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E-GOVERNMENT ADOPTION AMONG CITIZENS: THE CASE STUDY OF HEALTH CARE WORKERS IN A RURAL TURKISH HOSPITAL

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ABSTRACT

Rapid technological development enables governments to provide citizens more effective, timely and cost efficient services. Nowadays, many of the public services can be accomplished by utilizing the Internet. In this sense, Internet use in public services, widely known as e-Government, is adopted as an essential intermediary for government organizations on establishing a national ICT infrastructure. Although Turkey was connected to the Internet in 1993, the number of Internet users in Turkey has reached to nearly 37 million people, ranking the country to be one of the top 20 countries in the world. It may be stated that Turkey is still at the beginning of the information society transformation, at the same time, along with the motivation of e-Europe+ project in 2001; Turkish government organizations increasingly utilize the information and communication technologies in their activities. E-Government opportunities focus on the implementation of digital public services through instant access for citizens. However, the adoption and interaction of e-Government among citizens are nontrivial changes, while both of them require respectable period of time. The purpose of this study is to investigate the e-Government adoption levels of citizens in a rural province of Turkey. The study concentrates on the e-Government adoption among health care workers in Atatürk University Research Hospital. A questionnaire was prepared and applied to 200 representative health care workers. The results of the survey indicated that there were still barriers against the adoption of e-Government among health care workers, although the Internet use in public services was increasing. The regression and ANOVA results also suggested the statistically significant relationship between e-Government adoption and education level, income level, internet connection, and computer use level at the 0.05 and 0.10 significance levels.

JEL CLASSIFICATION & KEYWORDS

■ L86 ■ D83 ■ M15 ■ E-GOVERNMENT ADOPTION ■ HEALTH CARE WORKERS ■ REGRESSION ANALYSIS ■ ANOVA

INTRODUCTION

Information and communication technologies (ICT) were recognized to have enormous administrative potential and the diffusion of personal computers in the 1980s enabled the public administrators with a personal information technology system opening a new period of information technology use in government (Yildiz, 2007). In addition to provide information, communication, and transaction services, exciting and innovative transformation could be accomplished with the new technologies and practices (Chen, 2002). Most of public sector organizations have begun to implement transactional capabilities and individual transaction systems yield to Internet-based end-to-end processes. Recently, the very technologies will produce new demands for enhanced flexibility, transparency, and accountability from governments (Marche & McNiven, 2003). Public sector service quality affects quality of life, business activities and political legitimacy, and the choice of delivery has to match the widespread use of the Internet in private life and public sector (Aichholzer, 2004). E-Government initiatives promote more efficient processes by facilitating improved access, via information technology to information and services, and simultaneously fostering better relationships with their citizens, businesses and other organizations (Goh et al., 2008). Therefore, e-Government has become an explicit component of public sector reform, as an intermediary to increase efficiency, strengthen competitiveness and enhance modernization (Centeno et al., 2005).

E-Government can be briefly defined as the use of technology, mostly the Internet, as a means to deliver services to citizens, businesses, and other entities that provides information and services to the public and improves communication with citizens (Akman et al., 2005; Ho & Ni, 2004). According to The World Bank definition, it is a relatively new branch of study within the information systems field that is concerned with the use of ICT by the government agencies to electronically deliver its services (The World Bank, 2011; Patel & Jacobson, 2008). E-Government concerns with both internal and external of information technology, for internal administration as well as for external services and it is generally about better and more strategic information technology use (Grönlund, 2002). E-Government projects are usually service oriented, focusing on the implementation and diffusion of digital public services through one-stop point access for citizens (Anthopoulos et al., 2007). Theoretically, via a single Internet connection, citizens are able to contact government anytime and anyplace, in this manner without going through a street-level bureaucrat (Reddick, 2005).

On a global basis, there is a set of labels, such as e-Government, e-governance, one-stop government, digital government, and online government that get hold of the governmental quest for online government services (Andersen & Henriksen, 2007). Unlike, traditional structures, Internet delivery systems are non-hierarchical, non-linear, two way, and available twenty four hours a day, seven days a week. The non-hierarchical character of Internet delivery allows citizens to seek information at their own convenience, not just when a government is open (West, 2004). In that context, some perceived characteristics of e-Government services can be listed as increasing cost efficiency enhancement, cost recovery potential and right of citizens to assess government services online while decreasing potential for work overload and information security concerns (Ho & Ni, 2004). Consequently, e-Government implementation is significantly beneficial for manifold topics such as breaking down the barriers, more accessible

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government, improving service quality, integration of agencies, greater participation by people in government, and improved reputation (Chen et al., 2005).

Nowadays, the utilization of several innovative technologies based instruments and channels on the presentation of health care services take advantage of the prevalent e-Government phenomenon. In this way, e-Health services are considered as one of the fastest developing areas of health industry (Yurt, 2012; WHO, 2006). In recent years, a number of national health authorities has begun to focus on e-Health services such as electronic health cards, electronic patient records, and health portals (Andreassen et al., 2007). For health and social services, an emphasis on the 'patient' or 'user' as 'consumer' with to make decisions based on information and experience has emerged (Hardey, 2001). However, adoption of e-Government requires an integrative architecture framework approach to place government information and services online (Ebrahim & Irani, 2005). The purpose of this study is to investigate the e-Government adoption levels of citizens in a rural province of Turkey by concentrating on the e-Government adoption among health care workers in Atatürk University Research Hospital.

Literature Review

Neuhauser & Kreps (2003) examined current evidence concerning e-Health communication and evaluated opportunities for e-Health applications. They suggested that the biggest challenge in the e-Health era are determining the most powerful psychosocial mediators of behavior change, and translating those findings to successful communications efforts.

del Hoyo-Barbolla et al. (2006) presented a new model to understand the reasons why individuals would use new ICT to perform a change in their lifestyle through an e-Health application. This model allowed enhancing the user modelling process by taking into account both health behavior aspects as well as technological, and it was considered as being part of the explanation of some e-Health application under utilization.

Anderson (2007) investigated the present status of information technology in health care, the perceived benefits and barriers by primary care physicians and the results suggested that physicians in general perspective benefits to information technology, but also cite major barriers to its implementation in their practices, including lack of access to capital by health care providers, complex systems and lack of data standards that permit exchange of clinical data, privacy concerns and legal barriers.

Dixon (2007) suggested a roadmap for the adoption of e-Health, which advocates for greater dissemination of implementation best practices, continued development of a strong e-Health workforce, and sustainable resources to employ those seeking to adopt and use e-Health technologies in clinical practice. Furthermore, the e-Health community is invited to advance the roadmap to assist providers in embracing and utilizing information and communication technologies for health care system improvements.

Fitzgerald et al. (2008) used a socio-technical approach to collect the data of the UK and the Spanish case studies, aiming to unify existing views and to identify the roots of inconsistencies of the results for the implementation of e-Health systems. Their results suggested that although there are some benefits and barriers that are consistent amongst those reported, new benefits and barriers were found.

Gallant et al. (2008) applied an extension version of the Technology Acceptance Model to study hospital web sites and five significant factors, involving usefulness, ease of use, trust, privacy, and personalization have been emerged in the data analysis of 30 participants using a hospital web site.

Cheong et al. (2009) pointed out improving Korean Service Delivery System in health care by focusing on national e-Health system and they emphasized the privacy problem of electronic health records, the cooperation among the health care related organizations, and the renewal of e-Health related law or regulations.

Goroll et al. (2009) described the formation and implementation phases of the Massachusetts eHealth Collaborative, focusing on barriers identified, lessons learned, and policy issues. The Collaborative implemented electronic health records in a diverse set of competitively selected communities, encompassing nearly 500 physicians serving over 500,000 patients.

Tsinakis & Kouroubali (2009) presented an application of the fit between individuals, task and technology framework to analyze the socio-organizational-technical factors that influence information technology adoption in the health care domain and the detailed analysis of the case study showed common features, however differences of information technology adoption within the various health organizations in Greece.

Greenhalgh & Russell (2010) exhibited why the evaluations of e-Health programs fail and proposed an alternative set of guiding principles. As a result, they indicated that the precise balance between "scientific" and "alternative" approaches will depend on the nature and context of the program and probably cannot be stipulated in advance.

Huang et al. (2010) purposed to develop a framework to access a country's e-Health preparedness with respect to embracing e-Health and enable a country to identify as well as address areas that require further attention for successful e-Health initiative. Their analysis indicated that the relative health care system would appear to have less significance in establishing successful e-Health initiatives; hence e-Health initiatives are health care system independent and success or failure depends on ones state of preparedness.

Kreps & Neuhauser (2010) reviewed key communication issues involved in the design of effective and human e-Health applications and they suggested that the development, adoption, and implementation of a broad range of new e-Health applications holds promise to increase consumer and provider access to relevant health information, enhance the quality of care, reduce health care errors, increase collaboration, and encourage the adoption of healthy behaviors.

Long & Loria (2010) investigated older people's acceptance of e-Health services, in order to identify determinants of, and barriers to, their intention to use e-Health. They identified additional factors critical to the acceptance of e-Health, including the importance of the compatibility of the services with citizens' needs and trust in the service provider. In addition, most respondents expressed positive attitudes towards using e-Health and find these services useful, convenient, and easy to use.

Wilson et al. (2010) presented a longitudinal analysis of demographic factors contributing to adoption by patients of advanced e-Health services in the areas of transaction, communication, and personal support. Their research used Health Information National Trends Survey, conducted

in 2003, 2005, and 2007 by the U.S. National Cancer Institute and the findings showed that while use of advanced e-Health services is increasing overall, adoption trends vary substantially by service and by patients' demographic characteristics.

Lau et al. (2011) proposed a clinical adoption framework for making sense of health information system success in Canada. Their hypothesis is that successful clinical adoption of a health information system requires explicit recognition, strategies, and actions that address the factors described in the framework.

Basoglu et al. (2012) presented the patient preferences for an application in remote control monitoring by using analytical hierarchy process and conjoint Analysis, limiting to the diabetes and obesity patients in İstanbul, Turkey. Their results indicated that sending users' data automatically, availability of technical support, and price are key factors impacting patient's decisions.

Dünnebeil et al. (2012) extended existing Technology Acceptance Model for e-Health in ambulatory care settings and elaborated on determinants of importance to physicians in their decision to use e-Health applications, based on a quantitative study of German physicians who participated in the national testbed for telemedicine. The partial least squares regression model from data of 117 physicians showed that the perceived importance of standardization and the perceived importance of the current information technology utilization were the most significant drivers for accepting electronic health services in their practice.

E-Government and E-Health Implementation in Turkey

Countries worldwide are developing online services as a response to technology advances and herein delivering government services to the public electronically requires innovation which entails the adaptation of policy and strategy, and the associated changes in technologies and infrastructures (Janssen & Kuk, 2009). It is assumed that the governments of developing countries could follow the trend to serve citizens and businesses better to save costs by making internal operations more efficient, cutting down the complex and over stretched bureaucratic system (Basu, 2004). The use and implementation of e-Government for developed and developing countries doubtlessly differ. For developed countries; the demand for the use of e-Government services flows from citizens to governors, whereas for developing countries; this demand flows from top to bottom where the governors expect the use of e-Government services by the citizens (Naralan, 2008). As a developing country, e-Government is adopted as an essential element of Turkey's efforts for reorganizing its administrative system and establishing a national ICT infrastructure. For this purpose, Turkish government organizations increasingly utilize the Internet in their activities (Kaya Bensghir & Yildiz, 2002).

Although Turkey was connected to the Internet in 1993, the number of Internet users in Turkey has reached to nearly 37 million people, ranking the country to be one of the top 20 countries in the world (Internet World Stats, 2012). It may be stated that Turkey is still at the beginning of the information society transformation, at the same time, along with the motivation of e-Europe+ project in 2001; Turkish government organizations increasingly utilize the information and communication technologies in their activities. Turkish governments used the online National Population Management System (MERNIS) in 2002 when this year has been the milestone as the first unofficial pronunciation of e-Government was recognized. In 2003, the 'e-Transformation Turkey project' was launched under the responsibility of State Planning Organization and with an aim of carrying out the process of transformation into an information society in a harmonious and integrated structure all over the society with all citizens, enterprises and public segments. In this process, 'Turkey's Information Society Transformation Policy' has been adopted, that states Turkey's vision of transformation into an information society (Ministry of Develepment Information Society Department, 2012). Furthermore, 'Information Society Strategy 2006-2010' and 'Action Plan 2006-2010' were adopted in 2006, for the purposes of modernization in public administration and functioning; effective, fast, easy-to-access and efficient public service delivery to citizens and businesses; reducing the digital divide; increasing employment and productivity; ensuring effective and widespread use of ICT by businesses to create a higher value added (Çayhan, 2008).

One stop point access of e-Government services was proposed by Layne & Lee (2001) as a sub-horizontal integration stage in their four-stage growth model for e-Government. The official e-Government website of Turkey came into service on December, 2008, with a motto of 'the shortpath of government', that enables to access thousands of addresses through a one-stop point. E-Government gateway provides an infrastructure whereby the citizens can have secure access to the information and services and a joint structure is being established for development, provision, and improvement of e-Government services by identifying the needs of the citizens and government agencies. By utilizing the corresponding platform, citizens can securely benefit from the government services provided electronically (TURKSAT, 2009a). Currently, the responsibility of e-Government gateway implementation is carried out by the Ministry of Transport, Maritime Affairs and Communications and TURKSAT, the only satellite operator in Turkey. E-Government services in Turkey are classified into three groups: government to government (G2G), government to citizen (G2C) and government to business (G2B) services (Akman et al., 2005). According to Turkey's e-Government gateway database, at the present, it provides 814 public services of 111 government organizations to more than 15.5 million registered users.

The implementation of national e-Health policy proceeds in Turkey since 2003. The Ministry of Health requested International Telecommunication Union (ITU) to provide assistance in the implementation of Turkey's e-Health project and support in their Health Transformation project, which is an extensive and profound reform of the managerial and operational aspects of the health sector in Turkey. This project also includes a major re-organization of the delivery of medical services and their finances through the social security and health insurance schemes. According to ongoing Health Transformation Project, a high-level of autonomy will be given to the institutions, especially hospitals (Mandil, 2004a). Moreover, the recent past experience of the Ministry of Health, attempted to develop a hospital management information system which was then forced onto hospitals throughout Turkey, was an economically, managerially and technically efficient strategy (Mandil, 2004b).

The National Health Information System of Turkey is built on the e-Health network, called "Saglik-Net" (Turkish for Health-Net) that connects the following three components: (1) the National Health Data Dictionary and the Minimum Health Data Sets Server, (2) the Health Coding Reference Server, (3) the digital security mechanisms (Köse et al.,

2008). The Saglik-Net provides integrated, fast, secure information and communication services that collect data produced in health institutions directly from where they were generated. The main purpose of the platform is to increase the efficiency in health services by generating appropriate information for all stakeholders from the corresponding data. The other projects of the Ministry of Health such as the Family Medicine Information System, the Centralized Hospital Appointment System and the Core Resources Management System are all considered as the various applications of the Saglik-Net (Dogac et al., 2010).

Family medicine is the medical practice to which individuals and their dependents can access and that is the point of first medical contact with the health care system. Family doctors are family medicine specialists practicing family medicine and other physicians undergoing the training required in the transitional period for family medicine (The Ministry of Health of Turkey, 2006). The doctor-patient collaboration that is derived from the nature of family medicine implementation provides health care registrations are recorded with respect to a particular discipline (Yurt, 2012). The current recorded information is also observed by The Ministry of Health's relevant departments and the investment has to be made on the region where the family physician is located. Thus, the service and the information will be reached to the top level (The Ministry of Health of Turkey, 2007a).

The National Health Data Dictionary is considered as a reference for the ICT systems of Turkish institutions and it aims to constitute a common terminology that provides all the agencies of health sector deriving the analogous meaning from the concerning term (The Ministry of Health of Turkey, 2007b). It was completed and published in 2005 within the scope of the National Health Information System, and currently, the latest 2.0 version of the Dictionary involves 294 data elements. Therefore, each institution will be able to obtain the data from the minimum data sets by choosing from the data defined when they are requested (The Ministry of Health of Turkey, 2007a).

Telemedicine is defined as 'healing at a distance' that signifies the use of ICT to improve patient outcomes by enabling and increasing access to care and medical information. The purpose of the telemedicine is to provide clinical support, and improve health outcomes, while, it is intended to overcome geographical barriers by connecting the users who are not in the same location (WHO, 2010). The electronic medical data such as high-resolution images, sounds, video, and patient records are transferred by using telemedicine from one location to another, and the transfer of these data may utilize a variety of telecommunications technologies including ordinary telephone lines, ATM, the Internet, and mobile communication devices (Kuntalp & Akar, 2004). Telemedicine applications in Turkey, involving tele-radiological, tele-pathology, and tele-EKG services, have been generalized to 61 hospitals across the country since 2007; while they perform to save up transportation and accommodation costs of patients (Yurt, 2012).

Electronic identification management strategies facilitate the generalization of stronger electronic authentication and they enable higher value services that require a high level of security assurance to be offered (OECD, 2011). Electronic Identity Verification Project was developed for achieving to compensate the citizens' identity verification requirement while getting electronic public services through Turkey's e-Government gateway, and in this way ensuring the right citizen is performing the corresponding operations (The Scientific and Technological Research Council of Turkey, 2008). For these purposes, a joint identification verification system consisting of password, e-Signature and mobile signature has been established (TURKSAT, 2009b). One of the very successful extensions of the e-Identity verification management is the national e-Identity card project, which was primarily experienced as a pilot application in Bolu province. The project predicts secure access of health data, delivering the health services to the right citizens by courtesy of e-Identity cards with national operating system, and thus avoiding exploitation and operation costs. The system verifies the identification of physician and patient, and edits an e-Prescription using physician's e-Signature. So, the patient is able to purchase his/her drugs immediately after a biometrical identity verification of pharmacist and patient (Yurt, 2012).

The Medula System is established to record electronic payments in the health system and the data are evaluated by Social Security Institution of Turkey. Public health institutions have started to use the system by September, 2007, when the Health Implementing Notification came into effect (Republic of Turkey Social Security Institution, 2010). Currently; pharmacies, medical, diagnostic and treatment centers, and all other foundations using automation systems are integrated to the Medula System with a collaboration of Universal Health Insurance (GSS), MERNIS and the database of Ministry of Health (Özata, 2009). According to the Medula System in Turkey, there are approximately 30-40 million insured people, excluding green card holders (Yasar, 2011).

Hospital Appointment Center is a project of the Ministry of Health developed within the scope of e-Transformation in Turkey and the center intends to increase the effectiveness and efficiency of hospitals and so easier access to health care services. Turkish governors encouraged the widespread application throughout the country since 2011, the citizens are able to make an appointment from the hospitals and oral and dental health centers under the Ministry of Health, via call center (Hello 182) or the Internet (The Ministry of Health, 2013). Moreover, electronic prescription software is a well-designed example of modern e-Government applications in medicine, when experts in computer science, data security and medical professionals, and pharmacists are needed to build up the application (Niinimäki & Forsström, 1997). Transitioning from paper-prescribing practices to electronic transfer of prescription might change who holds the responsibility of protecting patients' privacy, therefore patients might no longer solely control their data's privacy while their prescription moves through the concerning system (Ball et al., 2003). In Turkey, prescriptions written by family physicians and by hospital doctors are recorded electronically in the database of the Ministry of Health since 2005 and 2009, respectively. The physicians or doctors adopt the electronic prescriptions through e-Signature, and the citizens are able to purchase their drugs using the electronic tracking number, generated by the system (The Ministry of Health of Turkey, 2012).

Methodology and Data Set

The aim of this study is to investigate the e-Government adoption levels of citizens in Erzurum, Turkey. The study concentrates on the e-Government adoption among health care workers in Atatürk University Research Hospital. The data set being employed in this paper consists of cross-sectional data obtained using a questionnaire. The aggregate number of health workers in Atatürk University Research Hospital during the period of the survey was 1467, and the survey utilized the following formula to

establish the sample size required for the investigation (Oktay, et al., 2009):

$$n = \frac{NPQZ^2}{(N-1)d^2 + PQZ^2}$$

In this formula above, *n* denotes sample size, *N* denotes the number of health care workers in Atatürk University Research Hospital, *P* denotes the probability of e-Government adoption for health care workers, *Q* is equal to 1-*P*, Z denotes the test statistic at (1-α) significance level, α denotes significance level, and d denotes the distance of tolerance. The survey specifies *P* = 0.90 and *Q* = 0.10 in order to provide the opportunity of a large sample size, and considers α = 0.05 and *d* = 0.05. As Z, the test statistic value, is approximately equal to 1.96 for the corresponding significance level, the survey requires 126 respondents, calculated below:

$$n = \frac{1467(0.9)(0.1)(1.96)^2}{(1467-1)(0.05)^2 + (0.9)(0.1)(1.96)^2} \cong 126$$

A questionnaire was prepared and applied to 200 representative health care workers using stratified sampling method. The questionnaire involves three sections. First section aims to evaluate demographic characteristics and e-Government perceptions of the respondents. Second section investigates the purpose of e-Government use of them, and third section comprises of Likert scale questions about the objectives and implementation of e-Government projects. The reliability of the corresponding questionnaire was found as 0.865, this means an obviously high reliability for social sciences. Regression models analyze the relationship between a dependent variable and an independent variable while controlling for the effects of other variables (Long & Freese, 1997). The analysis of variance (ANOVA) is considered as a partitioning of the total variance in a set of data into a number of component parts, so that the relative contributions of identifiable sources of variation to the total variation in measured responses can be measured (Landau & Everitt, 2004). In that context, the results were analyzed using regression analysis and ANOVA to indicate the relationship between several factors and e-Government adoption of health care workers, and to determine the explanation power of those factors against dependent variable.

Empirical Results

Table 1 summarizes the descriptive statistics for several demographic characteristics involved in the analysis of health care workers' e-adoption. As the table indicates, 30% of the respondents were nurses, 22.5% of them were physicians; 54.5% of the respondents were men, 45.5% of them were women; 66.5% of them were single; 32% and 31% of the respondents belonged to 21-24 and 25-28 age group, respectively; 48.0% of them were graduated from vocational college; while 31% had lower income. 77% of the respondents had at least one computer; the computer use level of 47% of them was intermediate; 73% of them had internet connection; 39% of them were using the Internet for 1-2 hour(s) in a day.

The authors investigated the relationship between several demographic factors and e-Government adoption of health care workers using regression analysis and ANOVA and the statistically significant relationships were represented. As Table 2 indicates, the change in the e-Government adoption of the respondents can be explained by the 2% change in the education level variable by observing the R^2 value (0.020), however the model was statistically significant at the 0.05 significance level in Table 3 (F = 4.131; df = 1;

Table 1: Descriptive statistics for the respondents' demographic characteristics

Variables	Frequency	Percent	Variables	Frequency	Percent
AGE GROUP			**"COMPUTER OWNERSHIP"**		
17-20	23	11.5	Yes	154	77.0
21-24	64	32.0	No	46	23.0
25-28	62	31.0	**COMPUTER USE LEVEL**		
29-32	19	9.5	No use/Elementary	19	9.5
33 and older	32	16.0	Intermediate	94	47.0
SEX	45	10.8	Good	66	33.0
Male	109	54.5	Advanced	21	10.5
Female	91	45.5	**INTERNET CONNECTION**		
MARITAL STATUS			Yes	146	73.0
Single	133	66.5	No	54	27.0
Married	67	33.5	**INTERNET USE**		
EDUCATIONAL LEVEL			No use/1-2 hour(s) or less in a month	24	12.0
High School	62	31.0	3-4 hours in a week	36	18.0
Vocational College	96	48.0	1-2 hour(s) in a day	78	39.0
Undergraduate or higher	42	21.0	3-4 hours in a day	32	16.0
OCCUPATION			5-6 hours in a day	10	5.0
Physician	45	22.5	More than 6 hours in a day	20	10.0
Nurse	60	30.0	**MONTHLY INCOME**		
Officer	29	14.5	750 TL or lower	62	31.0
Secretary	23	11.5	751-1250 TL	50	25.0
Technician	22	11.0	1251-1750 TL	44	22.0
Janiator	21	10.5	1751-2250 TL	18	9.0
E-GOVERNMENT GATEWAY AWARENESS			2251 TL or higher	26	13.0
Yes	67	33.5			
No	133	66.5			

Source: Authors

p = 0.043 < α = 0.05). Furthermore, as shown in Table 4, one unit change in education level will increase 0.087 unit of the e-Government adoption of the respondents (B = 0.087).

Similarly, as shown in Table 3, the change in the e-Government adoption of the respondents can be explained by the approximately 3% change in the occupation variable (R2 =0.028). The model was statistically significant at the 0.05 significance level (F = 5.790; p = 0.017 < α = 0.05), and one unit change in occupation will decrease 0.045 unit of the e-Government adoption of the respondents, because the value of the independent variable was negative.

Table 4 indicates that the change in the e-Government adoption of the respondents can be explained by the 4.3% change in the income level variable (R2 =0.043). The model was statistically significant at the 0.05 significance level (F = 8.919; p = 0.003 < α = 0.05), and one unit change in income level will increase 0.067 unit of the e-Government adoption of the respondents.

Table 2: Regression model summary, ANOVA results, and parameter estimators explaining the relationship between education level and e-Government adoption

Regression Summary					
Model	**R**	**R^2**	**Adjusted R^2**	**Std. Error**	
1	0.143	0.020	0.015	0.43356	
ANOVA Results					
Model	**Sum of Squares**	**d.f.**	**Mean Square**	**F**	**Sig.**
1 Regression	0.777	1	0.777	4 131	0.043
Residual	37 218	198	0.188		
Total	37 995	199			
Parameter Estimators					
	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1 (Constant)	1 405	0.170		8 253	0.000
Education Level	0.087	0.043	0.143	2 033	0.043

Source: Authors

Table 3: Regression model summary, ANOVA results, and parameter estimators explaining the relationship between occupation and e-Government adoption

Regression Summary					
Model	**R**	**R^2**	**Adjusted R^2**	**Std. Error**	
1	0.169	0.028	0.024	0.43719	
ANOVA Results					
Model	**Sum of Squares**	**d.f.**	**Mean Square**	**F**	**Sig.**
1 Regression	1 080	1	1 080	5 790	0.017
Residual	36 915	198	0.186		
Total	37 995	199			
Parameter Estimators					
	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1 (Constant)	1 875	0.062			
Occupation	-0.045	0.019	-0.169	30 230	0.000

Source: Authors

Table 4: Regression model summary, ANOVA results, and parameter estimators explaining the relationship between income level and e-Government adoption

Regression Summary					
Model	**R**	**R^2**	**Adjusted R^2**	**Std. Error**	
1	0.208	0.043	0.038	0.42851	
ANOVA Results					
Model	**Sum of Squares**	**d.f.**	**Mean Square**	**F**	**Sig.**
1 Regression	1 638	1	1 638	8 919	0.003
Residual	36 357	198	0.184		
Total	37 995	199			
Parameter Estimators					
	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1 (Constant)	1 579	0.063		24 954	0.000
Income Level	0.067	0.022	0.208	2 986	0.003

Source: Authors

Table 5: Regression model summary, ANOVA results, and parameter estimators explaining the relationship between internet connection and e-Government adoption

Regression Summary					
Model	**R**	**R^2**	**Adjusted R^2**	**Std. Error**	
1	0.161	0.026	0.021	0.43234	
ANOVA Results					
Model	**Sum of Squares**	**d.f.**	**Mean Square**	**F**	**Sig.**
1 Regression	0.985	1	0.985	5 267	0.023
Residual	37 010	198	0.187		
Total	37 995	199			
Parameter Estimators					
	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1 (Constant)	1 946	0.093		24 954	0.000
Internet Connection	-0.158	0.069	-0.161	-2 295	0.023

Source: Authors

Table 6: Regression model summary, ANOVA results, and parameter estimators explaining the relationship between computer use level and e-Government adoption

Regression Summary					
Model	**R**	**R^2**	**Adjusted R^2**	**Std. Error**	
1	0.118	0.014	0.009	0.43497	
ANOVA Results					
Model	**Sum of Squares**	**d.f.**	**Mean Square**	**F**	**Sig.**
1 Regression	0.533	1	0.533	2 817	0.095
Residual	37 462	198	0.189		
Total	37 995	199			
Parameter Estimators					
	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1 (Constant)	1 966	0.135		14 534	0.000
Computer Use Level	-0.064	0.038	-0.118	-1 678	0.095

Source: Authors

Table 5 indicates that the change in the e-Government adoption of the respondents can be explained by the 2.6% change in the internet connection variable (R2 =0.026). The model was statistically significant at the 0.05 significance level ($F = 5.267$; $p = 0.023 < \alpha = 0.05$), and one unit change in income level will decrease 0.158 unit of the e-Government adoption of the respondents.

Finally, as Table 6 indicates, the change in the e-Government adoption of the respondents can be explained by the 1.4% change in the computer use level (R2 = 0.014), the model was statistically significant at the 0.10 significance level ($F = 2.817$; $p = 0.095 < \alpha = 0.10$). As shown in Table 6, one unit change in education will decrease 0.064 unit of the e-Government adoption of the respondents.

In this section, the respondents' opinions about the meaning, the advantages, the disadvantages, and the barriers to access to e-Government services were investigated. Table 7 represents the responses of health care workers to the question, "what is e-Government?". As the table definitely shows, 75.5% of health care workers in the corresponding hospital were aware of the initial meaning of e-Government. However, surprisingly, 66.5% of them were not aware of the Turkey's e-Government gateway, which should be emphasized and discussed.

The corresponding questionnaire investigated the agreement/disagreement levels about the development and encouragement the use of e-Government services. According to Table 8, 83% of the respondents agreed or strongly agreed that e-Government services ensure the operation security; 58.5% of them agreed or strongly agreed that mobile service option of e-Government services will develop or encourage the use of those services. Similarly, 88.2% agreed or strongly agreed the services provide a detailed presentation; while 78% and 88.2% of them agreed or strongly agreed that several feedback options such as e-mail and questionnaire will help the e-Government services flourish, respectively. 85.7% of the respondents agreed or strongly agreed that decreasing the cost of the Internet use will also develop and encourage the use of e-Government services; whereas

Table 7: The responses to the question, "what is e-Government?"

Responses	Frequency	Percent
It is the use of computer in public offices	3	1.5
It is the use of personal ID number for any public services	10	5.0
It is the information communication among public organizations	15	7.5
It is the use of the Internet in public services	151	75.5
It is the transmission of public information into the computer	5	2.5
It is the communication system of the government	6	3.0
I have no idea	10	5.0
TOTAL	**200**	**100.00**

Source: Authors

92.7% agreed or strongly agreed on the importance of the simplification for those services. 61.8%, 66.9%, and 78.6% of the respondents expected the priority to the Internet users, one point access to the entire services, and discount on online payments when establishing e-Government services.

Table 9 indicates the respondents' opinions about the advantages of e-Government services. As shown in the table, 91.3%, 82.8, and 92.9 % kept their faiths that e-Government services decrease bribery and slacking of job; the services provide money and time saving, respectively. 96.9% of the respondents evaluated the 7 days/24 hours continuous e-Government services as a very important advantage against traditional public services. In this sense, 81.8% of the respondents also supported that e-Government services decrease bureaucracy. Finally, 67.8% of the respondents agreed or strongly agreed that e-Government services provide a transparent and efficient public administration; 62.8% and 90.9% of them agreed or strongly agreed that those services contribute to economic growth and the services provide establishing more operations by less labor force.

On the other hand, Table 10 addresses the respondents' opinions about the disadvantages of e-Government services. According to the table, 76.3% and 60.7% of the respondents complained about difficulties to access to the e-Government gateway; 66.5% and 57% of them pointed out the lack of comprehensibility and uncontrollability of operation success. 40% of them agreed or disagreed that e-Government services increase unemployment.

Table 11 presents the respondents' opinions about the barriers amongst e-Government services. According to the table, 81.1% and 70.8% of the respondents concerned about the personal information privacy and lack of sufficient infrastructure, respectively. 60.9% and 75.5% of the respondents mentioned educational issues, while 47.4% and 47.1% pointed out barriers about political support and bureaucracy, respectively. 59.4% and 52.9% of the respondents considered low income level and unreadiness of social psychology; while 62.2% and 53.9% emphasized large differences among regions and preference of face-to-face communication, respectively as the barriers amongst e-Government services.

Table 8: Respondents' opinions on development and encouragement the use of e-Government services

Which of these statements, do you think, will develop and encourage the use of e-Government services	Agreement/Disagreement Level									
	I strongly disagree		I disagree		Neutral		I agree		I strongly agree	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Ensuring the operation security	7	3.6	8	4.1	12	6.2	54	27.0	112	56.0
Mobile service option	8	4.0	16	8.0	48	24.0	81	40.5	36	18.0
Providing a detailed presentation	5	2.6	4	2.1	14	7.2	101	51.8	71	36.4
Feedback of opinion via e-mail	4	2.1	11	5.8	27	14.1	105	55.0	44	23.0
Questionnaire feedback about the services	7	3.5	15	8.0	49	26.1	83	44.1	34	18.1
Decreasing the cost of the Internet use	8	4.1	8	4.1	12	6.1	61	31.1	107	54.6
Simplification of operations	2	1.0	1	0.5	11	7.3	64	33.3	114	59.4
Priority to the Internet users	11	5.8	30	15.7	32	16.8	71	37.2	47	24.6
One stop point access to the entire services	7	3.6	14	7.3	43	22.3	71	36.8	58	30.1
Discount on online payments	14	7.3	10	5.2	17	8.9	58	30.4	92	48.2

Source: Authors

Table 9: Respondents' opinions about the advantages of e-Government services

Opinions about the advantages of e-Government services	Agreement/Disagreement Level									
	I strongly disagree		I disagree		Neutral		I agree		I strongly agree	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Decreases bribery and slacking of job	4	2	6	3.1	7	3.6	58	29.6	121	61.7
Provides money saving	0	0.0	14	7.3	19	9.9	58	30.2	101	52.6
7 days /24 hours continuous service	3	1.5	0	0.0	3	1.5	57	29.2	132	67.7
Provides to save time	3	1.5	1	0.5	10	5.1	51	26.2	130	66.7
Decreases bureaucracy	5	2.6	6	3.1	24	12.4	51	26.4	107	55.4
Provides a transparent and efficient administration	6	3.1	13	6.8	43	22.4	65	33.9	65	33.9
Contributes to economic growth	4	2.1	14	7.3	53	27.7	68	35.6	52	27.2
More operations are established by less labor force	1	0.5	5	2.5	12	6.1	74	37.6	105	53.3

Source: Authors

Table 10: Respondents' opinions about the disadvantages of e-Government services

Opinions about the disadvantages of e-Government services	Agreement/Disagreement Level									
	I strongly disagree		I disagree		Neutral		I agree		I strongly agree	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Difficulties to access to the e-Government gateway	8	4.1	19	9.8	19	9.8	91	46.9	57	29.4
Lack of comprehensibility	7	3.6	26	17.0	32	33.5	81	41.8	48	24.7
Difficult use	9	4.6	25	12.8	43	21.9	72	36.7	47	24.0
Uncontrolability of operation success	4	2.1	32	16.6	47	24.4	64	33.2	46	23.8
Increases unemployment	15	7.9	38	22.0	61	32.1	41	21.6	35	18.4

Source: Authors

Table 11: Respondents' opinions about the barriers amongst e-Government services

Opinions about the barriers amongst e-Government services	Agreement/Disagreement Level									
	I strongly disagree		I disagree		Neutral		I agree		I strongly agree	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Personal information privacy concerns	5	2.6	8	6.6	24	18.9	69	35.2	90	45.9
Only educated individuals can use	6	3.0	45	22.8	26	13.2	78	39.6	42	21.3
Lack of sufficient infrastructure	3	1.5	11	5.6	43	22.1	87	44.6	51	26.2
Lack of education	3	1.5	15	7.7	30	15.3	104	53.1	44	22.4
Lack of political support	8	4.2	27	14.1	66	34.4	65	33.9	26	13.5
Bureaucratic barriers	7	3.7	26	13.6	68	35.6	64	33.5	26	13.6
Low income level	4	2.1	27	14.1	47	24.5	80	41.7	34	17.7
Unreadiness of social psychology	7	3.6	38	19.7	46	23.8	77	39.9	25	13.0
Large differences among regions	6	3.1	28	14.5	39	20.2	81	42.0	39	20.2
Preference of face-to-face communication	11	5.7	30	15.5	48	24.9	65	33.7	39	20.2

Source: Authors

Conclusion

Both developed and emerging countries are increasingly improving online services as a response to technologic advances. In that circumstance, delivering government services to the public electronically requires innovation which entails the adaptation of policy and strategy, and the associated changes in technologies and infrastructures. The governments of developing countries could follow the trend to serve citizens and businesses better to save costs by making internal operations more efficient, cutting down the complex and over stretched bureaucratic system. The use and implementation of e-Government for developed and developing countries doubtlessly differ, whereas for developing countries, the demand flows from top to bottom where the governors expect the use of e-Government services by the citizens. As a developing country, e-Government is adopted as an essential element of Turkey's public administration and Turkish government organizations increasingly utilize the Internet in their operations.

The official e-Government gateway of Turkey enables to access thousands of addresses through a one-stop point since 2008. It aims to provide an infrastructure whereby the citizens can have secure access to the information and services and a joint structure is being established for development, provision, and improvement of e-Government services by identifying the needs of the citizens and government agencies. At present, the e-Government gateway of Turkey provides 638 public services of 80 government organizations to more than 14 million registered users. The National Health Information System of Turkey is built on the e-Health network, called "Saglik-Net" purposes to increase the efficiency in health services by generating appropriate information for all stakeholders from the corresponding data and provides an integrated, fast, and secure information and communication services. The various applications of Saglik-Net are the Family Medicine Information System, the Centralized Hospital Appointment System and the Core Resources Management System.

The adoption and interaction of e-Government among citizens require respectable period of time. This paper employs to investigate the e-Government adoption of health care workers in Atatürk University Research Hospital, Erzurum. The results of the questionnaire being applied indicated that even though, e-Government adoption is overwhelmingly increasing in Turkey, the e-Government and e-Government gateway awareness of the research sample is quiet low, numerically. The survey suggested the statistically significant relationship between educational level, occupation, income level, internet connection and e-Government adoption, separately at the 0.05 significance level. The results also designated a statistically significant relationship between computer use level and e-Government adoption of health care workers at the 0.10 significance level. Regression analysis and ANOVA results also suggested that the effects of demographic factors among e-Government adoption of health care workers were not satisfactory. The citizens were generally hopeful of the successful implementation of e-Government services and support the forthcoming innovations. Although, the efforts of Turkish governors along with international institutions are obviously encouraging, the effective presentation of e-Government gateway nationally, seems to be required. The further application of these e-Government adoption surveys, especially in rural territories, will provide, develop and encourage the effective implementation of e-Government services in Turkey.

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