: Results of the Analysis

Innovation Process
1. Idea generation
2. Project study
3. Project approval
4. Project implementation
5. New services
6. Innovation

Stakeholders	**%**
Private Sector	100
Public Sector	92.8
University	64.2
NGOs	35.7

Obstacles to Innovation	**%**
Bureaucracy	100
Approval authority	92.8
Legislation	92.8
Lack of qualified staff	71.4
Work environment	35.7
Financial constraints	35.7
Management hierarchy	21.4
Low wages policy	14.2
Government program	7.14

Sources of Innovation	**%**
Personnel	78.5
Legislation	64.2
Other Firms	14.2
Citizens	14.2

All of the public organizations follow six identical steps of innovation process to make innovation. Eventually, for all steps of the innovation process the frequency will be 100 %. According to Table 4.6 legislation is mentioned as a source and barrier of innovation, this can be seen as a contradiction. In fact, in some cases such as lack of qualified staff, the government introduces new laws to force organizations to make innovation. On the other hand, the laws restrict the innovation because one cannot act out of legislation.

According to results of the data analysis presented in Table 4.7, all public organizations collaborate with private organizations for their innovation project. In order to make innovation creative and qualified staff is required in an organization. However, because of low wages policy qualified staffs prefer to work in private sector instead of public sector. This challenge entails public organizations work with private organizations.

Driving forces of innovation has no such a percentage because this data is obtained from State Planning Organization which develops strategies and policies for the governmental institutions. Table 4.7 illustrates driving forces of innovation for public organizations.

Table 4.7: Driving Forces of Innovation

Driving Forces of Innovation
Policies favorable to innovation
Public demand, difficulties and delays on the services
Cost savings
Turkish information society strategy studies realized by State Planning Organization
Establishment of the strategy development units
Performance based budget studies
Improvement in standardization in the public services
Increasing collaboration between private sector, universities, public sector and NGOs
Policies favorable to innovation

CHAPTER 5

NEW TECHNOLOGICAL INNOVATION MODEL FOR PUBLIC SECTOR

In this chapter a new technological innovation model for public sector is offered to the public interest. This model may light the way for future technological innovation projects performed by the public organizations. This chapter explains every stages and steps of the technological innovation model and clarifies the technological innovation processes and stakeholders of the innovation process. In addition, sources of innovation and obstacles to innovation in the public sector are explained in this chapter.

A model is a mental picture that helps us to understand something we cannot see or experience directly (Dorin et al, 1990). The new technological innovation model that I offered for the public sector helps us understand technological innovation processes in the public sector and stakeholders of the process. Understanding technological innovation processes will provide us successful management of innovation in the public organizations.

The traditional view of the innovation process is based on the technology-push and market-pull approaches. Both approaches view innovation process as a linear process. The linear innovation model is seen as inadequate in capturing the essence of innovation, neglecting its evolutionary nature, and the fact that it integrates diverse knowledge sources (Parthasarthy et al, 2002). The consensus among researchers is that the innovation process is dynamic, nonlinear, and complex (Galanakis, 2006). Intra-organizational functionalities and external relations with various entities enhance the innovation process (Kusiak, 2007).

Innovation is not an exclusive internal activity of organizations in order to achieve monopolistic advantages (Schumpeter, 1934). And it doesn't follow a mechanistic sequence from research to production and to the market, in which research is the main driving force, as the linear model and product cycle theory argue. Increasingly, innovation is regarded as an evolutionary, non-linear and interactive process between the organization, knowledge suppliers and other organizations (Dosi, 1988).

The concept of non-linearity implies that innovation is stimulated and influenced by many actors and sources of information, both inside and outside of the organization. It is not only determined by scientists and engineers working in R&D or by the top-management. There are also interactions feeding back the experience of production, marketing and customers into earlier phases of the innovation process. The interactivity of the innovation process refers to the internal collaboration between several departments of a company as well as to external co-operations with other firms, knowledge providers (like universities and technology centers), finance, training, and public administration (Kaufmann and Tödtling, 2000).

Innovation can be modeled as some form of innovation production function (Geroski, 1990; Feldman, 1994; Love and Roper, 2001; Freel, 2003; Oerlemans et al, 2001). According to Griliches (1995) conception of the knowledge production

function knowledge is viewed primarily as a function of accumulated R&D expenditures. General form of innovation production functions is:

$$Ii = \alpha(t) + \beta 1Ri + \beta 2Ti + \beta 3Xi + \varepsilon i$$

Where "I" is some innovation output measure (new services), R is a direct measure of firm R&D expenditure and T and X are vectors of internally and externally sourced technological competence (employment of qualified staff and external cooperative relationships). Innovation output depends on the presence and volume of innovation resources and the utilization of these internal and external resources in the innovation process (Oerlemans et al, 2001).

Models of innovation take a number of forms, each of which is helpful in highlighting particular aspects and enabling better understanding and practice (Abernathy and Utterback, 1978; Van de Ven, 1989; Rothwell, 1992; Jelinek and Litterer, 1994; Dodgson and Rothwell, 1995; Bellon and Wittington, 1996; Pavitt, 2000; Tidd et al, 2001). A comprehensive model for understanding innovation in services and better understanding innovation in services especially in public sectors is not yet apparent in the literature.

More recently, Gallouj and Weinstein (1997) outlined six innovation models that could be used for describing innovation process. They distinguish between radical innovation, improvement innovation, incremental innovation, ad-hoc innovation, re-combinative innovation and formalization innovation. Van Der Duin et al (2006) developed a new innovation model named Cyclic Innovation Model for public organizations in the region of Flevoland, a province of the Netherlands. The Cyclic Innovation Model (CIM) views innovation processes as continuous interactions between developments and changes, product and services, technology, and science. CIM portrays innovation as a system of dynamic processes with four creative "nodes of change"; scientific exploration, technological research, product development and market transitions. Hemmert (2007) offered an innovation model that shows Korea's

national innovation system based on business sector, the government and the public research sector, and the higher education system and universities.

Although the existing models are designed for public organizations they are not appropriate for Turkish public organizations because dynamics of the innovation process such as drivers, sources, and barriers show significant differences among Netherlands, Korea, and Turkey. In addition, in Turkey, no comprehensive technological innovation model has emerged for public organizations. The research study attempts to address this gap through the development of a new technological innovation model for Turkish public sector.

Figure 5.1 illustrates the new technological innovation model for public sector. The new innovation model is constructed based on the results of the research. First, the innovation process in public organizations is applied in to the model. Second, external relations with stakeholders are placed in to the innovation process. A rectangle is placed between stakeholders and innovation process to express that innovation emerges as a result of interaction between the stakeholders. Third, sources of innovation and obstacles to innovation are integrated in the model. Finally, direction of the process from idea to innovation is shown in the model.

Results of the study clearly show that the innovation process is dynamic and complex. External relations with stakeholders enhance the innovation process. Innovation emerges as a result of interaction between the stakeholders. Innovation process has four main stages and six steps. Four main stages are idea generation, project development, production, and innovation. Six steps are idea, project study, project approval, project implementation, new services, and innovation.

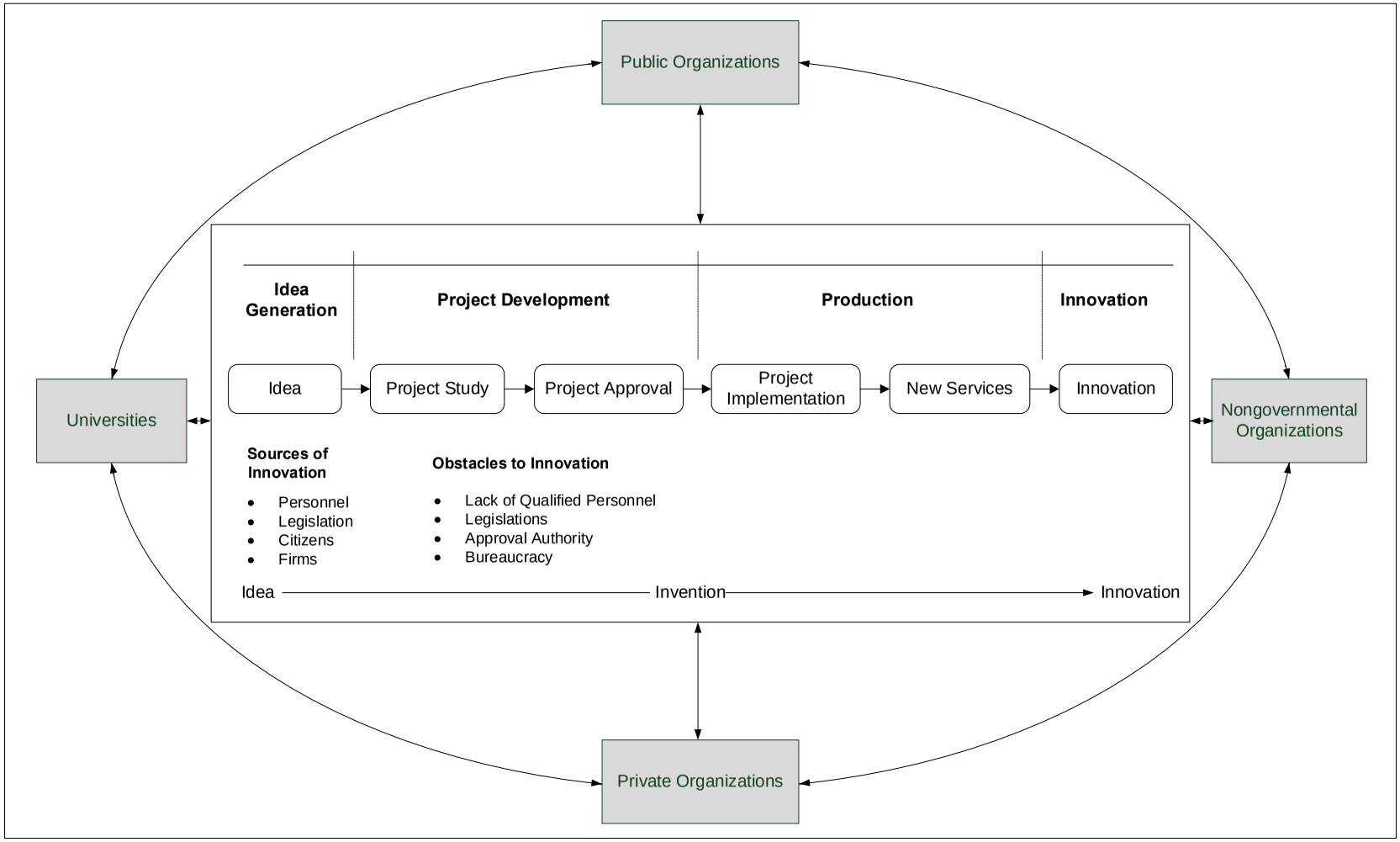

Figure 5.1: Technological Innovation Model for Public Sector

Innovation starts with idea generation in the first stage. New ideas can be generated by the personnel of the organization, legislation, citizens and other firms. After idea generation, the new ideas should be conceptualized projects in order to reach innovation.

Most of the time, because of some obstacles innovation cannot be achieved. The main obstacles in front of the innovation in the public sector found as; legislation, lack of qualified staff, approval authority, and bureaucracy. The most encountered obstacles are illustrated in the second stage of the model while other possible obstacles are not shown in the model.

Production as a third stage can only start after overcoming the mentioned obstacles. Project implementation is performed in fourth step and a new service is acquired in the fifth step. Although acquiring a new service can be seen as if an output of the previous step, it is a part of the innovation process because it in-holds acceptance and test sub-processes.

In the last step, innovation enlivens in the organization. This step is crucial because, diffusion of the new services is performed to provide adoption of innovation. Eventually, at the end of the innovation process, organization achieves better and improved services thanks to the innovation. The innovation creates economic and social benefit for the organization.

5.1 Detailed Description of the Model

5.1.1 Technological Innovation Process in the Public Sector

Technological innovation process in the public sector consists of four stages and six steps as illustrated in Figure 5.2. Stages of the technological innovation process are idea generation, project development, production and innovation. Six steps of the technological innovation process are idea, project study, project approval, project implementation, new services and innovation.

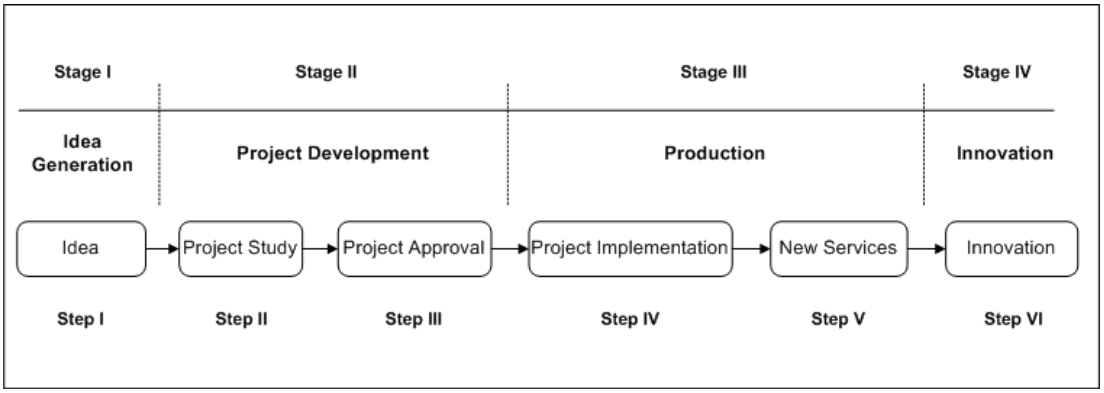

Figure 5.2: Technological Innovation Process in the Public Sector

Innovation process from a new idea to an innovation is illustrated in the new model (See Figure 5.3). Trott (2002) confirms that innovation is the management of all the activities involved in the process of idea generation, project development, production and application of a new product, process or service. Inventions are new discoveries, new ways of doing things, and new products. The process from new discovery to eventual product is the innovation process.

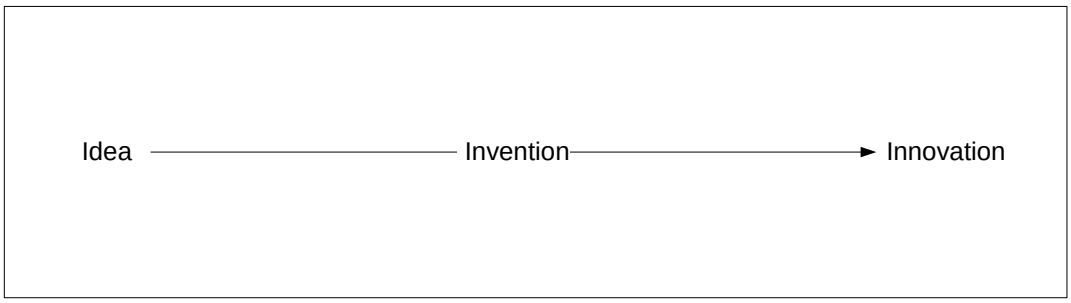

Figure 5.3: Innovation Process from a New Idea to an Innovation

According to Khilji (2006), an invention is converted to successful innovation only through parallel, directed interactions among organizational, scientific, and market aspects. Invention thus is one step, and innovation is a whole business process that creates change from invention, development, design, and production to marketing.

5.1.1.1 Idea Generation

Idea generation is the first stage of the technological innovation process, in this stage new ideas that will be transformed to new projects to lead innovation are generated. There are four different sources of new ideas and innovation in the public organizations (See Figure 5.4). The sources of innovation illustrated in the model are listed below:

- Personnel
- Legislation
- Citizens
- Firms

Personnel who think about how to serve better and how to ease business processes try to generate new ideas. New idea generation is performed in the public sector when there is qualified staff. Only skilled staff can generate new ideas in an organization. But employing qualified staff in the public sector is too hard because of the low wages policy. As a result, innovation and new idea generation get hard in the

public organizations with lack of qualified employee. Government tries to overcome inactivity of the staff and force them to design new projects by legislation. New laws are introduced to force organizations to make innovation.

Sometimes new ideas are generated by citizens. Citizens are the end users of the services for the public sector. When they are not satisfied from the existing services they make suggestions to the organizations. They generate new ideas in order to take a better service. In such cases innovation can be made in the public organizations when citizens inform to the organization about these new ideas.

Public organizations can demand new ideas and projects from other organizations especially from consulting firms to innovate in the organization. Some public organizations have no sufficient infrastructure and qualified employee to generate new projects and make innovation. Such organizations demand new ideas from other firms to innovate in the organization and meet citizen's needs.

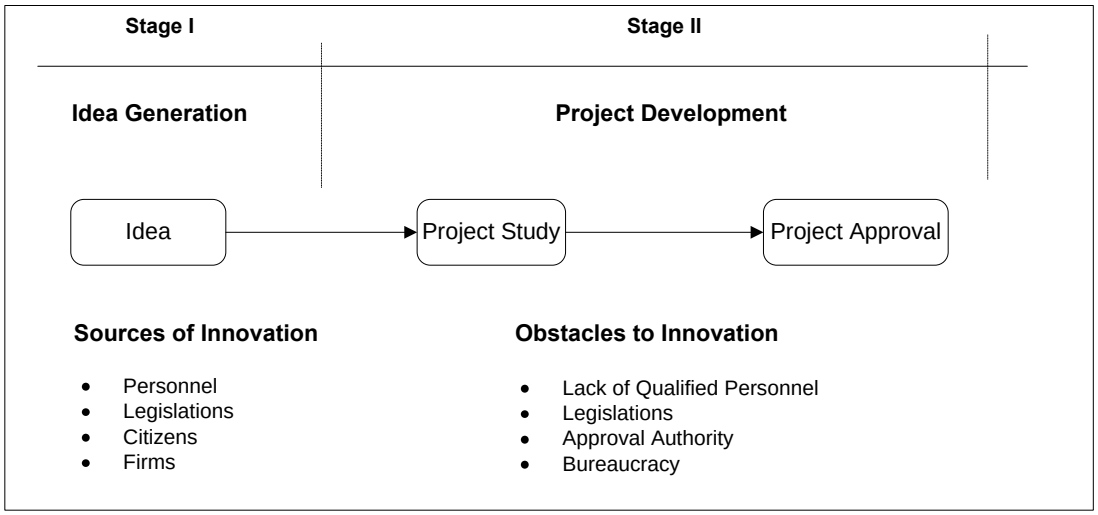

Figure 5.4: Sources of New Ideas and Obstacles to Innovation

5.1.1.2 Project development

Project development is the second stage of the technological innovation process. This stage consists of two steps. In the first step of the stage, project feasibility study, project plan, and project documentation are performed. Project feasibility study can be performed by the public organization or it can be adjudicated to the private organizations. Project documents such as, technical provision and project plan are prepared in this step. In the second step, approval of the project is performed by approval authority. First, approximate cost of the project is calculated in the project feasibility study. Approximate cost indicates the financial budget of the project. This indicator determines the approval authority. Approval authority is the authorizing officer who decides acceptance of the project. Authorizing officer can be head of the unit, undersecretary or minister according to the financial limit of the project. Limitation of expenditure is defined by the laws. Head of the unit can approve the projects up to his financial limit. If the budget of the project exceeds his financial limit undersecretary approves, else minister approves. The project approval is given by authorizing officer according to the public finance management and control law.

Obstacles in front of the innovation prevent transformation of new ideas into projects and transformation of the projects into innovation in the public sector. The most suffered obstacles are listed below:

- Lack of qualified staff
- Legislation
- Approval authority
- Bureaucracy

Lack of qualified staff is one of the main obstacles in front of the innovation in the public sector. The staff of the public organizations are not qualified enough to generate new ideas. For this reason appearance of innovation and new idea generation is too hard in the public sector. Indirectly low wages policy in the public

sector affects this lack negatively, because it makes difficult to employ qualified employee in the public sector.

Legislation is another important obstacle in front of the innovation in the public sector. The laws restrict the innovation because one cannot act out of legislation. New ideas and new projects have to be in agreement with the legislation. Although they are good ideas, if the new ideas are not compatible with the legislation it is impossible to use them to innovate in the organization.

After generation of new ideas, they should be conceptualized the project. Approval of these projects is performed by approval authority. If approval authority doesn't approve the project, innovation cannot be made in the organization.

Bureaucracy obstructs new idea generation and actualization of the new ideas through the projects. Bureaucratic obstacles should be removed in front of the staff pave the way for innovation. Organizations should be open to change. Management hierarchy in the organization can obstruct sharing new ideas. If staff has difficulty to reach managers to share new ideas in work environment that is closed to changes, it becomes a stillborn idea. It should be easier for the staff to reach the managers to share new ideas. For this reason, the organization and management hierarchy should be innovated.

In summary, the most encountered obstacles in front of the innovation are; lack of qualified staff, legislation, approval authority, and bureaucracy. These major obstacles are presented in the model.

5.1.1.3 Production

Production is the third stage of the technological innovation process. This stage composes two steps; project implementation and new services. In the first step of this stage, implementation of the project is accomplished. Project can be implemented in the organization by using available sources or it can be adjudicated to a private firm. If infrastructure and labor force of the public organization are not sufficient to accomplish project in the organization, projects are adjudicated to the firms. Public organizations adjudicate the projects according to public procurement law. First, the technical provision is prepared between two organizations. According to this provision, project is implemented by the private organization. The second step of this stage is gaining the new services. After implementation, a new service is acquired. The completed service is accepted by the examination and acceptance commission of the public organization. It is tested in the maintenance period. According to result of the tests, final acceptance of the service is done if there is no deficiency.

5.1.1.4 Innovation

Innovation is the last stage of the technological innovation process. In this stage, diffusion of the new service is performed in order to innovate in the organization. Innovation includes not only the development but also the diffusion of the new services. From the perspective of innovation systems, it is not just the development of new service that is important, as the accessibility of new service is also of interest (Doloreux, 2006).

Verloop (2004) claims that successful innovation requires changes in organizational processes and conversion of an idea into a new product that is designed, manufactured, and adopted by users. According to Rogers (1995) there are different success rates of adoption. Adoption is a decision to make full use of an innovation as the best course of action available (Rogers, 1995). Innovations that are perceived by its potential users as having a higher relative advantage, compatibility, trialability,

observability and less complexity will be adopted more rapidly than other innovations (Rogers, 1995; Tornatzky and Klein, 1982).

Distinguishing types of innovation is necessary for understanding organizations' adoption behavior and identifying the determinants of innovation in them (Damanpour, 1991). Service innovation is the major innovation type experienced in the public sector. "A service innovation is the introduction of a service that is new or significantly improved with respect to its characteristics or intended uses" OECD (2005c).

Service innovations frequently have effects on the service provider's productivity and flexibility. Moreover, they have effects on the quality and availability of services provided (Hipp et al, 2000). Service innovation offers new services for the organization. Offering a better service or a new service provides easier, cheaper, quicker, and more secured services. Service innovation changes the business processes of the public organization. Mistakes in the business processes are minimized because of the service innovation.

5.1.2 Stakeholders of the Technological Innovation Process

Innovation can arise from universities, private organizations, non-governmental organizations or public organizations. An important source of innovation comes from linkages between them. Figure 5.5 illustrates stakeholders of technological innovation process as composing a complex system where an innovation may emerge from one or more components of the system or linkages between them.

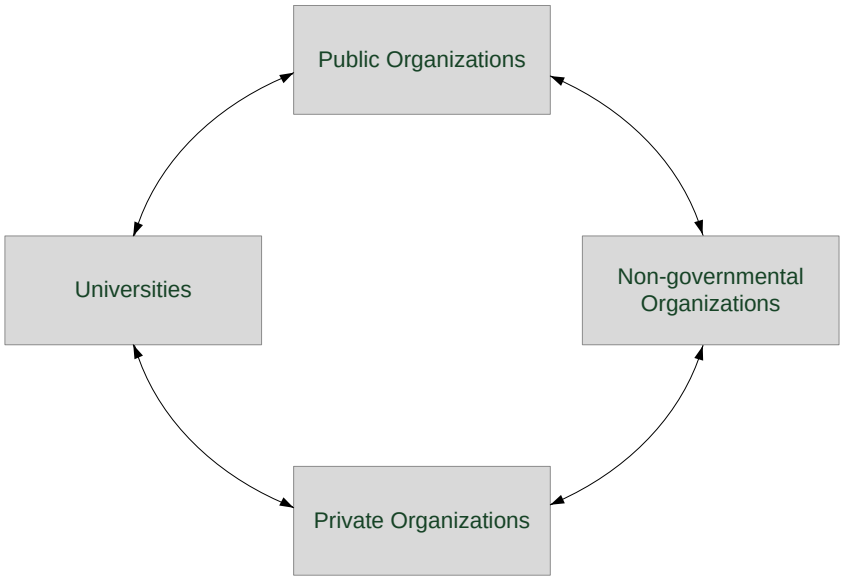

Figure 5.5: Stakeholders of the Technological Innovation Process

Public organizations cooperate with other public organizations during the innovation process. They perform information sharing between each other during the technological innovation projects. For example, during the project implementation step some public organizations are obtained traffic license information from Security Directorate and identification numbers is obtained from Birth Registration Office (See Case 6 and Case 8 in Appendix A).

Public organizations collaborate with private organizations especially in the techno parks to get technical support or to take know how information. Preparation of technical provision of the project can be adjudicated to private organizations. In addition to this, after implementation maintenance of the new service can be outsourced. Some of the projects are adjudicated to private organizations (See Case 5 in Appendix A). Consultancy service can be received from a private organization for some projects (See Case 7 in Appendix A). Some public organizations such as State Planning Organization, TUBITAK, and SIMIDO support other public organizations for the technological innovation projects financially and technically.

Public organizations collaborate with public or private universities during the innovation process. For the technological innovation projects supported by TUBITAK, it is mandatory to work together with a university until the end of the project (See Case 3 in Appendix A). Moreover, universities contribute to innovation through the publication of research results and testing new services.

Public organizations collaborate with non-governmental organizations (NGOs) during the innovation process. Non-governmental organizations are Ankara Chamber of Industry (ACI) Ankara Chamber of Trade (ATO), Technology Development Foundation of Turkey (TDFT), The Union of Chambers and Commodity Exchanges of Turkey (TOBB) perform a range of services including consultancy and training for organizations during the technological innovation projects, transmitting public R&D support to private sector, developing new support mechanisms suitable for continuously changing conditions thereby estimating the needs, expectations and priorities of public and private sector (See Case 1 and Case 6 in Appendix A).

5.2 Justification

Justification of the proposed model and findings are performed in the light of existing academic literature. Here, firstly justification of the findings will be performed and then comparison of the new model with existing models of innovation will be realized. A more detailed evaluation of the results of the study can be found in discussion section.

5.2.1 Justification of the Findings

Academic literature justifies the processes, stages, steps, and rationale of the new model. The proposed model for public sector has a technological innovation process inside and this process includes four stages; idea generation, project development, production and innovation. More detailed links between findings and academic literature can be found in discussion section.

According to Myers and Marquis (1969), innovation has a different meaning from a management perspective, it is not a single action but a total process of interrelated sub processes. It is not just the conception of a new idea, nor the invention of a new device, nor the development of a new market. The process is all these things an integrated fashion.

According to Betz (1998), Technological innovation is the invention of new technology and the development and introduction into the marketplace of products, processes, or services based on the new technology. Technological innovation process includes some stages. First, a new technology must be invented. Second, the new technology must be developed and embedded into new products, process, or services. Third, the technological innovation must be designed, produced, and marketed.

According to the new model, technological innovation arises from universities, private organizations, non-governmental organizations or public organizations. Public organizations cooperate with other public organizations, private organizations, non-governmental organizations or universities during the innovation process.

According to Betz (1998), there are many interactions within technological innovation among technology, business, industry, universities, government, product, customer, and application (See Figure 2.2). Schilling (2005) declares that innovation

can arise from individuals, universities, firms, private nonprofit organizations or public organizations (See Figure 2.6).

In this model, there are four different sources of new ideas and innovation in the public organizations. The sources of new ideas and innovation are:

- Personnel
- Legislation
- Citizens
- Other firms

In this model, staff and citizens who create new ideas and define problems are main sources of innovation. According to Csikszentmihalyi (1996) and Rubenstein (1976), individuals are key components of the innovation process. Individuals create new ideas, associations and define problems to lead inventions. According to Schilling (2005) and Trott (2002), one of the sources of innovation is the firm's research and development activities.

The study detected the most suffered obstacles in front of the innovation in the public sector. They are listed below:

- Lack of qualified staff
- Legislation
- Approval authority
- Bureaucracy

According to OECD report (2000), the lack of a sufficient supply of skilled personnel is a key barrier to innovation and needs to be addressed. According to Maital and Seshadri (2007), organizations work in bureaucratic, conservative and risk aware environment opposite innovative individuals and teams, so their work is much harder. But building slack in to the organization reduces negative impact of

bureaucracy. OECD report (2000) declares that to make effective use of the opportunities offered by ICT, countries need to ensure an environment conducive to innovation and receptive to new technologies. Furthermore policies favorable to collaboration between science and industry are important.

5.2.2 New Model vs. Other Innovation Models

Several innovation models are created from 1950 until today. Most known innovation models are; Technology Push, Market Pull, Coupling Model, Interactive Model, and Network Model.

At 1950s innovation has been viewed as a sequence of separable stages and activities. First, Technology Push model is developed. The Technology Push model supposes that in order to make innovation scientist makes discoveries, technologists apply them to develop product ideas and engineers and designers produce them. As a last step marketing department promotes the product to the customers. This model lays emphasis on research and development activities. At 1970s marketing is started to influential in the innovation process. The second linear model of innovation Market Pull model is developed. Market Pull model lays emphasis on marketing and customer needs. Market needs determines R&D, engineering and manufacturing activities. The Simultaneous Coupling model suggests that innovation is the result of the simultaneous coupling of the three functions; manufacturing, R&D, and marketing (Trott, 2002).

According to Trott (2002), the interactive model suggests that innovation is the result of the interaction of the market needs, the science and technology based institutions and technology developments (See Figure 2.15). Innovation process progresses on a complex set of communication path including internal and external linkages over that knowledge is transferred. Main organizational functions including R&D, manufacturing and marketing take part in the center of the model. There is a linkage

between market place, science bases institutions and organizational functions. Generation of ideas is provided by feedbacks received from three basic components: organization capabilities, market needs, and science and technology base.

Network model emphasizes on interaction of organization functions inside the organization and interaction of these functions with external environment (See Figure 2.16). In the organization there may be several functions depending on the business processes of the organization. The network model identifies three main organizational functions: business planning and strategy, R&D and manufacturing, and marketing. External environment includes universities, competitors, suppliers, distributors, customers, and government units.

The new technological innovation model emphasizes on innovation processes in the public organization and interaction of the organization with other organizations during the processes. This model identifies four main processes or stages to reach technological innovation; idea generation, project development, production, and innovation. It also identifies six sub processes or steps; idea, project study, project approval, project implementation, new services, and innovation. A public organization should follow these steps to reach technological innovation in the organization. A public organization collaborates with other external organizations during the innovation process. External organizations can be other public organizations, universities, private organizations, and non-governmental organizations.

New technological innovation model shows some similarities and differences from existing models of innovation. Table 5.1 illustrates a comparison between the new technological innovation model and other models of innovation; Technology Push and Market Pull, Simultaneous Coupling Model, Interactive Model, and Network Model.

Table 5.1: Comparison of the New Model with Existing Models

	New Model	**Linear Model**	**Simultaneous Coupling**	**Interactive Model**	**Network Model**
Date of Issue	2008	1950s	1980s	1980/90	2000s
Innovation Type	Service Innovation	Product Innovation	Product Innovation	Product Innovation	Product Innovation
Innovation Domain	Public	Private	Private	Private	Private
Innovation Processes	Idea Generation Project Development Production Innovation	R&D Manufacturing Marketing	Manufacturing R&D Marketing	R&D Manufacturing Marketing	Business Planning and Strategy R&D Manufacturing Marketing
Innovation Sources	Personnel Legislation Citizens Other Firms	Scientist	Scientist	Staff Market Needs Science Base	Scientists Engineers
External Interactions	Public Org. University Private Org. NGOs	No Interaction	No Interaction	Science Bases Institutions	Universities Competitors Suppliers Distributors Customers Government Units

A more detailed comparison is illustrated in the following tables in order to understand differences and similarities between new model and other models. Table 5.2 illustrates a comparison between the new technological innovation model and linear models of innovation; Technology Push and Market Pull.

Table 5.2: Comparison of the New Model and Linear Models

New Technological Innovation Model	**Linear Models of Innovation**
Emerged recently	Emerged in 1950s
Innovation process is a complex process that contains business processes and external interactions.	These models view innovation process as a sequence of separable stages and activities.
Innovation occurs in an innovation process through interaction of the organization with other organizations.	Innovation occurs in a simple linear sequential process without interactions.
New model is developed for service innovation.	Linear models are developed for product innovation.
New model is developed for public organizations.	Linear models are developed for profit making companies.
In order to make innovation collaboration is crucial with other organizations such as: public organizations, universities, private organizations, and non-governmental organizations.	There is no collaboration with other organizations during innovation process.

According to Simultaneous Coupling Model, innovation is the result of the simultaneous coupling of the three functions; manufacturing, R&D, and marketing. Table 5.3 illustrates a comparison between the new technological innovation model and Simultaneous Coupling Model.

Table 5.3: Comparison of the New Model and Simultaneous Coupling Model

New Technological Innovation Model	Simultaneous Coupling Model
Emerged recently	Emerged in 1980s
Innovation process is a complex process that contains business processes and external interactions.	Innovation process doesn't follow a linear sequential route.
Innovation occurs in an innovation process through interaction of the organization with other organizations.	Innovation is the result of the simultaneous coupling of the three functions; manufacturing, R&D, and marketing.
New model is developed for service innovation.	Simultaneous Coupling Model is developed for product innovation.
New model is developed for public organizations.	Simultaneous Coupling Model is developed for profit making companies.
In order to make innovation collaboration is crucial with other organizations such as: public organizations, universities, private organizations, and non-governmental organizations.	There is no collaboration with other organizations during innovation process.
Main business processes are; idea generation, project development, production, and innovation.	Main functions are; manufacturing, R&D, and marketing.

According to Interactive Model, innovation is the result of the interaction of the market needs, the science and technology based institutions and technology developments. Table 5.4 illustrates a comparison between the new model and Interactive Model.

Table 5.4: Comparison of the New Model and Interactive Model

New Technological Innovation Model	Interactive Model
Emerged recently	Emerged in 1980/90
Innovation process is a complex process that contains business processes and external interactions.	Innovation process progresses on a complex set of communication path including internal and external linkages.
Innovation occurs in an innovation process through interaction of the organization with other organizations.	Innovation is the result of the interaction of the market needs, the science and technology based institutions and technology developments.
New model is developed for service innovation.	Interactive Model is developed for product innovation.
New model is developed for public organizations.	Interactive Model is developed for profit making companies.
In order to make innovation collaboration is crucial with other organizations such as: public organizations, universities, private organizations, and non-governmental organizations.	There is a linkage between market place, science bases institutions and organizational functions.
Main business processes are; idea generation, project development, production, and innovation.	Main organizational functions are; R&D, manufacturing and marketing.
Innovation starts with new idea generation.	There is no starting point, innovation can occur on various points.
Generation of ideas provided by personnel, legislation, citizens, and other firms.	Generation of ideas is provided by feedbacks received from three basic components: organization capabilities, market needs, and science and technology base.

According to Network Model, innovation is the result of the interaction between organization functions inside the organization and external environment. Table 5.5 illustrates a comparison between the new model and Network Model.

Table 5.5: Comparison of the New Model and Network Model

New Technological Innovation Model	**Network Model**
Emerged recently	Emerged in 1980s
Innovation process is a complex process that contains business processes and external interactions.	Innovation process contains organizational functions and external interactions.
Innovation occurs in an innovation process through interaction of the organization with other organizations.	Innovation is the result of the interaction between organization functions inside the organization and external environment.
New model is developed for service innovation.	Network Model is developed for product innovation.
New model is developed for public organizations.	Network Model is developed for profit making companies.
In order to make innovation collaboration is crucial with other organizations such as: public organizations, universities, private organizations, and NGOs.	There are interactions with universities, competitors, suppliers, distributors, customers, and government units.
Main business processes are; idea generation, project development, production, and innovation.	Main organizational functions are; business planning and strategy, R&D and manufacturing, and marketing.
Interaction between organizations provides collaboration to make successful innovations.	Interactions contribute the knowledge base of the organization to form successful innovation management.

CHAPTER 6

DISCUSSION AND CONCLUSION

This section is divided into three subsections. In the first subsection, findings of the study are discussed and evaluated. The second subsection presents the conclusion reached based upon this research study. The third subsection offers recommendations for further research.

6.1 Discussion

This section discusses the findings of the study with existing literature. The discussion is divided into seven themes which are given in the following subsections. In each subsection, first the literature is given then the findings of the study are discussed and evaluated.

6.1.1 Innovation Concept

In the era of information that we are in, invention of the internet and advancements in internet applications made a great revolution all over the world and made a substantial contribution to economic growth. Particularly in service industries the advent of the internet has created a potential for further innovations. Increased turbulence, complexity and global competition have made identification, development, evaluation and adoption of innovations the decisive factors for the growth, productivity, competitiveness, survival, and profitability (Morgan, 1988; Delbecq and Mills, 1985; Bigoness and Perreault, 1981; Zaltman et al, 1973).

The word innovation stems from the Latin word "innovare" which means to renew. In this context innovation is defined as ideas, formulas, programmes or technologies, which the organization in question regards as new (Evan, 1993; Beatty and Gordon, 1991). Schumpeter (1939) defined innovation as the setting up of a new production function, which can take the form of a new commodity or product innovation, a new service, a new market, or a new production process. However innovation is more than a good idea or new service or products. Innovations need to change market conditions or conditions in society and must alter the organizational performance in a positive manner. In the case of business organizations innovations should enhance the organizations business performance and provide a source of competitive advantage (Soosay and Hyland, 2005). The value of innovation lies in its contribution to profit or addition to economic value (Goswami and Mathew, 2005).

By the end of the 1980s the knowledge-based economy, globalization and the pressure of international competition had increased the importance of innovation (Camagni 1995; Malmberg 1997; Ritsila 1999). Innovation is widely recognized as key to creating and sustaining a competitive advantage. Creating breakthrough innovations is a key strategy for many companies in an increasingly tight competition (Terninko, 1998). From total quality management (TQM) in the 1980s,

through reengineering in the 1990s, and Six Sigma today, new philosophies and methods are constantly being invented to meet new competitive challenges. And innovation has become a driving force and leading executive level mantra for a large number of organizations around the world as the global economy evolves (Salz, 2006). Enterprise process innovation (EPI), in particular, is a widely recognized source of competitive advantage (Matthyssens et al, 2006). Innovation is considered a fundamental component of entrepreneurship and a key element of business prosperity (Nonaka and Takeuchi, 1995).

In recent years, predominant source of sustainable competitive advantage has shifted from a static, defensible process or patent novelty, to an organization's dynamic capability to innovate continuously (IBM, 2006). Today's global economy requires that firms develop what is referred to as "dynamic capability" (Zollo and Winter, 2002). This includes a range of competencies, including the ability to acquire and assimilate knowledge, the ability to create a culture of innovation and experimentation, the ability to meet customer needs and address rapidly changing market conditions, and the ability constantly to re-invent internal processes (Duening, 2007).

Technological innovation represents an important source of global competitive advantage in today's technologically intensive competitive markets. To compete in today's technologically intensive competitive markets, companies must create new products, services and processes and they must adopt innovation as a way of corporate life (Tushman and Nadler, 1986). Technological innovations in a firm help it respond quickly to new product offerings and shorten product development time. As technological competition intensifies, it becomes more and more important that firms recognize, protect, and reinforce their technological capabilities as the sources of global competitive advantage (Guan and Liu, 2007). Technological innovativeness plays an important role in developed economies, it is also important in the

revitalization of transition economies since it is the driving force behind the process of restructuring and catching up (Gunther and Gebhardt 2005).

In today's competitive business, there is an increasing demand for new product innovation in an atmosphere that is increasingly cross-functional, collaborative, and fast paced (Bart and Pujari, 2007). Many studies have been confirmed that, there is a positive relationship between competition and innovation (Boone and Van Dijk, 1998; Porter, 1990; Van de Klundert and Smulders, 1997). Innovation capability is the most important determinant of firm performance (Mone et al, 1998; Cho and Pucik 2005). High levels of innovativeness have a positive influence on performance at the firm level and, as a result, on economic performance at the regional or national levels as well (Gössling and Rutten, 2007).

Innovation is considered as one of the most important factors enabling organizations to effectively compete (Christensen, 1997). In fact, some economists view innovation as the primary source of success in the global market (Schumpeter, 1934). Companies can raise their competitive advantage by adopting new technologies (Fernandes et al, 2006). And they can obtain greater opportunities for growth and they can improve flexibility for adaptation and renewal by developing radically new products through exploration (Benner and Tushman, 2003; Crossan and Berdrow, 2003; McGrath, 2001). Technological leadership through innovation may confer strong competitive advantage to a company and enable them to earn high rents from their investment in innovation (OECD, 2003).

Countries that generate innovation, create new technologies, and encourage adoption of these new technologies grow faster than those that do not. Innovation is singled out as the likely factor that drives long-term productivity and economic growth. Long run economic growth depends on the creation and fostering of an environment that encourages innovation and application of new technologies. Innovative activity underpins economic productivity and growth (OECD, 2003, 2005d, e, f).

In today's business environment, there is no executive task more vital and demanding than the sustained management of innovation and change (Tushman and Nadler, 1986). Management may have seen that a certain innovation supports and promotes the vision of the organization (Pearson, 1988). Organizations need to manage the innovations within a framework, or the consequences will be destructive for the organization (Soosay and Hyland, 2005). Asplund and Sandin (1999) and Cozijnsen et al (2000) argue that only one out of every five innovation projects ever initiated is viable because of management challenges.

Writer of this thesis calls attention to importance of innovation for a country. The writer aims to derive a technological innovation model for public sector in Turkey. To derive such a model, innovation process, stakeholders of the process, sources of innovation, obstacles of innovation and driving forces of innovation are identified.

6.1.2 Innovation Process

Innovation is widely recognized as a core renewal process within organizations. Unless managers continuously look for ways to change or at least improve offerings or create and deliver those offerings, organizations risk becoming increasingly vulnerable to hostile and turbulent environments (Bowen et al, 1994). For this reason, growing attention has been paid to the challenge of innovation management in trying to understand the generic and firm-specific issues surrounding the problem of dealing with this challenge (Tidd et al, 2001). To overcome these challenges, organizations need to be prepared for innovation, managers to understand the nature of innovation, organizations to develop a strategic portfolio of innovation projects (Tranfield and Smith, 1998). Understanding the nature of innovation is vital to manage innovation process. Developing such an understanding requires a careful examination of the nature of innovation in the life sciences, the innovation process that spans academic institutions, healthcare systems and multiple industrial organizations, and involves a wide range of stakeholders (Atun et al, 2007).

“Processes” can be defined as the particular ways in which an individual organization has learned to behave, and include the routines which characterize the culture of the organization (Schein, 1984). Many researches were performed on innovation processes in enterprises and regional competitiveness. With the increasing innovation process research, numerous studies and extensive research in innovation management have descriptively linked innovation with competitiveness and economic outcomes at the national level (Porter, 1990; Nelson, 1993). Moreover, these researches attributed to the recognition of innovation as a key determinant of economic growth and a basis for competitiveness (Porter, 2003). Now, it is widely accepted that technological innovation and its effective diffusion are central and crucial to the growth of economic output, productivity and employment (Sternberg and Arndt, 2001).

Writer of this thesis perceives innovation as a process. Many scientists defined innovation as a process (Hargadon and Sutton, 2000; Buggie, 2001). Nelson and Winter (1978) suggest that innovation, as driven by competition, can be viewed as a process. It is suggested that the process that may successfully attain innovation and hence future organizational growth consists of stages (Rothwell, 1994; Buggie, 2001) such as: strategy development, ideation, evaluation and implementation. Fraser et al (2005) defined innovation as an increasingly distributed process, involving development webs of multiple, players and modular production networks with a variety of possible and dynamic value chain configurations. Thus, viewing innovation as a process provides a systematic model and process of how innovation can be realized.

Storey (2000) sees the idea of innovation as a planned, rational process. This meant that managing it entailed a series of stages with each culminating in a phase or stage review. Typical phases were: idea conception, specification of product, planning the project, prototyping and so on, through to final review. This type of understanding of the process of innovation and its management is closely allied to the idea of product life cycles.

The results of the study demonstrate that, in order to reach innovation all of the public organizations follow six identical steps: new idea generation, project study (project plan, feasibility study, and documentation), project approval, project implementation, new services, and innovation.

Findings indicate that, innovation initiates with new idea generation first. Wolfe (1994) claims that innovation process research focuses on the analysis of ordered steps involving the formation, redesign and implementation of new ideas. And Nonaka (1994) confirms that knowledge creation and innovation take place inside new product development projects. According to Zaltman et al (1984) innovation process starts with the generation of initial idea leading to the development of a new product or service. In addition, Storey (2000) argues that innovation comes first and foremost from the ideas of individuals and from the way in which the ideas are captured.

Project study is the second steps of the innovation process. After idea generation, new ideas are selected to transform new projects. Cooper and Kleinschmidt (1986) see the idea development and idea selection stages as the 'fuzzy front end' of new product development. And deficiencies in idea development and idea selection are dominant factors explaining innovation failure (Khurana and Rosenthal, 1998). The idea development and idea selection phase is a fundamental stage of the overall innovation process because it represents the initial impulse for further innovation activities (Birkinshaw, 2000).

After project implementation new services enliven in the organization. After this step the last step named as "Innovation" comes. Diffusion and adoption of new service is realized in the last step. Innovation process includes not only the development but also the diffusion of new services. Because successful innovation requires changes in organizational processes and conversion of an idea into a new service that is designed, manufactured, and adopted by users (Verloop, 2004).

6.1.3 Stakeholders of Innovation

Findings indicate that, stakeholders of the technological innovation process are; universities, private organizations, non-governmental organizations and public organizations. An innovation may emerge from one or more stakeholders or linkages between them. According to Doloreux (2004), innovation system is viewed as a set of interacting private firms, public authorities, research organizations, and other bodies that function according to organizational and institutional arrangements and relationships that are conducive to the generation, use, and dissemination of knowledge. In this context, there are multitudes of actors involved in the innovation process. The main partners for innovation activities are; other firms, universities, technical colleges, technology transfer organizations, government agencies, and financial organizations.

Inganas et al (2007) investigated new energy technologies in their research study and identified a number of stakeholders; research institutes, technology providers, energy companies, investors and policy makers. According to them an intensive interaction between technology providers, power companies and research institutes is highly important for the successful transfer of new energy technologies from research institutes to the industry.

According to results of the study stakeholders are significant part of innovation process. External relations with stakeholders enhance the innovation process. Innovation emerges as a result of interaction between the stakeholders. Doloreux (2006) confirms these ideas declaring, innovation is a process by paying attention not only to different stages of evolutionary development, but also to certain types of institutional arrangements, organizational forms, and configurations of relationships among organizations that are all related to the provision of knowledge, finance, and other inputs to innovating firms. Many studies in innovation stress the importance of external linkages and processes at all points along the technology transfer pathway (Tidd et al, 1997). Innovation is seen increasingly as a multi-firm networking process

involving close collaboration between companies and a consequent linking of technology-push and market-pull factors (Rothwell, 1992). There is also a presumption that collaboration between universities and SMEs is desirable (Henry et al, 2000).

Several research studies have found that collaborations are an important instrument to acquire know-how and to learn new skills that reside within other organizations (Hagedoorn and Schakenraad 1994; George et al, 2002; Soh, 2003; Schildt et al, 2005). Hagedoorn and Schakenraad (1994) found a direct positive relationship between technological alliances and innovation rates.

Boer (2002) argues that, continuous innovation feeds from ongoing interaction between operations, incremental improvement, and learning. The learning does not only occur within organizations. They also made contacts with institutions such as universities, research centers, governmental organizations, professional institutions and other companies. And they receive some useful information and training from them. Large organizations operating with complex processes need to constantly obtain information and knowledge from external sources to maintain efficiency and innovate. The more relationships the organizations have with external organizations, the more they collaborated with them to engage in improvements and innovative efforts.

According to Metcalfe (1995), system of innovation is a set of distinct institutions which jointly and individually contributes to the development and diffusion of new technologies. These interconnected institutions create, store and transfer the knowledge which define new technologies. However innovative performance does not rely solely on the knowledge banked by firms and public sector organizations; instead, it also depends on the way that these different kinds of organizations interact with each other and their environment in terms to production and the dissemination of knowledge (Asheim and Coenen, 2005; Asheim and Gertler, 2005; Cooke, 2001;

Doloreux, 2004; Fischer, 2001). Successful innovative organizations are characterized by their ability to connect with and tap into different systems of innovation to acquire new knowledge, skills, and competences (Simmie, 2001).
According to findings 92.8% of the public organizations collaborate with other public organizations and all public organizations collaborate with firms for their innovation projects. Lundvall (1999) claims that, public sector R&D can be an important complement to R&D carried out in the private sector. The position taken in many nations and regions is that the role of public sector R&D is an important component of a regional or national innovation system (Fujisue, 1998).

According to findings 64.2% of the public organizations collaborate with universities for their innovation projects. This result shows that, universities have important role in the innovation process. Storper (1995) sees universities as a source of new technology, entrepreneurial talent and untraded interdependencies. Now, universities are viewed as drivers of economic growth, both in a regional, as well as, in a national context (Agrawal, 2001). Most studies focus on the motivation of the university to collaborate with private firms and public organizations, the mechanisms and the outcomes of such collaboration (Santoro and Saparito, 2003; Valentin and Sanchez, 2002). In such a mutual collaboration, universities profit from interaction by gaining access to funding and industrial technical expertise, organizations view universities as a source of new technologies (Santoro and Gopalakrishnan, 2000).

The role of universities within national innovation systems has been established as vital to innovative activities. The role is however not purely as a source of innovation but as a member of a network of relationships spanning government and industry (Etzkowitz and Leydesdorff, 2000). Universities and industry can merge the strengths of each to generate value from bringing to market products and services based upon university generated intellectual property (IP) (Etzkowitz and Leydesdorff, 1997). Private and public sectors have both recognized the potential such an approach can offer to help improve both firm and national level innovation

performance. Consequently, many firms have re-structured their R&D activities to include a diverse range of links with universities, while regional and national policymakers have developed incentives and instruments that attempt to facilitate the ability of universities and industry to collaborate more effectively and efficiently (Minshall et al, 2007).

Recently, the role of universities in a developed economy is enhanced by integration of a new mission besides the universities' traditional activities of research and teaching (Leydesdorff and Etzkowitz, 1998; Webster and Etzkowitz, 2000). A wide range of activities can be grouped under the third mission banner including faculty consultancy, licensing of university IP to established firms, building of spin-out ventures around university IP, and the support for the creation of student and faculty-led start-up ventures (Minshall et al, 2007).

6.1.4 Sources of Innovation

According to results of the study there are four major sources of innovation in the public sector; personnel, legislation, other firms, and citizens. New ideas that lead innovations can be generated by personnel, legislation, other firms, and citizens. Many scientists consider that knowledge and knowledge creation are key resources for innovation (Grant, 1996; Kogut and Zander, 1992; Spender, 1996; Teece, 1998). According to Tushman and Nadler (1986), the vast majority of successful innovations are based on the cumulative effect of incremental change in ideas. Minshall et al (2007) claims that the source of external ideas may include customers, suppliers, joint venture partners, universities, publicly funded research institutes, and start-up firms.

Results show that %78.5 of the new ideas was generated by personnel who think about how to serve better and how to ease business processes. Savory (2006) claims that innovations are often rooted in formal research projects but can also result from ideas, inventions and process changes produced by employees in the course of their

work. Griffin et al (2009) claims that, innovative persons use an innovation process that emphasizes the up-front aspects of finding interesting problems, planning first before executing, and understanding customer needs in great detail. This allows them to generate insights into how to solve those problems profitably for the firm. Once they have obtained and validated their insights for solving the problem, they participate in the actual implementation of the concept to a new product.

According to results 64.2% of the new ideas was arise from legislation to force organizations to make innovation. And 14.2% of the new ideas were generated by other firms and citizens. Ulwick (2002) pointed out that companies should not expect solutions to be offered by potential customers; rather, they should ask them about the desired product's characteristics. Christensen (1997) stated that customers may emphasize the product's functionality to too great a degree.

6.1.5 Obstacles to Innovation

According to results of the study there are nine potential obstacles in the public sector in front of the innovation: legislation, lack of qualified staff, approval authority, low wages policy, bureaucracy, management hierarchy, work environment, government program, and financial constraints. Results show that, the most suffered obstacles in front of innovation are; bureaucracy (100%), approval authority (92.8%), legislation (92.8%), and lack of qualified staff (71.4%).

Hadjimanolis (2006) has reported similar results in his case study research; structural barriers and bureaucracy were identified as most suffered barriers of innovation in an organization. In another study Wyatt examines cases of innovation in public services in the UK and US. According to Wyatt, demands for efficiency and higher service quality motivate innovation in the public services. She claims that regulations obstruct service innovation. Storey (2000) orders the key identified problems of the management of innovation as: the stifling effects of "bureaucracy" in established

organizations, a learned incapacity in previously successful organizations, the effects of organizational politics, failings in institutional leadership, and doubts about leader priorities and commitment.

In his research Van de Ven (1986) identifies four fundamental problems of innovation faced by established firms; the human problem of focusing organizational members' attention on the desired innovation, the process problem of realizing value from the new idea, the structural problem of "part-whole" relationships, and the strategic problem of institutional leadership. Hollins (2000) identified in his research in which more than 80 organizations were participated; lack of qualified staff within organizations and financial restrictions are the most common obstacles in front of innovation.

Freel (2005) categorizes constraints of innovation in to two broad categories: financial constraints and knowledge/skills deficiencies. Financial difficulties are the most important restraint on innovation at least from the perspective of the firms (Hewitt Dundas, 2003). Evaluations of the individual policy initiatives indicate that knowledge/skills deficiencies are key obstacles to be addressed (North et al, 2001).

6.1.6 Drivers of Innovation

In the study driving forces of innovation in the public sector was detected as: policies favorable to innovation, public demand, difficulties and delays on the services, cost savings, Turkish information society strategy studies realized by SPO, establishment of the strategy development units, performance based budget studies, improvement in standardization in the public services, and increasing collaboration between private sector, universities, public sector and non-governmental organizations.

According to De Bruijn and Lagendijk (2005), collaboration and alliances are the main significant drivers of innovation. According to Kusiak (2007), R&D and

marketing inputs (customer need, market trends, and competitors' movements) are the most important driving forces of innovation within any organization.

Successful innovation management is required in order to perform successful innovations. According to Howells (2005), an innovation model is essential to manage innovation process in the organization. In this study a new technological innovation model for public sector was developed (See Figure 5.1) based on the findings. This study presented a comprehensive model for understanding innovation in services and especially for better understanding innovation in services in public sectors.

6.1.7 Innovation Management

It is better to finish words by giving important recipes about innovation management in organizations. As it is stated before innovation is fundamentally about the production, diffusion and use of new, and economically useful, knowledge (Lundvall, 1995). Indeed, studies addressing poor management and technical skills (Adams, 1982; Bosworth and Jacobs, 1989).

According to Bessant and Boer (2002), recent developments in society, markets, technology and industry suggest that leading organizations need to find configurations of processes, procedures, people, technologies, and organizational arrangements that allow them to continuously innovative. Burns and Stalker (1994) and Tushman et al (1989) maintain that organizations pursuing innovative strategies need to use flexible, organic structures and management processes. This flexibility is needed to provide time and other resources for developing ideas and innovative practices and processes. They argue that management can provide a degree of flexibility in the application of resources that will permit innovation to take place. Innovation is more difficult in mechanistic organizations because of the constraints in place and the lack of flexibility.

The management of innovation requires persons who commit themselves with enthusiasm and self-motivation to the new ideas (Gemünden et al, 2007). Innovative individuals need the time and permission to access people, places and capabilities that can help develop their ideas, and to assist with the implementation of these ideas (Soosay and Hyland, 2005).

Organizational capability influences the speed of the innovational process through the infrastructure it creates for developing projects. Team autonomy, project integration and process organization are all related to organizational capability (Guan and Liu, 2007). Capabilities such as human, technological, and organizational capabilities are important to produce a new service (Gadrey et al, 1995). Human resource requirements and organization culture are two important points and must not be overlooked for the organizations to make successful innovations (Walker et al, 2000).

Creativity and idea generation need to be given enough time and room in the organization (Amabile and Conti, 1999). The consequence of reducing organizational slack will be a reduction in innovation, since slack provides resources for search and experimentation (Fisher and White, 2000). Slack can free up resources necessary for creative behavior, which can create new innovations (Singh, 1986). Recent research has found that the relationship between organizational slack and innovation is inversely U-shaped (Geiger and Cashen, 2002; Nohria and Gulati, 1996). The challenge for companies is to find a balance between reducing slack, while at the same time maintaining an ability to innovate (Bourgeois, 1981; Geiger and Cashen, 2002; Nohria and Gulati, 1996).

Farr (1990) gives prescriptions for enhancing individual creativity; forming innovative groups and teams (Anderson et al, 1992; Katz, 1994), promoting organizational innovation (Rosenfeld and Servo, 1990), and using inter-firm

partnerships, alliances and networks for innovation (Hargadon and Sutton, 1997; Quinn, 1992).

Continuous innovation is the fundamental task for an organization that exists in dynamic and unstable environments; and it requires a constant surveillance of regulatory policies, technologies, and the capability to quickly accomplish changes (Teece et al, 1997). Studies clearly show that innovation, as measured by R&D or patenting, has a positive correlation with economic productivity and enhances market share and profitability at company level. Innovation diffuses rapidly to competitor firms and it can be imitated (Atun et al, 2007). Hence, IP protection is important to sustain competitive advantage and allow the creators to capture the benefits of their investment in innovation. Regulatory policies should be done by governments for legal protection of the IP rights of the innovators. Studies demonstrate that there is a positive correlation between the strength of the IP protection and intensity of patenting (OECD, 2005a).

Organizational support for innovativeness tends to be an important element in the development of technological innovativeness and subsequent organizational performance (Antoncic et al, 2007). Scott and Bruce (1994) emphasized that the degree to which individuals perceived dimensions of the organizational climate as supportive of innovation was positively related to their innovative behavior.

Decision making processes and procedures play a large role in enterprise process innovation success (Duening, 2007). Hence top executives' actions to change roles, rules, and resources to provide increased adaptability will be positively related to firm's innovativeness. Top managers play a critical role in shaping a firm's innovation trajectory and managing the dynamic balance between innovation and efficiency across time and space (Nemanich et al, 2007). Leadership behaviors at the top management level impact organizational members; first, directly through interaction with individuals, second indirectly through cascading effects via middle

and lower management's attributions of strategic leaders (Bass et al, 1987). In addition, top managers shape individual behavior through the systems and structures they put into place (Jung et al, 2003).

The project manager has an important role model to foster innovative projects. Leading a project not only comprises leadership of a team, it also includes planning and controlling, as well as cooperation with various stakeholders, particularly project sponsors, project clients and project suppliers (Gemünden et al, 2007). The characteristics of the project leader are assumed to strongly influence the success of innovation projects. There is strong evidence that the competence of the project leader has a significant positive influence on the success of innovative projects (Murphy et al, 1974; Cooke Davies, 2002; Elkins and Keller, 2004; Prabhakar, 2005).

Howell, Shea and Higgins (2005) claim that, good manager behavior is characterized by (1) enthusiasm and confidence, (2) persistence, and (3) the capability to bring the right people together, and that this behavior significantly increases the success of new product development projects. Entrepreneurship is very important for innovation. Managers who have a positive attitude to entrepreneurship have an increased first mover advantage. The number of implemented innovations is a quantitative measure to indicate entrepreneurial behavior (Habets et al, 2007).

Kotter (1990) denotes that, leadership is a process whose purpose is to help direct and mobilize people and their ideas. It is important that the management demonstrates leadership and encourages personnel to operate effectively as teams. Leaders have influenced values and practices supporting innovation over a long period (Deschamps, 2003). The presence of an innovation culture can be a pre-requisite to encouraging technological innovation in the organizations (Savory, 2006).

Decision-maker refers to people from management personnel deciding whether or not to allocate resources towards developing the innovation to the end consumer deciding whether or not to realize the innovation (Sifonis et al, 2006). There can be a significant disconnect between recognizing the importance of innovation and implementing those ideas. The disconnect lies in the difficulty of communicating innovative ideas to decision-makers. Because an innovation is new and unusual it is difficult to describe in such a way that decision-makers fully understand the innovation and the benefits it offers (Gregan-Paxton and John, 1997).

Innovations involve individuals learning about new information and processes (Cantisani, 2006). Hence, cognitive techniques such as analogies provide a better understanding of the innovation by a combination of their experiences and events. Analogy provides the additional knowledge necessary for fully understanding the innovation, its applications and potential benefits (Sifonis et al, 2006). It also allows the audience to reason more effectively about the innovation (Chi et al, 1981).

6.2 Conclusion

I hope that this study and especially the new technological innovation model will provide successful management of innovation in the public organizations that will increase national productivity and, as a result, enable to gain international competitive advantage. The new model may help managers for long term planning of innovation activities and it may pave the way of managers for their innovation projects by means of determining unclear innovation process and identifying the inputs and outputs of the process. Moreover, this study is a guide for the managers in public organizations; finding out possible obstacles and offering solutions, identifying driving forces to accelerate the innovation process, emphasizing the importance of interaction between the stakeholders and recommending them to act as a single organization. I believe that the new model and findings presented here may provide important direction and guidance for managers laboring in public organizations.

6.3 Future Research

This thesis represents a preliminary study for innovation management in public organizations. Considerable results are acquired through the study. Important future works are emerged based on these results. In my estimation, this area is a very fruitful area for future research. Further research would be useful to develop a policy including applicable solutions for barriers of innovation identified in this research study. In addition, future research would be useful to develop metrics to evaluate the productivity of innovation projects in the public organizations. It is strongly recommended to develop and run an innovation network for public organizations and to develop an innovation maturity model to evaluate innovation maturity level of organizations.

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APPENDICES

APPENDIX A: CASE STUDY

Appendix A describes the cases and case study projects that examined during the study. This chapter explains only the organizations that perform technological innovation projects. It includes case study questions that are asked to the interviewees and answers of them. In this study, total sixteen managers are interviewed from fifteen ministries; three managers are interviewed from two governmental organizations; two managers are interviewed from one non-governmental organization; one manager is interviewed from one private organization. Twenty organizations have been conducted to participate in the study, however only fourteen of them were retained after consideration of the research criteria. Moreover, twenty eight projects are examined during the study.

A.1 Case 1: METU-Technopolis

The management company of METUTECH is Teknopark Inc. founded in 1991. Shareholders of Teknopark Inc. are The Middle East Technical University

Development Foundation, Ankara Chamber of Industry, Bleda Corporation, EBI Corporation, and Ortadoğu Software Corporation.

The studies on METUTECH project were started in 1987 to support the formation and development of high-tech using-producing firms to ensure the development of technology, and to maximize the university-industry cooperation. In addition to that making contributions to the studies that aim to enable the transmission of the results of university research into economic values and to contribute the improvement of international competitive power of the country by way of increasing the economic and technological level were also targeted (IRC, 2007).

The manager of Innovation Relay Center Anatolia project is participated in the case study as an interviewee. Table A.1 shows the interviewee information and the interview date.

Table A.1: Interviewee in the Case Study: Metu-Technopolis

Title	Organization	Date
Manager	Metu-Technopolis	July 8 2008

A.1.1 Case Study Project: Innovation Relay Centre Anatolia

Innovation Relay Centre (IRC) Anatolia established in April 2004, the IRC Anatolia Consortium is formed by Middle East Technical University Technopolis (the coordinator), Small and Medium Industry Development Organisation (SIMIDO), and Ankara Chamber of Industry. IRC Anatolia undertakes to build and develop an organizational infrastructure, for promoting the transfer of research results and

technologies, in accordance with the needs expressed by the industrial structure of Southeast, Middle, and East Anatolia regions in Turkey, in order to improve its competitiveness through innovation (IRC, 2007).

IRC Anatolia covers almost half of Turkey from the centre to the borders of the Black sea Region, and from the Mediterranean shores to the southeast region. This territory shall be managed through eight cities, each of which has one sub-region. The region of IRC Anatolia includes Ankara, Adana, Çorum, Eskişehir, Gaziantep, Kayseri, Konya and Samsun. Node offices in each city operate within its specific region and the surroundings (IRC, 2007).

In brief, IRC Anatolia is the bridge between European RTD programs (Research and Technological Development) and the Anatolian region. The main purpose of IRC Anatolia is to develop mutually profitable business alliances, and to help small and medium enterprises (SMEs) to find suitable technology partners or suppliers (IRC, 2007).

With the objectives of motivating and stimulating the Turkish industry, developing the scientific potential of Turkey through promoting the capacity of new technologies, encouraging the competitiveness and supporting the development of innovation processes, IRC-Anatolia serves for a region with a population of around 11 million, seventy five percent of which are younger than the age of 25. Within the region there are over eighteen thousand companies, of which almost ninety five percent are SMEs together with 14 universities, 3 national and over 60 university level research centers (IRC, 2007). In four years IRC project combined total 30 Turkish and foreign companies to perform technology transfer between them. First phase of Innovation Relay Centre (IRC) Anatolia project is completed in March 2008.

Business Support Network project is started in March 31th 2008 as a second phase of the IRC project. BSN project consists of two projects, which are IRC and Europe Information Centers projects. BSN project aims to supports small and medium enterprises, universities, and research and development centers about technology transfer, European funds and intellectual property rights. BSN project is separated from IRC project by some additional features such as, e-news letter and call center.

A.1.2 IRC Anatolia Project Partners

IRC Anatolia Consortium is formed by METU-Technopolis, Small and Medium Industry Development Organisation (SIMIDO), and Ankara Chamber of Industry (See Figure A.1).

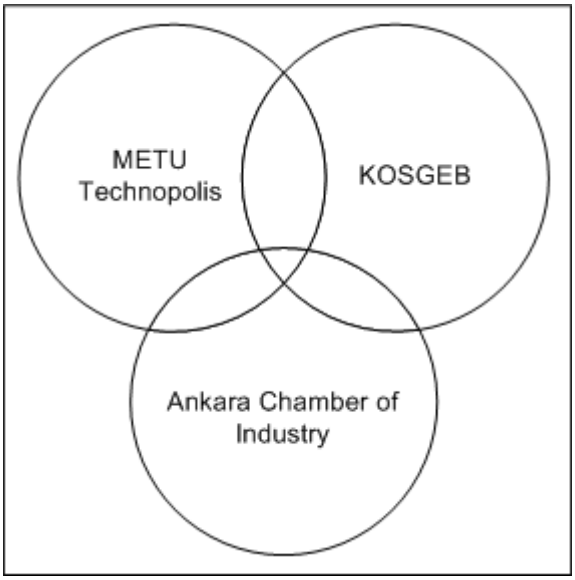

Figure A.1: IRC Anatolia Project Partners

A.1.2.1 METU-Technopolis (METUTECH)

METU-Technopolis, the first and the biggest science park of Turkey, is located in METU Campus. METUTECH hosts over 150 companies 75% of which are SMEs. The existing company profile of METUTECH is based on software development, IT, defense and electronics industry. The incubation center of METU-Technopolis serves 38 micro sized companies; most of which are spin offs from Middle East Technical University. About ten million Euros have spent in last four years for completing the infrastructure and facilities of the science park. Today, METUTECH operates in 60,000 square meters closed area (IRC, 2007).

METUTECH provides several free of charge services to its clients on different subjects, like as IPR, licensing and legal issues (such as contract management), international marketing, and financing. The bilateral organic relationship with Middle East Technical University and its 19 research centers assists METUTECH to render RTD dissemination services, as well (IRC, 2007).

As of today, METUTECH manages 30 national and international projects including IRC-Anatolia project. (4 of which are EU projects). The company has a wide level of knowledge and practice in project management, from scheduling to book keeping, coordination and control. Most of these projects have multi partners, from universities to industry, non-governmental organizations (NGOs) etc (IRC, 2007).

Focus sectors within the science park are ICT (software development), electronics (defense), telecommunications, energy, automotive, biotechnology, health care & medicine, advanced engineering (aerospace, defense, advanced materials) and environment (IRC, 2007).

A.1.2.2 Ankara Chamber of Industry (ACI)

Ankara Chamber of Industry, being the third largest chamber of industry in Turkey with three thousand members, parted from the Ankara Chamber of Commerce on 18th November 1963 and, with a group of two hundred and fifty-nine manufacturers from 11 different occupational groups, it started serving industrial producers in Ankara. The chamber involves 26 occupational groups and most members concentrate around Limited and Joint-Stock type companies. Among the wide range of groups, from Food Industry to Electric Home Appliances and Consumer Durables Industry, the members concerned with the Machine Tool Industry, Construction and System Contractors, Textile and Apparel Industry, Electronics Industry and Furniture Industry are increasing in number (IRC, 2007).

As well as the duties assigned by law, Ankara Chamber of Industry also has an important role in governmental decisions affecting the economy of Turkey, concerning the laws and regulations related to industry, as well as making an effort to enable new marketing and business opportunities for its members (IRC, 2007).

A.1.2.3 Small and Medium Industry Development Organisation (SIMIDO)

SIMIDO was founded within the structure of the Turkish Ministry of Industry and Commerce according to the law numbered 3624 and dated 20th April 1990, in order to increase the share and activity, and to promote the competitive power and position of small and medium sized industrial enterprises, and perform industrial integration conveniently for economical developments (IRC, 2007).

SIMIDO performs a range of services including consultancy and training for SMEs, technology development and innovation, information technology, quality development, market research and development of active trade, development of

international cooperation, regional development, and development of enterprise, presenting them via Business Development Centers, Technology Development Centers, Laboratory Departments and Synergy Focuses (IRC, 2007).

A.1.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

   Innovation Relay Center Anatolia, Business Support Network Anatolia

2. What are the stages and processes of the technological innovation projects?

   First new idea is generated by qualified staff. Second Project feasibility study is performed. If the project is accepted it is implemented. After implementation finally, the project is applied in to the organization and the organization is innovated. Budget and lack of qualified staff are two main obstacles of innovation.

3. Do you use any model for the management of the technological innovation projects?

   There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

All of the departments are cooperating in the organization during the project.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

Small and Medium Industry Development Organisation (SIMIDO), METU Technopolis, Ankara Chamber of Industry (ACI), Ankara Chamber of Trade (ATO), Technology Development Foundation of Turkey (TDFT), The Union of Chambers and Commodity Exchanges of Turkey (TOBB), Ministry of Industry, Universities, R&D Centers.

A.2 Case 2: Republic of Turkey Ministry of National Education

Ministry of National Education (MONE) is commissioned with the duty of reaching the goals set for Turkish National Education on behalf of the state. The major duties of the MONE are; to plan, program, implement, monitor and control education and training services, to open pre-primary, primary, secondary and all kinds of formal and non-formal education institutions, to organize and implement education and training services abroad for Turkish citizens (OECD, 2005a).

The manager of Management Information Systems Department of the General Directorate of Education Technologies (EGITEK) and the manager of Strategy Development Unit are participated in the case study as interviewees. Table A.2 shows the interviewees information and the interview date.

Table A.2: Interviewees in the Case Study: Ministry of National Education

Title	Organization	Date
EGITEK Management Information Systems Department Manager	Ministry of National Education	July 22 2008
Manager of Strategy Development Unit	Ministry of National Education	July 22 2008

A.2.1 Case Study Project 1: The Provincial and District Directorates of National Education Management Information System (ILSIS)

ILSIS project is established to execute the functions of provincial and district directorates of national education with the support of information technologies. The main objective of ILSIS is to ensure current, continuous, fast and secure information flow between the central and provincial organization of the Ministry of National Education (OECD, 2005b). ILSIS provides a web based management information system for appointment, personnel, examination, investment, audit, and investigation operations that are executed by the provincial and district directories of national education.

A.2.2 Case Study Project 2: E-School

E-School Project is started by Ministry of National Education in May 2006. According to Mehmet Altınsoy, General Co Director of Educational Technologies, in accordance with the project, all the identification information found in the Central Population Management System, namely MERNIS, of the Ministry of Internal Affairs and school registration information such as class, branch of each student has been recorded into the central information system by the schools using the unique

identification numbers. All of the students found in formal education are aimed to be recorded into the system in the near future. Transferring a student to another school is carried out electronically by the system.

He explains the benefits of the e-school project briefly; by the usage of the e-school service, all of the schools throughout Turkey started to give up buying software and decreased their software expenditures for carrying out student registrations. With this project, all of the records and standard forms held by the schools will be handled through the central information system over the internet, preventing unnecessary paperwork and waste of other resources. Moreover, parents can monitor the student information without attending the parents meeting or waiting the student's report card. The students' information will be placed in central information system of Ministry of National Education. Therefore, the bank records including the identification number of the student will be easily compared to the records in the Ministry, and this process will greatly be sufficient for preparing the exam files.

A.2.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

   ILSIS, E-School

2. What are the stages and processes of the technological innovation projects?

   Idea for these projects is originated from legislations. After approval of the project, it is implemented in the organization. Advantages of the projects are cost saving, time saving, and innovation in the service. Legislation, approval

authority, and bureaucratic work environment can be a barrier in front of the innovation.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

Network Management Department and Management Systems Department are cooperating and developing the projects.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are implementing the projects inside the organization using the infrastructure and labor of the ministry. We are not outsourcing the projects but we are taking support from consultancy firms. We are taking consultancy from Oracle firm just for the software not for the innovation.

A.3 Case 3: Republic of Turkey Ministry of Public Works and Settlement

The Ministry of Public Works and Settlement was formed in 1983 with the merging of the Ministry of Public Works and the Ministry of Reconstruction and Settlement. The purposes of the Ministry of Public Works and Settlement is to carry out civil works and major repairs concerning public buildings, and highways as well as providing services related to physical planning, land development and housing for low income families as well as extending disaster relief.

The head of IT department is participated in the case study as an interviewee. Table A.3 shows the interviewee information and the interview date.

Table A.3: Interviewee in the Case Study: Ministry of Public Works and Settlement

Title	Organization	Date
Head of IT Department	Ministry of Public Works and Settlement	July 25 2008

A.3.1 Case Study Project 1: Remote Sensing and Geographical Information Systems (CBS) Project

Remote Sensing and Geographical Information Systems project aims to form a technological base for the activities of public work and planning procedures to be more accurate and faster. In scope of the project a pilot region is selected and related data such as land use classification, forest areas, soil classes and degree of explosion to erosion are transferred to digital environment and several thematic maps are comprised at the first phase of the project which started in February 200A. Expanding the scope of the project among all the departments of the ministry to all levels of the workflow by building a Geographical Database which will produce

regional analysis on physical and social changes and development is the next step of the project.

A.3.2 Case Study Project 2: Land Registry and Cadastre Information System

Land Registry and Cadastre Information System are accomplished by the General Directorate of Land Registry and Cadastre. Land Registry and Cadastre Information System Project provided the following solutions; digital production and back up of the cadastral data, production of data in accordance with the National Geographic Network, definition of producing standards of data, integration of graphic or non graphic data, cooperation with Private Sector in the matter of data collection, storing, processing and getting ready to use.

A.3.3. Case Study Project 3: Disaster Information System

Disaster Information System aims to store all of the damage that are as a result of disaster in a database. Moreover, it facilitates holder of rights studies and house acquisition studies. It stores the data to use in these studies. After disaster, it sends the data of the damage assessment studies to the General Directorate of Disaster Affairs.

A.3.4 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

Remote Sensing and Geographical Information Systems Project, Land Registry and Cadastre Information System, Disaster Information System

2. What are the stages and processes of the technological innovation projects?

Project processes are depend on project type, budget and source. There are three types of budget; current budget, investment budget and private budgets (World Bank, EU, and TUBITAK). Current and investment budget are project resources of the ministry. Organizations suggest the investment budget to the State Planning Organization (SPO). If the SPO approves the budget ministry takes the fund. Then using that fund the project is implemented.

There are some restrictions for generation of the new ideas in the public sector. You cannot act out of legislation for this reason the laws restrict the generation of new ideas. In addition to this the staff of the ministry has no level to generate new ideas having notion of research and development. If approval authority doesn't approve the project there is no way to implement it. Moreover, bureaucracy and work environment obstruct the generation of new ideas.

The staff of the organization come together and establishes a commission to generate new ideas. These new ideas are generated to improve the services in the organization. It is possible to not generate good ideas in the commission, and if the idea is not compatible with the legislation or if the manager doesn't approve project doesn't implemented. New ideas can be generated by the consulting firms when the staff of the ministry asks how I can do better my work. If the new ideas are accepted the project is written. And then financial resource is searched. Project can be implemented with two ways. First way is implementing the project in the organization by building working groups. The second way is outsourcing the project.

3. Do you use any model for the management of the technological innovation projects?

There is no a model or informatics policy in the Ministry of Public Works and Settlement. We are working on quality management but still we do not have any certified model for the technological innovation projects. Besides the reasons to start a new project in the public sector are:

- Necessity
- Duties that are commissioned by the laws
- Public demand
- Difficulties and delays on the services
- Cost saving
- Turkish Information Society Strategy studies realized by State Planning Organization
- Establishment of the Strategy Development Units
- Performance based budget studies
- Improvement in standardization in the public services

4. Which departments are cooperating in the organization all the way of the project processes?

There is no research and development department in the Ministry of Public Works and Settlement. Research and development can take place in the units but there is no such a department in any ministry. Projects are performed by units of the ministry. Several units can work together in a project. IT departments support the units throughout the project. Strategy Development Units can perform innovation projects in it. The main task of the Strategy Development Units is forming the strategic plan of the organization for the future.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working together with private sector to take know how information. Moreover, we are working together with universities during the projects supported by TUBITAK.

A.4 Case 4: Republic of Turkey Ministry of Finance

The Ministry of Finance determines fiscal policies, implements the fiscal policies that are determined, monitors and audits the implementation of the policies in order to achieve economic and social objectives.

The head of IT department is participated in the case study as an interviewee. Table A.4 shows the interviewee information and the interview date.

Table A.4: Interviewee in the Case Study: Ministry of Finance

Title	Organization	Date
Head of IT Department	Ministry of Finance	July 28 2008

A.4.1 Case Study Project 1: Finance SGB.Net Project

Ministry of Finance Directorate of Strategy Development started to service according to Public Finance Management and Control Law beginning from 2006. It performs Finance SGB.Net project to build infrastructure necessary for an effective and productive work environment.

Finance SGB.Net project is designed as an institutional solution to meet all of the requirements of the Public Finance Management and Control Law. Software development studies are ongoing but user and menu management module, allocate fund module, expenditure tracking module, audit module, movable property registry and tracking module, and receivable tracking module are put into practice since 2007.

A.4.2 Case Study Project 2: Strategic Management Project

Strategic Management Project aims to connect performance program with strategic plan and budget. It also aims to provide a module for tracking and assessment for the use of strategic management.

A.4.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

   Finance SGB.Net Project, Strategic Management Project

2. What are the stages and processes of the technological innovation projects?

   Firstly new ideas are generated in the organization. Most of the time new ideas are generated by the staff in the public sector. New ideas can arise because of necessity or legislation. New ideas can be implemented through the projects. Secondly, the project is written, in this period the project feasibility study is prepared and an approximate cost is calculated. Approximate cost indicates the financial budget of the project. This indicator determines the approval authority.

A project file that includes project objectives and budget is offered to the authority. Authorizing officer decides acceptance of the project. Authorizing officer can be head of the unit, undersecretary or minister according to financial limit. Limitation of expenditure is defined by the laws. Head of the unit can approve the projects up to his limit. If the budget of the project exceeds his financial limit undersecretary approves, else minister approves. Finally, the project approval is given according to public finance management and control law. After approval of the project expenditure and process of the adjudication are decided by the authorizing officer. The authorizing officer decides how to the project is implemented. Project can be implemented in the organization by using ministry sources or it can be adjudicated to another firm. If it will be adjudicated the project files are prepared compatible with public procurement law and tender is received. The project is adjudicated to the best suitable tender. The final product is accepted by the examination and acceptance commission. The product is tested in the maintenance period. After test, if there is no deficiency final acceptance is done.

3. Do you use any model for the management of the technological innovation projects?

There is no defined model or strategy in the organization for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

A project can be implemented and accomplished in the organization. A unit can accomplish a project with its staff or it can receive support from other units.

Ministry of finance has ten information processing centre and each of them performs different innovation projects. They are getting help from each other to build a commission to accomplish the project.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

Consulting firms or universities perform the feasibility study of the project from the beginning. Consulting firms help to prepare feasibility study, contract and preparatory work. Feasibility study is done by an organization after approval of the project according to public procurement law. Consultancy services are received from other countries for the exterior projects. With other public organizations such as TUBITAK can be worked together during the project. Project can be implemented in the ministry or it can be outsourced. Administrative authority decides who will implement the project. If they decide to outsource the project is adjudicated by ministry or State Supply Office (SSO) adjudicates the project. Ministry can adjudicate the project according to public procurement law. Or a technical provision is prepared and sent to the SSO and SSO purchases goods or services according to the provision. It carries out all of the adjudication process instead of the ministry. Projects can be finance from three sources; TUBITAK, EU or ministry budget. If the project does not support from TUBITAK or EU, it is performed by using the budget of the ministry.

A.5 Case 5: State Planning Organization

State Planning Organization (SPO) was established in Turkey in 1960 to manage national economic development. The SPO maintains permanent representatives in international economic organizations and major foreign capitals. Because of its

exclusive structure, SPO works cooperatively with all of the public organizations and makes the suggestions and recommendations to the government.

The manager of IT department is participated in the case study as an interviewee. Table A.5 shows the interviewee information and the interview date.

Table A.5: Interviewee in the Case Study: State Planning Organization

Title	Organization	Date
Manager of IT Department	State Planning Organization	July 28 2008

A.5.1 Case Study Project: e-Transformation Turkey Project

E-Transformation Turkey Project is initiated by State Planning Organization (SPO) Information Society Department in March 2003. In the context of the project policies, laws, and regulations regarding ICT will be re-examined and changed with respect to the EU, participation of citizens to decision making process in the public domain via usage of ICT will be provided, enhancement of transparency and accountability for public management will be provided, good governance principles in government services will be formed, widespread usage of ICT will be ensured, coordination of public IT projects in order to avoid duplicating or overlapping investments will be provided, guidance to private sector will be provided.

A.5.2 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

2. What are the stages and processes of the technological innovation projects?

Firstly, new idea is generated. New ideas can be generated by two ways. First, new ideas can be generated by the staff of the organization as a result of their thinking about how they can service better. Second, government instructs the organizations to do innovation as a matter of legislation. The project is approved by general manager, undersecretary or minister according to authorization law. Second, the project budget is set and authority decides how to implement the project. If they decide to implement it in the organization a project team is upped. Project team analysis the infrastructure and builds road map. Project team implements and accomplishes the project. The project can be implemented working collaboratively with other organizations. For example, Sustainable Development Project is accomplished together with World Bank. And Information Society Project is adjudicated to a private firm.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

All of the units of the State Planning Organization cooperate all the way of the project processes.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

State Planning Organization works cooperatively with all of the public organizations because of its structure. It collects information from public organizations. It performs information exchange with public organizations for the public investment projects. It helps to the public organizations about EU projects and budget investments. SPO does not perform direct information exchange with private sector. It obtains information from private sector via Turkish Statistical Institute (TSI).

A.6 Case 6: Republic of Turkey Ministry of Transport

Ministry of Transport is a government ministry office of the Republic of Turkey, responsible for transportation affairs in Turkey. Ministry of Transport concerns Turkey's transport activities and provides services in road sector, railway sector, aviation sector, maritime sector, and communication sector.

The head of IT department is participated in the case study as an interviewee. Table A.6 shows the interviewee information and the interview date.

Table A.6: Interviewee in the Case Study: Ministry of Transport

Title	Organization	Date
Head of IT Department	Ministry of Transport	July 29 2008

A.6.1 Case Study Project 1: Land Automation Project

Land Automation project aims to provide an automation system for the road sector within the frame of the highway transportation law and legislations. By means of the Land Automation System, all of the operations related to passenger and cargo transportation will be performed online.

A.6.2 Case Study Project 2: National Transport Portal

National Transport Portal provides a secure and fast digital environment for the staff of the Ministry of Transport and citizens. All applications and requests will be made online because of the portal. Also all document transmissions will be performed using the portal and digital signature will be used to sign the documents online.

A.6.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

   Land Automation Project, National Transport Portal

2. What are the stages and processes of the technological innovation projects?

   New ideas are generated in the organization than after performing feasibility study for the project approval of the project is obtained. Related authority (head of the unit, undersecretary or minister) approves the project according to financial limit. After approval of the project provision is prepared and gone out to the tender.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

Infrastructure and labor of the ministry falls short since ongoing project are full scale projects. For this reason projects are adjudicated to the firms.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working with universities collaboratively throughout the projects. For example, Land Automation Project is performed by Gazi University. Also, we are working together with private sector and non-governmental organizations such as chamber of drivers. In addition, we are working together with other public organizations such as Security Directorate and Birth Registration Office. For example, traffic license information is obtained from Security Directorate and identification numbers is obtained from Birth Registration Office.

A.7 Case 7: Republic of Turkey Ministry of Energy and Natural Resources

The Ministry of Energy and Natural Resources is a government ministry office of the Republic of Turkey, responsible for energy and natural resources related affairs in Turkey. The Ministry of Energy and Natural Resources has the main responsibility to carry out generation and distribution of electricity, exploration and production of

crude oil and natural gas, refining, manufacturing of petrochemicals and transportation, and distribution of petroleum products.

The project development group manager is participated in the case study as an interviewee. Table A.7 shows the interviewee information and the interview date.

Table A.7: Interviewee in the Case Study: Ministry of Energy and Natural Resources

Title	Organization	Date
Project Manager	Ministry of Energy and Natural Resources	July 30 2008

A.7.1 Case Study Project 1: Ministry of Energy Information and Document Management System (ENEBIS)

Ministry of Energy Information and Document Management System (ENEBIS) is an Enterprise Resource Planning (ERP) project generated for the Ministry of Energy and Natural Resources. All of the business processes and document transmission are carried out online because of this project. In this project, huge databases and multi layered software architecture are used. Databases stores important data, this brings out data security issue. Ministry of Energy and Natural Resources applies ISO 27001 data security standard to solve data security issue.

A.7.2 Case Study Project 2: Ministry of Energy and Natural Resources Portal

Ministry of Energy and Natural Resources Portal provides a secure and fast environment for the staff of the Ministry of Transport and citizens. All of the business processes will be operable online at the end of the project. Digital signature will be used for document transmission. This portal will be an intelligent system and

it will comprehend Content Management System, Geographic Information System, and data mining and statistic applications.

A.7.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

ENEBIS, Ministry of Energy and Natural Resources Portal

2. What are the stages and processes of the technological innovation projects?

New idea is generated and a project plan is prepared to put into the practice the idea. Project is implemented after approval of the project. Projects can be implemented in the organization if there is qualified staff. If not the project is adjudicated. We use different strategy for the ENEBIS project. In this project we adjudicated the project but our staff worked with the firm during the project. ENEBIS project has been implemented according to CMMI third level and staffs of the ministry are received training.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

All of the departments are cooperating in the organization during the project implementation.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

Consultancy service is received from a private firm for the ENEBIS project. We also collaborate with universities, consulting firms, other governmental organizations, and NGOs through projects.

A.8 Case 8: Republic of Turkey Ministry of Agriculture and Rural Affairs

Ministry of Agriculture and Rural Affairs take measures and forms agriculture policies that aim to develop the agricultural sector. Ministry of Agriculture and Rural Affairs perform studies in the fields of vegetable production, organic agriculture, animal breeding, and water products. A project manager is participated in the case study as an interviewee. Table A.8 shows the interviewee information and the interview date.

Table A.8: Interviewee in the Case Study: Ministry of Agriculture and Rural Affairs

Title	Organization	Date
Project Manager	Ministry of Agriculture and Rural Affairs	July 31 2008

A.8.1 Case Study Project: Farmer Registry System

Farmer Registry System is a new system for the ministry aims to detect number of farmers in Turkey and determine cultivated lands and fields all over the Turkey. The information obtained through this project is used to improve the services offered to the farmers.

A.8.2 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

Farmer Registry System

2. What are the stages and processes of the technological innovation projects?

New idea is generated in the organization or new project proposals come from managers because of the legislations. After that, the project document is prepared. After approval of the project if there is enough infrastructure and labor in the ministry the project is implemented inside the organization else the project is adjudicated to the private firms.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

All of the departments of the ministry cooperate during the project.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working together with other public organizations. For example, identification numbers of the farmers are obtained from the Birth Registration Office for the Farmer Register System. Moreover, statistical information is obtained from Turkish Statistical Institute. Private sector is used to receive consultancy.

A.9 Case 9: Republic of Turkey Ministry of Industry and Commerce

Ministry of Industry and Commerce aims to form policies, take measures, perform supervision activities in order to increase competitive power of industry and commerce in Turkey and consumer protection. The Manager of Strategy Development Unit is participated in the case study as an interviewee. Table A.9 shows the interviewee information and the interview date.

Table A.9: Interviewee in the Case Study: The Ministry of Industry and Commerce

Title	Organization	Date
Manager of Strategy Development Unit	The Ministry of Industry and Commerce	August 1 2008

A.9.1 Case Study Project 1: Electronic Commerce Project

Electronic Commerce Project aims to adapt all of sales services that are performed on paper and via telephone or fax in to electronic environment. The system accelerates order and shipment process and enables productive and effective usage of the human resources cutting cost of the communication expenditures such as fax and telephone.

A.9.2 Case Study Project 2: Small and Medium Sized Industry Information Collection Project (KOSBILTOP)

KOSBILTOP Project stores information of the small and medium sized industries in a database. It allows access to this information by demanding firms. It also provides chance to the enterprises to be informed from bids and to receive tender.

A.9.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

   Electronic Commerce Project, Small and Medium Sized Industry Information Collection Project

2. What are the stages and processes of the technological innovation projects?

   First, new ideas are generated by the staffs who think how to service better in the organizations. Project documents are prepared for the selected ideas. Then the projects are eliminated according to government program, legislations, National Development Plan (NDP), Lisbon strategy and budget. After elimination, the

project is approved by authority and technical provision of the project is prepared. Technical provision and the project can be adjudicated to firms. In addition to this, after implementation maintenance of the product can be adjudicated to a firm.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

All of the departments are cooperating in the organization during the project.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working together with private firms especially in the techno parks, universities and other public organizations.

A.10 Case 10: Small and Medium Industry Development Organisation (SIMIDO)

Small and Medium Industry Development Organisation (SIMIDO) was founded within the structure of the Turkish Ministry of Industry and Commerce according to the law numbered 3624 and dated 20th April 1990, in order to increase the share and

activity, and to promote the competitive power and position of small and medium sized industrial enterprises, and perform industrial integration conveniently for economical developments (IRC, 2007).

The Manager of Technology Development Unit is participated in the case study as an interviewee. Table A.10 shows the interviewee information and the interview date.

Table A.10: Interviewee in the Case Study: SIMIDO

Title	Organization	Date
Manager of Technology Development Unit	SIMIDO	August 4 2008

A.10.1 Case Study Project 1: KOBI-NET Project

KOBI-NET is an e-commerce gateway for enterprises providing rapid access to up to date information to increase their competitive power and offering an electronic environment to communicate with the world. It is an e-commerce center that brings together enterprises with all scale and from different sectors. It offers to the enterprises the infrastructure that they will need to take part efficiently in the internet world called as “virtual free trade zone”. It intends to contact basic industry with sub industry by bringing together small and medium sized enterprises that are serving in the production and service sector with large sized enterprises in a virtual environment. It is the first project in Turkey that EU supported financially to enhance e-commerce and to support small and medium sized enterprises. KOBI-NET aims to encourage e-commerce between enterprises and provides a virtual environment for e-commerce.

A.10.2 Case Study Project 2: SIMIDO Management Information System

SIMIDO Management Information System aims to perform business processes of the services offered by SIMIDO in an electronic environment and to provide online evaluation of the applications.

A.10.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

   KOBI-NET Project, SIMIDO MIS

2. What are the stages and processes of the technological innovation projects?

   The mission of the Small and Medium Industry Development Organization is to support the organizations that are making innovation. We support mainly startup organizations for the technological innovation projects. SIMIDO supports business enterprises, these enterprises apply with the project. Examining and computing agency approves the project.

   Innovation project performed by SIMIDO follows these steps; first new idea is generated by staff or new laws force the organization to innovate. Then project feasibility study is performed and propounded. After approval project is implemented. Application of new product innovates to the organization.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

Technology development center in the SIMIDO leads technological innovation projects. Moreover, duty of the support technological innovation projects is given technology development center. Examining and computing agency decides the acceptance of the project and private sector firms take the support.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working together with private sector and public sector.

A.11 Case 11: Republic of Turkey Ministry of Health

The Ministry of Health has established organizations and institutions in order to carry out its responsibilities: to protect individual and public health, to give preventive, curative, rehabilitative services, to control and inspect the production and consumption of medicine, to produce vaccine, serum, blood products, to carry out the control services of food and food production places, to take necessary measures related to environmental health, to carry out the control services of infectious diseases.

The manager of Hospital Information System Unit is participated in the case study as an interviewee. Table A.11 shows the interviewee information and the interview date.

Table A.11: Interviewee in the Case Study: Ministry of Health

Title	Organization	Date
Hospital Information System Unit	Ministry of Health	August 11 2008

A.11.1 Case Study Project 1: Health-NET Project

This project aims to collect and store all of personal health data of citizens living in Turkey in a central system. HEALTH-NET is an integrated reliable and fast information and communication platform which is capable collecting information in proper format from where it was created and producing proper information for shareholders in the health sector to increase quality and to obtain benefits.

A.11.2 Case Study Project 2: TELETIP

The aim of this project is to share radiologic images in an electronic environment in the ministry. TELE-TIP project accomplishes three basic issues; remote patient monitoring, diagnosis and treatment of disease, medical education and research.

A.11.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

Health-NET, TELETIP

2. What are the stages and processes of the technological innovation projects?

New ideas are generated. Mostly, new ideas to lead innovations are generated by legislation in the Ministry of Health. Besides, personnel can generate new ideas. Than project study is performed and after approval production of the new service is initiated. Lastly, new service is started to use in the organization after testing.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

We are performing the projects with private sector because of lack of qualified staff. Legislation, financial constraints, and lack of qualified staff are the major obstacles to innovation.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working together with Ministry of Finance, Ministry of Labour and Social Security, and Ministry of Interior from public sector. Union of Hospitals and Health Industry Employers' Association of Turkey are non-governmental organizations that we collaborate during the projects. Moreover, we are

collaborating with private sector and we are receiving consulting service from Middle East Technical University.

A.12 Case 12: Republic of Turkey Ministry of Culture and Tourism

The Ministry of Culture and Tourism has established organizations and institutions in order to carry out its responsibilities: expanding Turkey's market share of tourism, increasing the total number of visitors, increasing awareness for natural richness and historical places of Turkey.

The manager of IT Department is participated in the case study as an interviewee. Table A.12 shows the interviewee information and the interview date.

Table A.12: Interviewee in the Case Study: Ministry of Culture and Tourism

Title	Organization	Date
Manager of IT Department	Ministry of Culture and Tourism	August 15 2008

A.12.1 Case Study Project 1: Turkey Tourism Portal

The project aims to increase awareness for natural richness and historical places of Turkey removing wrong and negative images.

A.12.2 Case Study Project 2: Turkey Culture Portal

The project aims to provide an interactive environment to the citizens that will present information about cultural and historical values.

A.12.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

Turkey Tourism Portal, Turkey Culture Portal

2. What are the stages and processes of the technological innovation projects?

The process is; idea generation, project studies, project implementation and application of the new service in the organization after tests. Lack of qualified personnel and financial constraints are the most encountered obstacles in front of the innovation.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

We are adjudicating the projects because of lack of qualified staff.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working together with Hacettepe University, Gazi University, Turkish Radio and Television Association, Turkish Language Society, The Ministry of Foreign Affairs.

A.13 Case 13: Republic of Turkey Ministry of Justice

The Ministry of Justice has established organizations and institutions in order to carry out its responsibilities: strengthening democracy, responsibilities and rights, delivering simple and fair routes to civil and family justice, protecting the public and reducing reoffending, and providing a more effective, transparent and responsive criminal justice system for victims and the public.

The manager of Project Management and Quality Department is participated in the case study as an interviewee. Table A.13 shows the interviewee information and the interview date.

Table A.13: Interviewee in the Case Study: Ministry of Justice

Title	Organization	Date
Manager of Project Management and Quality Department	Ministry of Justice	August 20 2008

A.13.1 Case Study Project 1: Better Access to Justice

The objective of the project is to strengthen the rule of law in Turkey and guarantee all citizens access to justice in line with the EU standards. The primary target group is citizens of Turkey. The project has social and technological dimensions. The social side of the project is providing mediation between courts and supplying legal aid for

poor citizens who cannot hire a lawyer. Technological side of the project is recording trials developing a system.

A.13.2 Case Study Project 2: National Judiciary Informatics System

The system establishes an electronic network covering all Courts, Offices of Public Prosecutors and Law Enforcement Offices together with the Central Organization of the Ministry of Justice in order to ensure fast, reliable, soundly operated and accurate judicial system.

A.13.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

   Better Access to Justice, National Judiciary Informatics System

2. What are the stages and processes of the technological innovation projects?

   Ideas generated by skilled personnel of the organization and firms can generate new ideas. Obstacles to innovation are lack of qualified staff, bureaucracy, and legislation. Management hierarchy can be an obstacle when staff cannot reach manager to share his ideas. After approval, project is implemented and new services are applied in the organization.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

The entire departments are cooperating during the project.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working together with police department, military police and private organizations. On the other hand, we are working together with foreign firms in a project. For example, a Rome-based firm running the Better Access to Justice Project working with a consortium of partners including the Center for Effective Dispute Resolution (United Kingdom), IBF International Consulting (Belgium), Istanbul Bilgi University, and Pricewaterhouse Coopers.

A.14 Case 14: Republic of Turkey Ministry of Labour and Social Security

The objectives of the Ministry of Labour and Social Security are: arrangement of labor environment, provision of industrial peace and enforcement of labor laws; the promotion of industrial safety and welfare; the development of new employment services to provide social security for all segments of society.

The manager of Computing Department is participated in the case study as an interviewee. Table A.14 shows the interviewee information and the interview date.

Table A.14: Interviewee in the Case Study: Ministry of Labour

Title	Organization	Date
Manager of Computing Department	Ministry of Labour and Social Security	August 27 2008

A.14.1 Case Study Project 1: Worker Entry and Exit Declaration Project

Worker entry and exit declaration information is delivered on papers. Thousands of papers should be entered the database, it takes too much time and effort. The objective of the project is to deploy entrance of the entry and exit declaration information task to the employer. Hereby paper based applications will be cancelled and better services will be delivered to the citizens.

A.14.2 Case Study Project 2: Work Inspection Project

The objective of the project is to provide a system for inspectors to faster the inspection process in a secure and electronic environment. Inspections will be performed faster and reports will be prepared quicker because of the project.

A.14.2 Case Study Project 2: Zone Automation Project

The objective of the Zone Automation project is to provide a central system for citizens gathering distributed servers. Better services will be served to the citizens because of the project.

A.14.3 Case Study Questions

1. What are the technological innovation projects that are performed by the organization?

Worker Entry and Exit Declaration Project, Work Inspection Project, Zone Automation Project

2. What are the stages and processes of the technological innovation projects?

The idea of the Worker Entry and Exit Declaration Project is generated by skilled personnel of the organization. Sometimes employers (citizens) generate new ideas. Than project study is performed. Obstacles to innovation are lack of qualified staff, bureaucracy, and legislation. Low wages policy in the public organizations effect the generation of new ideas in two sides. First, skilled personnel do not want to work here. Second even they work, they do not work hard saying I took little money. Approval authority obstructs the innovation. Because he doesn't understand the subject and he couldn't interfere in the project due to lack of information about subject. Management hierarchy can be an obstacle when staff cannot reach manager to share ideas. Financial constraints can be an obstacle. After approval, project is implemented in the organization using the infrastructure of the ministry. Lastly, new service will be initiated to serve in the organization.

3. Do you use any model for the management of the technological innovation projects?

There is no model for the management of the technological innovation projects.

4. Which departments are cooperating in the organization all the way of the project processes?

The entire departments are cooperating during the project.

5. Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? If yes, by whom?

We are working together with other public organizations, and private organizations.

APPENDIX B: RESEARCH AND INTERVIEW QUESTIONS

Appendix B contains questions asked to reach purposes to the research study. There are two types of questions in Appendix B. First type of questions that are called research questions contains the question that constitutes the basis of this research. Second types of questions that are called interview questions consists a set of questions that are asked to the interviewee to find answers of the research questions. Table B.1 illustrates research and interview questions of the study.

Table B.2: Research and Interview Questions

Research Question 1: What are the technological innovation projects that are performed by the organization?
Interview Questions: What are the technological innovation projects that are performed by the organization to improve the services of the organization? What are the names of the projects? Can you explain the objectives of the projects? Can you explain the scope of the projects?
Research Question 2: What are the stages and processes of the technological innovation projects?

Interview Questions: What are the stages of the technological innovation projects from beginning of the project to the outcomes of the project? What are the processes of the projects from beginning of the projects to the outcomes of the project? How does the idea of the innovation appear? What are the sources of new ideas and innovation? Who take the decision of the project? Who decides the feasibility of the project? Who approves the project? What are the processes after approval? Who implements the project? Does the project executed by the organization? What are the obstacles in front of the innovation? What are the drivers of innovation? What are the benefits of innovation to the organization?

Research Question 3: Do you use any model for the management of the technological innovation projects?

Interview Questions: Do follow any model for the innovation management? How do you manage the innovation projects?

Research Question 4: Which departments are cooperating in the organization all the way of the project processes?

Interview Questions: Which departments are cooperating in the organization all the way of the project processes? Which departments involve for the formation of the new idea? Which departments take place in the implementation phase?

Research Question 5: Who are the stakeholders of technological innovation process?

Interview Questions: Do you perform projects working with other organizations collaboratively? Do you outsourcing throughout the projects? Do you cooperate with which organizations during the innovation process?

APPENDIX C: ORGANIZATIONS INTERVIEWED IN THE CASE STUDY

Appendix C includes a range of information about interviews including interviewee title, organization name, department name, and interview date. Table C.3 illustrates interview information chronologically.

Table C.4: Organizations Interviewed in the Case Study

Title	Organization	Department	Date
Project Manager	Metu-Technopolis	Department of Project Development	July 8 2008
Innovation Management Consultant	Technopolis Group	Consultancy Division	July 12 2008
Policy and Project Development Group Coordinator	Technology Development Foundation of Turkey	Department of Policy and Project Development	July 15 2008
EGITEK MIS Department Manager	Ministry of National Education	General Directorate of Education Technologies	July 22 2008
Manager of Strategy Development Unit	Ministry of National Education	Directorate of Strategy Development Unit	July 22 2008
Head of IT Department	Ministry of Public Works and Settlement	General Directorate of Technical Research and Implementation	July 25 2008
Head of IT Department	Ministry of Finance	Department of Information Technologies	July 28 2008
Manager of IT Department	State Planning Organization	Department of Information	July 28 2008

		Technologies	
Head of IT Department	Ministry of Transport	Department of Information Technologies	July 29 2008
Project Development Group Manager	Ministry of Energy	Strategy Development Unit	July 30 2008
Project Manager	Ministry of Agriculture and Rural Affairs	Department of Information Systems and Evaluation	July 31 2008
Manager of Strategy Development Unit	The Ministry of Industry and Commerce	Directorate of Strategy Development Unit	August 1 2008
Manager of Technology Development Unit	SIMIDO	Technology Development Unit	August 4 2008
Manager of Hospital Information System Unit	Ministry of Health	Department of Information Technologies	August 11 2008
Manager of IT Department	Ministry of Culture and Tourism	Department of Information Technologies	August 15 2008
Manager of Project Management and Quality Department	Ministry of Justice	Department of Information Technologies	August 20 2008
Manager of IT Department	Ministry of Foreign Affairs	Department of Information Technologies	August 26 2008
Computing Department Manager	Ministry of Labour and Social Security	Department of Information Technologies	August 27 2008
Department Manager	Ministry of Interior	Department of Information Technologies	August 29 2008
Manager of IT Department	Ministry of Defense	Department of Information Technologies	September 1 2008
Manager of IT	Ministry of	Department of	September 3

Department	Environment and Forestry	Information Technologies	2008

APPENDIX D: CASE DESCRIPTION

This section contains detailed description of the case study. A range of information including technological innovation projects, technological innovation model, technological innovation process, stakeholders of the innovation process, sources of new idea and innovation, obstacles to innovation in the public sector, project implementation types, approval authority, advantages of the technological innovation projects, and drivers of innovation in the public sector are provided in this section.

D.1 Case Description

Twenty organizations have been conducted to participate in the study, however only fourteen of them were retained after consideration of the selection criteria. In addition, twenty eight technological innovation projects were examined. Fifteen ministries, two governmental organizations (Small and Medium Industry Development Organization, State Planning Organization), one nongovernmental organization (Technology Development Foundation of Turkey) and two private firms (METU-Technopolis, Technopolis Group) that are project partners of the public organizations were analyzed. Look Appendix C to see detailed information about interviewees.

D.1.1 Case 1: METU-Technopolis

An interview is made with METU-Technopolis on July 8 2008. Look Chapter A.1 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.1 illustrates the information retrieved after the analysis of related data.

Table D.1: Case 1

Case 1: METU-Technopolis	
Technological innovation projects	Innovation Relay Center Anatolia, Business Support Network Anatolia
Technological innovation model	No
Stakeholders of the innovation process	Small and Medium Industry Development Organisation (SIMIDO), METU Technopolis, Ankara Chamber of Industry (ACI), Ankara Chamber of Trade (ACT), Technology Development Foundation of Turkey (TDFT), The Union of Chambers and Commodity Exchanges of Turkey (TOBB), Ministry of Industry, Universities, R&D Centers.
Technological innovation process	1. New idea generation 2. Project feasibility study 3. Project approval 4. Project implementation 5. New products, processes and services 6. Innovation
Sources of new idea	Staff
Obstacles to innovation in public sector	Lack of qualified staff, budget

D.1.2 Case 2: Ministry of National Education

An interview is made with Ministry of National Education on July 22 2008. Look Chapter A.2 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.2 illustrates the information retrieved after the analysis of related data.

Table D.2: Case 2

Case 2: Ministry of National Education	
Technological innovation projects	ILSIS, E-School
Technological innovation model	No
Stakeholders of the innovation process	Private Firms
Technological innovation process	1. New idea generation 2. Project feasibility study 3. Project approval 4. Project implementation 5. New services 6. Innovation
Advantages of the technological innovation projects	Cost saving, time saving, and innovation in the service
Sources of new idea	Legislation
Obstacles to innovation in public sector	Legislation, approval authority, bureaucracy, and work environment

D.1.3 Case 3: Ministry of Public Works and Settlement

An interview is made with Ministry of Public Works and Settlement on July 25 2008. Look Chapter A.3 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.3 illustrates the information retrieved after the analysis of related data.

Table D.3: Case 3

Case 3: Ministry of Public Works and Settlement	
Technological innovation projects	Remote Sensing and Geographical Information Systems Project, Land Registry and Cadastre Information System, Disaster Information System
Technological innovation model	No
Stakeholders of the innovation process	University, Private sector, TUBITAK
Technological innovation process	1. New idea generation 2. Project feasibility study 3. Project approval 4. Project implementation 5. New services 6. Innovation
Advantages of the technological innovation projects	Improvement in the services
Sources of new idea	Staff, legislation, consulting firms, citizens
Obstacles to innovation in public sector	Legislation, lack of qualified staff, approval authority, bureaucracy, and work environment
Project implementation types	1. Implementing the project in the

	organization 2. Outsourcing
Drivers of innovation in the public sector	1. Necessity 2. Duties that are commissioned by the laws 3. Public demand 4. Difficulties and delays on the services 5. Cost saving 6. Turkish Information Society Strategy studies realized by State Planning Organization 7. Establishment of the Strategy Development Units 8. Performance based budget studies 9. Improvement in standardization in the public services

D.1.4 Case 4: Ministry of Finance

An interview is made with Ministry of Finance on July 28 2008. Look Chapter A.4 in Appendix A to see cases and case study projects in detail. Table D.4 illustrates the information retrieved after the analysis of related data.

Table D.4: Case 4

Case 4: Ministry of Finance	
Technological innovation projects	Finance SGB.Net Project, Strategic Management Project
Technological innovation model	No
Stakeholders of the innovation process	University, Consulting firms, State Supply Office, TUBITAK
Technological innovation process	1. New idea generation 2. Project feasibility study 3. Project approval 4. Project implementation 5. New services 6. Product acceptance and testing 7. Final acceptance of the product 8. Innovation
Sources of new idea	Staff, legislation
Obstacles to innovation in public sector	Legislation, approval authority, bureaucracy
Project implementation types	1. Implementing in the organization 2. Adjudicate
Drivers of innovation in the public sector	Necessity and legislation
Approval authority	Head of unit, undersecretary or minister

D.1.5 Case 5: State Planning Organization

An interview is made with State Planning Organization on July 28 2008. Look Chapter A.5 in Appendix A to see cases and case study projects in detail. Table D.5 illustrates the information retrieved after the analysis of related data.

Table D.5: Case 5

Case 5: State Planning Organization	
Technological innovation projects	E-Transformation Turkey Project
Technological innovation model	No
Stakeholders of the innovation process	Private firms, World Bank, Public Sector, Turkish Statistical Institute
Technological innovation process	1. New idea generation 2. Project feasibility study 3. Project approval 4. Project implementation 5. New services 6. Innovation
Sources of new idea	Staff, legislation
Obstacles to innovation in public sector	Legislation, approval authority, bureaucracy
Project implementation types	Implementing in the organization, adjudicate, implementing the project working collaboratively with other organizations
Drivers of innovation in the public sector	1. Seeking solutions for better service 2. Legislation
Approval authority	Head of unit, undersecretary or minister

D.1.6 Case 6: Ministry of Transport

An interview is made with Ministry of Transport on July 29 2008. Look Chapter A.6 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.6 illustrates the information retrieved after the analysis of related data.

Table D.6: Case 6

Case 6: Ministry of Transport	
Technological innovation projects	Land Automation Project, National Transport Portal
Technological innovation model	No
Stakeholders of the innovation process	University, private sector, non-governmental organizations, public organizations, Security Directorate, Birth Registration Office.
Technological innovation process	1. New idea generation 2. Project feasibility study 3. Project approval 4. Project implementation 5. New services 6. Innovation
Sources of new idea	Staff
Obstacles to innovation in public sector	Approval authority, legislation, lack of skilled staff, bureaucracy
Project implementation types	Adjudicate
Approval authority	Head of the unit, undersecretary or minister

D.1.7 Case 7: Ministry of Energy and Natural Resources

An interview is made with Ministry of Energy and Natural Resources on July 30 2008. Look Chapter A.7 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.7 illustrates the information retrieved after the analysis of related data.

Table D.7: Case 7

Case 7: Ministry of Energy and Natural Resources	
Technological innovation projects	ENEBIS, Ministry of Energy Portal
Technological innovation model	No
Stakeholders of the innovation process	Public sector, Private Sector, NGOs, Universities
Technological innovation process	1. New idea generation 2. Project plan 3. Project approval 4. Project implementation 5. New services 6. Innovation
Advantages of the technological innovation projects	New services, improvement in the quality of the services
Sources to new idea	Government policy, legislation
Obstacles of innovation in public sector	Approval authority, lack of qualified staff, low wages policy, legislation, bureaucracy, business manner of the organization, management hierarchy, obstacles to share new ideas in the closed work environment.
Project implementation types	Adjudicate
Drivers of innovation in the public sector	Free workplace environment, improved wages policy, open to change organization, acceptance of electronic signature, new laws.

D.1.8 Case 8: Ministry of Agriculture and Rural Affairs

An interview is made with Ministry of Agriculture and Rural Affairs on July 31 2008. Look Chapter A.8 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.8 illustrates the information retrieved after the analysis of related data.

Table D.8: Case 8

Case 8: Ministry of Agriculture and Rural Affairs	
Technological innovation projects	Farmer Registry System
Technological innovation model	No
Stakeholders of the innovation process	Private sector, Birth Registration Office, Turkish Statistical Institute
Technological innovation process	1. New idea generation 2. Project document preparation 3. Project approval 4. Project implementation 5. New services 6. Innovation
Advantages of the technological innovation projects	Improved services
Sources of new idea	Legislation
Obstacles to innovation	Approval authority, legislation, lack of skilled staff, bureaucracy
Project implementation types	1. Implementation in the organization 2. Adjudicate

D.1.9 Case 9: Ministry of Industry and Commerce

An interview is made with Ministry of Industry and Commerce on August 1 2008. Look Chapter A.9 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.9 illustrates the information retrieved after the analysis of related data.

Table D.9: Case 9

Case 9: Ministry of Industry and Commerce	
Technological innovation projects	Electronic Commerce Project, Small and Medium Sized Industry Information Collection Project
Technological innovation model	No
Stakeholders of the innovation process	Private firms, universities and other public organizations
Technological innovation process	1. New idea generation 2. Project document 3. Project approval 4. Project implementation 5. New services 6. Innovation
Sources of new idea	Staff
Obstacles to innovation in public sector	Government program, bureaucracy authority, lack of qualified staff, legislation, budget
Project implementation types	Adjudicate
Drivers of innovation in the public sector	Seeking solutions for better service

D.1.10 Case 10: Small and Medium Industry Development Organisation

An interview is made with Small and Medium Industry Development Organisation (SIMIDO) on August 4 2008. Look Chapter A.10 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.10 illustrates the information retrieved after the analysis of related data.

Table D.10: Case 10

Case 10: Small and Medium Industry Development Organisation	
Technological innovation projects	KOBI-NET Project, SIMIDO MIS
Technological innovation model	No
Stakeholders of the innovation process	Private firms and public sector
Technological innovation process	1. New idea generation 2. Project document 3. Project approval 4. Project implementation 5. New services 6. Innovation
Sources of new idea	Legislation, Staff
Obstacles of innovation in public sector	Legislations, approval authority, bureaucracy

D.1.11 Case 11: Ministry of Health

An interview is made with Ministry of Health on August 11 2008. Look Chapter A.11 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.11 illustrates the information retrieved after the analysis of related data.

Table D.11: Case 11

Case 11: Ministry of Health	
Technological innovation projects	Health-NET Project, TELETIP
Technological innovation model	No
Stakeholders of the innovation process	Private firms, public sector, universities, non-governmental organizations
Technological innovation process	1. New idea generation 2. Project document 3. Project approval 4. Project implementation 5. New services 6. Innovation
Sources of new idea	Legislation, Staff
Obstacles of innovation in public sector	Financial constraints, approval authority, legislation, lack of skilled staff, bureaucracy, work environment

D.1.12 Case 12: Ministry of Culture and Tourism

An interview is made with Ministry of Culture and Tourism on August 15 2008. Look Chapter A.12 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.12 illustrates the information retrieved after the analysis of related data.

Table D.12: Case 12

Case 12: Ministry of Culture and Tourism	
Technological innovation projects	Turkey Tourism Portal, Turkey Culture Portal
Technological innovation model	No
Stakeholders of the innovation process	Private firms, public sector, universities, non-governmental organizations
Technological innovation process	1. New idea generation 2. Project document 3. Project approval 4. Project implementation 5. New services 6. Innovation
Sources of new idea	Legislation, Staff
Obstacles of innovation in public sector	Approval authority, legislation, lack of skilled staff, bureaucracy, work environment, and financial constraints

D.1.13 Case 13: Ministry of Justice

An interview is made with Ministry of Justice on August 20 2008. Look Chapter A.13 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.13 illustrates the information retrieved after the analysis of related data.

Table D.13: Case 13

Case 13: Ministry of Justice	
Technological innovation projects	Better Access to Justice, National Judiciary Informatics System
Technological innovation model	No
Stakeholders of the innovation process	Private firms, public sector, universities
Technological innovation process	1. New idea generation 2. Project document 3. Project approval 4. Project implementation 5. New services 6. Innovation
Sources of new idea	Personnel of the organization and firms
Obstacles of innovation in public sector	Approval authority, legislation, lack of skilled staff, bureaucracy, and management hierarchy

D.1.14 Case 14: Ministry of Labour and Social Security

An interview is made with Ministry of Labour and Social Security on August 27 2008. Look Chapter A.14 in Appendix A to see cases and case study projects in detail. Appendix A includes case study questions that are asked to the interviewees and answers of them. Table D.14 illustrates the information retrieved after the analysis of related data.

Table D.14: Case 14

Case 14: Ministry of Labour and Social Security	
Technological innovation projects	Worker Entry and Exit Declaration Project, Work Inspection Project, Zone Automation Project
Technological innovation model	No
Stakeholders of the innovation process	Private firms, public sector
Technological innovation process	1. New idea generation 2. Project document 3. Project approval 4. Project implementation 5. New services 6. Innovation
Sources of new idea	Personnel, citizens
Obstacles of innovation in public sector	Lack of qualified staff, bureaucracy, legislation, low wages policy, approval authority, financial constraints and management hierarchy