

E-TRANSFORMATION AND TECHNOLOGICAL INNOVATION IN TURKEY

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Abstract

In Turkey, e-transformation studies have started to gain momentum since the early 2000s. Innovations in the public services have become mandatory to provide easier, cheaper, quicker, and more secured services to the citizens. Nowadays almost all public services are offered over the E-Government gateway. In today's fast changing technological environment, there is no executive task more vital and demanding than the sustained management of innovation and change. Identification of the technological innovation process is required in order to manage innovation in the public organizations. This study aims to identify technological innovation process, stakeholders of the process, sources of innovation, obstacles of innovation and driving forces of innovation. In this research study, case study is used as a research strategy and interviews, documentation, and observations are used as data collection methods. In the case study, total twenty organizations, including all ministries and the pioneer public organizations that perform e-transformation projects to lead innovation are analyzed. 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. Stages of the innovation process are idea generation, project development, production and innovation. Six steps of the innovation process are idea, project study, project approval, project implementation, new services and innovation. 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. Innovation cannot be achieved due to some obstacles. The main obstacles in the public sector can be listed as legislation, lack of qualified staff, approval authority, and bureaucracy. Production as the third stage can only start after overcoming the mentioned obstacles. Project implementation is performed in the fourth step and a new service is acquired in the fifth step. Innovation is the last stage of the technological innovation process where diffusion of the new service is performed in order to innovate in the organization.

Keywords: Innovation, E-Transformation, Innovation Management, Public Organizations, Turkey.

1 INTRODUCTION

Recently, E-transformation studies have gained significant improvements in Turkey. ICT infrastructure has become much stronger over the past decade. Capital investments in telecommunications and number of internet and computer users have been increasing day by day. This can be seen clearly in Table 1, which illustrates that in Turkey, number of PCs, number of internet users and capital investments in telecommunication are increased substantially.

	2002	2003	2004	2005	2006	2007
Personal computers (PCs) in use	3.000,0	3.507,6	3.934,8	4.381,7	4.850,6	5.336,7
Internet users	4.300,0	6.000,0	10.220,0	11.204,3	12.283,5	13.660,4
Capital investment in telecommunications	298,8	345,0	1.447,3	1.861,5	1.650,2	1.859,8

Table 1: Statistics about Turkey (Euromonitor International, 2009).

From 2002 to 2007 the number of PCs increased by 77.8 % while the number of internet users increased 217.6 %. The largest increase, however, occurred in capital investment in telecommunications by 522.4 %. However internet and PC usage in Turkey is still below expectations because the percentage of internet usage in Turkey is lower than that of in Europe. In 2008, the percentage of internet users in Turkey was 35.8 % of the population, while the percentage of internet users in Europe was 48.1 % of the population. Moreover e-readiness ranking of Turkey that is published in the Economist Intelligence Unit (2008) is below than intended position. According to e-readiness rankings, Turkey holds the 43th rank among 70 countries with the 5.64 e-readiness score.

E-Government is a way to promote development and reduce poverty. In addition, it strengthens the performance of government and public administration (Schuppan, 2009). It can provide substantial benefits for citizens, businesses, and governments (Jaeger and Thompson, 2003). Moreover, E-Government is a key for reducing communication and information costs, maximizing speed, broadening reach, and eradicating distance (Norris, 2001).

E-Government is seen as a catalyst or a tool for government administrative reform (Kraemer and King, 2006; Heeks, 1999). It provides several benefits: increased productivity, improved decision-making, better policy-making, decentralization, increased revenues, and integrated services (Macintosh, 2006). Moreover, it provides improved quality of services and wider political participation (Garson, 2004; Shelley et al, 2006). However, in their study, Helbig et al (2009) present the failure rate of E-Government projects to be higher than 85%. This result clearly proves that despite large investments in E-Government development, the expected benefits have not been achieved yet (Jaeger, 2005).

The main focus of E-Government is the reorganization of service processes and citizen services (Schuppan, 2009). Advances in information technology create a new mode of service delivery with E-Government through the internet (Baker, 2009). Thanks to these advances, E-Government supplies the means to transcend the obstacles of time and distance (West, 2004; Ho, 2002). In addition, E-Government facilitates to make government services more responsive (Gauld et al, 2009).

Significant e-transformation projects (See Table 3) were performed by public organizations that lead innovation in the public services. Innovation term has started to be mentioned most often in recent years. "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). Innovation has a different meaning from a management perspective; it is not a single action but a total process of interrelated sub processes. In other words, 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).

Innovation can arise from individuals, universities, firms, private non-profit organizations or public organizations. An important source of innovation comes from linkages between the sources. Innovation may emerge from one or more components of these sources or linkages between them (Schilling, 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, 2005). 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 new and better way no one else can.

Innovation energizes existing people in an organization and attracts new ones. The 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 to lowest level. It also changes value chain of the organization to support the product innovation (Maital and Seshadri, 2007). Innovation is critical 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).

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). This research aims to detect technological innovation process in the public organizations, stakeholders of the process, sources of innovation, driving forces of innovation and obstacles in front of the innovation. The results of the study will help effective management of innovation process in the public organizations.

2 METHODOLOGY

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). 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. The first and the most important, the case study method is appropriate when your research addresses either a descriptive question or an explanatory one. 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 identify innovation process, stakeholders of the process, sources of innovation, driving forces of innovation and obstacles in front of the innovation in the public organizations. Considering that, the case study emerges as one of the best research approaches to cover the purpose of the study. This study used case study as a research strategy and data gathered through case studies are qualitative. In this study interviews, documentation, and observations are used as data collection methods. The interviews performed during the study were semi structured or open interviews. The research process consisted of five steps:

- Literature review
- Setting the research questions
- Case and interviewee selection
- Data collection
- Data analysis

Twenty organizations participated in the study. All ministries, two governmental organizations (Small and Medium Industry Development Organization, State Planning Organization), one non-governmental organization (Technology Development Foundation of Turkey) and two private firms (METU-Technopolis, Technopolis Group) that are project partners of the public organizations are analyzed as cases.

The selection criteria for the cases 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

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 as the following:

- 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

Following research questions were prepared to guide data collection; findings and results were derived from the collected data.

- What are the e-transformation projects that are performed by the organization?
- What are the stages and processes of the technological innovation projects?
- Who are the stakeholders of technological innovation process?
- What are the sources of new ideas and innovation?
- What are the obstacles in front of the innovation?
- What are the drivers of innovation?

Twenty eight e-transformation projects that lead innovation in the public services were examined in the study. Table 3 illustrates examined E-Government projects which are performed by the public organizations.

Organization	E-Transformation Projects
METU-Technopolis, Ankara Chamber of Industry, SMIDO	Innovation Relay Centre 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
Small and Medium Industry Development Organization (SMIDO)	KOBI-NET Project, KOSGEB 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

Table 3: E-Transformation Projects

In this study interviews, documentation, and observations are used as data collection methods. The interviews performed during the study were semi structured or open interviews. Interviews were recorded and transcribed for analysis. Researcher took observation notes during the research. Detailed information about the technological innovation projects accumulated from documents, books, governmental reports, and governmental web sites.

Case study tactics used to increase reliability and validity of the study. Multiple sources of evidence (interviews with multiple organizations and departments, governmental documents, books, observation, web sites) are used in data collection phase to increase construct validity. Research questions are prepared to guide data collection, findings and results are derived from the collected data. The final report is reviewed by participants. For internal validity, pattern matching technique is used to analyze case study evidences in data analysis phase. For reliability of the study, case study protocol and case study database are prepared.

Analysis of the data collected from case study is performed using pattern matching technique. Campbell (1975) describes "pattern-matching" as a useful technique for linking data to the propositions. He asserts that pattern-matching is a situation where several pieces of information from the same case may be related to some theoretical proposition.

3 RESULTS

The analysis of the cases mentioned in the previous section provides us to reach quantitative and qualitative results that help to accomplish objectives of the study. Finally, innovation process in the public sector, stakeholders of the process, sources of innovation, obstacles to innovation, and driving forces of innovation were identified. Table 4 illustrates results that are obtained after the analysis of retrieved data. In the table, percentage shows frequency of the related item.

Innovation Process	%	Obstacles to Innovation	%
1. Idea generation	100	<i>Bureaucracy</i>	100
2. Project study	100	<i>Approval authority</i>	92.8
3. Project approval	100	<i>Legislation</i>	92.8
4. Project implementation	100	<i>Lack of qualified staff</i>	71.4
5. New services	100	<i>Work environment</i>	35.7
6. Innovation	100	<i>Financial constraints</i>	35.7
		<i>Management hierarchy</i>	21.4
		<i>Low wages policy</i>	14.2
		<i>Government program</i>	7.14
Driving Forces of Innovation		Sources of Innovation	
Policies favourable to innovation		Personnel	%
Public demand, difficulties and delays on the services		Personnel	78.5
Cost savings		Legislation	64.2
Turkish information society strategy studies realized by State Planning Organization		Other Firms	14.2
Establishment of the strategy development units		Citizens	14.2
Performance based budget studies		Stakeholders	
Improvement in standardization in the public services		Public Sector	%
Increasing collaboration between private sector, universities, public sector and NGOs		Public Sector	92.8
Policies favourable to innovation		Private Sector	92.8
		University	57.1
		NGOs	28.5

Table 4: Results of the Analysis

By referring to the results of the study, it can be stated that innovation process in the public organizations consists of four stages and six steps as illustrated in Figure 1. Stages of the innovation process are idea generation, project development, production and innovation. Six steps of the innovation process are idea, project study, project approval, project implementation, new services and innovation.

Innovation starts with idea generation as the first step where human capital is a key factor for the innovation process. That is, 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. However most of the time, because of some obstacles innovation cannot be achieved. The main obstacles in front of the innovation in the public sector were found as; legislation, lack of qualified staff, approval authority, and bureaucracy. Project approval as a third step can only be started after overcoming the mentioned obstacles. Project implementation is performed in fourth step and a new service is acquired in the fifth step. In the last step, innovation enlivens in the organization. In this stage, diffusion and adoption of the new services are performed in order to make innovation in the organization. From the perspective of innovation systems, innovation includes not only the development of new services, but also diffusion and accessibility of the new services (Doloreux, 2006).

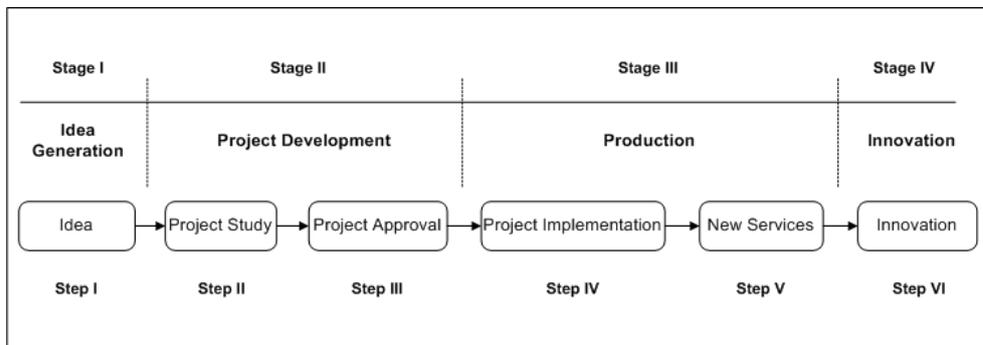


Figure 1: Technological Innovation Process in the Public Sector

The research study evidences that public organizations, private organizations were participated almost all of the innovation projects. On the other hand, Nongovernmental Organizations (NGOs) and universities were participated a few innovation projects performed by public organizations. Most of the innovations arise from personnel and legislation. Nevertheless, some of the innovations are arise from citizens and other firms. Legislation, lack of qualified staff, approval authority, and bureaucracy are the most suffered obstacles in front of the innovation in the public organizations.

According to results, it can be stated that, 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 process and providing easier, cheaper, quicker, and more secured services. In addition to this, offering a better service provides a competitive advantage.

4 DISCUSSION AND CONCLUSION

In the era of information that we are in, improvements in the internet based applications, acceptance of electronic signature law, and widespread usage of electronic commerce transported all of the business processes on a technology based environment. In this speedily changing environment, innovation takes an important place and becomes obligatory to make innovation to adapt the fast changing environment. Innovation is very important for public sector as much as private sector. Technology and innovation are key drivers of increased growth performance and competitive advantage. Besides innovation is the driving force of the economic development.

This study perceives innovation as a process as many scientists who define innovation as a process (Hargadon and Sutton, 2000; Buggie, 2001). According to Nelson and Winter (1978), innovation that is driven by competition can be viewed as a process. Rothwell (1994) claims that it is a process that may successfully attain innovation and hence future organizational growth consisting stages: 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. 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 involves 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.

Findings indicate that, stakeholders of the technological innovation process are; universities, private organizations, nongovernmental 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.

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 while 14.2% of the new ideas were generated by other firms and citizens. Ulwick (2002) stresses the importance of customers for innovation by saying, companies should not expect solutions to be offered by potential customers; rather, they should ask them about the desired product's characteristics. Christensen (1997) claims that, customers may emphasize the product's functionality to too great a degree.

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. 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%). 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. Moreover Hollins (2000) performs a research study in which more than eighty organizations participate to identify the most common obstacles in front of innovation. He finds the following results: lack of qualified staff within organizations and financial restrictions.

In the study driving forces of innovation in the public sector detected as the following: policies favourable 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. De Bruijn and Lagendijk (2005) confirm the results, listing the main drivers of innovation as collaboration and alliances. In addition 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.

Innovation in the services decreases mistakes in the business processes and provides easier, cheaper, quicker, and more secured services. However, successful innovation management is required in order to perform successful innovations. Identification of the process is essential in order to manage innovation in the organization successfully. Consequently, innovation process, stakeholders of the process, sources of innovation, obstacles in front of the innovation and driving forces of innovation in the public sector identified. Surely, the findings presented in this paper 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. Further research would be useful to research processes, stakeholders, obstacles, sources and drivers of the innovation for private organizations.

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Lately, the construction industry is facing substantial technological transformations that enrich both architecture and engineering (a/e) curricula. Advances in technology have led to changes in the perception of individuals for education in the construction industry. Most of the students (71%) in Turkey find instructors are insufficient pedagogically and engineering education focuses on mental development ignoring emotions and characteristics of cohorts. The pace of technological innovation in architecture, engineering, and construction education: Integrating recent trends into the curricula. *Journal of Information Technology in Construction (ITcon)*, 16 (24), 411-432. Google Scholar. Digital transformation is considered as an inevitable process for higher education systems like all socio-economic institutions and systems. The digital transformation, which paradoxically incorporates both challenges and conveniences, has to become the focus of corporations' strategies. Because there is a five-year strategic plan obligation of state institutions in Turkey, strategic plans were obtained from the web portal of Strategic Management in Public, Strategy and Budget Department of the Turkish Presidency. In strategic plans, flexible and technological learning diversity (n=30) statements were seen most. The majority of the statements under this code are related to distance education and open education. E-government and technological innovation in Turkey. Case studies on governmental organizations. Ibrahım Arpacı. Department of Information Systems, Informatics Institute, Middle East Technical University, Ankara, Turkey. Abstract. The second aspect is the transformation of governance positively affecting the relationship between citizens and governments through improving the interactivity between government and citizens and making it smoother, faster, and more responsive. Successful implementation of e-government will ensure improvement in processes within government agencies, which will result in increased efficiency and better management and delivery of public services (Irani et al., 2008).