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Determinants of E-Government Portal Adoption in Pakistan: Evidence from Diffusion of Innovations Theory

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Abstract

Electronic government is the use of the internet to provide government facilities and services, at any time and from anywhere. Successful e-government implementation through portals necessitates a thorough grasp of the system as well as the resolution of technical and non-technical difficulties from the standpoint of citizens. Several countries, notably developing countries, are implementing e-government systems; yet, the utilization pattern remains unclear. The ultimate goal of this study was to discover the determining factors for the adoption of e-government portals in Pakistan from citizens' viewpoints, using the Diffusion of Innovation Theory. To collect user perception, the study used a quantitative cross-sectional technique, with a Likert scale questionnaire survey. The survey included 345 residents from the urban areas of Sindh, Pakistan. Participants were chosen based on their familiarity with e-government portals, relevance, and convenience. The study used path analysis with AMOS software and structural equation modeling to examine the complex relationships between variables. The results show that behavioral intentions to use e-government portals are positively and significantly impacted by the Trialability, Observability, and Relative Advantage variables. The Compatibility and Complexity variables did not, however, appear to have a positive impact on behavioral intentions for the adoption of e-government sites. The study suggests that in order to boost e-government portal adoption, the government should make successful e-government portal usage more visible, offer opportunities for users to test out such services, and clearly communicate the perceived advantages of e-government portals over traditional methods.

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Keywords: E-government, e-government portals, e-government portals adoption, Diffusion of Innovation Theory, Behavioral intentions to use e-government.

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INTRODUCTION

The term "electronic government" refers to the delivery of government services and amenities via the Internet at any time and from any location (Abu-Shanab, 2014). E-Government improves the delivery of government services, streamlines administrative processes, and links government and citizens. The overall goal of e-government is to employ digital technology to improve government efficiency, effectiveness, and transparency. The Internet is the primary source that influences citizens' intentions to accept and use e-government services. E-government has become an important tool for helping and managing public services and facilities in recent years (Rana et al., 2017). Furthermore, the government understands the need to present transparent information in accordance with good governance (Jurisch et al., 2015). The adoption and acceptance of e-government services facilitate the delivery of potential advantages to the public, government agencies, and commercial sector (Alzahrani et al., 2017).

E-government portals are centralized online platforms that provide a single point of access to multiple government services, such as online transactions, information, and forms. They improve citizen-government interactions by connecting individuals, businesses, and other stakeholders to government institutions and services. Portals enable effective interaction and collaboration among citizens, corporations, and governments.

Some popular e-government service delivery portals in Pakistan include:

- The Pakistan Citizen Portal is a mobile app that allows citizens to report grievances online.
- Online Tax Filing: Pakistan's Federal Board of Revenue launched an online system for residents and businesses to file their tax returns.
- NADRA Portal: The National Database and Registration Authority offer online services for Computerized National Identity Card issuance/renewal, verification, cancellation, and registration of family members.
- Online Utility Bill Payments: Several Pakistani utility firms, such as Water & Power Development Authority, Sui Northern Gas Pipelines Limited, Sui Southern Gas Company, and Pakistan Telecommunications Limited, etc., permit residents to use online banking or mobile banking apps for bill payment for gas, water, electricity, and Internet utilities.
- Higher Education Commission Portal: The Pakistani Higher Education Commission launched online services for college students, such as online degree verification and scholarship application submission.
- E-Police: Some provinces have adopted e-police systems, which were started by the Punjab province and enable individuals to report crimes online and use digital platforms to access specific police services. An e-government portal is a way to provide enterprises, governments, and the general public with a variety of services.

Numerous studies examine the obstacles to the use of e-government, including institutional and technical barriers, the difficulty of managing records, data accessibility, data usage, data deposition, information quality, and regulation (Wang & Lo, 2016). E-government is the provision of government services and facilities via the Internet at any time or location (Alzahrani et al., 2017). Furthermore, taking into account the viewpoint of the populace, e-government deployment and adoption ensure not only the technical setups' readiness and accessibility but also other processes, such as organizational and social willingness. Therefore, a thorough understanding of the system is necessary for the successful deployment of e-government. Likewise, the examination of different technical and non-technical issues is crucial.

The purpose of the study is to look at what factors influence users' adoption of electronic government portals. The goal is explicitly broken down into the following objectives based on the Diffusion of Innovation Theory:

- To investigate the impact of Relative Advantage on the citizens' adoption of e-government portals.
- To examine the effect of Compatibility on users' adoption of e-government portals.
- To analyze the influence of Complexity on the adoption of e-government portals.

- To assess the role of Trialability in influencing users' adoption of e-government portals.
- To measure the effect of Observability on the adoption of e-government portals.

SIGNIFICANCE OF THE STUDY

The primary aim is to measure the variables that affect citizens' e-government portal adoption behavior. Residents' prompt replies will also enable the government to use e-government to change or enhance the level of governance. It is also crucial to comprehend whether citizens embrace or reject e-government efforts. The main goal of this investigation is to identify the factors that, in the context of Pakistan, help or hinder citizens' adoption and use of government e-portals. The study's conclusions are crucial for government employees, organizations, companies, and strategy makers to recognize the variables that could affect the degree of e-government facility utilization and acceptance. As a result, this research will present a good plan for e-government implementation to the concerned government officials, to increase e-government adoption and usage in the Pakistani context. The findings are also useful for practitioners, scholars, academicians, and policymakers who want to investigate the factors that predict natives' behavior in terms of adopting and using e-government facilities.

LITERATURE REVIEW

Diffusion Of Innovation Theory

The Diffusion of Innovation Theory explains how information technology innovation influences individuals and is adopted. According to this idea, a new technology is one that people are unfamiliar with in a certain setting of a society, and knowledge about the innovation spreads from person to person in a social context, which is known as diffusion (Robertson, 1967). The theory describes five critical elements for effective innovation adoption: relative benefit, compatibility, complexity, trialability, and observability (GREENHALGH et al., 2004). The magnitude of relative advantage is determined by how the user perceives they will profit from using the innovation. The compatibility of an innovation is determined by how well it fits inside the social and technical surroundings (Mustonen-Ollila & Lyytinen, 2003).

The adoption and dissemination of innovation are largely determined by how well it fits with current values, past experiences, and user needs (Dearing, 2009). Complexity refers to users' perceptions of how difficult it is to understand, learn, and apply an innovation. The lower the level of complexity, the more likely users will adopt and accept it. Trialability refers to an innovation's ability to be employed for a trial time without the need for adoption and with a low financial investment. Potential adopters are allowed to test the idea before committing to utilizing it. People are more likely to choose an invention with a higher trialability rate. Finally, the observability of innovation is addressed, as is the transparency of the benefits obtained by anticipated users. If users perceive the benefits of an invention, they will quickly adopt it (Sanson-Fisher, 2004). Furthermore, Rogers notes that time, channels of communication, and social situations are all important factors in the diffusion of innovations. The communication channel is responsible for the medium of information used by humans for innovation and its perceived usefulness (Dingfelder & Mandell, 2011).

THEORETICAL FRAMEWORK

This study is theoretically grounded on the Diffusion of Innovations Theory. The constructs of the framework are;

i) Behavioral Intentions

Behavioral intention has been identified as the key variable in the current study, allowing the researcher to assess individuals' intentions to use e-government services. It is widely acknowledged that e-government's contribution to the convenience of electronic transactions is judged effective when considering people's viewpoints. The value of the diffusion is determined by the extent to which citizens want to use its services, regardless of the opportunities and rewards associated with using e-government services. As a result, various factors influence persons' behavioral intentions (Lee, 2004). These elements have varying degrees of influence on each citizen. As a result, behavioral intention has been characterized in various technology adoption research projects to predict technology adoption, including the Theory of Planned Behavior, Diffusion of Innovation Theory, Technology Acceptance Model, and Unified Theory of Acceptance and Use of Technology.

ii) Predictors of Behavioral Intention

- Relative Advantage

Users believe that involving the innovation adoption process is a rational decision in assessing the new technology's advantage for personal and business use. Citizens' and organizations' trust is considered crucial when adopting a technology that demonstrates that a certain technology would provide value to its current state (Bradford & Florin, 2003). This demonstrates that citizens are more likely to adopt e-government when they view a new technology as advantageous or beneficial.

- Compatibility.

Compatibility is defined as the extent to which innovation is consistent with the expected end users' present standards and principles of behavior, requirements, and prior experiences. It has been demonstrated that higher levels of perceived compatibility are positively related to higher levels of intention to use (Colesca & Dobrica, 2008).

- Complexity

Complexity in the digital framework and use are individual constraints that limit the use of e-government since it requires new skills, takes more time, and creates irritation (Carter & Bélanger, 2005). In other words, technological innovation or e-government may provide obstacles since the advancements are difficult for people to understand. On the other hand, easy-to-use software and technology will drive e-government adoption (Carter et al., 2016).

- Trialability.

The intention to use is positively influenced by its trialability. Studies from several domains have discovered links between perceived attitude and trialability. Md Nor, Pearson, and Ahmad believe that e-government adoption has a significant and favorable impact on attitude, taking into account the utilization of technology.

- Observability

It has been proposed that citizens can better observe the repercussions of adoption from individuals who have already accepted the technology. According to (Chang, 2010), observability influences the extent to which an innovation is adopted. Culture and language have been shown to have an impact on low-observable innovations.

In other words, ambiguous and abstract inventions are typically difficult to monitor, resulting in slow acceptance due to their ambiguity.

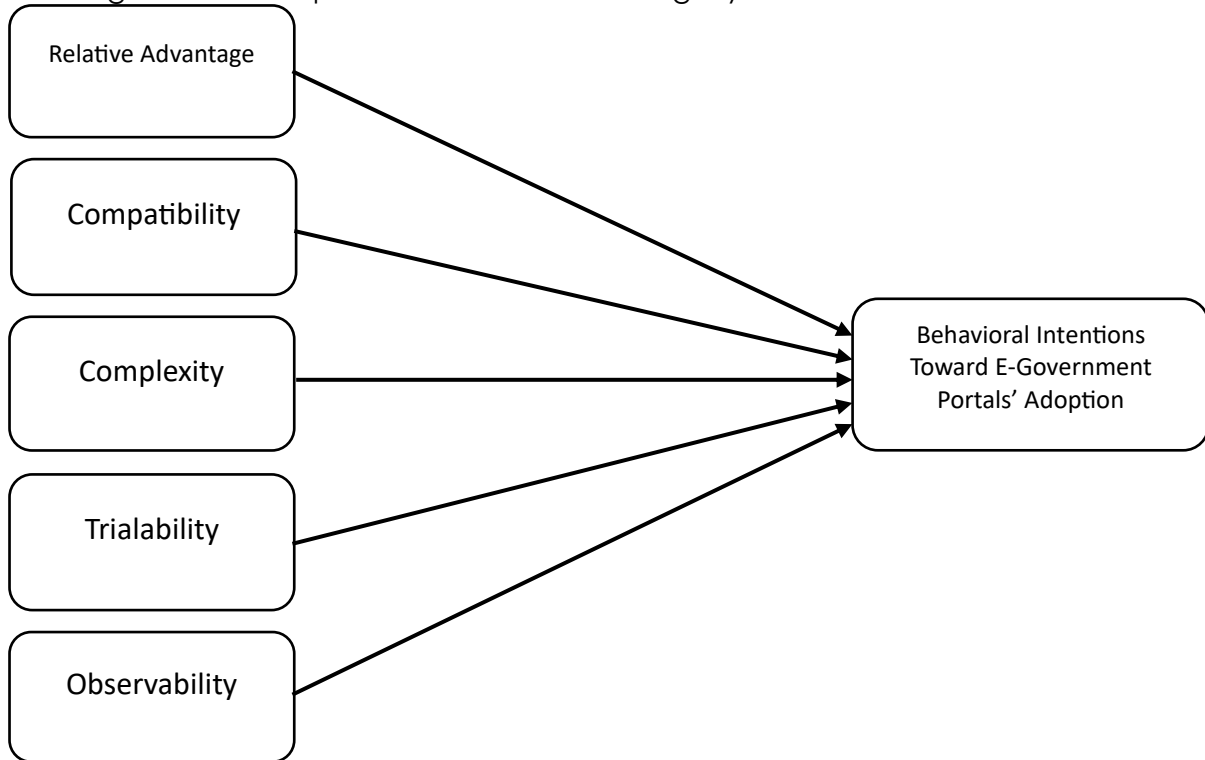


Figure 1.
Theoretical Framework of the Study

RESEARCH HYPOTHESES

H1: Relative advantage significantly influences citizens' behavioral intention to use e-government portals.

H2: Compatibility significantly influences citizens' behavioral intention to use e-government portals.

H3: Complexity significantly influences citizens' behavioral intention to use e-Government portals.

H4: Trialability significantly influences citizens' behavioral intention to use e-government portals.

H5: Observability significantly influences citizens' behavioral intention to use e-government portals.

MATERIALS AND METHODS

Research Design

Based upon the positivist research philosophy and deductive approach, this study seeks to measure relationships using empirical data. The research used a quantitative research methodology using a survey design to identify the factors influencing the adoption of e-government portals in Sindh, Pakistan. Furthermore, data were collected using a cross-sectional approach, collecting responses from participants at a single point in time.

Sampling Technique

This study employed a non-probability sampling approach using purposive sampling to select respondents from the accessible population. Non-probability sampling is commonly used when the population is not clearly defined, and equal participation chances cannot be ensured. The purposive sampling allows the researcher to select participants based on their knowledge, experience, and relevance to the research area under investigation. In this study, respondents were intentionally chosen based on their familiarity with e-government services, ensuring that the collected data accurately reflects informed perceptions regarding the adoption of e-government portals.

Sample Size

This study used an internet tool to calculate the sample size (References: *A-Priori Sample Size for Structural Equation Models*, n.d.).

Anticipated effect size: ?

Desired statistical power level: ?

Number of latent variables: ?

Number of observed variables: ?

Probability level: ?

Calculate!

Minimum sample size to detect effect: 256

Minimum sample size for model structure: 88

Recommended minimum sample size: 256

Figure 2.

Online Sample Size Calculator

The moderate effect size was 0.30, and the 0.95 statistical power was used to minimize the error margin to 0.05, allowing us to determine the minimal sample size required and appropriate for this model. Thus, by evaluating the sample size for the given model structure, it was determined that the minimal number of sample responses needed to assess the model is 256.

Target and Accessible Population

The study's goal was to analyze citizens' perceptions of the use of e-government portals in Pakistan. This pick was based on the fact that Pakistan is one of 64 countries that have just formally established their e-government portal on a national basis.

From the target population, the urban cities of Sindh, including Karachi, Hyderabad, Sukkur, Mirpur Khas, Tando Jam, Badin, Dadu, Thatta, etc were selected as the selected population of the study.

Data Collection Instrument

The questionnaire was designed using a five-point Likert rating scale, using construct measures adopted from previous research (Carter & Bélanger, 2005) (Colesca &

Dobrica, 2008) (McDonald & Siegal, 1992). The questionnaire contained 27 items that represented the constructs of the study framework.

Data Collection Method

This study collected data using the key informant technique. According to the exploratory data analysis, operations managers, tour consultants, general managers, marketing managers, and owners are responsible for operation management on a daily basis. This study's data were collected using a questionnaire and the survey method. The questionnaire for this study was administered in person using a face-to-face survey technique.

Reliability and Validity

Reliability refers to the degree to which a study's measures are error-free and capable of producing consistent results. Reliability also shows the consistency of results when the same measurement is taken several times with the same sample. The internal consistency demonstrates the relationship between each question's responses and the others. Though there are other techniques for this, the most used is Cronbach's Alpha, which indicates the degree of correlation on a scale (Malhotra et al., 2006). Cronbach's alpha ranges from 0 to 1. The higher the Cronbach's Alpha score, the greater the reliability.

Ethical Considerations

The study adhered to Dillman and Smyth's research ethics criteria (Dillman & Smyth, 2007). Before the study began, the subjects' agreement was acquired. Participants were given a clear explanation of the study's goal and were free to leave at any moment. It was made clear that the information gathered would only be utilized for the research project that was agreed upon with them. They were also told that the data collected would be kept private and not shared with anybody.

RESULTS

Piloting Study

To measure the internal consistency of the measurement tool before the actual data collection, it is recommended to have at least 50 participants (Sim & Lewis, 2012).

Table 1.
Piloting Study Statistics (n = 50)

Constructs	N Items	Cronbach's Alpha
Trialability	5	0.907
Observability	5	0.783
Relative Advantage	5	0.827
Compatibility	4	0.842
Complexity	4	0.850
Behavioral Intention	4	0.908

The results demonstrate that all the constructs under study have a greater Cronbach Alpha value of generally accepted 0.7 this indicates the internal consistency among items for the questionnaire.

Table 2.
Demographic Profile of the Respondents (n = 345)

Demographic	Categories	Frequency	Percent
Gender	Male	246	71.3
	Female	99	28.7
Age Group	Less than 20 years	20	5.8
	21 – 30 years	133	38.6
	31 – 40 years	146	42.3
	41 – 50 years	33	9.6
	60 years and above	13	3.8
Academic Qualification	Intermediate	89	25.8
	Undergraduate	52	15.1
	Graduate	169	49.0
	Post-Graduate	35	10.1
Occupation	Private sector employee	92	26.7
	State enterprise employee	74	21.4
	Government employee	54	15.7
	Students	72	20.9
	Unemployed	53	15.4
Years of Internet use	1 – 3 years	85	24.6
	3 – 5 years	70	20.3
	5 – 7 years	37	10.7
	7 – 10 years	74	21.4
	More than 10 years	79	22.9
Marital Status	Single	71	20.6
	Married	167	48.4
	Separated	70	20.3
	Divorced	37	10.7

Model Fitness

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Goodness of Fit (GoF)

Fitness Indices	Threshold	CFA	Decision
Chi-square (CMIN)	-	717.902	-
Degree of freedom (DF)	-	370	-
CMIN/DF	< 3.00	1.940	Excellent
Comparative Fit Index (CFI)	> 0.90	0.949	Acceptable
Normed Fit Index (NFI)	> 0.90	0.901	Excellent
Incremental Fit Index (IFI)	> 0.90	0.950	Excellent
Tucker-Lewis Index (TLI)	> 0.90	0.940	Excellent
Goodness of Fit Index (GFI)	> 0.90	0.884	Acceptable
Adjusted Goodness of Fit Index (AGFI)	> 0.90	0.854	Acceptable
Standardized Root Mean Square Residual (SRMR)	< 0.08	0.052	Excellent

Root Mean Square Error of Approximation (RMSEA)	< 0.08	0.052	Excellent
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The yielded insights reveal that the model fit indices have achieved their recommended thresholds, providing adequate model fitness of the confirmatory factor analysis model.

Structural Model

Table 4.
Goodness of Fit (GoF)

Fitness Indices	Threshold	SEM	Decision
Chi-square (CMIN)	-	933.380	-
Degree of freedom (df)	-	392	-
CMIN/df	< 3.00	2.381	Excellent
Comparative Fit Index (CFI)	> 0.90	0.921	Acceptable
Normed Fit Index (NFI)	> 0.90	0.871	Poor
Incremental Fit Index (IFI)	> 0.90	0.921	Excellent
Tucker-Lewis Index (TLI)	> 0.90	0.912	Excellent
Goodness of Fit Index (GFI)	> 0.90	0.849	Poor
Adjusted Goodness of Fit Index (AGFI)	> 0.90	0.820	Poor
Standardized Root Mean Square Residual (SRMR)	< 0.10		Poor
Root Mean Square Error of Approximation (RMSEA)	< 0.08	0.063	Excellent

The structural model's model fitness table above demonstrated that CMIN/DF has reached its threshold. According to their suggested threshold, IFI, TLI, and RMSEA have also been attained in the structural model (Astrachan et al., 2014). Furthermore, the structural model of the study has also met a significant threshold for CFI, which has recommended a threshold of 90 percent for sufficient model fitness. To meet the requirement for adequate model fitness, at least three model fitness indices should be attained; however, NFI, GFI, AGFI, and SRMR have been discovered to have slightly weaker model fitness than the suggested thresholds. The structural model of the current investigation has satisfactory model fitness, as the preceding table shown.

Path Analysis

The set hypotheses were tested using path analysis using AMOS and yielded the results.

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Hypothesis-testing using path analysis

Hypothesized Relationship	Estimate	S.E.	T-Stats	Prob.
Trialability → Behavioral Intention	0.292	0.050	5.806	0.000
Observability → Behavioral Intention	0.541	0.075	7.205	0.000
Relative Advantage → Behavioral Intention	0.288	0.046	6.198	0.000
Compatibility → Behavioral Intention	0.031	0.074	0.415	0.678
Complexity → Behavioral Intention	0.018	0.038	0.482	0.630

The results indicate that the Behavioral intention to adopt e-Government portals was found to be positively and significantly correlated with trialability (0.292, $p < 0.05$), observability (0.541, $p < 0.05$), and relative advantage (0.288, $p < 0.05$) while

compatibility (0.031, $p > 0.05$) and complexity (0.018, $p > 0.05$) have a positive but insignificant relationship with behavioral intention to use e-Government portals.

Squared Multiple Correlation

Squared multiple correlations were used to forecast the model's strength and the extent to which all exogenous constructs explained variability in endogenous latent constructs.

Table 6.
Squared Multiple Correlations

Endogenous Construct	R-Square
Behavioral Intention	0.381

According to Cohen, (2013), all exogenous factors in the model can predict behavioral intention to adopt e-government portals by up to 38.1%. As a result, it has been demonstrated that behavioral intention toward using e-government portals has significant predictive potential.

CONCLUSION

The ultimate goal of this study was to identify and examine the variables influencing Pakistani users' inclinations to adopt e-government portals. The study used a correlational research technique to understand how different factors affect users' behavioral intention to embrace e-government websites in Pakistan in order to accomplish the target and associated objectives. The study looked into the effects of factors related to Rogers' Innovation Diffusion Theory. To examine the complex interactions between variables, the study used structural equation modeling with path analysis using AMOS software. Within the given theoretical framework, this method made it possible to examine both direct and indirect impacts. Relative advantage, compatibility, complexity, trialability, and observability were all examined in relation to behavioral intentions.

SUMMARY OF THE FINDINGS

The path analysis using SEM in Amos confirms the positive and significant impact of the Trialability, Observability, and Relative Advantage variables on behavioral intentions for e-government portal adoption; however, the study found no evidence of the positive influence of the Compatibility and Complexity variables on Behavioral Intentions for e-government portal adoption.

RECOMMENDATIONS

The following suggestions are made to boost the use of e-government portals in light of the study's findings. In order to promote widespread adoption, managers should concentrate on making e-government portals more visible in Pakistan by utilizing the idea of observability. Managers should also make sure that e-government services are seen as practical and simple to use, stressing trialability by offering additional advantages like quick service and easy access. Additionally, managers might start a nationwide e-government awareness campaign to educate citizens, particularly those from lower socioeconomic groups, about the benefits of e-government services, emphasizing the altered services and related advantages. Stressing the growth of contentment and a reduction in adverse adoption-related outcomes.

LIMITATIONS

The study has some limitations due to financial and time constraints. The study was also limited to metropolitan regions in Pakistan's Sindh province. Furthermore, the current study is limited to a quantitative approach based on a five-point Likert scale survey. Furthermore, the study was limited to a cross-sectional design. Despite these limitations, the study has significant implications for the adoption of e-government services in nations such as Pakistan.

FUTURE RESEARCH

Because the concept of e-governments is growing, future e-government research will be required to better understand the relationship between citizens and the government. Future research may look into information quality to see how it influences e-government uptake. Second, the study is based on quantitative data; future studies may use qualitative research methodologies to delve deeper into the aspects that influence e-government adoption. Finally, in future studies, researchers may involve individuals from different nations to learn about their viewpoints. This allows the researchers to conduct a cross-national analysis of the factors influencing the adoption of e-government.

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Consent to Participate: Yes

Consent for publication and Ethical approval: Because this study does not include human or animal data, ethical approval is not required for publication. All authors have given their consent.

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