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A study on e-government services and citizen satisfaction during the COVID-19 pandemic period in Turkey

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ABSTRACT

In recent years, there has been significant interest in e-government applications, which have become an integral part of daily life, particularly regarding ease of use. This study investigates the factors influencing individuals' satisfaction with e-government services in Turkey during the COVID-19 pandemic. The research utilized microdata obtained from the Life Satisfaction Survey conducted by the Turkish Statistical Institute in 2020. Ordered logistic regression analysis was employed to identify the factors affecting individuals' satisfaction with e-government services. The results indicate that sociodemographic and economic variables significantly influence satisfaction levels. Age, education, gender, employment status, and income were determinants of citizens' satisfaction. Women exhibited a higher level of satisfaction with electronic government services compared to men. The importance of public services became more evident during the COVID-19 pandemic, and integrating the e-government concept into all public institutions has enhanced the capacity to respond swiftly to citizens' needs. This study offers valuable insights into the determinants of e-government satisfaction during the pandemic. Given the limited research on this topic, future studies from different perspectives will contribute significantly to the literature.

Contribution/ Originality: This study uniquely analyzes e-government satisfaction during COVID-19 in Turkey using national survey data and ordered logistic regression, offering evidence-based insights for digital public service policies.

1. INTRODUCTION

Technological change and transformation have significantly affected organizations in many aspects (Sai & Boadi, 2017). The rapid advancements in information communication and technology have resulted in the rejuvenation and enhancement of the conventional service model the government provides to its citizens and businesses (Tremblay-Cantin, Mellouli, Cheikh-Ammar, & Khechine, 2023). These advancements are seen as fundamental focal points in how information exchange between citizens and the state will be conducted, how transparency will be ensured, and how the government will demonstrate the delivery of public services while

implementing these services (Aham-Anyanwu & Li, 2017). In this context, e-government applications have held strategic importance in decision-making in public administration in recent years (Von Haldenwang, 2004). Reducing bureaucratic inefficiencies long regarded as a core limitation of traditional public administration marks a critical shift toward more effective and citizen-oriented service provision (Nguyen & Tran, 2022).

In the context of public administration, citizens' total expectations regarding public services reflect the perceived value of public services (Moore, 1997). In this regard, there are certain differences in the delivery of services between private sector entities and public institutions regarding their objectives (Nguyen & Tran, 2022). Although the private sector operates with a profit motive, public institutions or agencies serve based on various factors other than profit (Twizeyimana & Andersson, 2019). Governments, which perform the executive function in the separation of powers, are not intended to cater to the individual needs of citizens; instead, they are an authority that assists special interest groups and thus directly impacts the public (Castelnovo, 2013). As governments progress in line with their strategic directions, they offer value that meets the needs of their citizens by considering various social and political objectives alongside economic indicators (Grimsley & Meehan, 2007). To perceive citizens as customers and to provide good service to customers, the quality of service delivery must also be excellent (Frow & Payne, 2007). Therefore, it is suggested that the traditional understanding of public service should transition towards digital transformation to ensure the efficient and high-quality provision of services by the government to its citizens (Bannister & Connolly, 2014).

In late 2019, the Coronavirus, which emerged in Wuhan, China, profoundly changed everyday life worldwide (Chinnasamy et al., 2022; Prasad, Pasupathy, Chinnasamy, & Kalaiarasi, 2022). In this process, old habits at the social level have been replaced by new habits such as social distancing, contactless shopping, isolated lifestyle, wearing masks and using disinfectants. The Coronavirus's structural changes have resulted in a profound transformation in individuals' lifestyles and have given rise to a new order. States, institutions, societies and human life in general have entered the process of adapting to this innovative order (Dellazzana-Zanon, Leite, Jezus, Silva, & Zanon, 2020; Verma & Prakash, 2020). In this adaptation process, political actions and strategies have naturally been reshaping in public institutions and organizations (Dunlop et al., 2020). In this context, electronic government applications have become an important platform for public services throughout the global pandemic (Mat Dawi et al., 2021). Although this effective platform has become a necessity within the framework of public administration, citizens' satisfaction with electronic government applications is a vital determinant of success (Akyıldız & Can, 2023).

An important aspect to be examined in public services is citizens' active use and participation in e-government services (AlAwadhi, 2019). Therefore, while structuring government services, they should be effectively tailored to address the users' needs (Balaskas, Panagiotarou, & Rigou, 2022). Errors in the design phase of electronic government applications can negatively affect citizens' participation (Dickson, Gordon, & Huber, 2009). Therefore, it is crucial to engage citizens actively in electronic government services and provide opportunities for evaluating the system (Sharma, Borah, & Moses, 2021).

The electronic government service has significantly enhanced public service delivery by maintaining ongoing communication between citizens and governmental institutions, particularly during the COVID-19 pandemic. Given these developments, it is essential to assess the level of satisfaction among individuals in Turkey regarding electronic government services at the national level, especially during COVID-19. This research aims to outline the general characteristics of electronic government users in Turkey, considering the impact of the COVID-19 crisis, and to determine the sociodemographic and economic factors that influence user satisfaction with these services. To achieve this, data from the Life Satisfaction Survey (LSS) conducted by TurkStat (2020) were utilized, and the analysis of satisfaction levels was performed using the ordered logistic regression method. While numerous studies have addressed e-government services in current and historical contexts, this research provides a distinctive perspective on how the pandemic has influenced satisfaction levels. Notably, the analysis based on the LSS data

from individuals in Turkey represents one of the few studies that connect the effects of e-government with sociodemographic factors. Furthermore, in contrast to prevailing trends in existing literature, this study highlights the primary factors driving electronic government satisfaction and thoroughly examines the impact of COVID-19 on these factors. The research significantly contributes to understanding the electronic government's role during the local and global pandemic.

This study aims to address the following research questions: What socio-demographic factors influence individuals' satisfaction with e-government services in Turkey during the COVID-19 pandemic? What economic factors affect satisfaction levels with e-government services in Turkey during the COVID-19 pandemic? How do socio-demographic factors (age, gender, education level, marital status, etc.) and economic factors influence individual satisfaction with electronic government services in Turkey? How has COVID-19 changed the strength and interaction of factors affecting satisfaction with electronic government services?

This study contributes to the literature in several important aspects. First, it comprehensively analyzes the factors affecting satisfaction with e-government services during a global crisis such as COVID-19, filling a significant gap in understanding the effectiveness of electronic government systems during extraordinary periods. Second, this research uses nationally representative data from the Turkish Statistical Institute rather than narrow-scope samples, providing more generalizable and highly representative results on e-government satisfaction. Third, by analyzing the effects of socio-demographic and economic factors on electronic government satisfaction using an ordered logistic regression model, the study offers evidence-based recommendations to policymakers regarding which social groups should be prioritized for improvements. Finally, analyzing electronic government satisfaction during the pandemic period provides important insights into how the digital transformation of public services should be managed in similar crises that may occur in the future. The findings of this study will directly contribute to the development of Türkiye's digital transformation strategy and the improvement of electronic government services.

While existing research provides important findings on electronic government use and user satisfaction, there is a need for more studies on how extraordinary situations, especially global crises such as COVID-19, shape e-government satisfaction. This study aims to expand knowledge in this field by examining the impact of socio-demographic and economic factors on e-government satisfaction during the pandemic. Additionally, this study does not rely on specific user groups or narrower samples. It offers a more comprehensive analysis by using a broad data set at the national level. In this respect, it provides new insights for policymakers and researchers by addressing the effects of a global crisis on e-government satisfaction in a developing country context.

The study is structured under two main headings: literature review and methodology. In the literature review, the relationship between estate services and satisfaction was examined after attempting to explain the conceptual framework of estate applications. In the third part of the literature review, it is discussed how the e-government platform has gained importance during the COVID-19 period. In the methodology section, the factors affecting individuals' satisfaction levels with e-government services were identified using ordered logistic regression analysis.

2. LITERATURE REVIEW

2.1. E – Government Concept

The term "e-government" was first used in the USA's literature on digital government strategies in 1993 (Chung & Kim, 2019). E-government is "using and implementing information technologies in public administration to streamline processes, manage data and information effectively, enhance the delivery of public services, and expand citizen participation and communication channels" (Bakunzibake, Klein, & Islam, 2019). Although e-government systems have many social, political, and economic aspects, they are essentially described from a functional standpoint as those that use information and communication technology to improve services for residents (Yera, Arbelaitz, Jauregui, & Muguerza, 2020).

Lately, there has been significant interest in e-government applications, particularly in user-friendliness, which has become an integral part of our everyday lives (Chatfield & Alhujran, 2009). The e-government system, which uses telecommunications and information technology to offer services to the public in a digital environment, aims to strengthen democracy (Beldad, De Jong, & Steehouder, 2011). To shape government electronic government policies, it is strategically important to provide public services through e-government, protect personal data, and ensure the quality of the relationship between citizens and the state through service provision (Balaskas et al., 2022). Therefore, the public sector strives to foster a supportive environment by implementing innovative ideas and actively applying practical experiences to the public sector to establish a reasonable foundation (Singh & Sahu, 2018). In developing these conditions, the government aims to inform its citizens, provide quality services, respond to citizens' demands, ensure transparency, and digitize public organizations by integrating administrative practices with information and communication technologies (Balaskas et al., 2022).

Electronic government application is a communication and information technology that provides various services to citizens using electronic or online service platforms (Arief, Sensuse, Latif, & Abbas, 2021). E-government systems interface with conventional public management information systems (PMIS) regarding design, objectives, applications, organizational functions, and assessment standards (Scholl, 2006). Among the many advantages of e-government are its increased accessibility, ease of use of public services, and privacy for users and stakeholders (Mensah, Zeng, & Mwakapesa, 2022). The electronic government system is a valuable management instrument for improving public administration efficiency and guaranteeing transparency in the political process, considering the rapidly changing responsibilities of public and private sector actors (Von Haldenwang, 2004).

2.2. E – Government and Satisfaction

Advancements in modern information systems have had a significant effect on public institutions. A new administrative understanding, known as the e-service model, has arisen despite these developments significantly impacting the relationship between citizens, corporations, and the government (Palanisamy, 2004). Public institutions use modern information technology, generally known as e-government platforms, to improve citizens' services. Considering the common interests of both the government and businesses in e-services, ensuring user satisfaction with the provided services (Al-Kaabi, 2023).

Reviewing the literature on electronic government service satisfaction, this subject draws attention. Over the years, numerous studies have emphasized determining users' satisfaction with electronic government services (Kunstelj, Jukic, & Vintar, 2009; Morgeson & Petrescu, 2011; Verdegem & Verleye, 2009). Furthermore, studies employ different methodological approaches to assess citizen satisfaction with e-government services (Weerakkody, Irani, Lee, Hindi, & Osman, 2014).

Despite the considerable attention paid to citizen satisfaction regarding the e-government services offered by the government, there needs to be a common perspective established within the theoretical framework of satisfaction in electronic government services. Due to the need for a clear definition of satisfaction in e-government services, an attempt has been made to establish a conceptual framework where the government is perceived as the service provider and the citizen as the customer (Nguyen, Phan, Le, & Nguyen, 2020). According to information systems theory, satisfaction is a reaction to an information system's output. In this context, user pleasure is one of the criteria that establish an information system's success or efficacy (Gatian, 1994). As a communication and information technology, the core purpose of electronic government applications is to provide citizens with information from the government. The primary reason for attempting to enhance the information services provided in this application is to ensure citizen satisfaction (Horan & Abhichandani, 2006).

Studies investigating how e-government affects citizen satisfaction indicate that satisfaction levels increase when citizens' needs are met (Irani et al., 2012). A study on this topic revealed that citizens' perceptions of e-government services impact their overall satisfaction (Chan, Thong, Brown, & Venkatesh, 2021). Another study

corroborates this finding by indicating a direct influence of e-government service characteristics on citizen satisfaction (Obaid & Ahmad, 2021). The findings suggest that how citizens perceive the services provided by electronic government is crucial in shaping their satisfaction levels.

Numerous investigations have been conducted regarding the factors influencing satisfaction with electronic government services and the impact of these factors on citizen contentment with such services (Alawneh, Al-Refai, & Batiha, 2013; Gotoh, 2009; Nguyen et al., 2020; Rehman, Esichaikul, & Kamal, 2012; Weerakkody et al., 2014). The literature identifies several elements that influence the level of satisfaction among citizens resulting from e-government applications, including trust, privacy, security, accessibility, and awareness (Akyıldız & Can, 2023; Jaeger & Thompson, 2003; Malik, Shuqin, Mastoi, Gul, & Gul, 2016). Among these determinants, trust is crucial in shaping citizen satisfaction (Porúmbescu, 2016). Trust facilitates the relationship between the government and the public (Aladalah, Cheung, & Lee, 2018). However, citizens' trust in the e-government framework presents a complex challenge (Alshehri, Drew, & Alfarraj, 2012). Inadequate confidentiality in e-government services may adversely affect citizens' trust in these services (Cavoukian, Taylor, & Abrams, 2010).

Nevertheless, although the issue of trust in the electronic government system is complex, the concept of trust in the implementation of electronic government has attracted attention in the literature (Abu-Shanab, 2014). Studies show that trust determines citizens' use of e-government applications (AlAbdali, AlBadawi, Sarrab, & AlHamadani, 2021; Balaskas et al., 2022; Sofia Elena Colesca, 2009). In this context, the interaction between satisfaction and trust is reciprocal. Trust may lead to satisfaction or vice versa (Welch, Hinnant, & Moon, 2005). Some findings support this situation by finding that trust impacts citizen satisfaction (Nguyen et al., 2020; Santa, MacDonald, & Ferrer, 2019). Privacy and security are already major concerns in providing critical public services on the e-government platform (Bannister & Connolly, 2014). Therefore, it is an important criterion in determining citizens' satisfaction levels with electronic government services. Again, accessibility and awareness of e-government services are issues that affect citizens' satisfaction (Malik et al., 2016; Mohammad, 2020; Reddick, Abdelsalam, & Elkadi, 2012).

On the other hand, studies suggest that sociodemographic characteristics like age, education, gender, and educational attainment influence satisfaction with e-government services (Al Athmay, 2015; Nguyen et al., 2020). Age as a demographic factor directly affects the preference for and adoption of technological advancements (Morris & Venkatesh, 2000). There are differences between young and middle-aged individuals and older individuals regarding adopting technology-related matters (Venkatesh, Morris, & Ackerman, 2000). A previous study also reported differences among different age groups concerning adopting e-government (Al-Shafi & Weerakkody, 2010). Higher education levels are associated with a much more positive attitude toward embracing technology changes (Burgess, 2018). Therefore, the adoption of technological breakthroughs and educational attainment are positively correlated (Venkatesh et al., 2000). The positive correlation between education and e-government satisfaction is confirmed in the e-government service (Al-Shafi & Weerakkody, 2010; Colesca & Dobrica, 2008; Rana, Dwivedi, Lal, Williams, & Clement, 2017).

2.3. COVID-19 Periods and E – Government

Supply chains, finance, and the socioeconomic sector have all been impacted by the COVID-19 outbreak and the physical distancing measures associated with it (Aji, Berakon, & Husin, 2020). This outbreak led to significant disruptions in the global economy, impacting scientific research and opening new avenues for studies. With governments implementing quarantine measures and posing significant obstacles for physical establishments, people increasingly turned to online platforms to fulfill their purchasing and other needs. In short, electronic services were frequently utilized during this period (Paredes-Corvalan, Pezoa-Fuentes, Silva-Rojas, Rojas, & Castillo-Vergara, 2023). People's lives and perspectives were profoundly changed by the COVID-19 epidemic (Barrutia & Echebarria, 2021).

A key element in the evolving change dynamics is accelerating the momentum in the digitalization process observed within organizations (Agostino, Arnaboldi, & Lema, 2021). During this digitalization process, firms and public institutions took various steps to sustain their existence and gain a competitive advantage (Karamalis & Vasilopoulos, 2020). One of the most important effects that the COVID-19 pandemic has had on the global system is the acceleration of a new technological paradigm (Grinin, Grinin, & Korotayev, 2022). Consequently, public authorities must either update their current electronic government applications or switch to new ones to make information and communication technology more responsive and effective (Hodzic, Ravselj, & Alibegovic, 2021). Thus, it has also become a reality for the healthcare industry and electronic government. In an environment where physical contact is prohibited, integrating recent advancements in communication and information technologies into daily life is crucial for maximizing the efficiency of e-government applications (Balaskas et al., 2022).

In Turkey, an e-government application was first opened for access in 2008 under the name of 'E-Government Gateway' (Mahran, 2023). Population and Citizenship Information Systems, Health Information Systems, Social Security Information Systems, Ministry of Finance Information Systems, Ministry of Justice Information Systems, Land Registry Cadastre Information Systems, and Education Information Systems are public services offered through e-government infrastructure (Tosun, 2024).

With the emergence of the COVID-19 pandemic, Turkey adopted a social and political approach emphasizing the state's role by following a pragmatic strategy in public administration practices (Mahran, 2023). With the e-health application, one of the important pillars of the e-state application, public digital platforms were adopted, and more users were involved during the pandemic (Gündoğdu & Erkek, 2022). In this context, a significant increase in figures has been observed. In 2021, it was determined that there were over 54 million registered users, 5,746 different services, 2,994 mobile services, and 791 services belonging to other institutions (Akyıldız & Can, 2023).

3. MATERIAL AND METHOD

3.1. Data Source

This study utilized micro-level data from the Turkish Statistical Institute's 2020 Life Satisfaction Survey (LSS). The LSS has been conducted regularly since 2003 to measure individuals' perceptions of happiness, societal values, overall contentment in basic aspects of life, and satisfaction with public services. It also monitors changes in satisfaction levels over time. The study sample size is designed to produce estimates at the national level in Turkey. The LSS employs a two-stage stratified cluster sampling method for data collection. Initially, clusters consisting of approximately 100 households are selected, followed by the systematic selection of sample addresses from these clusters. The research was conducted with individuals aged 18 and over (TurkStat, 2020).

The primary justification for utilizing this data is its capacity to offer a broad viewpoint at the national level. Additionally, it is a research instrument that illuminates national needs and permits worldwide comparisons.

The LSS was conducted between November 1 and 30, 2020. The results were shared with the public in February 2021. In the LSS, only the following questions were asked regarding e-government: "Do you use public services provided in electronic environments?" and "Could you please state your level of satisfaction with the public services provided electronically?"(TurkStat, 2020).

3.2. Measures and Variables

In Turkey, individuals participating in the LSS were asked, "Could you please state your level of satisfaction with the public services provided electronically?" The level of satisfaction with e-government services, measured by this question, was used to create the dependent variable. The study's dependent variable is the level of satisfaction with electronic government services, which consists of three categories: 1. Satisfied/Very satisfied, 2. Moderately satisfied, 3. Not satisfied/Not satisfied at all.

The independent variables included in this study were determined from the variables in the LSS in Turkey. The variables concerning the socio-demographic and economic characteristics of individuals are as follows:

- Age (18 to 24, 25 to 34, 35 to 44, 45 to 54, 55 and over).
- Sex (Female, male).
- Marital status (Married, single).
- Education level (Not completed elementary school/elementary school, middle school, high school, university).
- Employment status (employed, unemployed).
- Household size (1 to 3 people, 4 to 5 people, six or more people).
- Monthly household income (1st group (min.), 2nd group, 3rd group, 4th group (max.)).

Ordinal and nominal variables were designated as dummy variables to assess the effects of the categories associated with all variables included in the ordered logistic regression.

The study's model is displayed in Figure 1.

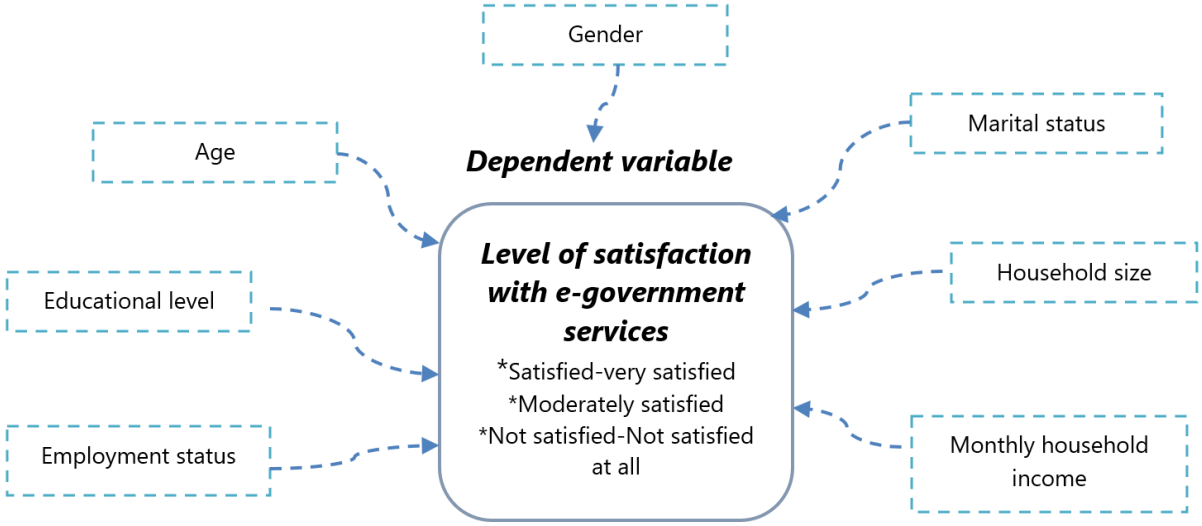

Figure 1. Study model.

3.3. Statistical Analysis

Data analysis was conducted using the SPSS 20 and STATA 15 software programs. Initially, the frequencies and percentages reflecting individuals' satisfaction levels with electronic government services were calculated based on their satisfaction ratings. Chi-square tests for independence were utilized to investigate the correlation between individuals' satisfaction levels and several independent variables. Subsequently, ordered logistic regression was conducted to determine the factors influencing individuals' satisfaction levels with electronic government services.

In this research, ordinal logistic regression was chosen. This choice was made because the response variable is structured on an ordinal. The study outlines independent variables that are believed to be associated with this dependent variable.

Regression methods investigate the association between a response variable and one or more independent variables for various purposes. The dependent variable is measured quantitatively using commonly employed simple and multiple linear regression methods. However, the categorical data type of the dependent variable is also frequently encountered in studies. Nonparametric statistics are used for categorical data (Akgül & Çevik, 2003). The models that feature a dependent variable with two states are expressed as binary preference models.

In comparison, models that feature a response variable with more than two states are referred to as multiple preference models. The primary objective of these models is to ascertain the probability of preference. These models include linear probability, logistic, and probit models (Tarı, 2018). The logistic regression method is useful in

predicting a qualitative variable from determinant variables (Özer, 2004). It is more suitable when the dependent variable is a qualitative data type with two or more alternatives, and it is comparable to linear regression (Leech, Barrett, & Morgan, 2014).

Different logistic regression methods exist depending on the number of categories of the qualitative dependent variable and whether they are ordered or unordered. If the dependent variable has two categories, two-category logistic regression is used. If there are more than two categories of unordered qualitative variables, multinomial logistic regression is applied. For more than two categories of ordered qualitative variables, ordered logistic regression is appropriate (Alpar, 2017). The ordered logistic regression model, proposed by McCullagh (1980) under the 'proportional odds model', is an important extension of the two-state logistic model when the response variable takes qualitative values measured on an ordered scale (Brant, 1990). Ordered regression,

$$Pr(Y \leq y_j|x = \left[\frac{\exp(a_j - x'\beta)}{1+\exp(a_j - x'\beta)}\right] j = 1,2,\dots,J-1 \quad (1)$$

is written as Equation 1. When Equation 1 is written as Equation 2 and Equation 3 by taking the natural logarithm of the model odds ratios,

$$logit\,(\pi_j) = \log\left(\frac{\pi_j}{1-\pi_j}\right) \quad (2)$$

$$log = \left[\frac{Pr\,(Y \leq y_j|x)}{Pr\,(Y > y_j|x)}\right] = a_j - x'\beta \quad (3)$$

In these equations, Y_j is the ordered categorical response variable, x' is a vector of explanatory variables, a_j's are the cut points corresponding to j-1 estimators $a_1 \leq a_2 \leq \cdots \leq a_{j-1}$ β's are $\beta = (\beta_1, \dots, \beta_k)'$ is a vector of regression coefficients corresponding to x'. These coefficients are independent of the categories of the dependent variable, i.e., in all aggregated logits, the β's of the kth independent variable are known to be equal to each other. The equality of β's at each cut-off point, i.e., the parameter estimates do not vary according to the cut-off points, is known as the parallel lines assumption in ordered logistic regression and tests the appropriateness of all categories with the same parameters (Ananth & Kleinbaum, 1997).

4. RESULTS

4.1. Chi-Square Analyses and Descriptive Statistics

Table 1 presents findings regarding sociodemographic and economic characteristics that may influence individuals' satisfaction with electronic government services in Turkey. The Chi-square test results indicated a significant association between most sociodemographic and economic factors examined in the study (excluding marital status, educational attainment, and monthly household income) and satisfaction with electronic government services.

Table 1. Findings on factors influencing satisfaction with e-government services.

Variables		Level of satisfaction with e-government services			n (%)	$\chi 2$	P
		Satisfied/Very satisfied	Moderately satisfied	Not satisfied/Not satisfied at all			
Age	18-24	1071(17.6)	81(16.1)	15(13.0)	1167(17.4)	29.966	0.000[a]
	25-34	1565(25.7)	103(20.5)	25(21.7)	1693(25.3)		
	35-44	1546(25.4)	134(26.7)	30(26.1)	1710(25.5)		
	45-54	1141(18.7)	84(16.7)	25(21.7)	1250(18.6)		
	55 and older	764(12.6)	100(19.9)	20(17.4)	884(13.2)		
Sex	Female	2676(44.0)	199(39.6)	56(48.7)	2931(43.7)	4.696	0.096[c]
	Male	3411(56.0)	303(60.4)	59(51.3)	3773(56.3)		
Marital status	Single	2021(33.2)	176(35.1)	34(29.6)	2231(33.3)	1.448	0.485
	Married	4066(66.8)	326(64.9)	81(70.4)	4473(66.7)		

Variables		Level of satisfaction with e-government services			n (%)	χ2	P
		Satisfied/Very satisfied	Moderately satisfied	Not satisfied/Not satisfied at all			
Educational level	Not completed /Elementary	1507(24.8)	150(29.9)	29(25.2)	1686(25.1)	9.016	0.173
	Middle	1050(17.2)	79(15.7)	23(20.0)	1152(17.2)		
	High school	1795(29.5)	127(25.3)	32(27.8)	1954(29.1)		
	University	1735(28.5)	146(29.1)	31(27.0)	1912(28.5)		
Employment status	Not working	2776(45.4)	251(50.0)	62(53.9)	3079(45.9)	6.885	0.032[b]
	Working	3321(54.6)	251(50.0)	53(46.1)	3625(54.1)		
Household size	1-3 people	2679(44.0)	239(47.6)	54(47.0)	2972(44.3)	11.029	0.026[b]
	4-5 people	2757(45.3)	195(38.8)	45(39.1)	2997(44.7)		
	6 or more people	651(10.7)	68(13.5)	16(13.9)	735(11.0)		
Monthly household income	1st group (Min.)	2354(38.7)	206(41.0)	59(51.3)	2619(39.1)	10.515	0.105
	2nd group	1150(18.9)	85(16.9)	14(12.2)	1249(18.6)		
	3rd group	1399(23.0)	120(23.9)	21(18.3)	1540(23.0)		
	4th group (Max.)	1184(19.5)	91(18.1)	21(18.3)	1296(19.3)		

Note: [a]p<0.01; [b]p<0.05; [c]p<0.10.

As shown in Table 1, 43.7% of the participants in the LSS in Turkey were female, while 56.3% were male. Regarding the age group, 25.5% of individuals fall into the 35-44 age group. While 66.7% of individuals were married, 33.3% were single. Furthermore, 17.2% of individuals were elementary school graduates, whereas 28.5% were university graduates. It was observed that 54.1% of individuals were employed. Regarding household size, 44.7% of individuals had 4-5 people.

4.2. Estimation of Models

The study used an ordered logistic regression model to identify the variables affecting people's satisfaction with electronic government services. Table 2 displays the estimated model findings.

Table 2. Estimated model results regarding socio-demographic and economic factors affecting individuals' satisfaction with e-government services.

Variables	β	Std. Error	z	95% CI		VIF
				Lower	Upper	
Age (Reference: 55 and older)						
18-24	-0.729[a]	0.203	-3.59	-1.127	-0.332	2.95
25-34	-0.654[a]	0.165	-3.96	-0.978	-0.330	2.73
35-44	-0.309[b]	0.156	-1.98	-0.616	-0.003	2.69
45-54	-0.481[a]	0.158	-3.05	-0.790	-0.172	2.17
Sex (Reference: Female)						
Male	-0.179[c]	0.100	1.79	-0.017	0.375	1.24
Marital status (Reference: Single)						
Married	-0.203[c]	0.115	-1.77	-0.428	-0.022	1.52
Educational level (Reference: University)						
Not graduated/Elementary	-0.153	0.143	-1.07	-0.432	0.127	1.96
Middle	-0.185	0.149	-1.25	0.477	0.106	1.54
High school	-0.313[b]	0.127	-2.46	-0.563	-0.064	1.66
Employment status (Reference: Not working)						
Working	-0.223[b]	0.105	-2.11	-0.430	-0.016	1.40
Household size (Reference: 6 or more)						
1-3 people	-0.241	0.154	-1.56	-0.544	0.061	3.10
4-5 people	-0.355[b]	0.148	-2.41	-0.645	-0.066	2.88
Monthly household income (Reference: 1st group (Min.))						
2nd group	-0.254[c]	0.134	-1.89	-0.517	0.010	1.23
3rd group	-0.062	0.126	-0.49	-0.309	0.185	1.34
4th group (Max.)	-0.234[c]	0.139	-1.68	-0.507	0.039	1.52

Note: [a]p<0.01; [b]p<0.05; [c]p<0.10.

It can be seen in Table 2 that the variables of age (18 to 24, 25 to 34, 35 to 44, 45 to 54), gender (male), marital status (married), educational level (high school), employment status (working), household size (4-5 people), and monthly household income (second and fourth income levels) were found to be statistically significant.

The model was also evaluated for collinearity among the independent variables. A variance inflation factor (VIF) of 5 or higher indicates moderate collinearity, while a VIF exceeding 10 signifies high collinearity (Ünver, Aydemir, & Alkan, 2023). No variable is responsible for collinearity among the variables, based on the VIF results shown in Table 2. Table 3 displays the predicted ordered logistic regression model's marginal effects.

Table 3. Marginal effects of socio-demographic and economic factors affecting individuals' satisfaction with e-government services.

Variables	Satisfied-very satisfied		Moderately satisfied		Not satisfied-not satisfied at all	
	M.Ef. (%)	S. Err.	M.Ef. (%)	S. Err.	M.Ef. (%)	S. err.
Age (Reference: 55 and older)						
18-24	7.48[a]	0.022	-64.13[a]	0.178	-71.61[a]	0.199
25-34	6.92[a]	0.019	-57.26[a]	0.143	-64.18[a]	0.162
35-44	3.77[c]	0.020	-26.46[c]	0.133	-30.23[c]	0.153
45-54	5.46[a]	0.019	-41.67[a]	0.136	-47.12[a]	0.154
Sex (Reference: Female)						
Male	-1.66[c]	0.009	15.94[c]	0.089	17.60[c]	0.099
Marital status (Reference: Single)						
Married	1.96[c]	0.011	-17.98[c]	0.101	-19.93[c]	0.113
Educational level (Reference: University)						
Not graduated/Elementary	1.54	0.014	-13.45	0.126	-14.99	0.140
Middle	1.85	0.015	-16.37	0.132	-18.22	0.146
High school	2.95[b]	0.012	-27.84[b]	0.113	-30.79[b]	0.125
Employment status (Reference: Not working)						
Working	2.10[b]	0.010	-19.82[b]	0.094	-21.93[b]	0.104
Household size (Reference: 6 and more)						
1-3 people	2.54	0.017	-21.15	0.134	-23.69	0.151
4-5 people	3.56[b]	0.016	-31.35[b]	0.129	-34.91[b]	0.145
Monthly household income (Reference: 1st group (Min.))						
2nd group	2.34[c]	0.012	-22.62[c]	0.120	-24.96[c]	0.132
3rd group	0.62	0.013	-5.46	0.111	-6.09	0.124
4th group (Max.)	2.17[c]	0.013	-20.80[c]	0.124	-22.97[c]	0.137

Note: [a]p<0.01; [b]p<0.05; [c]p<0.10.

As seen in Table 3, the probability of an individual aged 18 to 24 being satisfied or very satisfied with electronic government services is 7.48% higher than that of individuals in the 55 and above age group. In comparison, the probability of an individual aged 35-44 being satisfied or very satisfied with electronic government services is 3.77% higher.

While the probability of males being satisfied or very satisfied with electronic government services is 1.66% lower than that of females, the probability of being moderately satisfied is 15.94% higher. The probability of a married individual being satisfied or very satisfied with electronic government services is 1.96% higher than that of a single individual. In comparison, the probability of being moderately satisfied is 17.98% lower.

The probability of a high school graduate being satisfied or very satisfied with electronic government services is 2.95% higher than that of a university graduate. The probability of an employed individual being satisfied or very satisfied with electronic government services is 2.10% higher than that of an unemployed individual. The probabilities for individuals with a monthly household income at the 2nd and 4th income levels being satisfied or very satisfied are 2.34% and 2.17% higher, respectively, compared to those at the 1st income level. When considering household size, the probability of individuals with 4-5 members being satisfied or very satisfied with electronic government services is 3.56% higher than for those with six or more members.

5. DISCUSSION

The ability of government policies to improve citizens' interactions with the public is known as electronic government (Twizeyimana & Andersson, 2019). Governments have viewed electronic government as a key transformative tool for enhancing the efficiency and effectiveness of public services. It is also seen as a means to modernize bureaucratic processes, deliver better services to citizens and businesses, and strengthen democratic engagement (Rowley, 2011). Furthermore, it is observed that societal expectations and needs have changed significantly today, thus necessitating changes in governmental structures. Therefore, understanding the factors influencing satisfaction with electronic government services may be crucial for implementing changes or rules related to the new concept of electronic government.

Using TurkStat data, this study identified the economic and sociodemographic parameters that significantly impacted respondents' satisfaction with electronic government services during COVID-19. These factors were determined using ordered logistic regression analysis.

This study aims to determine the satisfaction levels of individuals benefiting from public services provided in a digital environment in Turkey, which is classified as a developing country. Many organizations worldwide have been compelled to adapt their traditional and electronic systems due to the rapid development of the internet and information technology applications. Electronic services are described as a transformation aimed at reducing bureaucracy, lowering costs, and improving the performance of public institutions and organizations within the current context (Al-Hawary & Al-Menhaly, 2016). Numerous studies in the literature relate to electronic government. However, studies focusing on determining satisfaction with electronic government services remain a significant area of interest. Various methodological approaches have been used in many studies on this issue (Ahmad, Waqas, & Zhang, 2021; Al-Hawary & Al-Menhaly, 2016; Al-Kaabi, 2023; Al-Kaseasbeh, Harada, & Saraih, 2019; Al-Yafi, Osman, Hindi, & Assoc Informat, 2014; Alnaser, Theep, & Alhanatleh, 2022). Similarly, this study aims to determine the primary factors influencing Turkish citizens' satisfaction with computerized government services. This study used the LSS micro dataset. The primary reason for utilizing this data is its capacity to provide a broad perspective at the national level. Additionally, it is a research instrument that highlights national needs and allows for international comparisons.

According to the current study, household size, monthly household income, education level, work status, age, gender, and marital status all impact how satisfied people are with electronic government services. There are studies on this topic in the literature that present diverse results (Nguyen et al., 2020; Orgeron & Goodman, 2011). Considering this, further studies on the impact of demographic factors on satisfaction with electronic government services would enhance the existing literature.

5.1. Theoretical Implications

- Education and E-government Satisfaction: An analysis of the results indicates that education significantly influences satisfaction with electronic government services. It has been found that individuals with a high school diploma exhibit a higher level of satisfaction with these services compared to the reference group. Other research suggests that university graduates are more inclined to utilize and express satisfaction with e-government services (Al-Shafi & Weerakkody, 2010; Al Athmay, 2015). This situation reveals the necessity for comparative analyses across different countries and contexts.
- Gender and E-government Satisfaction: Research indicates that women are more satisfied with electronic government services than men. Furthermore, it has been noted that in developing nations, women utilize information systems less frequently than their male counterparts in information technology (Avgerou & Walsham, 2017). In other studies, it is observed that men use and adopt e-government systems more than women (Mensah & Mi, 2019; Sabani, 2021). However, it is noteworthy that women are more satisfied than

men in this study. Conducting studies considering regional and cultural differences in Turkey can contribute to the literature.

- Age and E-State Satisfaction: Age is a significant determinant of satisfaction with electronic government services. Young individuals prefer to utilize the internet for e-transactions with devices connected to the internet and are more digital (Bélanger & Carter, 2009). People between the ages of 18 and 24 were identified as the most satisfied with electronic government services when the age range of respondents was considered. This result aligns with relevant literature, which indicates that individuals close to this age group are satisfied with and adopt e-government services (Abu-Shanab, 2014; Lai & Pires, 2009; Pham, Limbu, Le, & Nguyen, 2023; Shuib, Yadegaridehkordi, & Ainin, 2019). However, some research in the literature indicates that e-government satisfaction is not significantly impacted by the age variable (Nguyen et al., 2020).
- The relationship between employment status and satisfaction: An individual working in the study is more likely to be satisfied with electronic government services than an individual not working. As a result, there are studies supporting the relationship between satisfaction with electronic government services and employment status (Allam et al., 2021; Jun, Wang, & Wang, 2014). This finding extends the existing theoretical understanding of the relationship between employment status and technology use.
- Effect of Income and Household Structure: Compared to the reference group, it has been found that people with monthly household incomes in the second- and fourth-income ranges are more likely to be satisfied or extremely satisfied with electronic government services. People with higher incomes are more likely to be happy with the services provided by e-government. The benefit of income level has already been mentioned as the reason why people favor electronic government services (Zhang & Zhu, 2021). A study conducted in this context found a result that was close to this situation. It was observed that people with high household incomes use e-public services more (Taipale, 2013). Considering household size, it was found that individuals with 4-5 people in their household were more likely to be satisfied or very satisfied with electronic government services than those with six or more people. There are also studies with similar findings (Alkan & Ünver, 2020).

5.2. Practical Implications

- Programmes for Education Level: Differences in satisfaction based on education level indicate that digital training programmes should be developed for less educated individuals. Specific e-government usage training programmes, especially for high school graduates, may increase this group's satisfaction with the services.
- Gender-Focused Strategies: Considering the factors that increase women's satisfaction with e-government, special design and support mechanisms that empower women users can be developed. This may enable women users, especially those with limited access to information technologies, to benefit more from services.
- Policies for Older Individuals: It is known that older individuals are not familiar with the Internet and similar technologies. Additionally, the Internet is quite complex, and older adults tend to learn more slowly than younger individuals (Gounopoulos, Kontogiannis, Kazanidis, & Valsamidis, 2019). Digital literacy initiatives should be implemented, and simply navigable electronic government interfaces tailored to the needs of senior citizens can be created to further integrate older people with digital technologies.
- Services for Non-working Individuals: Providing more attractive and accessible e-government services for non-working individuals can increase the participation and satisfaction of this group. It would be useful for the public sector to organize awareness-raising campaigns for this group.
- Income and Household Policies: Access-facilitating measures for lower-income groups can increase satisfaction. Additionally, developing specialized family-friendly e-government services for large households can better respond to the needs of this group.

6. CONCLUSIONS

On a global scale, a state's capacity to achieve or maintain its status among developed nations is contingent upon its ability to offer a competitive edge through actions and policies characterized by strategic consistency. To successfully implement this competitive advantage in their managerial processes, they must have the ability to realize the intellectual transformation required by being an information society. In this context, the need to place innovative developments in information and communication technologies on an institutional basis within the framework of public administration principles is of great importance. In today's conditions, new public service systems inevitably arise due to the ability to offer public services to residents successfully. The e-government phenomenon has thus emerged.

In the changing world dynamics after globalization, digital transformation has also affected state institutions. Electronic government applications offered in public services at an evolutionary stage of the digitalization process have positive effects by reducing bureaucratic burdens. Receiving services easily and being satisfied are primary reasons citizens ensure they are content with public services. It is important to note that improper practices in the design process of electronic government applications can adversely affect citizen participation in the process (Dickson et al., 2009). In addition, delays, excessive costs, and lack of strategy are also seen as the reasons for this failure (Gacitúa, Astudillo, Hitpass, Osorio-Sanabria, & Taramasco, 2021). In the case of Turkey, such problems emerging in the digitalization process should be considered in the e-government area, and policymakers should take various measures and advance the process with great care.

The COVID-19 pandemic has presented significant challenges globally. The importance of public services has emerged during the pandemic crisis environment. Integrating the electronic government phenomenon into all public organizations has also strengthened the ability to respond quickly to the needs of citizens. To make the electronic government application as an integrated system even more widespread, it should be ensured that the state application is reinforced for all citizens by implementing various strategic policies. It is important that this process, which is managed effectively in the context of Turkey, is internalized and carried forward with a broader perspective and policies. The necessary educational activities should be handled more comprehensively to increase citizens' awareness and satisfaction.

The conveniences observed in the digitalization process and the context of electronic government present various concerns. Among these, data security is the most significant issue. The threat of private information theft recorded on virtual platforms causes unease among service users. Addressing this situation from a legal perspective is essential to make the process more transparent and secure. Turkey should clarify the legal basis for e-government applications (Alkan & Ünver, 2020).

7. LIMITATIONS OF THE STUDY AND FUTURE STUDIES

There are various limitations to this study. Firstly, the study's data are secondary. The variables required for statistical analysis consist of the variables in the data set. Secondly, no measurement was made regarding e-government satisfaction. The answers given by individuals regarding e-government satisfaction are their own responses. As a result, the information gathered in this way could be biased. The dependent variable is not fully detailed. In the LSS in Turkey, individuals were asked, 'Would you indicate your level of satisfaction with public services provided electronically?'. This study attempted a general evaluation using the available data through this question.

E-government studies are an increasingly popular topic in the literature. Research addressing different variables related to satisfaction with electronic government services and applications can be conducted in future studies. Especially in terms of different sample groups; for example, various research can be conducted on housewives and educationally disadvantaged groups. Systematic literature reviews and bibliometric analyses of

digitalization in public institutions can be examined. Again, conducting comparative studies regarding e-government that include regional differences will contribute to the literature.

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REFERENCES

Abu-Shanab, E. (2014). Antecedents of trust in e-government services: An empirical test in Jordan. *Transforming Government-People Process and Policy*, *8*(4), 480-499. https://doi.org/10.1108/tg-08-2013-0027

Agostino, D., Arnaboldi, M., & Lema, M. D. (2021). New development: COVID-19 as an accelerator of digital transformation in public service delivery. *Public Money & Management*, *41*(1), 69-72. https://doi.org/10.1080/09540962.2020.1764206

Aham-Anyanwu, N. M., & Li, H. L. (2017). E-State: Realistic or Utopian? *International Journal of Public Administration in the Digital Age*, *4*(2), 56-76.

Ahmad, N., Waqas, M., & Zhang, X. (2021). Public sector employee perspective towards adoption of e-government in Pakistan: A proposed research agenda. *Data and Information Management*, *5*(1), 119-124. https://doi.org/10.2478/dim-2020-0029

Aji, H. M., Berakon, I., & Husin, M. M. (2020). COVID-19 and e-wallet usage intention: A multigroup analysis between Indonesia and Malaysia. *Cogent Business & Management*, *7*(1), 180418. https://doi.org/10.1080/23311975.2020.1804181

Akgül, A., & Çevik, O. (2003). *Statistical analysis techniques: "Business applications in SPSS"*. Ankara: Emek Ofset Ltd.

Akyıldız, F., & Can, İ. (2023). Citizen satisfaction and influential factors of E-government services during the COVID-19 crisis: A Turkish case study. *Journal of Corporate Governance, Insurance, and Risk Management*, *10*(1), 9-20. https://doi.org/10.56578/jcgirm100102

Al-Hawary, S., & Al-Menhaly, S. (2016). The quality of e-government services and its role on achieving beneficiaries satisfaction. *Global Journal of Management and Business Research: A Administration and Management*, *16*(11), 1-11.

Al-Kaabi, R. (2023). The impact of e-government services on customer satisfaction in the private sector: A case study of the Kingdom of Bahrain (SIJILAT), an online commercial registration. *Electronic Journal of Information Systems in Developing Countries*, *89*(6), e12275. https://doi.org/10.1002/isd2.12275

Al-Kaseasbeh, H. M., Harada, Y., & Saraih, U. (2019). E-government services assessment from the perspective of citizens interaction and satisfaction in Jordan: Pilot study. *International Journal of Research & Review*, *6*(12), 50-56.

Al-Shafi, S., & Weerakkody, V. (2010). *Factors affecting e-government adoption in the state of Qatar*. Paper presented at the European and Mediterranean Conference on Information Systems 2010, Abu Dhabi, UAE

Al-Yafi, K., Osman, I. H., Hindi, N. M., & Assoc Informat, S. (2014). *Exploring user satisfaction of the public e-services in the State of Qatar: Case of traffic violations e-service provided by the ministry of interior*. Paper presented at the 20th Americas Conference on Information Systems, Savannah, GA.

Al Athmay, A. (2015). Demographic factors as determinants of e-governance adoption: A field study in the United Arab Emirates (UAE). *Transforming Government- People Process and Policy*, *9*(2), 159-180. https://doi.org/10.1108/tg-07-2014-0028

AlAbdali, H., AlBadawi, M., Sarrab, M., & AlHamadani, A. (2021). Privacy preservation instruments influencing the trustworthiness of e-government services. *Computers*, *10*(9), 114. https://doi.org/10.3390/computers10090114

Aladalah, M., Cheung, Y., & Lee, V. C. S. (2018). Towards a model for engaging citizens via Gov2.0 to meet evolving public value. *International Journal of Public Administration in the Digital Age*, *5*(1), 1-17. https://doi.org/10.4018/ijpada.2018010101

AlAwadhi, S. (2019). *A proposed model of trust factors for E-government adoption and civic engagement.* Paper presented at the 52ndHawaii International Conference on System Sciences (HICSS), Hi.

Alawneh, A., Al-Refai, H., & Batiha, K. (2013). Measuring user satisfaction from e-Government services: Lessons from Jordan. *Government Information Quarterly, 30*(3), 277-288. https://doi.org/10.1016/j.giq.2013.03.001

Alkan, Ö., & Ünver, Ş. (2020). Analysis of factors affecting the use of e-government services in Turkey. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 34*(4), 1431-1453.

Allam, A. A., AbuAli, A. N., Ghabban, F. M., Ameerbakhsh, O., Alfadli, I. M., & Alraddadi, A. S. (2021). Citizens satisfaction with E-Government mobile services and M-Health application during the COVID-19 pandemic in Al-Madinah region. *Journal of Service Science and Management, 14*(6), 636-650. https://doi.org/10.4236/jssm.2021.146040

Alnaser, A. S., Theep, K. A., & Alhanatleh, H. (2022). Do e-government services affect Jordanian customer loyalty? *Marketing i menedžment innovacij*, (2), 17-30.

Alpar, C. (2017). *Applied multivariate statistical methods.* Ankara: Detay Yayıncılık.

Alshehri, M., Drew, S., & Alfarraj, O. (2012). A comprehensive analysis of E-government services adoption in Saudi Arabia: Obstacles and challenges. *International Journal of Advanced Computer Science and Applications, 3*(2), 1-6.

Ananth, C. V., & Kleinbaum, D. G. (1997). Regression models for ordinal responses: A review of methods and applications. *International Journal of Epidemiology, 26*(6), 1323-1333. https://doi.org/10.1093/ije/26.6.1323

Arief, A., Sensuse, D. I., Latif, L. A., & Abbas, M. Y. (2021). *Study on e-government integration: A theoretical and empirical review.* Paper presented at the IOP Conference Series: Materials Science and Engineering.

Avgerou, C., & Walsham, G. (2017). *Information technology in context: Studies from the perspective of developing countries.* New York, USA: Routledge.

Bakunzibake, P., Klein, G. O., & Islam, S. M. (2019). E-government implementation and monitoring: The case of Rwanda's 'one-stop' E-government. *Electronic Journal of Information Systems in Developing Countries, 85*(5), 1-18. https://doi.org/10.1002/isd2.12086

Balaskas, S., Panagiotarou, A., & Rigou, M. (2022). The influence of trustworthiness and technology acceptance factors on the usage of e-government services during COVID-19: A case study of post COVID-19 Greece. *Administrative Sciences, 12*(4), 129. https://doi.org/10.3390/admsci12040129

Bannister, F., & Connolly, R. (2014). ICT, public values and transformative government: A framework and programme for research. *Government Information Quarterly, 31*(1), 119-128. https://doi.org/10.1016/j.giq.2013.06.002

Barrutia, J. M., & Echebarria, C. (2021). Effect of the COVID-19 pandemic on public managers' attitudes toward digital transformation. *Technology in Society, 67*, 1-12. https://doi.org/10.1016/j.techsoc.2021.101776

Bélanger, F., & Carter, L. (2009). The impact of the digital divide on E-government use. *Communications of the Acm, 52*(4), 132-135. https://doi.org/10.1145/1498765.1498801

Beldad, A., De Jong, M., & Steehouder, M. (2011). I trust not therefore it must be risky: Determinants of the perceived risks of disclosing personal data for e-government transactions. *Computers in Human Behavior, 27*(6), 2233-2242. https://doi.org/10.1016/j.chb.2011.07.002

Brant, R. (1990). Assessing proportionality in the proportional odds model for ordinal logistic regression. *Biometrics, 46*(4), 1171-1178. https://doi.org/10.2307/2532457

Burgess, R. (2018). *Key variables in social investigation* (Vol. 4). Abingdon, UK: Routledge.

Castelnovo, W. (2013, Jun 13-14). *A stakeholder based approach to public value.* Paper presented at the 13th European Conference on e-Government (ECEG), Univ Insubria, Dept Theoret & Appl Sci, Como, ITALY.

Cavoukian, A., Taylor, S., & Abrams, M. E. (2010). Privacy by design: Essential for organizational accountability and strong business practices. *Identity in the Information Society, 3*, 405-413. https://doi.org/10.1007/s12394-010-0053-z

Chan, F. K. Y., Thong, J. Y. L., Brown, S. A., & Venkatesh, V. (2021). Service design and citizen satisfaction with E-government services: A multidimensional perspective. *Public Administration Review, 81*(5), 874-894. https://doi.org/10.1111/puar.13308

Chatfield, A. T., & Alhujran, O. (2009). A cross-country comparative analysis of E-government service delivery among Arab countries. *Information Technology for Development*, *15*(3), 151-170. https://doi.org/10.1002/itdj.20124

Chinnasamy, P., Suresh, V., Ramprathap, K., Jebamani, B. J. A., Rao, K. S., & Kranthi, M. S. (2022). *COVID-19 vaccine sentiment analysis using public opinions on Twitter*. Paper presented at the International Conference on Advanced Materials for Innovation and Sustainability (ICAMIS), MLR Inst Technol, Hyderabad, ELECTR NETWORK.

Chung, C. S., & Kim, S. B. (2019). A comparative study of digital government policies, focusing on E-government acts in Korea and the United States. *Electronics*, *8*(11), 1362. https://doi.org/10.3390/electronics8111362

Colesca, S. E. (2009). Understanding trust in e-government. *Engineering Economics*, *63*(3), 7-15

Colesca, S. E., & Dobrica, L. (2008). Adoption and use of e-government services: The case of Romania. *Journal of Applied Research and Technology*, *6*(3), 204-217.

Dellazzana-Zanon, L. L., Leite, J. P. D. C., Jezus, M. J. C. D., Silva, C. H. F. D., & Zanon, C. (2020). Psychological effects of social distance caused by COVID-19 (Coronavirus) pandemic over the life cycle. *Estudos de Psicologia (Natal)*, *25*(2), 188-198.

Dickson, E. S., Gordon, S. C., & Huber, G. A. (2009). Enforcement and compliance in an uncertain world: An experimental investigation. *Journal of Politics*, *71*(4), 1357-1378. https://doi.org/10.1017/s0022381609990235

Dunlop, A., Lokuge, B., Masters, D., Sequeira, M., Saul, P., Dunlop, G., . . . Haber, P. (2020). Challenges in maintaining treatment services for people who use drugs during the COVID-19 pandemic. *Harm Reduction Journal*, *17*, 26. https://doi.org/10.1186/s12954-020-00370-7

Frow, P., & Payne, A. (2007). Towards the 'perfect' customer experience. *Journal of Brand Management*, *15*, 89-101. https://doi.org/10.1057/palgrave.bm.2550120

Gacitúa, R., Astudillo, H., Hitpass, B., Osorio-Sanabria, M., & Taramasco, C. (2021). Recent models for collaborative E-government processes: A survey. *IEEE Access*, *9*, 19602-19618. https://doi.org/10.1109/access.2021.3050151

Gatian, A. W. (1994). Is user satisfaction a valid measure of system effectiveness? *Information & Management*, *26*(3), 119-131. https://doi.org/10.1016/0378-7206(94)90036-1

Gotoh, R. (2009). Critical factors increasing user satisfaction with e-government services. *Electronic Government, an International Journal*, *6*(3), 252-264. https://doi.org/10.1504/EG.2009.024943

Gounopoulos, E., Kontogiannis, S., Kazanidis, I., & Valsamidis, S. (2019). *The impact of the digital divide on the adoption of e-government in Greece*. Paper presented at the Conference on Economies of the Balkan and Eastern European Countries, Bucharest, ROMANIA.

Grimsley, M., & Meehan, A. (2007). e-Government information systems: Evaluation-led design for public value and client trust. *European Journal of Information Systems*, *16*(2), 134-148. https://doi.org/10.1057/palgrave.ejis.3000674

Grinin, L., Grinin, A., & Korotayev, A. (2022). COVID-19 pandemic as a trigger for the acceleration of the cybernetic revolution, transition from e-government to e-state, and change in social relations. *Technological Forecasting and Social Change*, *175*, 1-10. https://doi.org/10.1016/j.techfore.2021.121348

Gündoğdu, S., & Erkek, S. (2022). Evaluation of e-health services from the citizen's perspective: Awareness, usage and satisfaction levels. *Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi*, *25*(2), 646-667.

Hodzic, S., Ravselj, D., & Alibegovic, D. J. (2021). E-government effectiveness and efficiency in EU-28 and COVID-19. *Central European Public Administration Review*, *19*(1), 159-180. https://doi.org/10.17573/cepar.2021.1.07

Horan, T. A., & Abhichandani, T. (2006). Evaluating user satisfaction in an e-government initiative: Results of structural equation modeling and focus group discussions. *Journal of Information Technology Management*, *17*(4), 33.

Irani, Z., Weerakkody, V., Kamal, M., Hindi, N. M., Osman, I. H., Anouze, A. L., . . . Al-Ayoubi, B. (2012). An analysis of methodologies utilised in e-government research: A user satisfaction perspective. *Journal of Enterprise Information Management*, *25*(3), 298-313. https://doi.org/10.1108/17410391211224417

Jaeger, P. T., & Thompson, K. M. (2003). E-government around the world: Lessons, challenges, and future directions. *Government Information Quarterly*, *20*(4), 389-394. https://doi.org/10.1016/j.giq.2003.08.001

Jun, K. N., Wang, F., & Wang, D. P. (2014). E-government use and perceived government transparency and service capacity: Evidence from a Chinese local government. *Public Performance & Management Review*, *38*(1), 125-151. https://doi.org/10.2753/pmr1530-9576380106

Karamalis, P., & Vasilopoulos, A. (2020). *The digital transformation in public sector as a response to COVID-19 pandemic: The case of Greece*. Paper presented at the XIV Balkan Conference on Operational Research.

Kunstelj, M., Jukic, T., & Vintar, M. (2009). How to fully exploit the results of e-government user surveys: The case of Slovenia. *International Review of Administrative Sciences*, *75*(1), 117-149. https://doi.org/10.1177/0020852308099509

Lai, C. S. K., & Pires, G. (2009, Sep 17-18). *Testing of a model evaluating e-government portal acceptance and satisfaction*. Paper presented at the 3rd European Conference on Information Management and Evaluation, IT Univ, Gothenburg, SWEDEN.

Leech, N. L., Barrett, K. C., & Morgan, G. A. (2014). *IBM SPSS for intermediate statistics: Use and interpretation*. New York: Routledge.

Mahran, M. A. A. M. (2023). *E-government applications in Turkey during the pandemic period*. (Master's Thesis), Sakarya Üniversitesi, Sakarya.

Malik, B. H., Shuqin, C., Mastoi, A. G., Gul, N., & Gul, H. (2016). Evaluating citizen e-satisfaction from e-government services: A case of Pakistan. *European Scientific Journal*, *12*(5), 346-370. https://doi.org/10.19044/esj.2016.v12n5p346

Mat Dawi, N., Namazi, H., Hwang, H. J., Ismail, S., Maresova, P., & Krejcar, O. (2021). Attitude toward protective behavior engagement during COVID-19 pandemic in Malaysia: The role of e-government and social media. *Frontiers in Public Health*, *9*, 609716. https://doi.org/10.3389/fpubh.2021.609716

McCullagh, P. (1980). Regression models for ordinal data. *Journal of the Royal Statistical Society: Series B (Methodological)*, *42*(2), 109–142.

Mensah, I. K., & Mi, J. N. (2019). Computer self-efficacy and e-government service adoption: The moderating role of age as a demographic factor. *International Journal of Public Administration*, *42*(2), 158-167. https://doi.org/10.1080/01900692.2017.1405980

Mensah, I. K., Zeng, G. H., & Mwakapesa, D. S. (2022). Understanding the drivers of the public value of e-government: Validation of a public value e-government adoption model. *Frontiers in Psychology*, *13*, 1-16 https://doi.org/10.3389/fpsyg.2022.962615

Mohammad, A. H. (2020). The effects of usability and accessibility for e-government services on the end-user satisfaction. *International Journal of Interactive Mobile Technologies*, *14*(13), 78-90 https://doi.org/10.3991/ijim.v14i13.14659

Moore, M. H. (1997). *Creating public value: Strategic management in government*. Cambridge, MA: Harvard University Press.

Morgeson, F. V., & Petrescu, C. (2011). Do they all perform alike? An examination of perceived performance, citizen satisfaction and trust with US federal agencies. *International Review of Administrative Sciences*, *77*(3), 451-479.

Morris, M. G., & Venkatesh, V. (2000). Age differences in technology adoption decisions: Implications for a changing work force. *Personnel Psychology*, *53*(2), 375-403. https://doi.org/10.1111/j.1744-6570.2000.tb00206.x

Nguyen, H. N., & Tran, M. D. (2022). Stimuli to adopt e-government services during Covid-19: Evidence from Vietnam. *Innovative Marketing*, *18*(1), 12-22. https://doi.org/10.21511/im.18(1).2022.02

Nguyen, T. T., Phan, D. M., Le, A. H., & Nguyen, L. T. N. (2020). The determinants of citizens' satisfaction of e-government: An empirical study in Vietnam. *Journal of Asian Finance Economics and Business*, *7*(8), 519-531. https://doi.org/10.13106/jafeb.2020.vol7.no8.519

Obaid, Q. M. S., & Ahmad, M. F. (2021). The linkage between e government and citizens' satisfaction in UAE. *Annals of the Romanian Society for Cell Biology*, 3118-3130.

Orgeron, C. P., & Goodman, D. (2011). Evaluating citizen adoption and satisfaction of e-government. *International Journal of Electronic Government Research*, *7*(3), 57-78. https://doi.org/10.4018/jegr.2011070104

Özer, H. (2004). *Econometric models with qualitative variables: Theory and an application*. Ankara: Nobel Yayın Dağıtım.

Palanisamy, R. (2004). Issues and challenges in e-governance planning. *Electronic Government, an International Journal, 1*(3), 253-272. https://doi.org/10.1504/EG.2004.005551

Paredes-Corvalan, D., Pezoa-Fuentes, C., Silva-Rojas, G., Rojas, I. V., & Castillo-Vergara, M. (2023). Engagement of the e-commerce industry in the US, according to Twitter in the period of the COVID-19 pandemic. *Heliyon, 9*(7), e16881. https://doi.org/10.1016/j.heliyon.2023.e16881

Pham, L., Limbu, Y. B., Le, M. T. T., & Nguyen, N. L. (2023). E-government service quality, perceived value, satisfaction, and loyalty: Evidence from a newly emerging country. *Journal of Public Policy, 43*(4), 812-833. https://doi.org/10.1017/s0143814x23000296

Porúmbescu, G. A. (2016). Linking public sector social media and e-government website use to trust in government. *Government Information Quarterly, 33*(2), 291-304. https://doi.org/10.1016/j.giq.2016.04.006

Prasad, K. S., Pasupathy, S., Chinnasamy, P., & Kalaiarasi, A. (2022). *An approach to detect COVID-19 disease from CT scan images using CNN-VGG16 model.* Paper presented at the 2022 International Conference on Computer Communication and Informatics (ICCCI).

Rana, N. P., Dwivedi, Y. K., Lal, B., Williams, M. D., & Clement, M. (2017). Citizens' adoption of an electronic government system: Towards a unified view. *Information Systems Frontiers, 19*, 549-568. https://doi.org/10.1007/s10796-015-9613-y

Reddick, C. G., Abdelsalam, H. M. E., & Elkadi, H. A. (2012). Channel choice and the digital divide in e-government: The case of Egypt. *Information Technology for Development, 18*(3), 226-246. https://doi.org/10.1080/02681102.2011.643206

Rehman, M., Esichaikul, V., & Kamal, M. (2012). Factors influencing e-government adoption in Pakistan. *Transforming Government- People Process and Policy, 6*(3), 258-282. https://doi.org/10.1108/17506161211251263

Rowley, J. (2011). E-government stakeholders—Who are they and what do they want? *International Journal of Information Management, 31*(1), 53-62. https://doi.org/10.1016/j.ijinfomgt.2010.05.005

Sabani, A. (2021). Investigating the influence of transparency on the adoption of e-government in Indonesia. *Journal of Science and Technology Policy Management, 12*(2), 236-255. https://doi.org/10.1108/jstpm-03-2020-0046

Sai, A. A., & Boadi, P. O. (2017). A bundled approach to explaining technological change: The case of e-Estonia. *European Journal of Business and Management, 9*, 1-17.

Santa, R., MacDonald, J. B., & Ferrer, M. (2019). The role of trust in E-Government effectiveness, operational effectiveness and user satisfaction: Lessons from Saudi Arabia in e-G2B. *Government Information Quarterly, 36*(1), 39-50. https://doi.org/10.1016/j.giq.2018.10.007

Scholl, H. J. (2006). Electronic government: Information management capacity, organizational capabilities, and the sourcing mix. *Government Information Quarterly, 23*(1), 73-96. https://doi.org/10.1016/j.giq.2005.11.002

Sharma, A., Borah, S. B., & Moses, A. C. (2021). Responses to COVID-19: The role of governance, healthcare infrastructure, and learning from past pandemics. *Journal of Business Research, 122*, 597-607. https://doi.org/10.1016/j.jbusres.2020.09.011

Shuib, L., Yadegaridehkordi, E., & Ainin, S. (2019). Malaysian urban poor adoption of e-government applications and their satisfaction. *Cogent Social Sciences, 5*(1), 1565293. https://doi.org/10.1080/23311886.2019.1565293

Singh, M., & Sahu, G. P. (2018). Study of e-governance implementation: A literature review using classification approach. *International Journal of Electronic Governance, 10*(3), 237-260. https://doi.org/10.1504/IJEG.2018.095954

Taipale, S. (2013). The use of e-government services and the Internet: The role of socio-demographic, economic and geographical predictors. *Telecommunications Policy, 37*(4-5), 413-422. https://doi.org/10.1016/j.telpol.2012.05.005

Tarı, R. (2018). *Econometrics* (13th ed.). Kocaeli: Umuttepe Yayınları.

Tosun, A. (2024). A paradigm shift in public service delivery: E-government. *International Journal of Social Sciences, 8*(33), 137-154.

Tremblay-Cantin, C.-A., Mellouli, S., Cheikh-Ammar, M., & Khechine, H. (2023). E-government service adoption by citizens: A literature review and a high-level model of influential factors. *Digital Government: Research and Practice, 4*(1), 1-24. https://doi.org/10.1145/3580369

TurkStat. (2020). *Life satisfaction survey*. Retrieved from https://www.tuik.gov.tr/media/announcements/yasam_memnuniyeti_arastirmasi_2020.pdf

Twizeyimana, J. D., & Andersson, A. (2019). The public value of E-government - A literature review. *Government Information Quarterly*, *36*(2), 167-178. https://doi.org/10.1016/j.giq.2019.01.001

Ünver, S., Aydemir, A. F., & Alkan, O. (2023). Predictors of Turkish individuals' online shopping adoption: An empirical study on regional difference. *Plos One*, *18*(7), e0288835. https://doi.org/10.1371/journal.pone.0288835

Venkatesh, V., Morris, M. G., & Ackerman, P. L. (2000). A longitudinal field investigation of gender differences in individual technology adoption decision-making processes. *Organizational Behavior and Human Decision Processes*, *83*(1), 33-60. https://doi.org/10.1006/obhd.2000.2896

Verdegem, P., & Verleye, G. (2009). User-centered E-government in practice: A comprehensive model for measuring user satisfaction. *Government Information Quarterly*, *26*(3), 487-497. https://doi.org/10.1016/j.giq.2009.03.005

Verma, A. K., & Prakash, S. (2020). Impact of Covid-19 on environment and society. *Journal of Global Biosciences*, *9*(5), 7352-7363.

Von Haldenwang, C. (2004). Electronic government (E-government) and development. *The European Journal of Development Research*, *16*, 417-432. https://doi.org/10.1080/0957881042000220886

Weerakkody, V., Irani, Z., Lee, H., Hindi, N., & Osman, I. (2014). A review of the factors affecting user satisfaction in electronic government services. *International Journal of Electronic Government Research*, *10*(4), 21-56. https://doi.org/10.4018/ijegr.2014100102

Welch, E. W., Hinnant, C. C., & Moon, M. J. (2005). Linking citizen satisfaction with e-government and trust in government. *Journal of Public Administration Research and Theory*, *15*(3), 371-391.

Yera, A., Arbelaitz, O., Jauregui, O., & Muguerza, J. (2020). Characterization of e-government adoption in Europe. *Plos One*, *15*(4), e0231585. https://doi.org/10.1371/journal.pone.0231585

Zhang, B. H., & Zhu, Y. H. (2021). Comparing attitudes towards adoption of e-government between urban users and rural users: An empirical study in Chongqing municipality, China. *Behaviour & Information Technology*, *40*(11), 1154-1168. https://doi.org/10.1080/0144929x.2020.1743361