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C O N T E N T S

An Evaluation of Factors Influencing Citizens' Adoption of E-Governance Services in Goa

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Abstract

E-governance is not limited to the presence of a government website on the internet. In recent years, there has been a global trend of governments making significant strides in making their services and information accessible online. This shift towards digital governance reflects a growing recognition of the transformative potential of information and communication technologies (ICTs) in public administration. In an era where digital transformation is a key driver in public administration, it is essential to understand the determinants that enable the effective use of e-governance services.

Therefore, this study examines the crucial factors that influence citizens' adoption of e-governance services within contemporary governance frameworks, with a specific focus on the state of Goa, India. The extended Unified Theory of Acceptance and Use of Technology (UTAUT) is employed to evaluate the factors that may affect the adoption of e-governance services. Alongside the core constructs of UTAUT —performance expectancy, effort expectancy, social influence, and facilitating conditions —this study also integrates trust as a key determinant.

Data were collected from 417 respondents, all of whom are citizens who directly utilise e-governance services. A structured questionnaire using a 7-point Likert scale was employed through a stratified sampling technique.

The research employs Partial Least Squares-Structural Equation Modelling (PLS-SEM) through SmartPLS 4.0. The findings revealed that effort expectancy, facilitating conditions, performance expectancy, social influence, and trust are significant factors positively influencing the adoption of e-governance services.

These findings provide significant insights for policymakers, technologists, and administrative bodies seeking to enhance the adoption of e-governance systems, aiming to integrate technology more effectively into governance structures. Furthermore, this research enriches the existing literature on e-governance adoption in developing countries, adding substantial value to the field of study

Keywords: Adoption, Determinants, E-Governance Services, Technology, UTAUT Model.

Introduction

The application of information and communication technology (ICT) to improve public administration services and efficiency began in the latter half of the twentieth century (Ramirez-Madrid et al., 2024). As the use of ICT has expanded, the interaction between government and citizens has evolved, becoming a transformative force that shapes administrative landscapes worldwide (Alhadid et al., 2022; Heeks, 2006). The use of relevant ICT tools, such as the internet, to address the needs of citizens, businesses, and the general public in accessing quality public services is referred to as e-governance (Mensah & Adams, 2020). Governments around the globe are exploring the digital landscape to enhance service delivery, promote transparency, and engage citizens more effectively (Sofyani et al., 2020; Dawes, 2008). It is essential to build on existing research to provide nuanced insights into the diverse factors influencing e-governance adoption (Ilieva et al., 2024; Andersen & Henriksen, 2006) as we embark on this exploration.

Norris and Reddick (2013) stress the need for comprehensive studies to uncover the complexities of e-governance adoption and its implications. Their work emphasises the gap between citizen expectations and institutional frameworks in digital governance. The adoption of e-governance services has become a key focus in discussions about administrative efficiency, citizen engagement, and overall governance effectiveness (Gil-Garcia & Pardo, 2005). As governments aim to integrate artificial intelligence to enhance governance structures, understanding the underlying factors becomes essential (Gil-Garcia et al., 2012; Fountain et al., 2002).

Despite the growing adoption of digital platforms worldwide, many citizens remain hesitant to fully engage with e-governance services (Rana et al., 2015). This reluctance can hinder the broader goals of transparency, efficiency, and accessibility that e-governance seeks to provide. Identifying and assessing the key factors affecting e-governance adoption is essential for understanding how to increase citizen engagement and satisfaction, overcome potential barriers, and create a more inclusive digital governance landscape. When e-governance services are effective, citizens perceive the government as more responsive and trustworthy, which positively influences their willingness to adopt these services (Carter & Bélanger, 2005; Rana et al., 2015).

Research on e-governance emphasises the importance of citizen-centred design to boost adoption and engagement. Studies indicate that understanding citizens' needs helps inform better policies and interface designs, making digital services more intuitive and accessible (Alryalat et al., 2017; Venkatesh et al., 2012). Targeted interventions, such as digital literacy programs and inclusive designs, can help reduce barriers and promote digital inclusivity (Zaidi et al., 2021; Dwivedi et al., 2012). Research on technology adoption in e-governance identifies determinants, including perceived service quality, trust, and citizen satisfaction, as key factors influencing adoption behaviour (Dwivedi et al., 2019; Alawadhi & Morris, 2008).

Prior studies on e-governance adoption have been relatively limited in developing countries (Weerakkody et al., 2013; Ahmad et al., 2013). Given this context, it is crucial to explore the specific factors that shape the adoption of e-governance services. This paper conducts an analytical examination of the determinants influencing e-governance adoption, utilising a robust measurement model supported by reliability and validity assessments to explore the complexities involved.

Research Question and Objective

This study aims to answer the following research question:

What are the key factors that influence citizens' adoption of e-governance services?

Consequently, the primary objective of this research is to identify and evaluate the determinants that affect the adoption of e-governance services among the citizens of Goa.

Theoretical Framework and Hypotheses Development

Theoretical Framework: Unified Theory of Acceptance and Use of Technology (UTAUT)

Earlier studies suggest several factors that influence an individual's decision to adopt e-governance services (Xin et al., 2022). Different researchers have attempted to provide insights into the implementation, acceptance, and diffusion of e-government services in various national contexts (Mensah et al., 2020). Numerous models have been developed to understand the adoption of information technologies, along with the Unified Theory of Acceptance and Use of Technology (UTAUT) model, created by Venkatesh et al. (2003), being one of the most prominent (Wang & Shih, 2009). According to Venkatesh et al. (2003), this model explains 70 % of the variance in individuals' intentions to use technology. Since its introduction, UTAUT has been widely applied and validated across various fields that incorporate information technology, including e-governance (Al-Swidi & Faaeq, 2019; Sawalha et al., 2019; Naranjo-Zolotov et al., 2018). Research on citizens' adoption of e-governance services has explored various perspectives, including studies that offer citizens the option of non-adoption (Distel, 2018; Van De Walle et al., 2018).

The adoption of e-governance services by citizens is a crucial factor in the success of e-governance initiatives (Carter & Bélanger, 2005; Ozkan & Kanat, 2011; Liu et al., 2014). Studying citizens' adoption of e-governance services in developing countries is essential for providing theoretical and practical contributions to the literature (Gupta et al., 2016; Dwivedi et al., 2012). Previously, trust in e-governance services was accepted as a single construct (Warkentin et al., 2002). The existing literature reveals a multifaceted exploration of the determinants influencing the adoption and subsequent impact of these digital initiatives.

This study integrated the UTAUT's constructs and trust to propose a model for adopting e-governance services (Gupta et al., 2008). UTAUT has demonstrated its robustness across diverse frameworks and has been further tested using trust as a determinant (Venkatesh et al., 2016). As a result, researchers concluded that a modified version of the UTAUT model, enhanced with a trust determinant, would be an appropriate analytical framework for examining citizens' adoption of e-governance services. The original model identifies four key factors of technology adoption: effort expectancy, performance expectancy, social influence, and facilitating conditions, all of which are influenced by moderators such as age, gender, experience, and voluntariness (Venkatesh et al., 2003). In the current study, the UTAUT model, illustrated in Figure 1, has been streamlined to emphasise the primary determinants affecting the adoption of e-governance services from the perspective of citizens. The original UTAUT determinants are highlighted, including independent variables such as effort expectancy, performance expectancy, social influence, and facilitating conditions, along with the addition of an extra factor, trust, and the dependent variable, adoption of e-governance services. This additional element has been incorporated into the extended UTAUT model to evaluate citizens' experiences with e-governance services (Weerakkody et al., 2013).

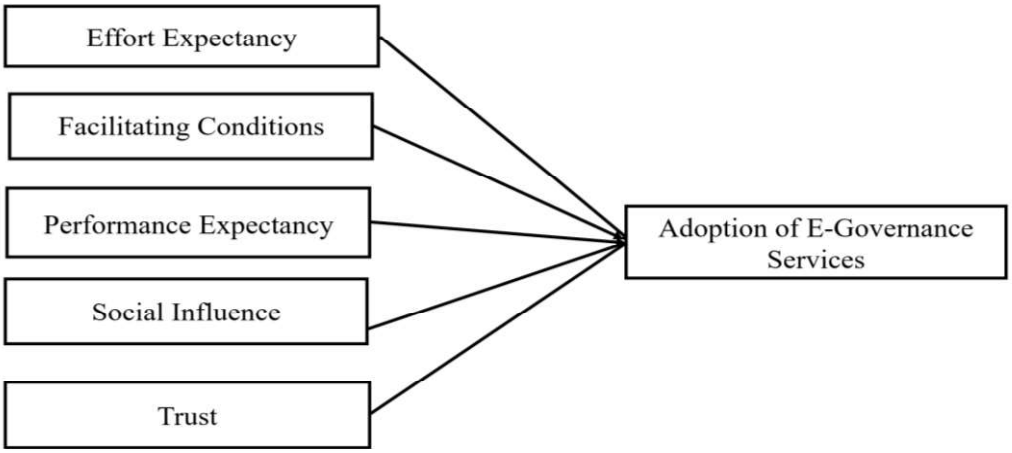

Figure 1: Proposed Research Model

Hypotheses Development

Effort expectancy

'Effort expectancy' refers to "the degree of ease associated with utilising a system" (Venkatesh et al., 2003) or "the level of simplicity tied to its use" (Davis et al., 1989). Research indicates that the easier a technology is to use, the more likely it is to be adopted by users (Mensah et al., 2020). This highlights the significance of user experience in the adoption of technology. Numerous studies have consistently identified a positive and significant relationship between effort expectancy and citizens' adoption of e-governance services (Dwivedi et al., 2017; Gupta, Bhaskar, & Singh, 2016). To enhance adoption, e-governance services should be designed to be clear and straightforward, ensuring accessibility for citizens with varying degrees of internet proficiency (Xin et al., 2022).

Thus, the hypothesis formulated is as follows:

***H_1**: Effort expectancy significantly influences citizens' adoption of e-governance services.*

Facilitating conditions

'Facilitating conditions' are defined as the extent to which an individual perceives that a technical and organisational infrastructure is available to support the utilisation of a system. This concept encompasses elements of perceived behavioural control and compatibility, as noted by Venkatesh et al. (2003). Previous studies have demonstrated the significant influence of facilitating conditions on the adoption of e-governance services (Verkijika & De Wet, 2018). Furthermore, additional research suggests a correlation between facilitating conditions and citizens' acceptance of e-governance (Dwivedi et al., 2017; Sivathanu, 2018; Faulkner, Jorgensen, and Koufariotis, 2019). Consequently, the following hypothesis is established:

***H_2**: Facilitating conditions have a significant influence on the adoption of e-governance services among citizens.*

Performance Expectancy

'Performance expectancy' refers to the extent to which citizens believe that utilising a system will enhance their job performance. This encompasses perceived usefulness, relative advantage, and outcome expectations (Venkatesh et al., 2003). In the context of e-governance, citizens' confidence in their ability to learn and effectively use online government services is assessed through their performance expectations (Xin et al., 2022). Prior research has demonstrated a positive correlation between performance expectancy and the adoption of e-governance services by citizens (Sivathanu, 2018; Dwivedi et al., 2017; Gupta, Bhaskar, & Singh, 2016). Hence, the following hypothesis was framed:

***H_3**: Performance expectancy has a significant influence on the adoption of e-governance services among citizens.*

Social influence

Social influence refers to the extent to which peers affect the utilisation of a particular system and the significance they attach to the beliefs of others regarding the adoption of a new system. It assesses the role of social factors, interactions, and collective opinions on individuals' behavioural decisions concerning the use of government services (Ilieva et al., 2024). Prior research has established a connection between social influence

and citizens' adoption of e-government (Dwivedi et al., 2017). Consequently, the following hypothesis has been formulated:
H_4: Social influence has a significant influence on citizens' adoption of e-governance services.

Trust
Trust can be defined as an attitude of confident expectation that one's vulnerabilities in a risky situation will not be exploited (Alkraiji & Ameen, 2022). Various definitions of trust in the context of online services have emerged in the literature, given that trust is a multifaceted and complex construct that encompasses a wide range of disciplines (Verkijika and De Wet, 2018). Citizen trust is vital to a government's competitiveness as the world increasingly transitions into a digital era (Im et al., 2014). The extent to which citizens trust e-governance services significantly influences their perceptions of the effectiveness and operations of government systems (Alzahrani et al., 2017). Additionally, when citizens who utilise e-governance services report satisfaction, their trust in the government tends to grow (Welch, 2004; Im et al., 2014). Ultimately, trust reflects citizens' confidence in the reliability and security of e-governance systems, which plays a crucial role in shaping their adoption decisions (Alryalat et al., 2023). Hence, the hypothesis has been developed as follows:
***H_5:** Trust has a significant influence on the citizens' adoption of e-governance services.*

Research Methodology
This research employs a quantitative approach to analyse the factors influencing the adoption of e-governance services in Goa, India. Five constructs were identified and adapted from the extended UTAUT framework (Venkatesh et al., 2016). A self-administered questionnaire utilised a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The questionnaires were pilot-tested to ensure clarity, resulting in revisions before finalising the instruments. Data collection involved distributing the questionnaires through stratified sampling, targeting 417 direct users of e-governance services who had utilised at least three different services. The collected data were analysed using Smart PLS. Specifically, Smart PLS version 4.0 was used for structural equation modelling to examine the relationships between the independent variables and the dependent variable.

Data Analysis and Results

Descriptive Analysis
Table 1 presents the demographic composition of the respondents participating in the research, offering insights into key characteristics such as place of residence, gender, age, educational qualifications, occupation, and annual family income.

Table No. 1: Demographic Profile (N=417)

Demographic	Category	Frequency	Percentage
Place of Residence	North Goa	137	32.9
	South Goa	280	67.1
Age (Years)	15-30	110	26.4
	31-45	191	45.8
	46 and above	116	27.8
Gender	Male	191	45.8
	Female	226	54.2
Educational Qualification	Graduate	151	36.2
	Post Graduate	149	35.7
	Professional	117	28.1
Occupation	Student	83	19.9
	Service	169	40.5
	Self Employed	110	26.4
	Retired	55	13.2
Annual Family Income	Up to Rs 500,000	71	17
	Rs. 500,001 - 10,00,000	148	35.5
	Rs.10,00,001- 15,00,000	140	33.6
	Above Rs.15,00,000	58	13.9

***Source**: Authors' compilation using primary data*

In the survey, participants from North Goa made up 32.9%, while those from South Goa accounted for 67.1%. This geographical distribution is important as it offers insights into the regional representation of the survey.

The age distribution of respondents is divided into three groups: 15-30 years, 31-45 years, and 46 years and above. This classification was selected to ensure a balanced representation of different age categories. The majority of participants, comprising 45.8% of the sample, fell within the 31-45 age range. Those aged 15-30 accounted for 26.4%, and 27.8% were 46 years or older.

The survey's gender representation was intentionally balanced, with 54.2% of respondents identifying as female and 45.8% as male. This balanced gender representation is important as it ensures a diverse and representative sample, thereby enhancing the credibility of the survey results.

Participants also varied across a wide range of occupational categories, including students, service workers, the self-employed, and retirees. The student category accounted for 19.9%, the service sector for 40.5%, the self-employed for 26.4%, and retirees for 13.2%. This diverse mix of occupations enhances the exploration of perspectives from different fields, ensuring that everyone's viewpoint is valued and important. Notably, the largest group, constituting 35.5% of the sample, fell within the income bracket of Rs 500,001 to Rs 1,000,000. This income distribution provides a nuanced understanding of the economic diversity among respondents.

Measurement Model Assessments

The assessment of the measurement model is the first step in PLS-SEM analysis, which evaluates the reliability and validity of the identified determinants in the research, specifically focusing on the adoption of e-governance services. The internal consistency reliability of the constructs is measured using Cronbach's alpha and composite reliability, with a threshold of 0.70 for all items. Next, validity is confirmed by examining convergent and discriminant validity. Convergent validity assesses how well the construct explains the variance of its items, using the average variance extracted (AVE), with a threshold of 0.50 or higher (Hair et al., 2017). Discriminant validity determines whether a construct is distinct from others, measured by the Fornell-Larcker criterion, which requires the shared variance for all constructs to be larger than their AVE, and by the heterotrait-monotrait (HTMT) ratio of correlations, where all values should be below 0.85 (Henseler et al., 2015).

Table No. 2: Constructs' Reliability and Validity

Constructs	Variable Code	Factor Loading	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Adoption (AD)	AD1	0.879	0.888	0.889	0.748
	AD2	0.859			
	AD3	0.881			
	AD4	0.84			
Effort expectancy (EE)	EE1	0.906	0.909	0.926	0.733
	EE2	0.816			
	EE3	0.877			
	EE4	0.852			
	EE5	0.827			
Facilitating conditions (FC)	FC1	0.877	0.886	0.904	0.687
	FC2	0.8			
	FC3	0.866			
	FC4	0.786			
	FC5	0.81			
Performance expectancy (PE)	PE1	0.656	0.86	0.863	0.647
	PE2	0.854			
	PE3	0.841			
	PE4	0.826			
	PE5	0.828			
Social influence (SI)	SI1	0.838	0.913	0.924	0.695
	SI2	0.857			
	SI3	0.865			
	SI4	0.818			
	SI5	0.848			
	SI6	0.774			
Trust (TR)	TR1	0.858	0.871	0.887	0.621
	TR2	0.861			

	TR3	0.803			
	TR4	0.852			
	TR5	0.783			
	TR6	0.617			

Source: *Authors' compilation using primary data*

Table 2 provides a comprehensive overview of the reliability and validity. The reliability of the instrument varies from 0.860 to 0.913. This indicates that all the values of the constructs are within the range. Hence, the data is reliable. (Hair et al., 2017). Composite reliability values offer additional insight into the model's internal consistency. High composite reliability values are observed across various factors. For instance, Effort Expectancy displays a composite reliability of 0.926 for its items, reinforcing the reliability of the construct.

AVE values gauge convergent validity by measuring the variance captured by the latent constructs relative to measurement error. All the constructs in the study demonstrate AVE values above the threshold, confirming strong convergent validity.

Table No. 3: Fornell-Larcker Criterion

	AD	**EE**	**FC**	**PE**	**SI**	**TR**
AD	0.865					
EE	0.382	0.856				
FC	0.448	0.297	0.829			
PE	0.597	0.403	0.558	0.804		
SI	0.555	0.231	0.273	0.481	0.834	
TR	0.557	0.312	0.247	0.434	0.646	0.788

Source*: Authors' compilation using primary data*

Note: ***AD****- Adoption of e-governance services,* ***EE****-Effort expectancy****,*** ***FC****- Facilitating conditions,* ***PE****-Performance expectancy****,*** ***SI****- Social influence,* ***TR****-Trust*

Table 3 employs the Fornell-Larcker criterion to assess discriminant validity among the identified constructs. Discriminant validity is crucial to ensure that each latent construct is distinct within the model. The diagonal elements of the table represent the square root of the AVE for each construct, indicating the amount of variance captured by that construct. The off-diagonal elements display correlation coefficients between constructs (Fornell & Larcker, 1981). In this study, the diagonal values of all the constructs were greater than the correlation coefficients between the respective constructs, and the square root of the AVE for each construct is consistently more significant than the correlation coefficients with other constructs. This adherence to the Fornell-Larcker criterion assures that each factor is adequately distinct, reinforcing the reliability of the measurement model.

Table No. 4: Heterotrait-Monotrait (HTMT) Ratio

	AD	**EE**	**FC**	**PE**	**SI**	**TR**
EE	0.41					
FC	0.495	0.327				
PE	0.684	0.445	0.629			
SI	0.599	0.232	0.294	0.536		
TR	0.632	0.344	0.282	0.503	0.712	

Source*: Authors' compilation using primary data*

Note: ***AD****- Adoption of e-governance services,* ***EE****-Effort expectancy****,*** ***FC****- Facilitating conditions,* ***PE****-Performance expectancy****,*** ***SI****- Social influence,* ***TR****-Trust*

Table 4 exhibits the Heterotrait-Monotrait (HTMT) Ratio proposed by Henseler et al. (2015), which was also applied to assess discriminant validity. In this case, every ratio is less than 0.85, within the threshold limit of the HTMT ratio.

Structural Model Assessment

Once the reliability and validity of the constructs are established, it is important to analyse the structural model. This model illustrates the relationships between independent and dependent variables. Figure 2 depicts these relationships.

Table No. 5. Path Coefficient and Hypothesis Testing

Hypotheses	Relationship	Path Coefficient	T Stats	P Values	Inference
H_1	Effort expectancy -> Adoption of e-governance services	0.108	2.481	0.013	*Supported*
H_2	Facilitating conditions -> Adoption of e-governance services	0.152	3.021	0.003	*Supported*
H_3	Performance expectancy -> Adoption of e-governance services	0.266	4.883	0	*Supported*
H_4	Social influence -> Adoption of e-governance services	0.21	3.887	0	*Supported*
H_5	Trust -> Adoption of e-governance services	0.234	4.745	0	*Supported*
TR	0.557	0.312	0.247	0.434	0.646

Source: *Authors' compilation based on primary data*

Table 5 presents the results of the structural model, which aims to understand the relationships between independent constructs and dependent constructs. The model runs bootstrapping with 5,000 samples at a significance level of 0.05. The R^2 value is 51.50%, indicating the model's strong statistical ability.

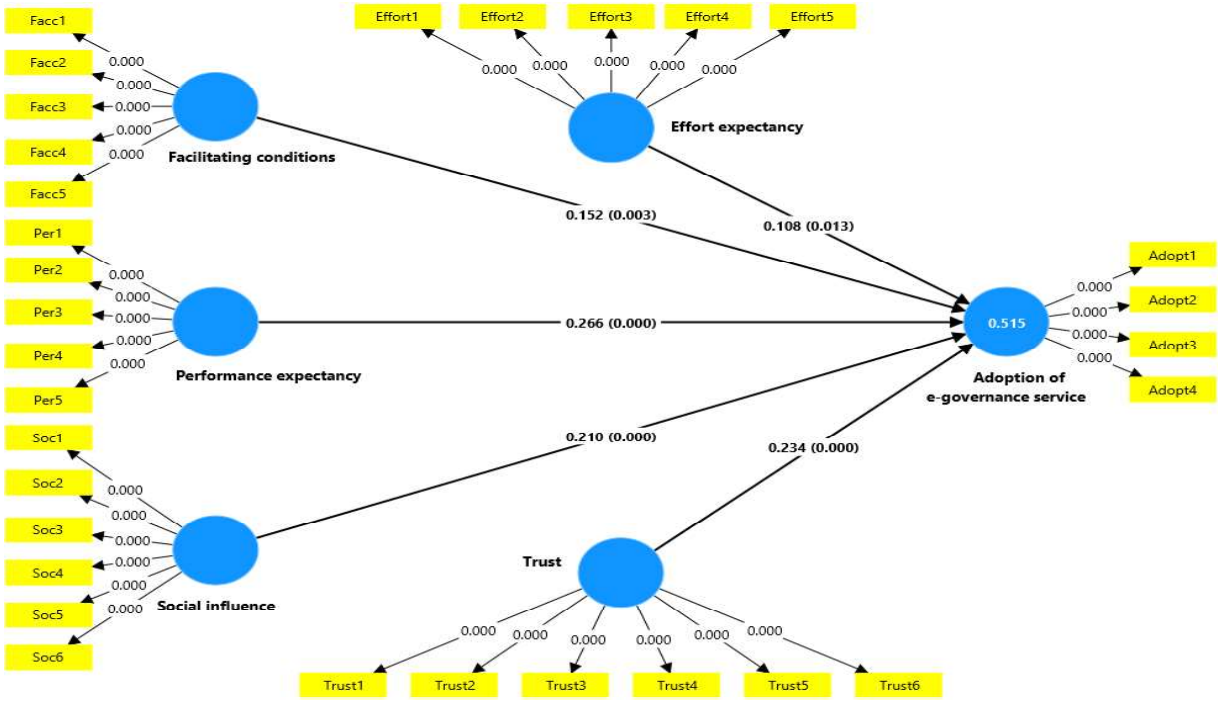

Figure 2: Research Model using Smart-PLS

Findings of the Study

H_1: Effort Expectancy to Adoption of e-governance services: The path coefficient of 0.108 suggests that an increase in effort expectancy positively influences adoption. The T statistic 2.481 is highly significant (p = 0.013), indicating a strong relationship between effort expectancy and adoption.

H_2: Facilitating Condition for the Adoption of e-Governance Services: The path coefficient of 0.152 suggests that the facilitating condition has a positive influence on the relationship, and the T-statistic of 3.021 is significant (p = 0.003), providing support for this relationship.

H_3: Performance expectancy to Adoption of e-governance services*:* The positive mean value of 0.266 suggests a positive effect of performance expectancy on adoption. The T statistic 4.883 is statistically significant (p = 0.000), confirming the relationship between performance expectancy and adoption.

H_4: Social Influence on Adoption of e-governance services*:* The path coefficient value of 0.210 indicates a potential influence of social influence on adoption. However, the T-statistic of 3.887 is statistically significant (p = 0.000), indicating that this relationship is supported at the chosen significance level.

H_5: Trust to Adoption of e-governance services: The positive mean value of 0.234 suggests a positive influence of Trust on adoption. However, the T-statistic of 4.745 is statistically significant (p = 0.000), indicating that this relationship is supported at the chosen significance level.

Conclusion

The impact of e-governance extends beyond administrative efficiency; it can also enhance the association between the government and its citizens, promoting a more participatory democracy. By providing better access to information, services, and decision-making, e-governance enhances transparency and accountability, thereby strengthening the legitimacy of governments. This study provides significant insights into the intersection of technology and governance. This enhances the credibility of the research and offers a deeper understanding of the various factors influencing e-governance adoption.

The main findings of this study shed light on the pivotal role of effort expectancy, facilitating condition, performance expectancy, social influence, and trust in driving the adoption of e-governance services. These insights offer valuable guidance to policymakers and stakeholders seeking to enhance the efficacy and impact of digital governance initiatives.

Recommendations

This research enhances understanding of e-governance and offers practical insights for future governance. The identified determinants guide informed decision-making for a more integrated, transparent, and citizen-focused approach. Policymakers can utilise these findings to gain a deeper understanding of citizens' needs and effectively implement e-governance services in Goa, India. Additionally, the study recommends that the government increase public awareness to encourage the utilisation of these services.

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