ASSESSMENT OF THE SATISFACTION WITH ELECTRONIC PUBLIC ADMINISTRATION IN THE CONTEXT OF DIGITAL TRANSFORMATION

ABSTRACT

Aims: The aim of the article is to measure and to identify satisfaction with electronic public administration in the context of digital transformation within Slovakia using available data and indices.
Place and Duration of Study: The electronic survey was carried out in the period from 19 February 2022 to 21 February 2022.
Methodology: The survey methodology consisted of two parts. The First part was realised due to the primary research represented by the citizens of the Slovak Republic aged 18 to 65 years using e-Government services. The survey involved 423 respondents. Second part of the survey involved the Evaluation of the American Customer Satisfaction Index.
Results: The survey revealed the overall satisfaction with the central state portal for public services at the level of 61.7%.
Conclusion: Furthermore, the results of the model showed that the quality of electronic services was the most important issue with the highest impact on the user satisfaction and, subsequently, affecting users´ trust.

Keywords: satisfaction, digital transformation, American Customer Satisfaction Index – ACSI, Slovakia.

The abstract could be improved by including more context on the significance of evaluating electronic public administration in Slovakia and its connection to global digital transformation trends. Expanding the results section to incorporate additional insights, such as demographic patterns or comparisons with international benchmarks, would enhance comprehensiveness. The conclusion, though concise, could emphasize broader implications, such as policy recommendations or directions for future research. Clarifying

how the American Customer Satisfaction Index (ACSI) was specifically adapted for this study would provide better understanding for readers unfamiliar with the index. Finally, refining the language for smoother readability such as replacing "realised due to" with "conducted through" would improve the overall clarity and professionalism of the abstract.

1. INTRODUCTION

We are currently in the midst of a digital transition age where nearly all knowledge and information has been converted to digital form, enabling us to store vast amounts of data. It also enables effective data processing, searching, archiving, and classification. Based solely on binary computer notation, increasingly complex systems are created that reach into the realm of artificial intelligence [1]. Citizens communicate with public administration organizations on a regular basis. In order to provide more effective interaction between the specified subjects, it is crucial to enhance and streamline communication through the use of information and communication technologies (ICT). Our society is becoming more and more reliant on knowledge, and success in the modern digital world depends on using it effectively. Efficiency is defined as the use of financial resources to provide the highest degree of pleasure possible with the inputs and technology available [2].

One significant technology trend that is changing industry, society, and government operations is digitization. Digitization has many advantages, but it also comes with expenses and demands investment [3]. The technical process of converting analog information flows into digital data with discontinuous values based on two distinct states is known as digitization [4]. Information is broken down into its most basic parts by digital technology. Digitization makes it possible to manipulate information, text, pictures, software code, sound, and video by breaking down an analog signal into discrete components; this is known as its transforming and informing power [3, 5]. The extent and impact of the digital economy are determined by the ways in which individuals adopt information and communication technologies [6].

Information and communication technologies are being progressively incorporated into e-government procedures as a result of continuous globalization and informatization initiatives. It is becoming more widely acknowledged that e-government is evolving toward a more comprehensive approach and that strategic national planning is necessary for governance in the area of sustainable development [7]. Public sector businesses confront many of the same issues as private sector businesses, particularly when it comes to digitization, as noted by authors Fine and Johnson [8]. For public administration digitization projects to be developed and implemented successfully, Breaugh and colleagues contend that cooperative approaches are necessary [9]. In the commercial world, measurements of customer satisfaction and operational efficiency are crucial.

Therefore, this article focuses on the importance of measuring efficiency and satisfaction in the context of digital transformation within the public sector.
Slovak Republic does not regularly measure users´ satisfaction with new or existing electronic services, which is important to mention. In order to overcome this gap, the contribution offers a potential implementation and modification method. This study tend to overcome the gap in the assessment of data envelopment analysis satisfaction because comparable metrics utilizing a number of accessible indicators were not found in the EU. Overall, this study provides a framework for future research in this field and provides an overview for evaluating customer satisfaction with e-government services. It also measures the effectiveness of the current state of e-Government. Using e-Government services benefits citizens who live outside of large cities. Rural dwellers may find e-government services far more beneficial [10,11].
In comparison to the rural residents, urban dwellers use the Internet twice as frequently [12]. Because of transportation costs, time constraints, or traffic congestion, online communication may be more advantageous in rural areas than in urban ones [10]. Online services are thought to be particularly beneficial in terms of their adaptability, speed, accessibility, mobility, and educational value. In addition to proper information organization and communication security, it is crucial that the content be presented in a way that is both understandable and readable. E. perceived trust, which guarantees more accurate information when utilizing e-government services. In general, government information on websites from government agencies can be regarded as reliable; however, if not communicated face to face, some requests or information could be misinterpreted [10].
E-Government is categorized into various levels, ranging from 1.0 to 3.0. As e-Government services progress, they are becoming increasingly intricate and sophisticated, which consequently raises their operational and developmental costs [13]. E-Government 1.0 emphasizes delivering transactional public administration services to both citizens and businesses. In contrast, E-Government 2.0 seeks to enhance citizen engagement, along with promoting transparency and accountability. Meanwhile, E-Government 3.0 is regarded as a strategic approach to address the escalating issues and challenges faced by contemporary society, particularly the overwhelming data influx associated with the second generation of e-Government. Its objective is to leverage new technologies to assist in policy formulation and tackle social issues for the benefit of citizens [14,15]. The National Agency for the Information Society views e-Government 3.0 as a collection of initiatives aimed at delivering high-quality, cost-effective services designed to meet citizen satisfaction. Furthermore, it forms the services to the needs of citizens, fosters entrepreneurship, and enhances efficiency while improving access to information and services. As a result, new technologies are utilized to customize services for citizens. With the emergence of new technologies, different tiers of e-Government services can be established. It is crucial to ensure that web portals are free from technical issues that could adversely impact citizens´ perceptions. Additionally, maintaining functionality across all levels is vital to prevent malfunctions, slow page loading,etc.The progression of e-Government levels is illustrated in Table 1.

Table 1. Development stages of e-Government

	Main intention	Main method	Level of use	Tools used and service delivery	ICT area
e-Government 1.0	Better service	Online public administration	National	Web portal (personal visit—one-way communication)	Infrastructure and organization
e-Government 2.0	Openness and cooperation	Open and coordinated governance	National and local	Web portal, social media (two-way communication)	People and data
e-Government 3.0	Solving societal problems, ensuring citizen welfare, optimizing resources	Intelligent management	From local to international	Ubiquitous smart services, smartphones, apps	Artificial intelligence (AI) technologies and Internet of Things (IoT) infrastructure

The efficiency of e-Government is considered by several authors to be one of the most important drivers of progress in e-Government, and the efficiency of electronic public administration includes various disciplinary perspectives [19,20]. The efficiency of e-Government can also be measured by measuring user satisfaction, process efficiency, security and trust, innovation and adaptability, etc. In addition, it is possible to identify other areas that are closely related to e-Government [20].

There are various indices that are relevant and evaluate the levels of digital society and e-Government. These indicators are important in assessing the level of digitization, efficiency and involvement of government digital services institutions in different countries. These indices and assessments are policy-making tools that help countries and regions to identify areas where they can improve their digital level. Individual authors used various international indicators from databases such as Eurostat, The Organisation for Economic Co-operation and Development (OECD), the European Commission, the World Bank, etc., when measuring efficiency.

An important indicator in the development and progress of e-Government is the e-Government Development Index (EGDI). The E-Government development index

measures the willingness and ability of certain governments to use information and communication technologies to provide public services.
The evaluation of e-Government is carried out by the European Commission and compares the levels of e-Government in European countries. The comparison is made in four areas, according to which the indicators for the government are measured (see Figure 2) [21]. The areas are focused on the users, transparency, login and eID and cross-border services. The results achieved by Malta and Estonia indicate that their e-Governments are most focused on users, transparency, technological equipment and services, and they are open to users from other European countries as well. These countries were followed by Luxembourg (87%), Iceland (86%), the Netherlands (85%), Finland (85%), Denmark (84%), Lithuania (83%), Latvia (80%), Norway (79%), Spain (79%) and Portugal (81%).
It can be concluded that Denmark and Estonia are significant leaders in the digitalization of public administration and that they achieved above-standard results for most of the indicators. Denmark, Estonia and Finland are also leaders in terms of the results achieved within the EU27 (27 states of the European Union). By contrast, Slovakia achieved lower results in selected indicators, or decreases in some areas. Slovakia should pay more attention to build e-Government and target areas such as education, better participation of citizens in public sector and involvement in cooperation in the area of e-Government, such as with Estonia and Finland.
When carrying out the analysis in Slovakia and abroad, the focus was oriented on the evaluation of the central portals of the public administrations of several countries. The central portals in these countries are different. In some areas, Singapore achieves a better or equal level. In Denmark, Finland and Singapore, citizens mainly access e-Government services via smartphones. From the performed analysis, we identified a gap in the survey of the measurement of efficiency and satisfaction in the context of digital transformation in Slovakia. Efficiency measurement models within the European Union are focused more on EU digitization and not on EU e-Government, which forms part of digitization. For this reason, the aim of the survey was oriented on measurement and identification of efficiency within the European Union using available data and indices [22].

❖ Strengths:

The introduction offers a thorough overview of digital transformation and e-Government, successfully connecting global trends to the specific context of Slovakia. It highlights significant tools, such as the e-Government Development Index (EGDI), and compares Slovakia's performance with countries like Estonia and Denmark. Additionally, the explanation of e-Government levels (1.0

to 3.0) and their strategic implications is clear and informative, providing valuable insights into the impact of digitization on public administration.

❖ **Areas for Improvement:**

The introduction is detailed to the point of being overwhelming, which affects its readability and focus. Transitions between sections, such as global comparisons, Slovakia's challenges, and e-Government levels, could be smoother for improved coherence. Terms like "efficiency" and "trust" should be more clearly defined, and the study's aim is introduced too late in the section. The text also contains some repetitive content and overly complex sentences, which reduce clarity and conciseness.

❖ **Suggested Revision Approach:**

The introduction should start with a clear statement of the study's purpose and its importance. It should be structured to cover **Global Trends**, **Slovakia's Position**, **e-Government Levels**, **Methodological Gaps**, and **Objectives of the Study**. Simplifying technical jargon, eliminating repetitions, and breaking down lengthy sentences will improve readability and ensure the content aligns with the study's objectives.

2. MATERIAL AND METHODS

The article includes data collection that is both qualitative and quantitative. In the article were utilized mathematical and statistical techniques, including multi-correlation methods and the entropic approach for determining weights, The primary analytical tools being used were mathematical-statistical methods, the American Customer Satisfaction Index (ACSI), and a questionnaire survey. Within the scope of primary research, a quantitative approach utilizing a questionnaire survey was applied.

A research deficiency was identified in measuring the satisfaction of e-Government across EU countriečs through diverse indexes. This disparity was recognized through the examination of articles in a global context. To assess satisfaction in public administration or e-Government, the survey questionnaire and the American Customer Satisfaction index were used. Following that, the core research focused on satisfaction within the chosen area was structured according to the American Customer Satisfaction Index, Government framework, along with additional inquiries.

The most used customer satisfaction indices worldwide are the American Customer Satisfaction Index - Government and the European Customer Satisfaction Index [23,24]. The ACSI Government Model is a key checkpoint for evaluating the success of government projects and online initiatives. It is one of the more complex and representative representations of citizens' experience with government websites. The ACSI is used to track users´ satisfaction with product quality over time. Results can be compared with results from private and public sector organizations. The ACSI governance model was first used in 1994 [23,24]. The ACSI provides cause-and-effect analysis to better allocate resources to those that have the greatest impact on product improvement. Satisfaction factors are grouped into four broad categories that are used as inputs to measure quality (information, process, customer service and website) on the left, overall satisfaction (ACSI) in the middle and satisfaction outcomes on the right site (see Figure 1). As one of the solutions, the ACSI model - Government questionnaire was utilized, and it was subsequently used to evaluate satisfaction with e-Government services aimed at the central state portal of the Slovak Republic.

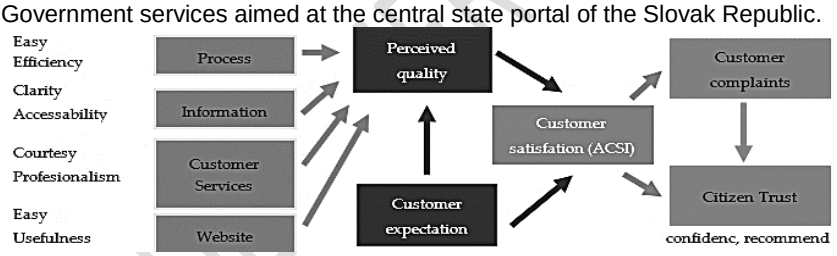

Fig. 1. The government ACSI model [22]

The participants involved in the survey were selected by random sampling among citizens of the Slovak Republic. The questionnaire was created electronically using the Google Docs tool. The electronic survey was conducted in the period from 19 February 2022 to 21 February 2022. The target group were citizens of the Slovak Republic aged 18 to 65 years, residents in the Slovak Republic, with experience in using e-government services. The criteria for inclusion in the sample of respondents were age (18-65 years), place of residence (Slovakia) and use of e-government services. Participants under 18 years, over 66 years, respondents residing outside the Slovak Republic, and participants who did not use e-government services were excluded from the survey. 423 respondents participated on the survey. The target sample of completed questionnaires was 386, calculated on a base of more than 100,000 respondents. The variability of the base set

represents had a value of 0.5. The confidence interval was 95% and the maximum accessible margin of error represented 5%.
There were 301 females and 122 males participants included in the survey. 225 respondents had permanent residence in cities and 198 in rural areas. Of these, 162 respondents lived in Western Slovakia (38.3%), 106 respondents (25.1%) lived in Eastern Slovakia, and 155 respondents (36.6%) lived in Central Slovakia. The largest group of respondents were in the age group between 41 and 50 years, had a university degree and were employed.
The methods and procedures of this survey are shown in Table 2.

Table 2. Methodology of the article

Paper	Information	Method	Research Phase
Main data collection	The data were focused on digitization, e-Government, efficiency	Analysis, method determination	I.
Analysis	Books, scholarly articles on digitization, e-Government and other research areas.	Analysis, method of collecting and processing information, extraction and compilation methods, method of abstraction	II.
User identification and satisfaction measurement using ACSI	Data were obtained from respondents.	Primary results of entropic data measurement method, chi-squared test, multi-correlation method	III.
Result and discussion, Conclusion	The Conclusion determines the level of satisfaction determined by ACSI within Slovakia and the efficiency levels of countries for individual years.	Synthesis method, deduction method, induction method, generalization method	IV.

This paper includes both qualitative and quantitative data collection. In addition, a variety of methods are used in this paper, such as multi-correlation method, entropy weight determination method, etc. [22].
Next, the values up for one respondent (I_i) will be calculated:

$$I_i = \frac{\sum_{j=1}^{n} I_{ij}}{10}$$

Next ASCI is calculated according to the formula:

$$ASCI = \left(\frac{E-MIN}{MAX-MIN}\right) \text{ x } 100$$

where E represents the overall mean value of the American Customer Satisfaction Index for all respondents:

$$E = \frac{\sum_{n=1}^{N} I_i}{N}$$

and N is number of respondents.

❖ **Strengths:**

The "Material and Methods" section clearly outlines the use of both qualitative and quantitative data collection methods, providing a well-rounded approach to the research. The inclusion of mathematical and statistical techniques, such as multi-correlation methods and the entropic approach, adds strength to the methodology. The use of the American Customer Satisfaction Index (ACSI) offers a solid framework for evaluating citizen satisfaction with e-Government services. The demographic breakdown and random sampling ensure a representative sample for the study.

❖ **Areas for Improvement:**

The section could benefit from clearer explanations of the methodological techniques, especially the multi-correlation and entropic methods, which are mentioned briefly without sufficient detail. Some parts, such as "Next ASCI is calculated according to the formula," are unclear and need further clarification or revision. Additionally, the repetition of the ACSI model and its applications could be reduced to improve clarity and avoid redundancy.

❖ **Suggested Revision Approach:**

To enhance clarity, the explanations of the multi-correlation and entropic methods should be expanded with more details or references. The phrasing in the formula section should be revised for better accuracy, ensuring that readers can easily follow the calculation process. Redundant mentions of the ACSI model should be consolidated, and the methodology section should be better

structured for improved readability and smoother transitions between the different methods used.

3. RESULTS AND DISCUSSION

The results section is divided into two parts. The first part determines the level of electronic services – the use of the state portal. Hypothesis testing and comparisons were performed between urban and rural residents. In addition, the American Customer Satisfaction Index (ACSI) was calculated in the second part of the article.

3.1. The First Part—Primary Research in Slovakia

The rate of the use of public services via the state portal in Slovakia represented 74%, and 26% of citizens did not use this portal. Rural portals are used by 88% and other services are used by 87% of the respondents (see Table 3). Other services included electronic vignettes, e-prescriptions, the online land registry, etc. The basic access points include the central state portal, Slovensko.sk, the rural portals of municipalities and other electronic services. The skewness may indicate that respondents are less satisfied or have a different experience, which is reflected in the lower satisfaction scale values.

Table 3. Descriptive analysis of satisfaction questions from the primary questionnaire

	Other Electronic Services		State portal (Slovensko.sk)		Rural Portal	
Rate of use of basic access points in Slovakia number of respondents in %	yes	no	yes	no	yes	no
	87%	13%	74%	26%	88%	12%
Min	1		1		1	
Max	10		10		10	
Average	6.986		6.621		6.741	
Modus	8		8		5	
Median	7		7		7	
Standard deviation	1.900		1.976		2.355	
Skewness	−0.512		−0.325		−0.543	
N	368		272		174	

Based on the conducted analysis, hypotheses were established. The hypotheses were tested using the chi-squared test between the city and rural areas. The aim was to find out the difference in use between citizens living in cities and those in rural areas.

The research question (RQ) was as follows: *Does the type of permanent residence, i.e., city, influence the central portal for public electronic services or electronic state services?*
Hypothesis 0A (H0A): *There is no significant difference in the level of use of the central state portal for public electronic services (Slovensko.sk) between citizens living in cities and in rural are-as.*
Hypothesis 1A (H1A): *There is a significant difference in the level of use of the central state portal (Slovensko.sk) between citizens living in cities and in rural areas.*
Research question 1 (RQ 1): *Do you currently live in a city or a rural area?*
Research question 2 (RQ 2): *How often do you visit the portal (slovensko.sk)* (see Table. 4)?

Table 4. Use of public electronic services (slovensko.sk) by respondents rural and city areas

Number of respondents		
Town	always	9%
	often	15%
	sometimes	20%
	occasionally	26%
	I don't use	30%
Rural	always	6%
	often	24%
	sometimes	21%
	occasionally	27%
	I don't use	22%

The positive answers that were used to represent a "yes" answer were always, often, sometimes, and occasionally. A negative answer was represented by "no"—we do not use it. If Chí X2-test < Chí X2-critical, we accepted hypothesis H0A. In this example, based on calculations, with Chí X2-test > Chí X2-critical, we accept H0A (See Table 5).

Table 5. Chi-squared test results for cities and municipalities in rural areas

Observed Data	**City**	**Rural Area**	**Total**
Yes	134	138	272
Well	57	39	96
Total	191	177	N = 368
Expected data	**City**	**Rural area**	**Total**
Yes	141.2	130.8	272
Well	49.8	46.2	96
Total	191	177	N = 368

Indicator	Degree of freedom	Chi X^2-test	Chi X^2-Critical	Significance level	*p*-value	Decision rule
Values	2	2.905	5.991	5×10^{-2}	8.8×10^{-2}	Accepted H0A

From the results, it can be concluded that there are no significant differences in the use of public electronic services (slovensko.sk) between the two areas, nor within regions or between cities and municipalities. Respondents from rural areas used the portal to a greater extent and more frequently than respondents from cities.

3.2. The American Customer Satisfaction Index

The Government model included 15 questions in the American Customer Satisfaction Index survey. The specific inquiries concentrate on details, procedures, customer support, and websites. The areas noted reflected perceived quality. In addition, there were inquiries regarding the user's anticipated level of service. Along with these aspects, there were inquiries regarding general customer satisfaction, customer grievances, and user confidence.

The specific items in the questionnaire employ a Likert scale ranging from 1 to 10, where, for instance, 1 represents a negative outlook — "do not recommend, hard, etc.", and 10 signifies a positive response — "recommend, easy, etc." Through the assessment of satisfaction and utilizing the American Customer Satisfaction Index, users could evaluate the relevance of the consumer satisfaction metric and the evaluation of satisfaction across different services.

The information needed to assess satisfaction based on the American Customer Satisfaction Index was gathered effectively (refer to Table 6).

Table 6. The descriptive analysis of questions from the American Customer Satisfaction Index

The Areas of the ACSI		Questions	Average	Standard Deviation	Median	Pointedness	Skewness
Perceived Quality	Information	OT2	6.03	2.11	6	−0.25	−0.22
		OT3	6.03	2.26	6	−0.47	−0.22
	Process	OT4	6.61	1.97	7	−0.38	−0.33
		OT5	6.06	2.09	6	−0.52	-0.15
	Customer service	OT6	7.17	1.95	7	−0.79	-0.19
		OT7	7.07	2.02	7	−0.65	-0.24
	Website	OT8	6.38	2.11	6	−0.65	-0.17
		OT9	6.88	1.87	7	−0.41	-0.20
Customer expectation		OT1	6.83	2.32	7	-0.65	−0.35
		OT12	6.09	2.11	6	-0.46	−0.43
Customer Satisfaction (ACSI)		OT10	7.03	2.06	7	-0.34	−0.46
		OT11	6.62	1.98	7	-0.41	−0.32
Customer complaints		OT13 OT13 A	Almost no complaints				
User confidence	Fidelity	OT14	7.04	2.38	7	−0.49	−0.58
	Recommendation	OT15	6.78	2.34	7	−0.28	−0.56

Satisfaction scores for individual respondents for all areas (see Table 7).

$$I_i = \frac{\sum_{j=1}^{1} 7.5}{10} \times 100 = 70.45\%$$

Table 7. Satisfaction scores for individual respondents for all areas

Respondent	Partial Respondent Satisfaction
I_1	69.17%
I_2	81.60%
I_3	43.10%
I_{272}	67.92%
E—total value	1783

$$E = \frac{7.05+8.25+\ldots+6.93}{272} = \frac{1783}{272} = 6.557$$

$$ACSI = \left(\frac{6.557 - 1}{10 - 1}\right) \times 100 \; = \; 61.74\%$$

These outcomes reflected customer satisfaction rated from 0 to 100, with the figure of 61.74% showing a marginally increased satisfaction with electronic srvices regarding the use of the state portal, Slovensko.sk, thus confirming the assumptions of Research question Q 1–2.

Further findings were acquired regarding satisfaction for specific domains of perceived quality (64.2%), customer expectations (64.5%), customer contentment (68.2%), and user confidence (69.1%).

The overall satisfaction measured was at a rate of 61.7%. Within the specific domains, user trust received the highest rating, at 69.1%, while customer expectation attained the lowest score, lying just above the average. Updating the central state portal for public electronic services is essential to enhance user satisfaction with e-Government services.

The effect of digitalization lies on many spheres, such as economy, society, management, or the environment [25]. In this study, the effect was assessed solely within the European Union. The findings indicate that the chosen indicators validated the conclusions of several authors, and that this effect remains evident in the EU area [26]. The rise of digitization greatly enhances societal welfare in a developed economy. Studies conducted on 24 EU nations indicate that a noticeable rise in digitization score leads to an improvement in quality of life. In less developed economies, factors besides digitization are essential for quality of life (basic needs come first, followed by housing, clothing, water and energy, then health, and ultimately transport and communication). Digitization affects quality of life solely when individuals have their fundamental needs met. Rising degrees of digitization also enhance access to essential services, as indicated by the HDI, which monitors worldwide access to healthcare and education, along with overall quality of life. The analysis indicates that greater digitization in countries enhances all these aspects. The influence of digitization on health, education, and living standards is more evident in developing countries [25,26,27,28]. Future research should place more emphasis on the categorization of electronic waste, the recycling process, and reintegrating used materials into the production system [29].

An additional notable findings show that the portal's usage rate is substantial; however, satisfaction rates vary between local and other public administration services, including the central public services portal. These levels were also affected to a certain extent by how challenging it is to utilize the services. The findings indicate that the participants exhibit a negative outlook on the advancement of e-Government when contrasted with the ideal scenario. Therefore, in the future, it is necessary to carry out further research to determine the ease of use of individual services in the central state portals of all EU countries using the Index Calculation and Maintenance Methodology (CES).

The research question was set in the survey: Is there a variation in the utilization of e-Government services among residents of urban and rural regions? [10]. Based on Hypothesis 0A, there is no meaningful difference in the usage of the portal

Slovensko.sk among citizens residing in urban and rural areas. Based on the results obtained, it is acceptable to endorse the 0A hypothesis and assert that there is no noteworthy difference between the two groups examined. This outcome can be viewed favourably, indicating that residents utilize e-Government services even beyond urban regions. Furthermore, a comparable conclusion holds true for regions. Roy et al., along with Seo and Bernsen, view the usage by this group as beneficial because of transportation expenses, time limitations, or traffic jams [10,11]. Nonetheless, there are various services that are not fully utilized, such as mID or app-in-picture. Consequently, it would be prudent to raise awareness of these and other services available to citizens in rural regions. Nonetheless, a distinction can be noted in selecting the service type, as people in rural regions prefer the state portal for public electronic services over the Singapore approach, where an app is utilized more often, although the portal is also accessible. The key benefits of e-Government identified by the respondents include time savings, reduced physical strain, and around-the-clock access. The findings suggest that, among the drawbacks and shortcomings of e-Government, citizens recognize digital literacy and a lack of information. The government ought to concentrate on these two elements by incorporating the information portal into Slovensko.sk, similar to what other countries have done.

In practice, e-Government ought to allow citizens to communicate with authorities from the convenience of their homes, rather than requiring citizens or business owners to visit an office physically. This might also lower expenses (automating processes may conserve certain human resources) and, importantly, benefit the environment (such as by decreasing paper usage). The key requirement for the successful execution of this project is, most importantly, the extension of the Internet to most homes and businesses in Slovakia. In Slovakia, the e-Government initiative is already a genuine and legally anticipated endeavour. The public administration informatization strategy indicates, among other points, that the advantages targeted by the strategy, strategic objectives, and particular actions are centred on a client-oriented public administration (for citizens, businesses, and the wider community). The functioning of public administration can be executed electronically by utilizing information and communication technologies (via the Internet, mobile devices, or alternative communication methods) and more [30,31]. It is possible to measure satisfaction using the American Customer Satisfaction Satisfaction can be assessed using the American Customer Satisfaction Index in Slovakia; however, the findings indicate a need to reassess the complaints section, as a significant number of responses were lacking in this area. The use of the ACSI model and findings indicate that the total satisfaction rate for Slovensko.sk is 61.7%. This helps illustrate more clearly that contentment with the portal alone is inadequate. The portal has been operational for over 10 years, yet the state has been unable to adjust it to better meet citizens' satisfaction. A bigger number of participants voiced concerns regarding the design and reliability of the portal. The information helps enhance the comprehension of how ACSI operates. It can be asserted that ACSI can be applied to various services or solutions in the context of e-Government in Slovakia. Future studies might consider altering the ACSI, whether through assessing the e-Government 3.0 level or by re-examining and supplementing the questions in the model [16]. Given that e-Government is utilized via mobile applications, like in Singapore, and the use of artificial intelligence in

public administration [32,33], it would be fitting to develop a multilevel questionnaire that considers the e-Government service level in other countries, such as Singapore, if the questionnaire were to be applied there. The findings rely on the current evidence, established by E. Welch, regarding the cyclical relationship between trust and satisfaction: trust leads to satisfaction and the opposite is also true [34]. The findings indicate that individuals who have greater trust in the government tend to be more content with e-Government. The findings offer a fresh viewpoint on the link between satisfaction and quality, suggesting that this link is somewhat more robust. Quality is influenced by processes, the website, and the information.

In establishing the weights for the ACSI, the entropic method was employed, though the main goal was to incorporate the Analytic Hierarchy Process (AHP) as well. Non-tropical weighing offers a more impartial perspective in weight assessment and is better suited for evaluating the weight of a complex system. Every method has its drawbacks, so it would be prudent to also utilize the AHP method to benefit from the strengths of both objective and subjective approaches. Consequently, in future studies, the AHP weight can be established at 50% and the entropy method weight at 50% when determining the complex weight [35].

In addition, the temporal element of the service was overlooked in the initial research. What is the probability that satisfaction levels would differ if the service was released 1 year versus 10 years later, or if it was a newly launched service or a portal? One can speculate that a specific group of users will embrace the service, and there might be a distinction between a user trying the service for the first time and one who has utilized it multiple times before. Future studies might also explore whether there is a variation in ACSI satisfaction between individuals residing in urban areas and those in rural environments. Moreover, an appropriate approach for determining when to utilize the service is to apply it at consistent time intervals (once a year), during significant system changes or minor updates that may impact customer experience. It would likewise be feasible to contrast [36], which evaluated the satisfaction levels with central government portals and private sectors. In a certain study, the researchers discovered that federal portals lack the same quality standards as other digital services [36]. In the process of modernizing and refreshing the portal, Slovensko.sk, it would be beneficial to conduct this comparison, as it would allow for determining whether the revamped central portal for public services measures up in quality to the most advanced portals in the electricity trading sector. The ACSI survey can be utilized at various levels, including local levels or alongside other public service portals.

Tan et al. mention in their study that electronic public administration is progressively becoming a recognized element of virtual nations. Nevertheless, the absence of public confidence stemming from the novelty and unpredictability of online transactions impedes the widespread acceptance of public electronic services. Considering technology as a social actor that interacts and engages with the customer, we suggest a research model highlighting the crucial influence of e-Government service quality on citizens' perceptions of the reliability of e-government websites, which subsequently encourages the adoption of e-Government website services. The results of this research show that the quality of e-government websites plays a significant role in fostering citizens' trust in public electronic services [37]. The findings from the research conducted by Li and Shang

[38] indicate that citizens' engagement with e-government indirectly restores their confidence in the government. This occurs through its impact on how citizens assess the integrity, performance, and responsiveness of public administration based on their e-Government experiences. However, the mediating role of citizens' evaluations of the government in the link between electronic public administration usage and public trust is diminished by citizens' expectations of their government. The results emphasize various strategies to speed up the implementation of e-Government. Enhancing citizens' confidence in e-Government systems by improving reliability, security, and transparency is crucial. Simultaneously, it is essential to implement measures that promote digital access, skills, and capabilities among various population segments [39]. The standard of electronic services greatly influences the development of public trust. The standard of electronic services greatly influences public contentment. Public confidence directly influences public contentment with public services, yet additional unmeasured elements also affect public perception and satisfaction [40].
It is crucial to assess if the personal outcomes have fulfilled the expectations of the population, which ought to be evident in their satisfaction [22, 41,42].

Results and Discussion

The **Results** section is divided into two parts: the first analyzes the use of electronic services via the state portal in Slovakia, while the second examines citizen satisfaction through the American Customer Satisfaction Index (ACSI).

3.1. The First Part—Primary Research in Slovakia

The use of public services via the state portal in Slovakia was found to be 74%, with 26% of citizens not using the portal. Rural areas reported higher usage rates at 88%, compared to 87% for other services such as electronic vignettes, e-prescriptions, and the online land registry. Basic access points include the central state portal, Slovensko.sk, as well as rural municipal portals and other electronic services. A skewness in the data suggests that some respondents may have had a less favorable experience, reflected in the lower satisfaction scale values.

Hypothesis Testing:
The hypotheses tested using the chi-squared test focused on whether the type of permanent residence (city vs. rural area) influenced the use of the Slovensko.sk portal. The null hypothesis (H0A) proposed no significant difference in the use of the portal between citizens in urban and rural areas. The alternative hypothesis (H1A) suggested a significant difference. After applying the chi-squared test, the results showed no significant difference in portal usage between rural and urban areas. In fact, rural residents were found to use the portal more frequently than city dwellers.

3.2. The American Customer Satisfaction Index (ACSI)

The ACSI model was used to evaluate citizen satisfaction with the state portal. The model involved 15 questions focused on service quality, procedures, customer support, and user expectations. Responses were rated on a Likert scale from 1 to 10, where 1 represented negative feedback, and 10 represented positive feedback. Satisfaction scores for various areas, including perceived quality (64.2%), customer expectations (64.5%), contentment (68.2%), and user confidence (69.1%), were calculated. The overall satisfaction score for the portal was 61.7%, with user trust receiving the highest rating (69.1%) and customer expectation receiving the lowest. These findings suggest that while there is moderate satisfaction with the portal, improvements are needed to increase overall satisfaction, especially in areas like portal design and functionality.

Discussion

The findings suggest that Slovensko.sk is widely used by citizens, including those from rural areas, and that there is no

significant difference in usage between rural and urban residents. However, satisfaction levels vary, with user trust being the strongest factor in satisfaction. There is also a clear indication that improvements to the portal are necessary to enhance satisfaction, particularly in terms of design and ease of use. The application of the ACSI model revealed that the satisfaction level is relatively low (61.7%), suggesting that while the portal is functional, it is not meeting the high expectations of all users. This highlights the need for further development of e-Government services, with particular emphasis on improving user experience, accessibility, and digital literacy.

Additionally, the research confirms the broader trend that increased digitalization, while beneficial, requires careful attention to factors such as reliability, security, and user education to ensure widespread adoption and satisfaction. Future research should consider expanding the ACSI model to address additional factors such as digital accessibility, mobile app usage, and integration of new technologies in public administration. Also, further studies could explore how satisfaction levels evolve over time, particularly as the portal undergoes updates or improvements. While the Slovensko.sk portal shows promise in terms of usage, significant efforts are required to improve user satisfaction and ensure it meets the needs of all citizens, particularly in rural areas. This research also suggests that e-Government services can significantly enhance public welfare, but only if users are equipped with the necessary tools and knowledge to fully benefit from them.

4. CONCLUSION

The purpose of this study was to investigate if Slovakia use the American Customer Satisfaction Index as part of the e-Government concept. The verification

of the application of the ACSI model was done during the primary research. The results of the survey showed that it is convenient to utilize this measurement model. According to the survey, 61.7% of respondents were overall satisfied with the central state portal for public services (Slovensko.sk). Additionally, the model's findings demonstrated that quality is the most crucial factor since it has the biggest influence on users´ satisfaction, which in turn influences consumer trust. The process optimization and improvement have to be the main focus regarding the central site for public services' qualitative components. Central portal for public services has several shortcomings, such as outdated design, reliability problems, etc.

Based on these findings, experts at ACSI might explore e-Government 3.0, revising inquiries that target the local domain of e-Government or introducing new services. It is important to note that Slovakia lacks a consistent evaluation of satisfaction regarding both new and established e-Government services. Consequently, this research addressed that void and proposed potential implementation methods, along with possible adjustments. To ensure user utility, the government should prioritize the connectivity of service systems, along with enhancing processes and quality. The final output model may encompass interactions with online public administrations and the ACSI index. Should there be a need to elevate the ACSI index, a more thorough investigation could be conducted into those components of the index that currently fall short of satisfactory levels.Further research on this issue is needed to be done in the future.

This study investigated the use of the American Customer Satisfaction Index (ACSI) in Slovakia's e-Government framework. The results showed that 61.7% of respondents were satisfied with the central state portal (Slovensko.sk), with service quality being the most significant factor influencing user satisfaction and trust.

However, the portal faces issues such as outdated design and reliability concerns, highlighting the need for improvements. The study suggests that Slovakia should focus on optimizing processes, enhancing connectivity, and evaluating satisfaction across both new and established e-Government services. Further research is needed to address the components of the ACSI that currently fall short and to explore potential improvements in e-Government 3.0.

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