

The Role of Policy and Key Factors Shaping the Adoption of E-Governance Services in Higher Education

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Abstract: This paper evaluates the intricate relationships among apparent utility, easy to understand, digital literacy, trust in technology, and the purpose to adopt E-Government services within Pakistani universities. The analysis, involving 298 participants, focuses on identifying key motivators for utilizing E-Government services. Results indicate that perceived usefulness serves as a mediator between apparent easy to proceed and the purpose to adopt these services. Interestingly, higher levels of trust in technology and digital literacy are inversely associated with the inclination to use E-Government services. However, digital literacy directly influences individuals' perceptions and intentions regarding these services. The paper also explores the linking between the appeal of E-Government services and their perceived utility, emphasizing that trust in technology and computer proficiency can moderate this relationship. These findings offer valuable insights for future studies on technology adoption in higher education and provide a useful reference for policymakers seeking to enhance the adoption of the E-Government services.

Keywords: E-Governance, Perceived Usefulness, Digital Literacy, Technology Adoption, Policy Implications, Higher Education.

1. Introduction

In current years, the addition of digital technologies into many sectors has reshaped traditional practices, creating new opportunities and avenues for more efficient service delivery and communication. Especially in the education sector, has undergone and witnessed a transformative move as electronic Governance (e-Governance) services playing an important role and improving in gained prominence in educational experiences (Bhanti P.A. & P.K.U, 2023). . In the education sector E-Governance services provide the vital range of digital solutions to streamline the best academic processes, simplifying administrative tasks, and ensure provide the easy access to educational resources and opportunities. The numerous benefits of accepting such services are massive, vast, ranging from better administrative efficiency to boost the student engagement and personalized learning experiences (M.K.D, 2024). The adoption, effectiveness and success of e-Governance services in education depend on the intentions of individuals willing to use these digital platforms. It is very important for the Governments, educational institutions, and service providers must understand the key factors that shape his willingness to embrace such services.

This research focuses on the key feature such as perceived usefulness, simplicity and ease of use, digital literacy, and trust in the technology, to examine the factors that influence the intention to adopt e-Governance services in education (N, 2023). The digital revolution has definitely reshaped and transformed the public

services, with the help of electronic Governance (e-Governance) platforms becoming an important part of modern governance. As Governances worldwide increasingly adopt digital strategies to improve administrative efficiency, processes and improve service delivery, the education sector has experienced a profoundly impacted by this technological transition. E-Governance services are now play a crucial role in supporting and facilitate the educational learning processes, and provide access to learning resources, and enabling personalized learning experiences. Understanding the factors that influence individuals' willingness to adopt purpose these e-Governance facilities is essential for ensuring their effective use and maximizing their benefits which they offer (Oliveira, 2024)

According to Aladwani (Aladwani, 2021) people's perceptions of the utility of technology have a substantial effect on their actual adoption rates? Based on these ideas is the Technology Acceptance Model, which says that people are more willing to embrace and adopt new technologies if they are perceived as valuable to employ. While discussing e-government services for education, perceived value relates to how much prospective users believe said services will enhance said users' education. According to Davis (Doanldson, 2021) claimed that users' perceptions of a tool's usability impact how they feel and what they do with it. (Ray, 2022) Explains that a person's level of digital literacy significantly determines whether to adopt new technology. Literacy in the digital age refers to an individual proficiency and level of comfort in using digital technologies. According to Van Deursen (al., 2021) and Silva (Silva, 2021) , people with a upper level of digital literacy use more digital services. Those people having lower levels of digital literacy need more help adopting new technology. For e-government services to be effective in the classroom, students must be literate in the digital domain. Moreover, Cater and Liu (Liu, 2021) stressed the role of trust in technology adoption, a concept based on people's faith in electronic network safety, dependability, and privacy. Users' faith in the technology serve as fundamental pillar plays in e-Government services. According to Junglas and Watson (Watson, 2024), trust is an important factor in whether or not people engage with all the services enhanced by advanced technology.

Perceived Usefulness serves as a fundamental construct within the Technology Acceptance Model (TAM), highlighting the level to which potential users perceive that adopting e-Governance services would improve their educational experiences. This construct acknowledges that users have a higher tendency embrace and more willing to adopted new technologies if they perceive concrete benefits and positive outcomes. Additionally, seeming ease of use is a key factor that determines the extent to which individuals consider utilizing e-Governance services as straightforward and convenient. The simplicity of interaction with digital platforms is integral, as complex interfaces may deter potential users from engagement Berenyi & Sasvari (Sasvari, 2019). Moreover, the level of digital literacy plays and act as major role in shaping individuals' attitudes and intentions toward e-Governance services.

Digital literacy encompasses individuals' competence and familiarity with digital technologies and online platforms. A higher level of digital literacy can foster confidence and ease in using e-Governance services, while lower digital literacy might result in hesitation or aversion. Furthermore, trust in the technology emerges as a significant aspect that impacts users' intentions. Trust pertains to the reliability, security, and data privacy associated with e-Governance services according to U.K & M. Ahmed (M.Ahmed, 2023) Users are more likely to embrace services when they perceive the technology as trustworthy and capable of safeguarding their sensitive information Gupta (al, 2016).

In the rapidly evolving landscape of Pakistani higher education, the integration of electronic Governance (e-Governance) services has emerged as a transformative force M. Al-Kharusi (al A.-K. e., 2020). However, despite its main benefits, the extensive adoption of these services for educational enhancement remains a complex challenge, Javed (al J. e., 2021) Existing literature underscores the significance of factors like apparent usefulness, professed ease of use, digital literacy, and trust in shaping individuals' aims to embrace e-Governance services Barua, (Barua, 2021) Nevertheless, a comprehensive investigation into the interplay of these factors and their potential mediation in influencing the intention to adopt e-Governance services for education is conspicuously absent within the context of Pakistani public and private universities.

This research and study seeks this gap by examining the intricate relationships among these variables, providing a nuanced understanding of the psychological and technological dynamics that either facilitate or hinder the adoption of e-Governance services in the educational context Owolabi (al O. e., 2020)

This study holds significant relevance for the higher education sector in Pakistan, encompassing both public and private universities. It focuses on influential stakeholders, including policymakers, university professors, and lecturers, to explore the changing aspects of e-Governance service adoption. This research and study examines critical factors such as seeming usefulness, ease of use, digital literacy, and trust in technology to uncover the drivers and barriers persuading the intention to adopt these services. The research findings have the potential to impact academic research and practical implementation, offering valuable guidance for policymakers in formulating effective strategies to optimize e-Governance platforms. These strategies can streamline administrative processes and enhance the overall educational experience.

Furthermore, this study aims to provide valuable power and help the educational institutions and service providers to develop user-focused strategies to enhance and boost the engagement, better-quality learning environments, and promote advanced digital practices in all Pakistani universities. By examining the impact of ease of use, digital literacy, and deep trust in technology on adoption intentions, and investigating how perceived usefulness influences these moderates' relationships, this study gives a complete understanding of all the major key factors influencing the adoption of e-Government services in the education sector.

2. Literature Review

This part reviews different research studies based on published research papers, emphasizing the significant role of perceived usefulness in the adoption of E-Governance services in educational sector. Research by Donaldson and Davis (Davis, 1989)], for example, introduces the Technology Acceptance Model (TAM), which highlights perceived usefulness as a key factor influencing technology adoption. This model has been normally used to understand user behavior in adopting technological innovations and even including E-Governance services. Building of this framework and model, Sivathanu (Sivathanu, 2023) found that seeming usefulness plays an important role in influencing the intention to use E-Governance services in educational settings. Moreover found that seeming usefulness plays an important role in influencing the intention to use E-Governance services in educational settings.

Moreover M. & U,F Khan (al U. e., 2019) explored the adoption of E-Governance services among faculty and students in Pakistani universities, revealing that perceived usefulness strongly influenced their willingness to embrace these services. Furthermore, Tripathi and Parihar (Parihar, 2011) studied and discover E-Governance adoption between Jordanian students, further confirming research study and strengthening the knowledge that perceived usefulness is pivotal in shaping their intentions to adopt such services. Together these studies reinforce the idea that seeming usefulness is a major driver in the adoption of E-Governance services across all the different educational contexts and sectors.

The major concept of perceived usefulness particularly relevant in the context of the Pakistani Universities, where the efficient administrative processes and improved access to educational resources are highly valuable. Alryalat (al A. e., 2020) highlighted that the professed benefits of e-Governance services, such as streamlined administrative process and easy access to information, play an important role in individuals' willingness to adopt these services in higher education institutions. Furthermore, as education continues to shift towards digitalization and digital transformation, the integration of e-Governance services has the power to enhance the overall educational experience. Similarly Kharusi (Al-Kharusi, 2021) highlighted the significance of professed usefulness in fostering the adoption of e-Governance services among students in Oman. This finding resonates with the potential benefits that Pakistani universities can derive from the adoption of similar services.

The decision to adopt is shaped by perceived ease of use E-Governance services in Pakistani universities. Another very important key factor influencing adoption is perceived easy to use. The concept of main idea and element of the Technology Acceptance Model (TAM), is widely recognized in the research study on

technology adoption behaviors, including the adoption of e-Governance services in educational sector within Pakistani universities Donaldson and Davis (Donaldson, 2021) introduced the TAM, emphasizing perceived ease of use as a critical determinant of users' intention to adopt technology. Studies across various domains have highlighted its significance in influencing users' perceptions and behaviors. In the perspective of e-Governance facilities, Donaldson and Davis (al D. &, 2000) demonstrated that perceived simplicity of use significantly impacted the intention to accept and use technology. This finding has been echoed by Alryalat (al K. e., 2022) who found that perceived ease of use was a key driver in influencing the adoption of e-Governance services among individuals.

Within Pakistani universities, Safdar (Safdar, 2023) conducted a study among faculty members and students, revealing that apparent ease of use significantly influenced individuals' aims to adopt e-Governance facilities. This aligns with the findings of Malik (V.P.Malik, 1972) who demonstrated that ease of use was a crucial factor affecting the readiness and usage of e-Governance services among university students. Moreover, the educational landscape of Pakistani universities, with its diverse user base, underscores the importance of intuitive and user-friendly interfaces for e-Governance services. Palanisamy (Palanisamy, 2024) emphasized that convenience to play a significant role in the adoption of e-Governance services among students in Oman. This finding holds relevance for Pakistani universities, where user-friendly interfaces can influence the acceptance and able to use of such services.

Digital literacy impacts intention to embrace E-Governance services in Pakistani universities. The main role of digital literacy is influencing individuals' intention to adopt and utilize technology, particularly e-Governance services within the context of Pakistani universities, holds significance as technological integration continues to reshape the education landscape. Van Deursen (al., 2021) and Helsper (Helsper, 2023) conceptualized digital literacy as a multi-dimensional construct encompassing cognitive, emotional, and social dimensions. It serves as a crucial determinant of individuals' abilities to navigate digital platforms effectively. In the perspective of technology adoption, including e-Governance services, digital literacy plays a pivotal role in determining users' readiness to embrace digital solutions.

Studies conducted in various contexts underline the most importance of the digital literacy. In the specific context of e-Governance services, Berenyi and Sasvari (Sasvari, 2019) emphasized that digital literacy is essential for individuals to confidently use digital platforms. This aligns with the findings of Venkatesh and Morris (Morris, 2023) who identified digital literacy as a significant predictor of users' aim to adopt e-Governance services. Within the realm of Pakistani universities Safdar (Safdar, 2023) investigated the adoption of e-Governance services and highlighted digital literacy as a critical factor influencing adoption intentions among faculty members and students. Similarly, emphasized the role of digital literacy in shaping individuals' readiness to adopt e-Governance services within the university context. Furthermore, Johnson and Iyamu (Lyamu, 2023) studied e-Governance readiness among university staff in Nigeria and found that digital literacy significantly influenced their intention to embrace e-Governance initiatives. This underscores the relevance of digital literacy in educational settings where technology integration is pivotal.

Trust in technology influences intention to adopt E-Governance services in Pakistani universities. The part of trust in determining individuals' intentions to adopt technology, specifically e-Governance services within the context of Pakistani universities, is a critical factor in understanding the dynamics of technological adoption in educational settings. Carter and Liu (Liu, 2021) emphasized the significance of trust in technology adoption. Trust encompasses users' confidence in the reliability, security, and privacy of digital systems. In the context of e-Governance services, Belanger (Belanger, 2005) highlighted that trust plays a vital role in determining users' intentions to adopt technology-mediated services. The importance of trust in technology is particularly relevant within the educational landscape of Pakistani universities.

Dash and Pani (Pani, 2019) demonstrated that trust was a significant predictor of individuals' intention to adopt e-Governance services among faculty members and students. Similarly Jan and Saeed (Saeed, 2022) found that trust in e-Governance services influenced users' intentions to adopt these services in a Jordanian context. In the context of higher education, Gonzale (Gonzale, 2007) explored the factors influencing students' intention to utilized e-learning platforms and highlighted trust as a pivotal factor. This notion

extends to e-Governance services, where trust in the technology's security and reliability is likely to impact users' willingness to adopt these services. Furthermore, Fatile (Fatile, 2021) examined the adoption of e-Governance services among students in Oman and found that trust in technology significantly influenced their intentions to adopt these services. This reinforces the role of trust in fostering technology adoption within educational environments. Apparent helpfulness mediates the effect of perceived simplicity of use on intention to embrace E-Governance services in Pakistani universities.

The mediation effect of perceived usefulness in the relationship between perceived ease of use and the intention to adopt technology, specifically e-Governance services in the context of Pakistani universities, underscores the complex interplay of cognitive factors in shaping users' adoption behaviors. A new model was given and the name of model Technology Acceptance Model (TAM), introduced by Donaldson and Davis (Davis, 1989), postulates that perceived ease of use influences users' perceptions of seeming usefulness, which in turn impacts their purpose to adopt technology. This mediation effect has been widely validated across various domains, including e-Governance services. Van Deursen (al., 2021) and Helsper (Helsper, 2023) demonstrated that perceived ease of use indirectly affected users' intentions to adopt technology through perceived usefulness F.Khan (al U. e., 2019) found that perceived usefulness mediated the relationship between perceived ease of use and the intention to adopt e-Governance services among faculty members and students.

Similarly Safdar (Safdar, 2023) emphasized that perceived usefulness played a mediating role between perceived ease of use and readiness to adopt e-Governance services among university students. Moreover, as the educational landscape evolves towards digital transformation, the integration of user-friendly and useful e-Governance services becomes crucial. Al- Kharusi (Al-Kharusi, 2021) highlighted that the mediating effect of perceived usefulness is a critical factor in the adoption of e-Governance services among students in Oman.

Perceived usefulness mediates the effects of digital literacy and belief in technology on intention to embrace E-Governance services in Pakistani universities. Exploring the mediating effects of perceived usefulness in the relationships between digital literacy, trust in technology, and the intention to adopt technology, particularly e-Governance services within Pakistani universities, sheds light on the interplay of cognitive and psychological factors shaping technology adoption behaviors. The significance of perceived usefulness, introduced by Guida and Crow (Crow, 2009) as a key determinant of technology adoption intentions has been well-established. Perceived usefulness represents users' belief that technology enhances their performance or experiences. [9] Showed that perceived usefulness mediates the effect of external factors on the intention to adopt technology. In the context of e-Governance services (Madon, 2023). Demonstrated that perceived usefulness mediates the relationship between external factors and adoption intentions among students in Oman. This finding suggests that individuals' perceptions of the usefulness of e-Governance services mediate the impact of other factors on their intention to adopt. Considering digital literacy, studies such as Van Deursen and Helsper (al., 2021) highlight the pivotal role of digital literacy in individuals' ability to effectively engage with technology. It encompasses cognitive, emotional, and social dimensions of digital competence.

Table.1 Factors Affecting E-Governance Adoption in Education

Factor	Study	Key findings	Gaps	Present focus required
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Perceived Usefulness	Sivathanu [20], Tripathi & Parihar [22]	Strongly influences e-Governance adoption in education. Increases efficiency and productivity.	Studies often lack differentiation between faculty and student perceptions. Contextual variation across countries is not well explored.	Conduct comparative analysis across user groups and different regions. Explore long-term effects on academic institutions.
Perceived Ease of Use	Malik [25], Alryalat [23]	User-friendly platforms encourage adoption. Simple and intuitive designs enhance engagement.	Most studies focus on adoption but not on continued use. Empirical validation in Pakistani universities is lacking.	Design-specific user-friendly interface models and test them on large user bases. Conduct longitudinal studies on user retention.
Digital Literacy	Safdar [24], Venkatesh & Morris [27]	Higher digital literacy leads to higher e-Governance adoption. Digital skills are essential for engagement.	Quantification of different levels of digital literacy is missing. Training program effectiveness is rarely measured.	Develop frameworks for digital literacy improvement in universities. Assess the impact of digital literacy training programs.
Trust in Technology	Carter & Liu [10], Dash & Pani [30]	Trust in security, privacy, and reliability significantly impacts adoption. Positive perception of technology increases engagement.	Variations in trust levels among different stakeholders (students, faculty, administrators) are not well studied. Security and policy concerns remain vague.	Investigate user trust-building mechanisms. Provide policy recommendations for security enhancements.
Mediating Role of Perceived Usefulness	Safdar [24], Al-Kharusi [15]	Acts as a bridge between ease of use, digital literacy, and trust in technology. Enhances overall adoption rates.	Mediation effects are not uniformly strong across different contexts. Large-scale validation is lacking.	Conduct structural equation modeling studies. Validate mediation effects using larger, cross-cultural datasets.
Regional & Cultural Considerations	Jan & Saeed [31], Fatile [33]	Adoption rates and challenges vary by country. Socioeconomic factors play a	Lack of comparative studies between different regions. Socioeconomic	Conduct cross-country analyses. Investigate how socioeconomic

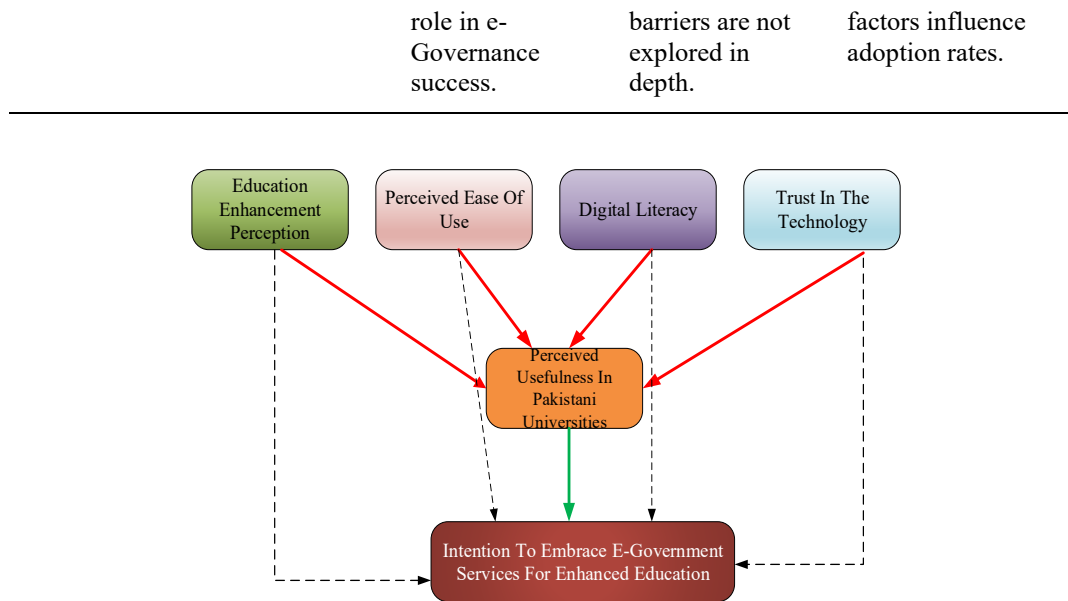


Figure 01: Framework of the research

The interaction between digital literacy and intention to adopt technology has been explored by Johnson and Iyamu (Lyamu, 2023) who demonstrated that digital literacy significantly influences users' intentions to adopt e-Governance services. Trust in technology, as underscored by Misuraca (Misuracca, 2021) is a vital factor in technology adoption. Users' confidence in the security and reliability of digital systems shapes their intention to adopt technology. In the context of e-Governance services, Arsheen and Ahmad (Ahmad, 2021) found that trust influenced adoption intentions among Jordanian students. In the unique context of Pakistani universities, where digital transformation and e-Governance services integration are at the forefront, the mediating effect of perceived usefulness between digital literacy, trust in technology, and the intention to embrace these services is of paramount importance. Sachodeva (Sachodeva, 2002) highlighted that the interplay of these factors significantly impacts the readiness to adopt e-Governance services among university students. The research framework as illustrated in Fig.1. The detailed exiting works and their issues are clearly mentioned in Table.1

3. Methodology

The correlational research design, the gold standard for this kind of investigation, was used to compile the quantitative data. The survey, using questionnaires, is a method used for gathering data. The goals of this method MacDonald (MacDonald.R.J, 2018) are to quantify the data and extrapolate the results from the study population. The method is based on a way to collect quantitative statistics. Quantitative studies MacDonald (MacDonald.R.J, 2018) also use objective research and statistical methods. The study will be set up as a poll, and this will be done with a Likert-type survey that asks people to rank how they feel about different things. Kothari (Kothari, 2020) defined that researchers usually use two main methods, qualitative and quantitative.

Quantitative research is based on facts, while qualitative research "uses the scientific method to make sense of non-numerical data. Ciurea (Ciurea, 2023) explore this method gets information through talks with focus groups, projection techniques, case studies, narrative analysis, and ethnographic observation. The study's cross-sectional and Quantitative methodology helped us determine the study's assumptions, research questions, and goals. This method is chosen because it makes looking at a lot of data easier and coming to valuable conclusions, summaries, comparisons, and generalizations. We used a questionnaire poll because quantitative research is about numbers and statistics. It is a co-relational study because it examines the relationships between the different factors and their meaning. This study was done for scholarly reasons and because there wasn't enough time.

The information was compiled using surveys that were modified from several original sources. The data was compiled using a standardized questionnaire that was adapted from a number of different studies. This cross-

sectional study gathered its information through the use of an online questionnaire. The whole university teaching staff responded to the survey, that ranging start from "strongly agree" to "strongly disagree" this is known as a five-point Likert scale. The surveys also capture respondents' names, genders, marital situations, ages, organizations, years of experience, and titles. Process was finished after collecting the data, after that it was entered into SPSS software and coded.

Descriptive statistics were employed to analyses the distributions of respondent demographics and responses. Hypotheses were tested through software using inferential statistics such as Correlation analysis, Regression analysis was engaged to further specify the nature of the interplay between the variables; and a reliability test was conducted to ensure that all of the numbers added up correctly. The main purpose of that study is to investigating the effects of aims to investigate educational enhancement Perception, perceived eases of use, Trust in technology, digital literacy, perceived usefulness, and Educational Enhancement Perception, Intention to Embrace E-Government Services for Enhanced Education because” main focus area of that study is comprised university faculty of different are and division of Province Punjab. This present survey only includes public sectors and private sectors university teachers. In Public universities we include Emerson University, Multan, BZU Multan and Islamia University Bahawalpur from different Punjab province divisions, while in private sectors universities we include NUML Islamabad, Superior University Lahore, Air University Islamabad and Fast University Islamabad.

The sample size of that study was determined in accordance with endorsements by Hair et al. (2018), and who also noted that research using the factor analysis must be collect that data from 298 respondents to minimize the sampling error from research. The audience of our current study and research is very limited to the teachers of Public sectors University and Private sectors universities. In Private sectors Universities we add the main campus not sub campus of National University of Modern Languages (NUML) Islamabad, main campus of Superior University Lahore, main campus of Air University Islamabad. In the Public sector Universities we add Emerson University Multan and Islamia University Bahawalpur, because researcher want to find out the tendency of the variables in Private and Public Sectors University that’s are located in different areas of Punjab Province.

In this research main target population is the public and private universities main faculty, but for our research we take only teachers of these five universities are selected for our sample. For our sample we selected **50** Teachers from (Emerson University) and **65** Teachers from (NUML), **69** Teachers from (Superior university) **70** Teachers from (Islamia University Bahawalpur) and in the last **44** Teachers from (Air university Islamabad). The total sample size of our research is **298** Teachers. We use close-ended questionnaire for our research instrument in this survey. The close-ended questionnaire used in all the quantitative research studies (Razi et al., 2015). In the first part of the survey, we asked from participants about demographics information such their age, education level and in the last employment history. We request to all staff members that they gave the rate perceived eases of use, Trust in technology, digital literacy, perceived usefulness and Educational Enhancement Perception, Intention to Embrace E-Government Services for Enhanced Education

3.1 Data Analysis

The data presents demographic information about the participants, showing their gender, age, education, and experience. With respect to gender, **65.4%** are the male and **34.6%** are the female, as shown in Table.2.

Table.2 Data Analysis

Demographic variables	Values	Frequency	Percentage
Gender	Male	193	65.4
	Female	102	34.6
Age	25-30	36.7	51.4
	31-35	22.2	31.4
	36-40	11.8	16.6
	Above than 40	.7	1.0
	Master	49	16.6

Experience	Bachelor	4	.4
	M.Phil	199	71.4
	Ph.D	46	15.4
	1-5 Years	134	45.3
	6-10 Years	94	31.8
	Above 10 Years	68	23.0
Total		298	100.0

In terms of age, the majority (51.4%) fall within the 25-30 range, followed by 31-35 (31.4%), 36-40 (16.6%), and only a small percentage (1.0%) being above 40. In terms of education, the largest group holds M.Phil degrees (71.4%), followed by PhD holders (15.4%), Master's degree holders (16.6%), and a small fraction (.4%) with Bachelor's degrees. In the context of experience, the highest proportion (45.3%) have 1-5 years of experience, followed by 6-10 years (31.8%), and the remaining (23.0%) having over 10 years of experience. The total number of participants is 298.

3.2 Reliability Analysis

The analysis of reliability shows the stability and consistency of the variables. Each variable variance, standard deviation and coefficient of Cronbach's Alpha was analyzed, as given Table

Table.3 Reliability Analysis

Variables	Variance	St. Deviation	Mean	Cronbach's Alpha
EEP	66.803	8.17332	24.7669	.963
PEU	44.169	6.64601	21.4932	.910
DL	70.314	8.38535	19.6959	.929
T	56.911	7.54393	27.2196	.854
PU	44.441	6.66638	18.7466	.822
IOG	22.199	4.71159	12.9696	.793

EP=Intention to Embrace E-Governance Services, PEU= Perceived Ease of Use, DL= Digital Literacy, T=Trust in Technology, PU= Perceived Usefulness, IOEGGD=Intention to Adopt E-Governance Services

The scores of the variables show low variance and standard deviation. Cronbach's Alpha values of 0.96 and 0.85 for the intention to adopt the government services Trust in Technology are relatively higher than other variables that indicate excellent and reasonable internal consistency. Internal consistency is acceptable for Perceived Ease of Use, Digital Literacy, Perceived Usefulness, and Intention to Adopt E-Government Services, with values of Cronbach's Alpha of 0.910, 0.929, 0.822, and 0.770, respectively.

3.3 Correlation Statistics

The matrix of the correlation indicates the relation of the variables. The desire to adopt e-governance services is positively related to the perceived ease of use, trust in technology and digital literacy, as given in Table.4. Technology trust is positively related to perceived utility. Perceived ease of use correlates with other characteristics. The intention to adopt the E-Governance services variable has little connection. These connections indicate that perceived ease of use and digital literacy may impact adopting the E-Governance service.

Table.4 Correlations Statistics

		EP	PEU	DL	T	PU	IOEGGD
EP	Pearson Correlation	1	0.578**	0.032	0.060	0.005	0.028
	Sig. (2-tailed)		0.000	0.000	0.306	0.003	0.632
	N	296	296	296	296	296	296
PEU	Pearson Correlation	0.578**	1	0.085	0.028	0.023	0.042
	Sig. (2-tailed)	0.000		0.145	0.635	0.693	0.467
	N	296	296	296	296	296	296
DL	Pearson Correlation	0.032	0.085	1	0.534**	0.723**	0.013
	Sig. (2-tailed)	0.587	0.145		0.000	0.000	0.819
	N	296	296	296	296	296	296
T	Pearson Correlation	0.060	0.028	0.534**	1	0.350**	0.128*
	Sig. (2-tailed)	0.000	0.001	0.000		0.000	0.028
	N	296	296	296	296	296	296
PU	Pearson Correlation	-.008	0.023	0.723**	0.350**	1	0.027
	Sig. (2-tailed)	0.001	0.002	0.000	0.000		0.639
	N	296	296	296	296	296	296
IOEGGD	Pearson Correlation	0.028	0.004	0.056	0.128*	0.027	1
	Sig. (2-tailed)	0.001	0.004	0.003	0.028	0.639	
	N	296	296	296	296	296	296

****.** Correlation is significant at the 0.01 level (2-tailed).

*****Correlation is significant at the 0.05 level (2-tailed).

EP=Intention to Embrace E-Governance Services, PEU= Perceived Ease of Use, DL= Digital Literacy, T=Trust in Technology, PU= Perceived Usefulness, IOEGGD=Intention to Adopt E-Governance Services

3.4 Multiple Regression Analysis

The model summary presents regression analysis to explore the factors influencing Intention to Adopt E-Governance Services (IOEGGD). The model's R-squared of 0.024 indicates that about 2.4 per cent of the variance in IOEGGD can be accounted for by the combined effect of Trust in Technology (T), Perceived Ease of Use (PEU), Digital Literacy (DL), and Intention to Embrace E-Governance Services (EP), as given in Table.5.

Table.5 Regression analysis

Model Summary									
Model	R	R Square			Std. Error of the Estimate	Change Statistics			Sig. F Change
		R Square	Adjusted Square	Change		F Change	df1	df2	
1	.154a	.024	.010	.024	4.57986	1.770	4	291	.135
a. Predictors: (Constant), T, PEU, DL, EP									
ANOVAa									
Model	Sum of Squares		Df	Mean Square	F	Sig.			
1 Regression	148.469		4	37.117	1.770	.001b			

Residual	6103.748	291	20.975
Total	6252.216	295	

a. Dependent Variable: IOEGGD

b. Predictors: (Constant), T, PEU, DL, EP

Coefficients						
Model	Unstandardized Coefficients			Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	18.456	2.242		8.230	.000
	EP	.006	.024	.056	.240	.001
	PEU	.032	.035	.028	.897	.000
	DL	.045	.036	.027	1.242	.000
	T	.180	.070	.021	2.551	.000

a. Dependent Variable: IOEGGD

The adjusted R-squared value, at .010, suggests that the model's fit is limited in explaining IOEGGD variation while considering the number of predictors. The estimate's standard error is 4.57986, the average difference between observed and anticipated values. ANOVA demonstrates that the regression model is statistically significant (F equals 1.770, p is less than 0.001), indicating that at least one predictor is related to IOEGGD. Research shows that Trust in Technology positively affects IOEGGD (β equals 0.021, p is less than 0.001), suggesting that higher levels of trust lead to increased intention to embrace E-Governance services. Intention to Embrace E-Governance Services, Perceived Ease of Use, and Digital Literacy all have significant positive impacts (β equals 0.056, 0.028, 0.027, p is less than 0.001), indicating their influence on adoption. The constant term (β equals 18.456, p is less than 0.001) represents the baseline level of IOEGGD when all predictors are zero. This analysis shows that Trust in Technology and other factors influence users' inclination to adopt E-Governance services.

3.5 Mediation Analysis

Perceived usefulness mediates the effect of perceived ease of use on intention to embrace E-Governance services in Pakistani universities

3.5.1 Direct effects without Mediator

Using e-governance is investigated. The importance of perceived ease of use, technology trust, and digital understanding is shown. The evidence supports hypothesis one, as given in Table.6

Table.6 Direct effects without Mediator

Effects	Paths	Path coefficient	SD	t-value	p-value	R2
Direct without mediator	PU→IE	0.360	0.06	0.660	0.04*	0.03

Note: n=260, p<0.05*, PU=Perceived usefulness and IE= Intention to E Governance.

3.5.2 Indirect effects without Mediator

The second hypothesis is technical faith improves utility perception. The third theory ties digital literacy to usefulness, as given in Table.7.

Table.7 Indirect effects without Mediator

Effects	Paths	Path coefficient	SD	t-value	p-value	R2
Indirect with mediator	EP→PU	0.049	0.02	2.42	0.01**	

PU→DL	0.078	0.19	4.16	0.000***	0.07
T→PU	0.003	0.01	0.05	0.97	

Note: n=298, p<0.05*, p<0.01 and p<0.000***, EP=Intention to Embrace E-Governance Services, DL= Digital Literacy, T=Trust in Technology, PU= Perceived Usefulness**

The fourth theory links E-Governance to technical faith. E-Governance adoption increases with digital literacy, the fifth hypothesis. The sixth hypothesis argues technological trust and digital expertise affect E-Governance adoption. This study uses many mediators to examine Pakistani institutions' e-government use, usefulness, and adoption intentions. The study found a strong association between e-government service utility, simplicity, and use. Perceived usefulness and E-Governance intention are directly related, indicating the positive path with the 0.360 coefficient value. The impression of usefulness raises the use of E-Governance. It is statistically significant.

4.1 Hypothesis 1: Perceived usefulness mediates the effect of perceived ease of use on intention to embrace E-Governance services in Pakistani universities.

This hypothesis posits that Perceived Usefulness (PU) moderates the relationship between Perceived Ease of Use (PEU) and Intention to Embrace (IE) E-Governance services among university students in Pakistan. Building upon the expanded versions of the Technology Acceptance Model (TAM), which assert that users' perceptions of a technology's usefulness significantly influence its adoption, PU reflects individuals' belief that the technology will enhance their efficiency. The Perceived Ease of Use and Perceived Usefulness of E-Government services influence users' willingness to adopt them.

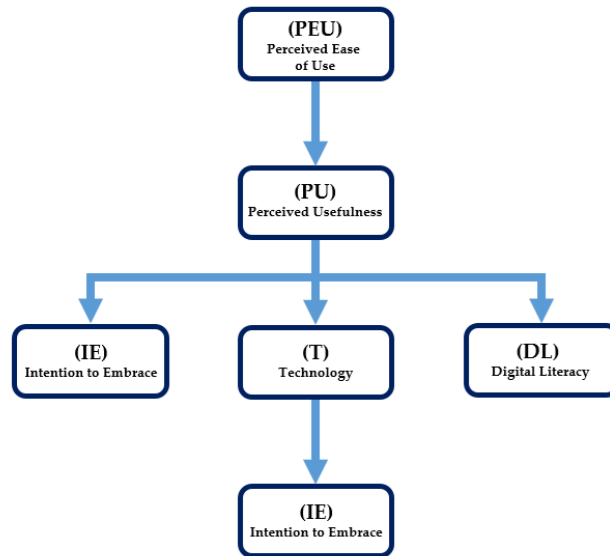


Figure.2. Path Diagram of Hypotheses on Factors Influencing the Intention to Embrace E-Governance Services in Pakistani Universities

In alignment with Venkatesh's findings [27], a positive path coefficient of 0.360 exists between individuals' interest in using E-Government services and their perception of the services' usefulness.

The path diagram illustrates the relationships between key factors influencing students' intention to embrace E-Governance services in Pakistani universities, as shown in Figure.2 It shows how Perceived Ease of Use (PEU) affects Perceived Usefulness (PU), which in turn influences their intention to adopt these services. Additionally, Trust in Technology (T) and Digital Literacy (DL) both positively impact Perceived Usefulness (PU), thereby strengthening the intention to embrace E-Governance. The diagram emphasizes the interconnectedness of these factors, suggesting that enhancing trust, digital literacy, and ease of use can significantly encourage students to adopt E-Governance services.

4.2 Hypothesis 2: Trust in technology positively influences perceived usefulness of E-Governance services.

This hypothesis explores the relationship between Trust in Technology (T) and Perceived Usefulness (PU) of E-Governance services. Trust in technology plays a critical role in shaping users' perceptions of the technology's usefulness. The analysis confirms that trust positively influences PU, with a path coefficient of 0.078, meaning that as individuals develop greater trust in the technology, their perception of its usefulness also increases. This finding is consistent with previous research, such as Tan & Teo [46] that highlights the importance of trust in fostering positive perceptions of technological usefulness.

4.3 Hypothesis 3: Digital literacy positively influences perceived usefulness of E-Governance services.

This hypothesis examines the impact of Digital Literacy (DL) on the perceived usefulness of E-Governance services. Digital literacy refers to the ability to use technology efficiently. The hypothesis asserts that higher digital literacy enhances the perceived usefulness of E-Governance services. The data supports this notion, with a path coefficient of 0.049, indicating that increased digital literacy boosts the perception of usefulness. This aligns with Venkatesh & Davis' [47] that emphasizes the role of perceived usefulness in mediating the effects of trust and digital literacy on technology adoption.

Table.8 Key summary of the discussed hypotheses

Hypothesis	Description	Path Coefficient	Key Finding	Supporting References
H1	Perceived Usefulness (PU) mediates the effect of Perceived Ease of Use (PEU) on the Intention to Embrace (IE) E-Governance services	0.360	A positive relationship between interest in E-Government services and perceived usefulness	Venkatesh [27], Silva [9]
H2	Trust in Technology (T) positively influences Perceived Usefulness (PU) of E-Governance services	0.078	Trust in technology increases perceived usefulness of E-Government services	MacDonald [40], Tan & Teo [43]
H3	Digital Literacy (DL) positively influences Perceived Usefulness (PU) of E-Governance services	0.049	Higher digital literacy enhances the perceived usefulness of E-Government services	Venkatesh & Davis [45], Livingstone & Helsper [44]
H4	Trust in Technology (T) positively influences the Intention to Embrace (IE) E-Governance services	0.003	Increased trust in technology correlates with greater intention to adopt E-Government services	Pavlou [46], McKnight [47]
H5	Digital Literacy (DL) positively influences the Intention to Embrace (IE) E-Governance services	0.049	Higher digital literacy increases the intention to use E-Government services	Selwyn [48]

H6	Perceived Usefulness (PU) mediates the indirect effect of Trust in Technology (T) and Digital Literacy (DL) on Intention to Embrace (IE) E-Governance services	--	PU mediates the relationship between T, DL, and IE for E-Government services adoption	Coughlin & Venkatesh [49]
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The **table.8** summarizes the relationships between various factors and students' intention to adopt E-Governance services in Pakistani universities. It highlights how Perceived Usefulness (PU) mediates the effect of Perceived Ease of Use (PEU) on the intention to use these services. Additionally, it shows that Trust in Technology positively influences both Perceived Usefulness and students' Intention to Embrace E-Governance services. Digital Literacy is found to enhance both the Perceived Usefulness and the Intention to embrace these services. Finally, the table indicates that Perceived Usefulness mediates the indirect effect of PEU, T, and DL on IE. **table.9** shows how various factors impact the intention of university students in Pakistan to use E-Governance services. It highlights that Perceived Usefulness (PU) is influenced by Perceived Ease of Use (PEU), Trust in Technology (T), and Digital Literacy (DL). Additionally, Trust in Technology and Digital Literacy both positively affect the Intention to Embrace (IE) these services. Perceived Usefulness plays a key role by mediating the relationship between Trust in Technology, Digital Literacy, and Intention to Embrace. This suggests that improving students' digital skills and trust in technology can boost their adoption of E-Governance services.

Table 9 Summary Of Matrix Of Relationships

	PEU (Perceived Ease of Use)	PU (Perceived Usefulness)	T (Trust in Technology)	DL (Digital Literacy)	IE (Intention to Embrace)
PEU	--	Yes	No	No	Yes
PU	Yes	--	Yes	Yes	Yes
T	No	Yes	-	Yes	Yes
DL	No	Yes	Yes	-	Yes
IE	Yes	Yes	Yes	Yes	--

5. Conclusion

This study explores the key factors influencing the adoption of E-Governance services in Pakistani universities. The findings confirm that Perceived Ease of Use (PEU), Trust in Technology (T), and Digital Literacy (DL) play crucial roles in shaping Perceived Usefulness (PU) and, ultimately, the intention to embrace E-Governance. Hypothesis 1 is supported, showing that PU mediates the relationship between PEU and E-Governance adoption. Hypothesis 2 establishes that trust in technology enhances PU, while Hypothesis 3 highlights the positive impact of digital literacy on PU. Hypothesis 4 confirms that trust in technology directly influences the adoption of E-Governance services. Similarly, Hypothesis 5 demonstrates that digital literacy positively affects adoption. Lastly, Hypothesis 6 shows that PU mediates the indirect effects of trust in technology and digital literacy on E-Governance adoption. These insights provide policymakers and stakeholders with valuable guidance for designing strategies to enhance E-Governance adoption in educational institutions.

6. Limitation

Even though this approach is helpful, it is essential to note that it has some limitations:

1. The cross-sectional nature of the research limits the ability to establish causal relationships. Future longitudinal studies could offer deeper insights into changes over time

2. The study is limited to Pakistani universities, restricting the generalizability of findings to other regions or educational settings. Comparative studies across different countries could improve applicability
3. The reliance on self-reported data introduces the possibility of response bias and common method variance, which may affect the accuracy of results. Future studies could incorporate objective measures or multiple data sources to mitigate this limitation

7. Future implication

The results of that research have significant implications for advancing the adoption of E-Governance in educational institutions. Policymakers should prioritize initiatives that enhance perceived ease of use, foster trust in technology, and integrate digital literacy programs into the education system. Strengthening digital literacy among students and faculty in Pakistan can amplify the positive impact of perceived usefulness on adoption intentions. Additionally, future longitudinal studies could provide deeper insights into the long-term effects of these interventions, ensuring a more comprehensive and sustainable approach to E-Governance adoption.

Reference

- A. Ray. (2022). "Digital literacy. In Advanced Methodologies and Technologies in Library Science, Information Management, and Scholarly Inquiry.,". *IGI Global Journal*, 4(6), 1-11.
- Ahmad, A. &. (2021). SLR: A systematic literature review on blockchain applications in healthcare. *International Conference on Information Science and Communications Technologies (ICISCT)*.
- al, A. e. (2020). Citizen's adoption of an E-Government system: Validating the extended theory of reasoned action (TRA). In Open government: Concepts, methodologies, tools, and applications., " IGI Glo.,. *International Conferance on E-Governance System* , 651-677.
- al, A.-K. e. (2020). Large-scale retrieval of coloured dissolved organic matter in northern lakes using Sentinel-2 data. *Journal of Remote Sensing*, 122-158.
- al, D. &. (2000). New CEO Goverance and New shareholder returns: Agency theory or stewardship theory Paper presented at the meeting of the Academy of Management. Washington DC,. *Journal Of Academy & Management. Washington DC*.
- al, G. e. (2016). Citizen adoption of e-government: a literature review and conceptual framework. Electronic Government. *International Journal of Literacy*, 160-189.
- al, J. e. (2021). Role of blockchain technology in healthcare: a systematic review. *International Conference on Innovative Computing (ICIC)*, 190-234.
- al, K. e. (2022). New Modern Citizen's adoption of an E-Government system: Validating the extended theory of reasoned action (TRA). In Open & Close Government: Concepts, methodologies, tools, and applications.,. *Journal of Ecomonic & Management* , 651-674.
- al, O. e. (2020). International relationships with variables of psychological & technology ume-60, Issue-1,, September 2020. *International Journal of Research Publications*,, 230-265.
- al, U. e. (2019). Deficiencies in project governance: An analysis of infrastructure development program. Administrative sciences, vol. 9, no. 1, pp. 109-125, 2019. *Journal Administrative sciences*, 109-128.
- al., D. e. (2021). The third-level digital divide: Who benefits most from being online? In Communication and information technologies annual,. *Emerald Group Publishing Limited*,, 29-54.
- Aladwani. (2021). "Corruption as a source of e-Government projects failure in developing countries: A theoretical exposition" vol. 36, no. 1, pp. 105-112, 2021. . *International Journal of Information Management*, 105-112.
- Al-Kharusi. (2021). Large-scale retrieval of coloured dissolved organic matter in northern lakes using Sentinel-2 data. *Journal of Management and Remote Sensing*, 123-156.
- Barua. (2021). E-governance adoption in government organization of India vol. 8, no. 6, pp. 125-145, 2021. . *International Journal of Managing Public Sector Information and Communication Technologies*, 125-149.

- Belanger. (2005). U-government: a framework for the evolution of e-government, *Electronic Government. International Journal Electronic Governance* , 426-445.
- Bhanti P.A. & P.K.U. (2023). "E-governance in higher education: Concept and role of data warehousing techniques,". *International Journal of Computer Applications*, 875-895.
- Ciurea. (2023). The mythological chimera and new era of relapse prediction post-transplant. *Blood Reviews. Reivew Journal of Management*,, 100-139.
- Crow, G. &. (2009). E-government and e-governance. ICT4D: Information and Communication Technology for Development,. *Information and Communication Technology for Development*,, 283-320.
- D., V. &. (2000). "A theoretical extension of the technology acceptance model: Four longitudinal field studies. ,, " p. 46(2), 2000. . *Journal Of Management Science*, 3(2), 46.
- Davis, D. &. (1989). CEO Goverance and shareholder returns: Agency theory or stewardship theory Paper presented at the meeting of the Acadeny of Management. Washington DC. *Acadeny of Management. Washington DC*, 122-148.
- Doanldson, D. &. (2021). L. &. D. J. Donaldson, ""CEO Goverance and shareholder returns: Agency theory or stewardship theory Paper presented at the meeting of the Acadeny of Management. Washington DC, vol. 3, no. 1, pp. 500-545, 2001. . *Acadeny of Management. Washington DC*,, 500-545.
- Fatile. (2021). Electronic governance: myth or opportunity for Nigerian public administration. *International Journal of Academic Research in Business and Social Sciences*, 112-134.
- Gonzale. (2007). E-government success: some principles from a Spanish case study. *Industrial Management & Data Systems. Industrial Management & Data System*, 845-961.
- Helsper. (2023). New gradations in digital inclusion: Children, young people and the digital divide in new media,. *New media & society*, 671-696.
- Kothari. (2020). Research methodology: Methods and techniques. *New Age International Journal*, 198-232.
- Liu, C. &. (2021). Technology humanness, trust and e-government adoption. *International Journal of Business & Management*, 550-598.
- Lyamu, J. &. (2023). Framework for the adoption of e-commerce: A case of South African retail grocery sector. *Journal of Infromation system in Developing Countries* , 120-155.
- M.&.S, T. &. (1998). M. &. T. T. S. Tan, "Factors influencing the adoption of the Internet," *International Journal of Electronic Commerce*,, pp. 2(3), 5-18. , 1998. *International Journal of Electronic Commerce*, 2(3), 5-18.
- M.Ahmed, U. &. (2023). Identifying the factors affecting individuals' trust to use social media for e-government services: A conceptual model. *Mehran University Research Journal Of Engineering & Technology*,, 109-124.

- M.K.D, D. &. (2024). "The Usage of E-Governance Applications by Higher Education Students,". *Educational Sciences: Theory and Practice*,, 1925-1943.
- MacDonald.R.J. (2018). Professional development for information communication technology integration: Identifying and supporting a community of practice through design-based research,. *Journal of Research on Technology in Education*,, 429-445.
- Madon. (2023). Evaluating the developmental impact of e-governance initiatives: An exploratory framework,. *The Electronic Journal of Information Systems in Developing Countries*, 1-13.
- Misuracca. (2021). SLR: A systematic literature review on blockchain applications in healthcare. *International Conference on Information Science and Communications Technologies (ICISCT)*,.
- Morris, V. &. (2023). User acceptance of information technology: Towards a unified view, . *Journal Of Mangement & Research* , 425-478.
- N, Y. &. (2023). "E-governance: past, present and future in India.,," p. arXiv preprint arXiv, vol. 4, no. 2, pp. 1308-3323, 2023. p. *arXiv preprint arXiv*, Vol. 4. 1308-3323.
- Oliveira, T. A. (2024). "Challenges for connecting citizens and smart cities: ICT, e-governance and blockchain" . *MDPI Journal Sustainability*, 2926-3000.
- P. Silva, ". (2021). ' Technology acceptance model (TAM)(1989). Information seeking behavior and technology adoption," , pp. 205-219.. . *Journal of Theories and trends*, 2(2), 205-219.
- Palanisamy. (2024). Issues and challenges in e-governance planning. Electronic Government,. *International Journal of Governance* , 253-272.
- Pani, D. &. (2019). "E-Governance paradigm using cloud infrastructure: Benefits and challenges". *Journal of Procedia Computer Science*, 843-855.
- Parihar, T. &. (2011). E-governance challenges and cloud benefits. *IEEE International Conference on Computer Science and Automation Engineering*,.
- Ray. (2022). "Digital literacy. In Advanced Methodologies and Technologies in Library Science, Information Management, and Scholarly Inquiry.,," IGI Global Journal, vol. 4, no. 6, pp. 1-11, 2022. *IGI Global Journal*, 1-11.
- Sachodeva. (2002). e-Governance strategy in India. White Paper on e-Governance strategy in India. *Journal of Governance and strategy*, 123-145.
- Saeed, J. a. (2022). LoT-Based solutions to monitor water level and smart water. *Journal Resarch of Science* , 309-344.
- Safdar. (2023). Impact of good governance and natural resource rent on economic and environmental sustainability: an empirical analysis for South Asian economies. Environmental Science and Pollution Research. *Journal of Environmental Science and Pollution Research*.

- Sasvari, B. &. (2019). State of digital literacy: preparedness of higher education students for e-administration in Hungary, vol. 1, no. 2, pp. 230-265, 2019. *Central and Eastern European eDem and eGov Days*, 230-265.
- Silva. (2021). Technology acceptance model (TAM)(1989). Information seeking behavior and technology adoption. *Journal of Theories and trends*, 205-219.
- Sivathanu. (2023). An empirical study of cloud-based e-governance services adoption in India, vol. 14, no. 1, pp. 86-107, 2023. . *International Journal of Electronic Government Research (IJEGR)*, 86-109.
- V.P.Malik. (1972). Challenges and future prospects for E-governance in india, , vol. 7, no. 3, pp. 1964- 1972, 2024. *Journal of Science, Engineering and Technology Research*, 186-230.
- Watson, J. &. (2024). Task-Technology fit for mobile locatable information system. *International DBLP Journal*, 1046-1057.