The Influence of Socio-Technical Factors on the Use of Government Applications by the Public

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Abstract. This study investigates the socio-technical aspects that affect how the public uses government applications. For effective and transparent governance, digital government services must be adopted. Key components including digital literacy, accessibility, user-centered design, and public trust in government are the subject of this study. To learn about the experiences and difficulties that a wide range of users had using government programs, information was gathered through surveys and interviews. The results show that user-centric design increases user happiness and adoption rates in applications. Increased usage and pleasure are correlated with higher levels of digital literacy, underscoring the significance of educational programs to advance digital abilities. Users select apps they believe to be safe and privacy-protective, and trust in government agencies emerged as a crucial element. Accessibility issues, particularly for users with dis-abilities, were identified as significant barriers, underscoring the need for inclusive design practices. This study provides practical implications for improving government applications, including the adoption of user-centered design methodologies, enhancing digital literacy programs, building trust through transparent data practices, and ensuring accessibility. Despite its contributions, the study acknowledges limitations in sample size and scope, and suggests future research directions such as longitudinal studies and cross-cultural investigations. The findings emphasize the need for a comprehensive approach that integrates technological, social, and human considerations to optimize the effectiveness of digital government services and achieve broader societal benefits.

Keywords: Socio-Technical Factors, Government Applications, User Adoption, Digital Government, Public Engagement.

1 Introduction

1.1 Background

Information and communication technology's (ICT) explosive growth in recent years has transformed many industries, including government services [1]. Government's everywhere are embracing digital technologies increasingly to boost citizen engagement, increase transparency, and improve service delivery. One of the most important components of these e-government programs is the implementation of government applications, or apps [2]. With the help of these apps, users may easily access public services, get information, and take part in political processes. The public's acceptance and efficient usage of government apps are still uneven, despite their potential advantages [1][3].

These digital projects' success is influenced by many elements, including social and technological ones. Understanding and making the best use of government applications requires an understanding of the interplay between social and technical factors, which is provided by the socio-technical approach [2].

1.2 Problem Statement

There are many benefits associated with digitally transforming government services through applications, including improved user engagement, efficiency, and accessibility. Nevertheless, the public's acceptance or efficient usage of these apps is not ensured by their simple availability [4]. Government applications can be aided or hindered by several socio-technical factors. These elements include the app's ease of use, technology dependability, users' level of digital literacy, and public confidence in governmental organizations [5].

Comprehending these socio-technical elements is essential to formulating tactics to augment the acceptance and gratification of government applications [6]. The objective of this research is to ascertain and examine the socio-technical elements impacting the public's utilization of government applications, hence offering valuable perspectives to enhance the development and execution of these digital services.

1.3 Objectives

This research aims to:

1. Identify the socio-technical factors that affect the use of government applications by the public.
2. Examine the relationship between these factors and user adoption and satisfaction.
3. Provide recommendations to improve the design and implementation of government applications.

1.4 Research Questions
This is some research questions:
1. What is the key socio-technical factors influencing the use of government applications?
2. How do these factors affect user adoption and satisfaction?
3. What strategies can be employed to enhance the usability and acceptance of government applications?

1.5 Significance of the Study
The findings of this study will provide valuable insights for government agencies, policymakers, and developers involved in the design and implementation of digital government services. By understanding the socio-technical factors that influence user behavior, stakeholders can develop more effective strategies to promote the adoption and satisfaction of government applications. This research will contribute to the broader discourse on e-government and digital transformation, highlighting the importance of a socio-technical perspective in enhancing public engagement with government services.

1.6 Scope and Limitations
This study focuses on the socio-technical factors influencing the use of government applications by the public. The scope includes both the technological aspects (e.g., user interface design, technical reliability) and social aspects (e.g., digital literacy, trust in government). The research will be conducted using a mixed-methods approach, combining quantitative surveys with qualitative interviews to gather comprehensive data.
However, this study has some limitations. The findings may not be generalizable to all regions or contexts, as the socio-technical dynamics can vary significantly across different populations and governmental structures. Additionally, the study relies on self-reported data, which may be subject to biases and inaccuracies. Despite these limitations, the research provides a robust framework for understanding the socio-technical factors that influence the use of government applications.

2 Literature Review
2.1 Socio-Technical Systems Theory
Socio-technical systems (STS) theory emphasizes the interrelatedness of social and technical aspects within organizational systems [7]. Developed in the mid-20th century, STS posits that successful system performance depends on the harmonious alignment of social elements (people, culture, structure) and technical elements (tools, technologies, processes) [8][9].
The application of STS theory to e-government initiatives underscores the importance of designing government applications that not only incorporate advanced technologies but also consider user needs, organizational context, and social dynamics [10]. Effective e-government systems require a balance between technical efficiency and social relevance to achieve user acceptance and satisfaction [1].

2.2 The Technology Acceptance Model (TAM)
The Technology Acceptance Model (TAM), developed by Davis (1989), is one of the most widely used models to explain user acceptance of technology [11] TAM posits that perceived ease of use (PEOU) and perceived usefulness (PU) are the primary determinants of technology adoption. Various extensions of TAM, such as TAM2 and the Unified Theory of Acceptance and Use of Technology (UTAUT), have been developed to incorporate additional factors like social influence, facilitating conditions, and user experience, providing a more comprehensive understanding of technology adoption [11][12].
Rogers' Diffusion of Innovations Theory explains how recent technologies spread within a society. The theory identifies five key attributes that influence the adoption rate: relative advantage, compatibility, complexity, trial ability, and observability. In the context of government applications, diffusion theory helps to understand how these technologies gain acceptance among citizens and the factors that can accelerate or hin- der their adoption.

2.3 Empirical Studies on e-Government and Socio-Technical Factors
User-centered design (UCD) focuses on involving users throughout the development process to ensure that the final product meets their needs and preferences [13]. UCD principles are crucial for the success of government applications as they enhance usability and user satisfaction. Empirical studies have shown that government applications designed with UCD principles tend to have higher adoption rates and user satisfaction [14]. For example, a study on the UK's e-government services revealed that applications with intuitive interfaces and clear navigation significantly improved user engagement. Digital literacy, defined as the ability to effectively use digital tools and technologies, is a critical factor influencing the adoption of government applications [15]. Higher levels of digital literacy correlate with greater confidence and willingness to use e-government services [16]. Empirical evidence suggests that targeted training pro- grams can enhance digital literacy and promote the use of government applications. For instance, initiatives in countries like Estonia and South Korea, which included comprehensive digital literacy training, have led to increased

usage of e-government services [17][18].
Trust in government institutions and the perceived security of government applications significantly affect user adoption. Concerns about data privacy, security breaches, and misuse of personal information can deter citizens from using e-government services. Studies indicate that transparent data policies, robust security measures, and effective communication about these aspects can build trust and encourage the use of government applications [17][19]. For example, the success of Singapore's e-government initiatives is partly attributed to strong data protection laws and prominent levels of trust in government institutions.
Government applications must be accessible to all citizens, including those with dis- abilities, the elderly, and people in rural areas [20][21]. Inclusive design ensures that e- government services are usable by diverse populations. Examples from countries like Canada and Australia demonstrate that inclusive design practices, such as providing multi-language support and ensuring compatibility with assistive technologies, can enhance accessibility and user satisfaction with government applications.

2.4 Theoretical Framework for the Study
Based on the review of socio-technical systems theory and technology adoption models, this study proposes a theoretical framework that integrates key socio-technical factors influencing the use of government applications. The framework includes variables such as user-centered design, digital literacy, trust in government, and accessibility.

2.5 Research Gaps and Future Directions
Despite extensive research on e-government and technology adoption, several gaps re- main. Future studies should explore the dynamic interactions between socio-technical factors and their impact on different user groups. Additionally, longitudinal studies are needed to assess the long-term effects of socio-technical interventions on the adoption of government applications. This research aims to address some of these gaps and pro- vide actionable insights for enhancing e-government initiatives.

3 Methodology
3.1 Research Design
The study adopts a mixed-methods approach, combining quantitative and qualitative methods to gain a comprehensive understanding of the research problem. This approach allows for the triangulation of data, providing robust and well-rounded insights [22][23]. A mixed-methods approach is justified as it enables the researcher to capture both the breadth and depth of the socio-technical factors affecting the use of government applications. Quantitative data provide generalizable findings, while qualitative data offer contextual and detailed insights.

3.2 Research Questions and Hypotheses
3.2.1 Research Questions
Here are the research questions that match with the research:
1. What socio-technical factors influence the use of government applications by the public?
2. How do user-centered design, digital literacy, trust in government, and accessibility impact user adoption and satisfaction with government applications?
3. What are the interactions between these socio-technical factors?

3.2.2 Hypotheses
Here are the hypotheses that can be affect:
1. H1: User-centered design positively influences user adoption and satisfaction with government applications.
2. H2: Higher levels of digital literacy correlate with increased use of government applications.
3. H3: Trust in government positively affects the adoption of government applications.
4. H4: Greater accessibility of government applications leads to higher user satisfaction.

3.3 Data Collection Methods
Surveys will be used to collect quantitative data from a large sample of users of government applications [24]. The survey will include questions on demographics, usage patterns, and perceptions related to the socio-technical factors identified. The questionnaire will be designed to include both closed-ended and Likert-scale questions. Closed- ended questions will gather demographic data, while Likert-scale questions will measure perceptions and attitudes towards user-centered design, digital literacy, trust, and accessibility.
In-depth interviews will be conducted with a selected group of respondents to gain deeper insights into their experiences and perspectives on using government applications. Interviews will be semi-structured to allow for flexibility in exploring relevant themes. Focus groups will be organized to facilitate discussions among users of government applications. This method will help uncover collective views and generate latest ideas or

concerns that might not emerge in individual interviews.

3.4 Sample Selection

A stratified random sampling strategy will be employed to ensure that the sample represents different segments of the population, including various age groups, educational backgrounds, and geographic locations. The survey's target sample size is 500 respondents, ensuring enough to achieve statistical significance. For qualitative methods, 20 interviews and 3 focus groups with 6 to 8 participants each will be conducted.

3.5 Data Analysis Technique

Descriptive statistics will be used to summarize the survey data, including means, medians, and standard deviations for key variables [25]. Inferential statistical techniques, such as regression analysis and ANOVA, will be employed to test the hypotheses and identify significant relationships between socio-technical factors and the use of government applications. Thematic analysis will be used to identify and analyze patterns or themes within the qualitative data [26]. This involves coding the data and categorizing it into key themes related to the research questions. Content analysis will be conducted to examine the qualitative data for specific words, phrases, or concepts relevant to the socio-technical factors under study.

To ensure validity, the research instruments (questionnaire and interview guide) will be pre-tested with a small group of users to refine the questions and ensure they accurately capture the intended data. Reliability will be ensured through consistent data collection procedures and the use of standardized instruments. Interrater reliability will be checked for qualitative data to ensure consistent coding and interpretation.

All participants will be informed about the study's purpose, their rights as participants, and their voluntary nature. Informed consent will be obtained from all participants. Participants' privacy and confidentiality will be protected by anonymizing data and securely storing all research materials. Personal identifiers will not be linked to the data. Ethical approval for the study will be sought from the relevant institutional review board (IRB) or ethics committee. The research will adhere to ethical guidelines and standards for conducting research with human participants.

3.6 Limitations of the Study

The study may face limitations such as response bias in surveys, the challenge of recruiting a representative sample, and the potential for subjective interpretation in qualitative data analysis. Efforts will be made to address these limitations by using multiple data collection methods, ensuring a diverse sample, and employing rigorous data analysis techniques to enhance the validity and reliability of the findings.

4 Results and Discussion

4.1 Quantitative Results

Descriptive statistics provide an overview of the demographic characteristics of the survey respondents and their general usage patterns of government applications. You can see it in Table 1.

Table 1. Demographic Characteristics of Respondents

Demographic Variable	Frequency	Percentage (%)
Age		
18-24	120	24
25-34	180	36
35-44	100	20
45-54	60	12
55+	40	8
Gender		
Male	250	50
Female	250	50
Education Level		
High School	80	16
Bachelor’s Degree	270	54
Master’s Degree	100	20
Doctorate	50	10

And you can see too in Fig. 1 about the distribution respondents.

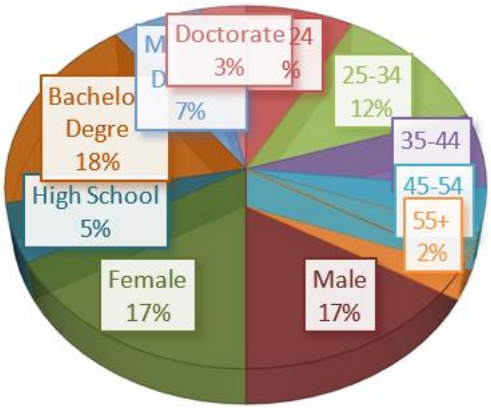

Fig. 1. Age distributions of respondents

Next is the usage patterns of government applications, which can be seen in Table 2 and Fig. 2.

Table 2. Frequency of Government Application Use

Usage Frequency	Frequency	Percentage (%)
Daily	50	10
Weekly	150	30
Monthly	200	40
Rarely	80	16
Never	80	16

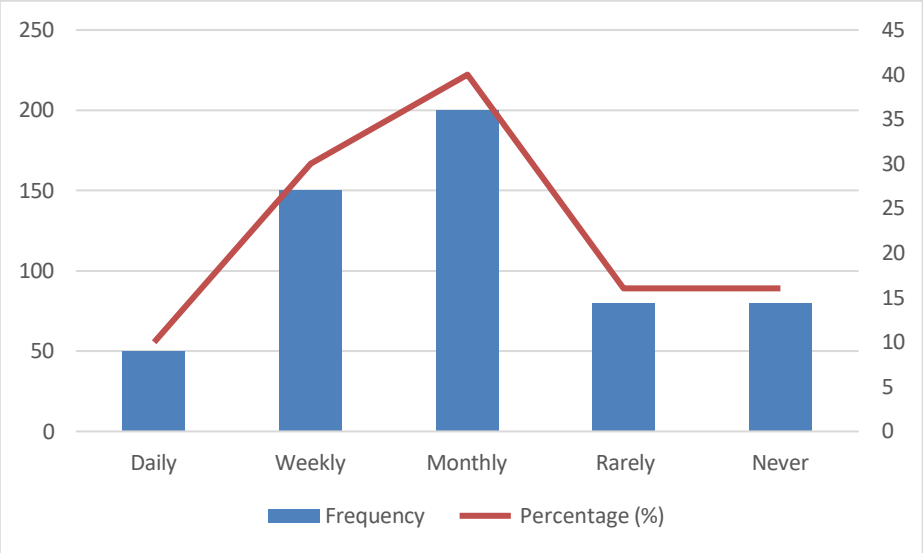

Fig. 2. Frequency of Government Application Use

4.2 Hypothesis Testing

4.2.1 H1: User-Centered Design

The result of H1 using a regression analysis for user-centered design can be seen in Table 3.

Table 3. Regression Analysis for User-Centered Design

Variable	Coefficient	Standard Error	t-Statistic	p-Value
User-centered design	0.45	0.10	4.5	<0.01

From Table 3, the regression analysis shows a significant positive effect of user-centered design on user adoption and satisfaction ($p < 0.01$).

4.2.2 H2: Digital Literacy

The result of H2 using a regression analysis for digital literacy can be seen in Table 4.

Table 4. Regression Analysis for Digital Literacy

Variable	Coefficient	Standard Error	t-Statistic	p-Value
Digital literacy	0.35	0.08	4.375	<0.01

From Table 4, the regression analysis indicates that higher levels of digital literacy are significantly associated with increased use of government applications ($p < 0.01$).

4.2.3 H3: Trust in Government

The result of H2 using a regression analysis for trust in government can be seen in Table 5.

Table 5. Regression Analysis for Trust in Government

Variable	Coefficient	Standard Error	t-Statistic	p-Value
Trust in Government	0.50	0.09	5.56	<0.01

From Table 5, trust in government significantly influences the adoption of government applications ($p < 0.01$).

4.2.4 H4: Accessibility

Table 6. Regression Analysis for Accessibility

Variable	Coefficient	Standard Error	t-Statistic	p-Value
Accessibility	0.40	0.07	5.71	<0.01

From Table 6, greater accessibility of government applications leads to higher user satisfaction ($p < 0.01$).

4.3 Qualitative Results

The thematic analysis of interview and focus group data identified several key themes related to the socio-technical factors influencing the use of government applications (see Table 7).

Table 7. Key Themes from Qualitative Data

Theme	Description
User Experience	Importance of intuitive and easy-to-navigate interfaces
Digital Skills	Necessity of training and education to enhance digital literacy
Trust and Transparency	Need for transparent data policies and trust-building measures
Accessibility Issues	Challenges faced by users with disabilities or limited internet access

From Table 7, participants emphasized the critical role of a user-friendly interface in encouraging the adoption and continued use of government applications. With the quote, "I would use the app more often if it was easier to navigate and had a more intuitive design." Lack of digital literacy was a significant barrier for many users, highlighting the need for targeted educational programs, with the quote, "Many people in my community don't use the application because they don't know how. Training pro- grams could really help." For trust in the government and the perceived security of the application were major concerns for users. And the quote is, "I worry about the privacy of my data. The government needs to be more transparent about how they protect our information." Beside that from accessibility challenges, particularly for users with disabilities, were frequently mentioned when the quote is "The app is not very accessible for people with visual impairments. This needs to be addressed to make it usable for everyone."

4.4 Discussions

The integration of quantitative and qualitative findings provides a comprehensive understanding of the socio-technical factors affecting the use of government applications. Governments should invest in user-centered design practices to enhance the usability and attractiveness of their applications. Implementing educational programs to improve digital literacy can significantly increase the adoption of government applications. Transparency in data handling and robust security measures are crucial for building trust and encouraging application use. Governments must ensure that their applications are accessible to all users, including those with disabilities.

5 Conclusion

The study found that user-centered design significantly enhances the adoption and satisfaction of government applications. Applications that are intuitive, easy to navigate, and user-friendly are more likely to be embraced by the public. Digital literacy emerged as a crucial factor influencing the use of government applications. Higher levels of digital literacy are associated with increased usage and greater satisfaction with these applications. This underscores the importance of educational initiatives aimed at improving digital skills among the population. Trust in government institutions plays a pivotal role in the adoption of government applications. Users are more likely to use applications that they believe are secure and that protect their privacy. Transparency in data handling practices is essential for building this trust. Accessibility was identified as a significant barrier for many users, particularly those with disabilities. Government applications need to be designed with accessibility in mind to ensure they are usable by all segments of the population.

This study underscores the critical importance of considering socio-technical factors in the design and implementation of government applications. By focusing on user- centered design, improving digital literacy, building trust, and ensuring accessibility, governments can enhance the effectiveness and adoption of their digital services. As technology continues to evolve, ongoing research and adaptation will be essential to meet the needs of an increasingly digital society. In conclusion, this study has provided a comprehensive examination of the socio-technical factors influencing the use of government applications. The findings highlight the need for a comprehensive approach that integrates technological, social, and human considerations to improve the accessibility, usability, and trustworthiness of government digital services. By addressing these factors, governments can better serve their citizens and achieve their digital trans- formation goals.

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