



THE EFFECT OF INFORMATION TECHNOLOGIES ON PERSONNEL PRODUCTIVITY: EMPIRIC RESEARCH REGARDING IT APPLICATIONS ¹

Bilgi Teknolojilerinin Personel Verimliliği Üzerine Etkisi: Bilişim Uygulamaları Üzerine Ampirik Bir Araştırma

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ABSTRACT

For public institutions to use their resources effectively and economically in line with their specified policies and goals and sustain their accountability and financial transparency, they need to adapt to changing and developing technology and acquire up-to-date information. These two factors are significant elements that help strategic decisions that increase personnel productivity. When public institutions implement Information Technologies, which is necessary in their work process, their costs will be reduced and they will work faster and easier. Thus, their personnel's occupational productivity will be increased. Whereas the use of Information Technologies has increased productivity in every area in recent years, it has also increased personnel productivity. In this study, Information Technologies' effect on personnel productivity was examined through a case of Erciyes University. Within this scope, a theoretical examination took place in two sections until the application phase. In the application phase, it was aimed to obtain a general evaluation and verdict.

Key words: E-Government, Productivity, Information Technologies, Government Personnel, SGB.net

ÖZET

Kamu kurumlarının kaynaklarını belirlenen politika ve hedefler doğrultusunda etkili, ekonomik ve verimli bir şekilde elde etmesi ve kullanması, hesap verebilirliği ve mali saydamlığı sürdürebilmesi için değişen ve gelişen teknolojiye ayak uydurması ve aynı zamanda güncel bilgiye de sahip olması gerekmektedir. Bu iki faktör personel verimliliğini artıracak stratejik kararların alınmasını sağlayan önemli bir unsurdur. Kamu kurumları iş süreçlerinin vazgeçilmez parçası olan bilgi teknolojilerini çalışma hayatına adapte ettiklerinde işleri daha az maliyetle, daha hızlı ve daha kolay yapacaklardır. Böylece çalışanlarının mesleki verimliliği de artacaktır. Nitekim son yıllarda Bilişim teknolojilerinin kullanımının yaygınlaşması her alanda verimliliği artırırken aynı zamanda personel verimliliğini de artırmıştır. Bu çalışmada bilgi teknolojisi kullanımının personel verimliliğine etkisi Erciyes üniversitesi örneği üzerinden incelenmiştir. Bu çerçevede uygulama aşamasına varıncaya kadar iki bölümde teorik olarak incelenmiş ve uygulama aşamasında ise genel bir değerlendirme ve yargıya ulaşılmaya çalışılmıştır.

Anahtar Kelimeler: E-Devlet, Verimlilik, Bilişim Teknolojileri, Kamu Personeli, SGB.net

1. INTRODUCTION

With the transition to an information society and new developments in the information technologies field, a phenomenon called the new economy, or e-economy, has emerged. In recent years, significant progress has been made in Turkey in this field. The e-economy or new economy approach has begun being effective in all aspects of life. The public sector, too, has been one of the sectors that have been affected by the new developments. In the process of restructuring in the public sector, one of the most significant reforms is the changes brought on by the Public Financial Management and Control Law No. 5018. With this change, it was essentially aimed to improve the quality of public services and manage country resources more effectively by improving the morale and satisfaction of personnel.

Institutions working effectively and efficient human resources are closely related. However, it is hard to say that many institutions or establishments use human capital adequately or run such a mechanism successfully. Increasing pressure on governments has revealed new demands regarding global competition-macro balance and a competitive investment environment. Thus, increasing public demands regarding effective service presentation, transparency, accountability, and the activity of transactions and processes have created the need for a public administration system that maintains a robust governance structure, consistency, an

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investment environment for growth, transparency, accountability, and performance-focused management; that serves the public and realizes its projects. For public administration systems to achieve their highly prioritized goals, quality human capital must be provided.

Nowadays, terms like information age, information society, information technology, information infrastructure, and information highway are used frequently. Its root cause is the increase of the significance of information regarding economic and societal development (Tonta, 1999).

Due to the increase of technological developments and computer usage in the information society, significant changes in production, communication, and transportation systems have occurred. For example, the assembly-line production system has been switched with a robotic system. In the information system, the communication system has been affected significantly as well, and communication through electronic devices has become widespread (Dura & Atik, 2001, 55).

Developing countries need to participate in producing information by using the opportunities of the new economy as much as adapting to the change. For Turkey to adapt to the information economy that underlies being able to be an information society, it needs to exhibit its e-transformation policies and first and foremost, make the most out of the new economy's e-government, e-commerce, and e-education opportunities. These are as important for a country to develop as industrialization is.

Developments in information technologies also affect the working processes of public institutions. Public services/management that are generally slow and ineffective will be able to obtain a more effective and faster structure by using information technologies. Thus, higher quality service is provided to service receivers, while savings in time, effort, and cost are achieved.

In this study, the connection between information technology and personnel productivity is examined. The study consists of 3 parts. In the first part, basic concepts about information technologies and productivity are explained. In the second part, information about the history of e-government applications and information technologies used within the public are discussed. In the third and last part of our study, research aimed at specifying the effect on the productivity of personnel that use information technology and work at Erciyes University is included.

The research is limited to 167 people working at Erciyes University due to time and cost limitations. The questionnaire method was used in data collection. The convenience sampling method was preferred due to its advantage of collecting information in the least time with the least cost.

2. BASIC CONCEPTS

The significance of human capital in intrinsic growth models is seriously emphasized. Human capital, which forms the primary source of economic growth, is used to express all concepts, such as information, skills, abilities, health status, place in societal relationships, and education level a person or society has. The first economists to introduce the concept of human capital are said to be classic economists, such as Adam Smith, J. Stuart Mill, and Alfred Marshall. Later, economists such as Denison, Schultz, and Becker developed the human capital hypothesis based on Smith's opinions. In research conducted by Denison, it was emphasized that education improves the skill and productivity capacity of the workforce and through this, helps to increase national income. Alternatively, Shultz credited a big part of the USA's growth rate to investments made in education (Grammy & Assane, 1996).

In the recent past, Lucas (1988) and Rebelo (1991) regarded human capital as production factors like physical capital. The economy needs human capital investments as much as physical capital investments. The concept emphasized as human capital generally emerges through education but could also emerge by itself through trial-and-error while cooperating. The investments made to human capital are explained as the opportunity cost of the time spent on education (Cheng & Hsu, 1997).

Lucas indicated that the increase of an individual's human capital contributes to increasing his/her productivity and that all production factors contribute to productivity. He emphasized that any investments governments would make to education and the development of technological infrastructures would create positive effects on human capital accumulation. It would affect growth much more than the effects of investments made on physical capital. In fact, empirical studies conducted in the past have indicated that human capital affects economic growth positively (Lucas, 1988; Barro, 1998).

Many studies have proved the significance of human capital. In the public sector, the productivity of personnel directly affects the quality of the services provided. One of the most critical parameters that affect personnel quality is the ability to use information technologies.

3. DEFINITION, FACTORS, AND SIGNIFICANCE OF PRODUCTIVITY

The concept of productivity, which goes back to physiocrats, means the relationship between the outputs a production or a service unit produces and the input used to produce outputs. That is to say, productivity is the efficient use of the resources used in the production of various goods and services (Kutlar and Kartal, 2004).

The word “verimlilik” (productivity) is derived from the word “verim” (yield) and expresses being efficient. Yield is defined as the result or the quantity of something run, processed of a managed product or output. “Verimlilik”, which is expressed with the word “Productivity” in English, in the most general sense, is the relation between the output a system produces and the input used in producing this output, and how efficient the resources used in the production of goods and services are utilized. Productivity is sometimes expressed as producing the same output with lesser cost or producing more products with the exact input cost. Hence, productivity focuses on inputs, the outputs of the goods and services, and at what rate the inputs are used to produce or present the outputs. For the concept of productivity to be appropriately understood, terms like input, output, performance, and service level must be known (www.tdk.gov.tr).

The concepts of productivity and activity, despite being used interchangeably, cover different contents. Because of this, the differences between the concepts of productivity and activity should be put forth. Drucker’s distinction is used to show the difference between productivity and activity. According to Drucker, productivity is about the work being done right, and activity is about doing the right work. That is to say, productivity focuses on inputs and outputs while activity focuses on outputs, results, and their effects. Essentially, productivity measures how well the production resources are used, and activity specifies at what ratio goals are achieved. In parallel with this, it is proposed that productivity criteria are the objective criteria of the activity of the production operations of an organization.

While productivity is related to all of the in-organization operation fields, activity, however, starts with the execution of the work, just like in other social structures. Even though productivity is seen as the first step, activity is prioritized more, and productivity should be used collaterally. In this scope, while activity is a short-term phenomenon, productivity is perceived as a phenomenon that covers a longer term (Çoban, 2007: 21).

3.1. The Significance of Productivity

The concept of productivity, which was used in the literature for the first time in 1530 by Agricola in his work titled “Re Metellica”, took its place in economic thought thanks to Francois Quesnay. Quesnay, covered the topic of net output (produit net) in his work “Tableau de Economique” (Akyıldız, Karabıçak, 2002: 58).

Productivity is generally defined in two ways, in a broad sense and the strict sense. In a broad sense, productivity is an abstract concept that measures the sensitivity and activity of tools used in reaching economic goals. Productivity in the strict sense has the same meaning as productivity in the technical sense; it indicates the physical relation between production amount and production factors. Productivity is used in the strict or technical sense both in practice and in the literature, and it is defined as the production amount of a production factor or that factor’s mean product. Production is a dynamic measurement, not a static one. To measure productivity, it is necessary to measure the production amount per unit of each factor that participated in production in a specific production term (hour, day, week, month year, etc.) and compare the factor productivity of various measured terms (Doğan, 1989: 228).

Productivity or performance, in the simplest sense, is the ratio of output to input. In this context, productivity is not a subjective concept and it enables measuring the productivity of examined decision-making units independently. Productivity is the result of the composition of various factors within institutions, which are separate but closely related, such as input flow, the effect of management, scale status, the relative significance of other factors, and the staff’s “cooperation and working tenacity” (Çoban, 2007, 22).

4. INFORMATION TECHNOLOGIES AND THEIR EFFECT ON PRODUCTIVITY

When looking at the past, the highest increases observed in productivity erupted with some unique technologies. These technologies are called general-purpose technologies. General technologies provide

many more opportunities compared to special-purpose technologies. In other words, if the technology has a more general application area, economic growth potential is higher. For example, the steam engine is a crucial general-purpose technology. This technology has various application areas, including running the mechanical parts of factories.

Another critical technology that caused various innovation rings to emerge is electricity (Aslan, 2005: 43). The backbones of being competitive are speed, ease in management, and productivity, which occur because of these factors in the work-life enabled by technology. Technology is the most important factor we use to do our work with lesser cost, to do our work faster, to do our work easier, to manage our job better, to make better decisions, and most importantly, to increase the occupational productivity. Technological innovations and changes draw attention with their qualities that increase productivity. An increase in quality and productivity and an increase of the industry's share in total production, accompanied by product variety, are achieved by adapting technical information to the industry (Yücel, 1997: 20).

In the era in which we are in, the information age, the human factor is essential in enabling various technological innovations to emerge and to be developed. The opportunities offered by information technologies have facilitated the work of managers and workers responsible for management and decision-making at every stage. Thanks to information technologies, it is possible for managers to access collected data very quickly. They can make efficient decisions by interpreting these data.

The developments in information technologies contribute to economic growth directly and indirectly. These contributions occur thanks to both total information technology production that includes both software and services and the increase in productivity enabled by the widespread use of information technologies in the economy. If we add the network effect enabled by the use of information technologies and especially the decisiveness of the finance and foreign trade networks have over the global economy, it will be understood that this relation is much more than it seems. Furthermore, the use of information technologies and the network effect contribute to economic growth indirectly by changing the economy's working dynamics, significantly increasing productivity in business models, or improving production procedures in an innovative manner (Uçkan, 2006: 29).

It is inevitable for public institutions to use information technologies to make their business procedures more productive. Thanks to the increase in productivity enabled by information technologies, positive developments have also occurred in public institutions. Thanks to the use of information technologies, the public sector, too, has seen an increase in productivity. With the use of information technology, the cost of the service/production has been decreased, and cumbersomeness in business procedures has started to disappear.

5. INFORMATION SOCIETY, INFORMATION TECHNOLOGY, AND E-GOVERNMENT

The information society is defined as a society phase, which comes after the industry society on the social evolution line; of which all weight in economy is shifted towards the service industry, occupational and technical researcher class comes to the forefront, all kinds of policies and innovations are derived from scientific knowledge, relies on sophisticated technologies (Savaş & Karadal, 2002: 687).

Information society can be defined as a society whose dynamism is based on information instead of physical power or energy, in which the primary production consists of services and skillful experts are originated from society's new values. In contrast to industry society, which the amount of goods is defined as the indicator of its living standards, information society defines its services (health, education, recreation, and art activities) as the indicator of its life quality. While industry society is within employment or production, the form of society in which the share of industry increases, the information society, is the society in which the share of information sector increases both production and employment (Yeniçeri & İnce, 2002: 256).

Nowadays, information technologies are the core factor, which affects the structure, mechanism, performance, and change of organizations, and private and public sectors are deeply affected by information technologies (Isaac-Henry, 1993: 15). Workers in all sectors work with bytes instead of pieces of paper/documents, and databases have replaced folders. (Bennet, 1998: 92). In this process, governments too are improving their service quality, improving their performances, and staying away from conservative government understanding.

E-government, which is also called "smart government" or digital government (Yanık, Değişimin Rotası ve e-Türkiye (The Course of Change and e-Turkey), 2002), is defined as governments using information

technologies within their internal mechanism and services they provide. (Özcivelek, 2004). From the concept of e-government, it is understood that it is the phenomenon in which duties and services that governments are responsible for providing to its citizens and duties and services the citizens are responsible for providing to the government being executed mutually within electronic communication and process environments uninterruptedly and safely (www.taek.gov.tr). In Figure 1, the structure of e-government and its relation with various units are shown.

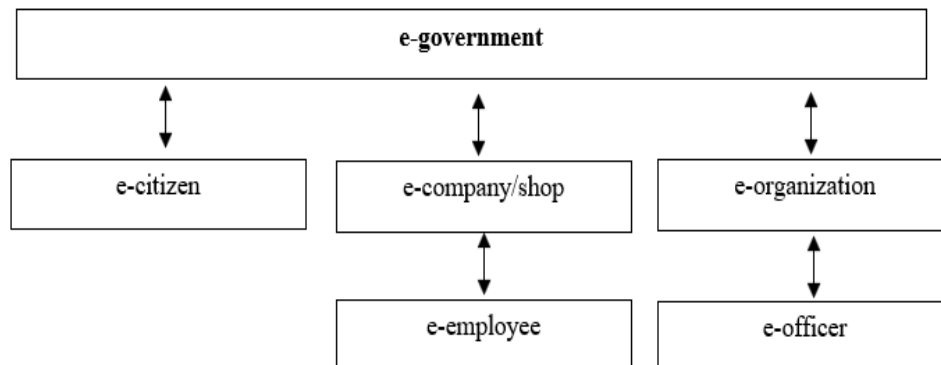


Figure 1. E-Government Structure

Source: Turkey's Council of IT, e-Government Work Group Report, 2002, 16.

Citizens and institutions (private or public), the main elements of a government, show themselves as e-citizen, e-company, and e-institution on e-government. However, assigning priorities to the said elements and approaching any of the elements as “would not be good for e-government” without realizing them altogether (e.g., not forming e-workplaces) while establishing e-government cause the entire process to be negatively affected. Each element will achieve the concept of “e” in itself, develop by being influenced by each other, and eventually, the e-government will be established (Demirel, 2006).

In the current age, information has come to the forefront. Although the significance of information and information sharing is increased to the rapid development of information technologies, managers generally neglect information sharing. Workers/personnel who know about the significance of their work will have a higher amount of motivation because they will be able to know what they do, understand the significance of their work, and see their contribution to the obtained results. However, the motivation of a worker, who gets many folders stacked on his desk every day and does not know the purpose of those concepts, eventually diminishes, and in connection with that, his/her productivity decreases (Çuhadar, 2005).

6. HISTORY OF E-GOVERNMENT APPLICATIONS IN THE WORLD

Citizens and institutions, the main elements of a government, show themselves as e-citizen, e-company, and e-institution on e-government. However, assigning priorities to the said elements and approaching any of the elements as “would not be good for e-government” without realizing one of them entirely while establishing e-government cause the entire process to be negatively affected. Each element will achieve the concept of “e” in itself, develop by being influenced by each other, and eventually, the e-government will be established.

E-government as a model, in the technical sense, is a productivity management system that regards public administration activities as services, enforces quality/cost performance criteria, and aims to produce top-quality service with minimal cost and effort. In this regard, the e-government model is a productivity management system based on less cost/quality service performance and structured according to total quality management and customer satisfaction criteria. The concrete expression of this system associated with e-business models is regarded as within electronic commerce and this system offers a decentralized horizontal coordination structure (Uçkan, 2003: 44-47). Thus, transitioning to the electronic government structure requires a distinct difference in understanding regarding the public administration system and civic perspective.

In Table 1, relations between citizen-public administration within e-government and conventional government are shown.

Table 1. Relationship between the Traditional Government and the Citizen-Public Administration in E-Government

Traditional Government	E-government
Passive Citizen	Active-Customer-Citizen
Paper Based Communication	Electronic Communications
Vertical/Hierarchical Structure	Horizontal/Coordinated Networking
My Management Data Upload	Citizen's Data Upload
Element Response	Automated Voicemail Call Center etc.
Staff Assistance	Self Help/Expert Assistance
Element Based Control Mechanism	Control with Automatic Data Update
Cash Flow/Cheque	Electronic Funds Transfer (EFT)
Traditional Government	E-Government
Partitioned/Interrupted Service	Holistic/Continuous/Differentiated Service
High Transaction Costs	Low transaction costs
Inefficient Growth	Productivity Management
One Way Communication	Interaction
Nationality relationship	Participation relationship
Closed Government	Open Government

Source: Uçkan, 2003: 47.

When conventional government and e-government are compared, it is seen that e-government applications bring upon a more participative, more open, and interactive system. Working procedures in conventional public life are based on citizens or institutions making demands by meeting with the relevant units face-to-face. Within this understanding; writing a petition, filling out a form, or preparing a document, which are essential parts of the activities demanded by the government for those who are in need, change form or get wholly ruled out.

It is possible to classify the stages of transitioning to e-government this way (Leigh, Atkinson, 2001: 6-7):

Web sites of public institutions, from the emergence of the Internet to the end of the 1990s, have only provided information for their users. At this stage, providing an interactive service is out of the question.

Public websites have started to transition from the information provider model to the transactional model after the 1990s. Governments have increasingly started to step into a system in which citizens will complete their transactions online.

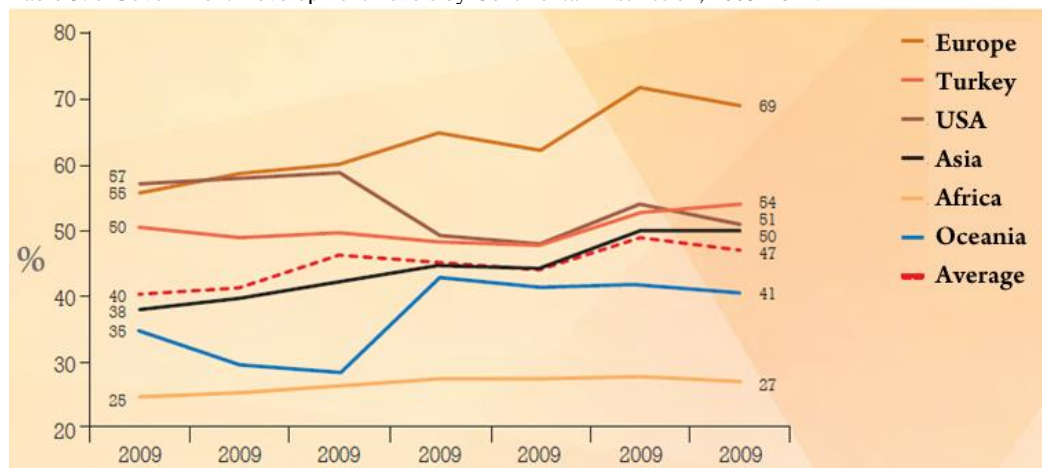
For an e-government system to be customer-focused, separately designed websites and information technology infrastructures of public institutions must be united under a single roof (embedded database) according to its citizens' needs. To make it real, the government should not just collaborate with the bodies on the same legal status as it is, but also with the government's various layers (central-local) and have these layers collaborate with the private sectors.

In a study conducted by the United Nations Organization and the American Society for Public Administration, the stages of e-government consist of five main categories (Akçakaya, 2017).

- 1- *The emergence of the E-Government Stage:* In this period, official government websites emerge.
- 2- *Development Stage:* In this period, the number of government websites increases and enters in a dynamic state.
- 3- *Interactive Stage:* Users can download some forms from government websites and interact with public agencies.
- 4- *Transaction Stage:* Users can pay some services' fees through public websites.
- 5- The last stage is uninterrupted integration, and public agency websites and public services offered in those websites are linked to each other without a problem. The last stage is expressed with names, such as e-government gateway and e-government portal. This form enables all public services to be brought to users through a single website that belongs to the government.

User Focality and Activity in Public Services: The potential of developments in ICT being able to respond to new needs quickly has made it possible for significant innovations in the presentation of public services to be put into practice and it made conveying these services to the citizens and organizations easier. Rapid and substantial development has been observed in the e-government concept, which emerged in the 1990s and electronic public services from the beginning. According to the UN e-government research, the world ratio of the development of e-government services in 2014 was 47%.

Table 3. e-Government Development Levels by Continental Distinction, 2003-2012.



Source: 2015-2018 Information Society Strategy, Ministry of Development - United Nations e-Government Studies (2003-2012)

Mobile technologies are expected to be the most widespread technology in e-government service presentation. Depending on developments in technology and user preferences, it is anticipated that social networks will be used much more in e-government service presentation processes. From the public decision-making mechanisms to the presentation of services in the electronic environment and measuring the service presentation quality and user satisfaction, the use of social networks is increasing in every stage. A significant worldwide tendency towards transitioning to common data centers and public clouds is observed. Due to advantages such as security and savings, countries are leaning towards combining their numerous current data centers. South Korea, the USA, and England are successful examples regarding common data centers, and they keep developing innovative applications.

7. THE PURPOSE OF E-GOVERNMENT

The primary purposes of the e-Government applications are as follows (Evren, 2004):

- 1- *Save on Costs:* With the adoption of the e-government system, decreasing expenses that are a burden on the government will be possible.
- 2- *Bringing Document Administration Under Control:* As the understanding of e-government settles in, processes made through papers, like voting, health, tax, registry, and customs processes, and various services, like municipal services will be transferred to the electronic environment and it will enable any kind of analysis.
- 3- *Transparency:* The opportunity of any information being available on the Internet will be accompanied by the understanding of transparent government. It will enable the concept of a government that exists for its people to settle in by adding a new dimension to government-citizen relations. Transparency will not just bring down the privacy limitations regarding the works being done and services to minimal levels, but will also make paving the way for the right and freedom of information easier (Köseçik & Karkın, 2004: 99).
- 4- *Service Quality:* Services that will begin to take place through the Internet will enable the service to be conveyed to citizens in a certain quality level and a standardized way.
- 5- *24 Hours and 7 Days a week Public Service:* Aside from the increasing quality of service, the government will only be a click away from the citizens and will offer its services 24 hours and seven days a week.
- 6- *Increase in Participation:* The number of citizens that will utilize government services will increase because the idea is that the more rights citizens are given, the more interactive the government gets.
- 7- *Opportunity for Easy, Quick, and Comfortable Access:* As the Internet technology is begun to be used in providing public services, the government gateway will become a government portal and everyone being able to utilize the comfort of the new technology will generate the concept of equality and make equal-quality services more widespread.

Goals such as optimizing working methods in e-government, minimalizing the error rate, accelerating the transition to digital democracy, providing for economical supply and demand, improving and accelerating

decision-making processes (Tübitak-Mam, 2004: 9), forming a basis for productions with high added values, and creating a happy society that is reliable, productive, and is at peace with its government are pursued as well. It is aimed to present transition to citizen-focused services and electronic government applications and public services on electronic environments through the means of the opportunities of the ICT, in an interoperable and integrated way that is focused on the needs of citizens and business life. In the process of putting these applications to practice, increasing the accessing opportunities and capability of the citizens and business life to public services is pretty significant alongside presenting public services in a more efficient and effective way.

With the e-Government application, the understandings of increasing service quality, reducing costs, gaining trust, and spreading out the understanding of democracy have gained significant importance. The e-Government gateway studies include aspects that will maximize the benefits mentioned in this paper.

It is understood that, by the year 2010, Turkey got pretty close to its goal of presenting the 20 essential public services of the EU entirely in the electronic environment (Table 2).

Table 2. Twenty Basic Public Services of the EU, and the Status of Presentation in Turkey

CITIZEN-ORIENTED SERVICES		
ROW	DEFINITION OF THE PUBLIC SERVICE	THE STATUS OF APPLICATION IN OUR COUNTRY
1.	Income tax: notification and assessment	In the scope of the e-Declaration service, assessment and payment transactions can be made online.
2.	Job searching services through business institutions	Search, and application processes for public/private sector jobs and employees can be made through the website of the Turkish Employment Agency.
3.	Social security contribution (insurance premiums) - Unemployment allowance - Children allowance - Health insurance - Student allowance	- Online application for unemployment allowance can be made through the website of the Turkish Employment Agency - There is no website that allows finding information or making transactions about family and children allowance directly. - Processes regarding health insurance can be made online through Social Security Institution's applications. - Through the website of the General Directorate of Higher Education Credit and Hostels Institution, application for student scholarship, credit and hostel, and results and debt status can be accessed.
4.	Personal documents (passport and driver's license)	It is possible to receive information, book an online application appointment from a single point, and apply online within a part of 81 provinces.
5.	Vehicle license	Information is given regarding new vehicle registration, and online applications can be made within a part of 81 provinces. The sale, transfer, and registration processes of second-hand cars are made by Notary Offices through personal applications made to Notary Offices. Processes are completed at Notary Offices through the electronic environment; also, there is no need to apply to a separate institution.
6.	Construction license application	Not available right now.
7.	Reporting to the police	It can be made through the web pages of the Security General Directorate and Provincial Security Directorates.
8.	Public libraries (catalogs, availability of search tools)	Through the National Library website, catalog scans and book reservations can be made for the books that are contained within themselves. Within the scope of the Integrated e-Library System, mass catalog scan service is started to be offered. On the website of the General Directorate of Libraries and Publications, a bibliographic tag scan can be made within about 400 libraries that transitioned to the automated system.
9.	Documents (birth and marriage): application and receiving	In some municipalities, the application for initiating marriage processes can be made online.
10.	Application to higher education/ universities	Electronic class registration systems are used at universities, but the university registration process cannot be made.

Table 3. Business Life-Oriented Services

BUSINESS LIFE-ORIENTED SERVICES		
1.	Insurance premium for workers	Notifications can be sent through the internet; information regarding debt, assessment, and collection can be reached, and online payment can be made.
2.	Company tax: notification, verification	In the scope of e-declaration, notification, assessment, and payment processes can take place.
3.	Value-added tax: notification, verification	In the scope of e-declaration, notification, assessment, and payment processes can take place.
4.	New company registration	Pilot application of the centralized legal entity information system, which will enable new company registration and trade registry processes to take place through the electronic environment.

5.	Data transfer for statistics	Data regarding some of the surveys carried out on organizations can be accessed in the electronic environment.
6.	Customs notifications	Declarations can be issued in the electronic environment.
7.	Permissions regarding the environment (reporting included)	The project, which provides the opportunity for the processes regarding environmental permissions and licenses to take place in the electronic environment, is at the pilot application stage in 14 provinces.
8.	Public procurement	Electronic Public Procurement Platform (EKAP) has been established. Public procurement bulletin is published in the electronic environment. However, various institutions and organizations publish their procurement notices on the internet.

Source: BPT (Department of Information Society), Information Society Statistics, 2010: 55.

It is anticipated for the actions that will take place with the 2015-2018 Information Society Strategy and Action Plan to support economic growth and employment increase through uniting the information technology sector with a firm structure, whose competitive power is high, increasing the influence of ICT on other sectors, and establishing a fitting ecosystem that enables the development of online initiatives. On the other hand; with supportive efforts, such as establishing information security and user trust, putting innovative information technology solutions to practice in fields such as urban life, green information technology, e-health, and efficient use of information, and making user-oriented and efficient activity to take place through establishing broadband infrastructures, spending effort on catering expert IT personnel, and putting the legal infrastructure which the transition to the information society requires; it will be possible for the contribution of the information technology sector to the economy to be ensured (Figure 2).

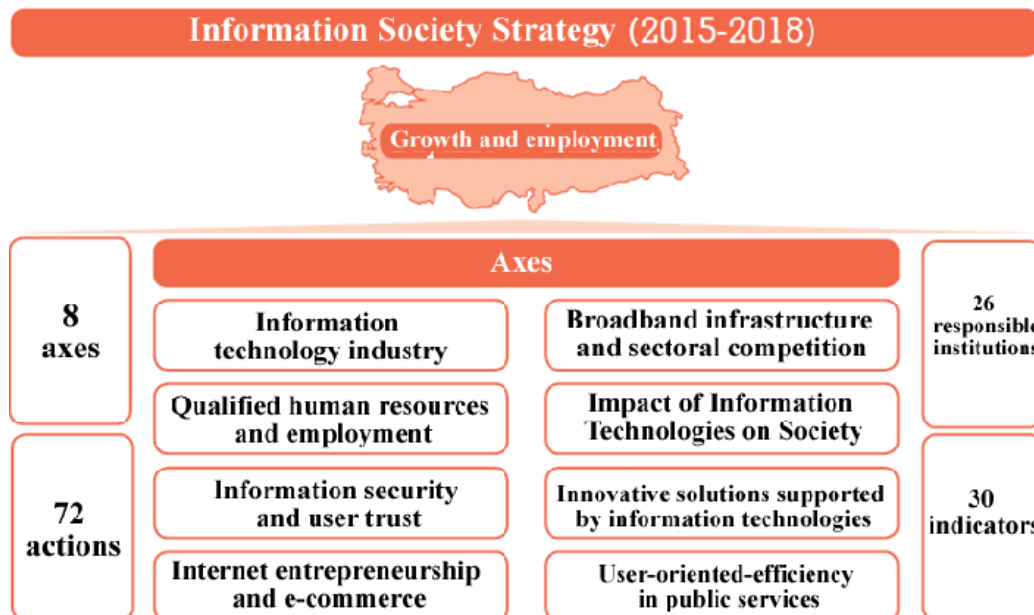


Figure 2. Axes and Focus in the 2015-2018 Information Society Strategy

Source: 2015-2018 Information Society Strategy, Ministry of Development.

Countries that are exercising public cloud focus on specifying the structure of the administration system, priorities, and roadmap, creating a system in which the private sector is cooperated with, and harmonizing security and the body of current law.

Technological developments make it easier for shared services to be presented in public institutions and to enable a single-stop that is integrated and high-grade e-government service presentation through sharing of information and documents between institutions. Thus, a significant amount of savings in cost and time is procured and administrative burdens are decreased.

7.1. Expectations Of Public Administration

It is expected that a performance-oriented public administration, whose actions follow its words, serves the public achieves essential goals of the systems, and increases quality of human capital. For a performance-oriented system from this point of view, a software project called SGB.net is launched by the Department of Strategy Building. With the software SGB.net, it is aimed for the financial procedure stages (budget processes, fund transfer, expense tracking, expense management, debt tracking, movable property management, settlement, etc.) to take place through the system. With SGB.net, which is in use in Turkey, many gains are acquired (<https://sgbnet.tarim.gov.tr/>).

Gains acquired by the SGB.net system are as follows:

- ✓ Personnel use their time productively,
- ✓ Efficient resource management and expense efficiency,
- ✓ Quick and quality public service presentation,
- ✓ Instant tracking of Department's financial processes,
- ✓ Transparency and accountability via sharing of data and information,
- ✓ Integrated service presentation under a single roof,
- ✓ Preventing financial losses by standardizing expense processes,
- ✓ Preventing cumbersomeness in expense processes,
- ✓ Contribution to the procurement of alternative policies through analysis

8. THE EFFECT OF USING INFORMATION TECHNOLOGIES ON PERSONNEL PRODUCTIVITY: EMPIRICAL RESEARCH ON AN INFORMATION TECHNOLOGY APPLICATION

In this section, the aim, scope, population and sample, data collection method, statistical processes, and analyses of the research are mentioned.

8.1. The Aim of the Research

In the period where business life is intensely competitive in the world, accessing information and using technology has significant importance. In all institutions and countries that use information and technology effectively, it is revealed that productivity of each person increases faster and more prosperously, and more quality services and products are produced through producing information faster and in more quantity, and utilizing them in business life.

One of the essential resources of long-term productivity is producing and utilizing new technologies. In our study, the effect of information technologies on personnel productivity is studied. Erciyes University personnel's levels of using and utilizing technology and the interaction between them and their productivity are examined.

8.2. The Scope of the Research

In our study, Erciyes University personnel constituted the population. The population that constituted the questionnaire was 1,404 people working at Erciyes University. The questionnaire was carried out in accordance with the judgment sampling method with 210 people, which constituted 15% of the staff, and 167 questionnaires were answered. Because 2 of the questionnaires could not pass the confidence tests, they were left out of the assessment and the assessment was made with 165 questionnaires.

8.3. The Method of the Research

The research was carried out using qualitative and quantitative research methods and a descriptive research model (Kurtuluş, 2008) and administered to the subjects with convenience sampling and questionnaire forms. In the study, the questionnaire form used for data collection consisted of 31 questions. The questionnaire consists of three significant scales. These are the 5-factor personality traits questionnaire (10 questions), information technology usage scale (14 questions), and personnel productivity scale (3 questions). Demographical traits were tried to be determined with four questions. The personality traits consist of five sub-scales, namely, entrepreneurship, social responsibility, discipline, emotional stability, and open-mindedness. The administration information technology systems scale consists of 4 sub-scales: utilizing computers, utilizing data, decision-making, and information sharing. Personnel productivity consists of 3 sub-scales: decreasing errors, saving time, and performance increase.

8.4. Limitations of the Research

Due to time and cost constraints, the research covers only the personnel of Erciyes University. The questionnaire study, which underlies the research, was carried out between November 8th, 2010 – January 12th, 2011. The target audience in the research was all personnel, who carry out their work using computer technologies.

8.5. Discoveries of the Research

Multivariate statistical analyses were utilized in order to test the research hypotheses developed in accordance with the aims of the research. However, data must be assessed in terms of reliability and validity before carrying out a multivariate statistical analysis. Because of this, confidence and validity analyses were carried out before testing the research hypotheses. The reliability of scales in the research was determined using the internal consistency method. Internal consistency is determined using the alpha coefficient. The alpha coefficient is the most commonly used method when testing the confidence of a scale. The alpha coefficient is between zero and one. To consider a research scale reliable, the alpha coefficient must be 0.70 or above (Hair et al., 1998: 118).

8.6. Analysis and Assessment of the Data

Multivariate statistical analyses and parametric and non-parametric tests were used in the analyses of the data collected throughout the research. Analyses were made using the SPSS 17.0 packaged statistical program. Frequency distribution, arithmetic mean, standard deviation, frequency, percentages, t-test, ANOVA, correlation, and regression analyses were carried out via the SPSS program.

In order to test the reliability of the questionnaires, Cronbach's Alpha values were calculated. Cronbach's Alpha values are shown in Table 4. Results in the table show that the questionnaire is reliable.

Table 4. Reliability Test

Scales	Cronbach's Alpha
For the full survey	86,6
Personality traits scale	74,1
IT scale	90,0
Personnel productivity scale	81,7

Demographic traits of the participants are shown in Table 5.

Table 5. Demographic Characteristics of Participants

Age	Frequency	Percent	Job/Duty	Frequency	Percent
21-30	52	31.7	Academician	24	14.6
31-40	61	37.2	Director/Administrator	14	8.5
41-50	42	25.0	Other	43	26.2
51 and above	10	6.1	Stock Staff	12	7.3
			Government official/ Computer Operator	72	43.3
Total	165	100	Total	165	100
Working Time	Frequency	Percent	Education	Frequency	Percent
1-10 years	72	43.9	Middle-High School	33	20.11
11-20 years	60	36.6	Associate degree	37	22.6
21-30 years	32	18.9	Bachelor degree	72	43.3
31 and above	1	0.6	Post graduate	18	11.0
			PHD	5	3.0
Total	165	100	Total	165	100

The levels of significance that participants expressed for the qualities given in the questionnaire are as follows: 1 - < 2 Insignificant, 2 > 3 Neutral, 3 > 4 Significant, 4 > 5 Very Significant.

The minimum/maximum, mean, and standard deviation of participants' answers are given in Table 6.

Table 6. Minimum/Maximum, Mean, Standard Deviation of Participants' Assessments of the Expressions in the Questionnaire

	Minimum	Maximum	Mean	Std. Deviation	
A keen and entrepreneurial person	1.00	5.00	3.8909	1.08773	Significant
An incompatible and aggressive person	1.00	5.00	3.7939	1.30896	Significant
A person who enforced his/her self-discipline	1.00	5.00	4.0545	1.10019	Very Significant
A person who is disappointed quickly, fragile and anxious	1.00	5.00	3.0909	1.16775	Significant
A person who is open to new experiences and able to think in a complex way	1.00	5.00	3.7697	1.03373	Significant
A silent, composed, and unsociable person	1.00	5.00	3.497	1.2861	Significant
A friendly person who can make friends easily	1.00	5.00	3.9515	1.01697	Significant
An inattentive person who cannot focus much	1.00	5.00	3.5152	1.25720	Significant
A person who is calm and emotionally stable	1.00	5.00	3.8242	.97500	Significant

A person who is not very open to creative ideas in a traditional sense	1.00	5.00	3.6727	1.16955	Significant
In our institution, computer software (Say2000i, SGB.net, Microsoft Office et cetera) use is adequate in our institution. Utilizing computers	1.00	5.00	3.7152	1.01697	Significant
In our institution, administrators can use computer software regarding their expertise (Word, Excel, Powerpoint, Outlook, Say2000i, SGB.net, Budget-Expense-Movables-Accounting Automations et cetera) effectively. Utilizing computers	1.00	5.00	3.3939	1.24791	Significant
In our institution, information used to make decisions can be obtained when necessary (in real-time). Utilizing data	1.00	5.00	3.4485	.99637	Significant
In our institution, alternative strategies can be developed by utilizing information technologies (IT) and e-government applications. Decision-making	1.00	5.00	3.2000	1.06611	Significant
Information technologies have helped in saving time. Utilizing data	1.00	5.00	3.9091	.98041	Significant
Our institution can communicate effectively thanks to the communication enabled by information technologies and can reflect it on the decision-making process. Decision-making	1.00	5.00	3.5333	1.02727	Significant
The information our institution obtained and utilized on the computer environment in order to make decisions that are consistent and appropriate for its purpose is adequate. Utilizing data	1.00	5.00	3.7394	3.31460	Significant
In our institution, data input is made through the computer environment, and the output process is generally tracked in an electronic environment. Utilizing computers	1.00	5.00	3.7212	.99748	Significant
In our institution, the use of information technology in the decision-making process has increased the data processing capacity, decreased costs, and increased productivity. Decision-making	1.00	5.00	3.7091	.96283	Significant
In our institution, information technologies have increased the administrators' decision-making speed and made making accurate decisions in less time easier. Decision-making	1.00	5.00	3.5758	1.03683	Significant
Information technologies have helped controlling business procedures. Utilizing computers	1.00	5.00	3.9333	.91820	Significant
The information obtained in our institution can be spread quickly and effectively via the communication (network) environment. Information sharing	1.00	5.00	3.8061	.92984	Significant
Information technologies have reduced the possibility of making errors. Information sharing	1.00	5.00	3.8061	.96838	Significant
Sharing information via information technologies has also reduced bureaucracy in our institution. Information sharing	1.00	5.00	3.4848	1.17705	Significant
Thanks to information technologies, I can complete the tasks that took me a lot of time previously in less time. Personnel productivity	1.00	5.00	4.0485	.79485	Very Significant
By inputting and inspecting data and using information technologies, the number of incorrect operations has been decreased. Personnel productivity	1.00	5.00	3.9273	.86647	Significant
My performance and productivity are affected positively thanks to definitions of personnel duties being made clear and operations being checked via information technologies. Personnel productivity	1.00	5.00	3.7879	1.02878	Significant

Note: 1 - < 2 Insignificant, 2 > 3 Neutral, 3 > 4 Significant, 4 > 5 Very Significant

Being "A person who enforced his/her self-discipline" and "Being able to complete tasks that took more time previously in lesser time thanks to the improvements made in the business procedures by information technologies" are deemed very significant by the participants. Our research questionnaire does not contain any subjects that are deemed less significant or insignificant.

8.6.1. ANOVA Analysis

There is a significant difference due to sigma being less than 0.05 in the sub-scales “Utilizing computers in regards to personnel productivity”, “utilizing data”, “making shared decisions”, and “information sharing.” Administrators and staff being able to use computers and related programs effectively enable utilizing data, which is significant for them to make decisions and it increases productivity (Table 7).

Table 7. ANOVA (Personnel Productivity)

According to personnel productivity	Sum of Squares	df	Mean Square	F	Sig.
Age	9,696	10	,970	1,208	,290
Job/Duty	30,679	10	3,068	1,450	,164
Education	15,299	10	1,530	1,487	,149
Working Time	4,659	10	,466	,766	,661
Avg. personality trait- Initiative	13,062	10	1,306	1,575	,119
Avg. personality trait- Conform	8,615	10	,861	1,108	,359
Avg. personality trait-Self-discipline	8,215	10	,821	1,078	,383
Avg. personality trait- Disappointment	8,102	10	,810	1,873	,053
Avg. personality trait-openness to innovation	9,928	10	,993	1,525	,135
Avarege Utilizing computers	26,258	10	2,626	5,608	,000
Avarege Utilizing data	36,324	10	3,632	2,270	,017
Avarege Decision-making	34,481	10	3,448	5,920	,000
Avarege Information sharing	54,697	10	5,470	19,044	,000

8.6.2. Correspondence Analysis

Correspondence analysis is a method that makes interpreting categorical variables easier, makes interpreting similarities, differences, and relations between variables in rows and columns in crosstabs more effortless, and shows these variables' joint changes in a space with lesser dimensions graphically (Suner & Çelikoğlu, 2008, 9). The relation between personnel productivity and MIS (Management Information System) qualities obtained as a result of the correspondence analysis is given in Figure 4.

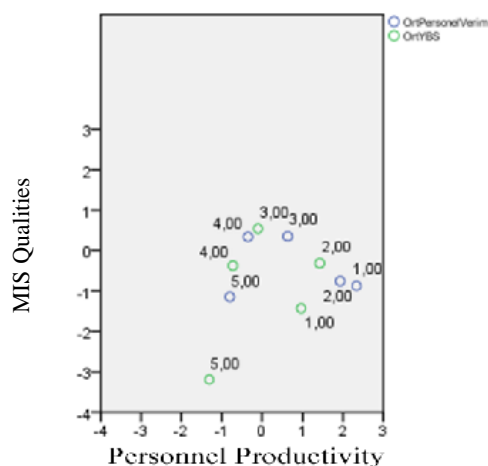


Figure 4. Relation of Personnel Productivity And MIS Qualities

Dimension 1 variable shows personnel productivity.

Dimension 2 variable shows the qualities of management information system (MIS) qualities.

As seen in **Figure 4**, as usage qualities of MIS increase, productivity increases relatively as well. This can be seen when areas in which the MIS dimension is more than 0 are examined.

8.6.3. Regression Analysis

According to the regression analysis, because significance (sigma) is below 0.05, the effect of information technologies is present, the effect of personality traits on personnel productivity could not be determined (Table 8-9-10).

$$R = 1,546 + 0,622 IT (MIS)$$

Table 8. Regression Analysis Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	,607 ^a	,368	,361	,61450

Determinants: (Fixed), Personality, MIS

Table 9. ANOVA Table of The Regression Analysis

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	35,692	2	17,846	47,262	,000 ^a
Residual	61,172	162	,378		
Total	96,865	164			

a. Predictors: (Constant), Kişilik, MIS

b. Dependent Variable: Personnel Productivity

Table 10. Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1,546	,354		4,366	,000
Avg. MIS	,622	,064	,605	9,652	,000
Avg. personality trait	,030	,076	,025	,398	,691

a. Dependent Variable: Avarege Personnel Productivity

8.6.4. Correlation Analysis and Decision Tree

There is a positive, bidirectional, and strong relationship rated at 0.439 between the computer technologies usage sub-scales “utilizing data” and “utilizing computers”. There is a positive, bidirectional, and strong relationship rated at 0.709 between the subscales “utilizing computers” and “decision-making” (Table 11).

Table 11. Correlation Analysis

Scales	Pearson Correlation	1	2	3	4	5	6	7
1- Avarege Utilizing computers	Pearson Correlation	1,00						
2- Avarege Utilizing data	Pearson Correlation	,439**	1,00					
3- Avarege Decision-making	Pearson Correlation	,709**	,491**	1,00				
4- Avarege Information sharing	Pearson Correlation	,593**	,406**	,712**	1			
5- Avg. Personnel Productivity	Pearson Correlation	,465**	,327**	,498**	,723**	1		
6- Avg. personality trait	Pearson Correlation	,091	,064	,096	,011	,073	1	
7- Job/Duty	Pearson Correlation	-,175*	-,177*	-,108	-,066	,174*	,101	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

According to the research, when making a decision or plans regarding personnel productivity, we should develop strategies that will have the personnel participate in decision-making. As seen in the decision tree in Figure 5, there is a very significant relationship between decision-making and personnel productivity. (Adj. P value = 0,000)

The parts whose mean is ≤ 3.25 is 38.2% and the parts whose mean is above 3.25 is 61.8%. So, the mean average of the relation with personnel productivity can be explained with the percentage of 61.8% if we choose the decision-making factor.

9. RESULT AND SUGGESTIONS

Various developments have occurred from the birth of humankind to our time. These developments and innovations still occur and will occur in the future. We are in an information era in which reaching broad markets is easier in the globalized world, enabling earning high profits and thus, information technologies are inseparable from business life. While information technologies are in every aspect of business life, their significance increases as well. Undoubtedly, all elements of public administration will be affected by these developments as well. As using information technologies make working easier, it is also an inevitable fact that it saves time and workforce.

Information and communication technologies (ICT) influence public institutions and organizations positively in terms of presenting information and service with a new understanding and approach, and it comes before as a necessary element in terms of establishing an effective and interoperable e-government structure.

On the road to being an information society, ICT investments in every area of life, and naturally in public services, gradually increase.

Today's conditions require public agencies which;

- ✓ Reach their strategic goals by using their resources effectively, economically, and productively,
- ✓ Base its activities on cost-benefit and activity analyses,
- ✓ Establish its internal control system,
- ✓ Are conscious about their responsibilities of being transparent and accountable,
- ✓ Have an understanding of their total financial discipline.

These will be achieved by;

- ✓ Controlling public resources,
- ✓ Planning the allocation of the resources,
- ✓ Managing the resources,
- ✓ Redefining the business processes of public agencies,
- ✓ Establishing cooperation and information sharing between institutions,
- ✓ Establishing management information systems that will support data-oriented decision-making procedures.

It was determined in the data we collected, via our study questionnaire that computer technologies increase productivity. In terms of personnel productivity, a significant difference was determined between the subscales utilizing computers, utilizing data, making shared decisions, and information sharing, due to sigma being less than 0.05. As seen in the correspondence analysis graph, as management information system (MIS) usage qualities increase, productivity increases relatively as well. This can be seen when areas in which the MIS dimension is more than 0 are examined. Because sigma is below 0.05, the effect of information technologies is present. The effect of personality traits on personnel productivity could not be determined.

There is a positive, bidirectional, and strong relationship rated at 0.439 between the computer technologies usage sub-scales "utilizing data" and "utilizing computers". There is a positive, bidirectional, and strong relationship rated at 0.709 between the subscales "utilizing computers" and "decision-making".

Suggestions

- ✓ Enabling all procedures of public administration being controlled via a single database in order for the personnel to use their time productively and their performance to be measured,
- ✓ Revising unnecessary procedures regarding effective resource management and saving costs following the needs that emerge as the result of the application,
- ✓ Supporting e-government applications to make quick and quality public service presentation possible, training both the public personnel and citizens, and supporting these pieces of training with distance education,
- ✓ Expanding transparency and accountability via sharing data and information,
- ✓ Preventing financial losses by standardizing expense procedures,
- ✓ Increasing personnel productivity by preventing cumbersomeness within process procedures,
- ✓ Producing necessary policies by doing analyses in light of the data collected from the system enables public administration productivity, and accordingly, personnel productivity increases by using computer technologies.

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