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Challenges and opportunities for implementing E-Voting in Pakistan. Comparative Analysis of India and Philippine

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Abstract

Electronic voting is a revolution in the electoral system, which will provide convenience, efficiency and cost saving when practiced. This paper focuses on the technological, operational, and sociopolitical peculiarities of e-voting implementation in Pakistan with reference to India and the Philippines. By synthesizing from the existing literature and conducting surveys, this research explores how e-voting can be used to solve the problems such as electoral fraud, fast vote tallying, and increased participation. Accordingly, the research findings show that, though e-voting helps to democratically improve the efficiency of electoral processes, this activity successfully encountered severe challenges in Pakistan caused by such factors as insufficient infrastructure, low levels of e-literacy, and public skepticism about technology and voting. Comparative analysis highlights the parallelism of India and the Philippines, where security, system openness and voters' sensitization remained effective drivers towards e-voting acceptability. Therefore, this research suggested that elements of good governance from the Indian and Philippine experiences including integrated and effective cybersecurity framework, independent audits and voter education on infrastructure and trust deficits in Pakistan will have to be tailored to fit the

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Pakistan context. In conclusion the study finds that with right phased and transparent implementation strategy, e-voting can act as a godsend to the Pakistan democracy to enhance the electoral transparency and integrity.

Keywords: e-voting; voters' intention; election commission of Pakistan; Challenges; Opportunities; Khyber Pakhtunkhwa; Pakistan.

Introduction

When the global society goes digital, the manner in which countries hold their elections is aligned to the level of democracy featured in such systems. Digital democracy brought about by technologies driven advancements in communication tools is gradually changing public relations in election. An important component of this process is Electronic Voting (e-voting), of course, which is another type of voting at all. E-voting can either be physical where citizens vote at polling stations or online whereby citizens cast their votes from any location and at any time they wish. The introduction of e-voting offers some impacts above the system made use of for paper including; efficiency, time consumption, and cost reduction (Samihardjo et al., 2021). However, this shift has sparked ongoing debates: Is e-voting the salvation for democracy or is it in fact just an intermediate step on the road to fully-fledged digital rule? Some literature suggested it, that also some other literature have recommended it, some of the these include (Lindner and Aichholzer 2020, Fauzi and Habibi 2023, Metallo et al., 2023). Electronic voting is gradually gaining more acceptance due to its advantages in terms of efficiency, volume of the work performed, time, and number of persons involved. Because of its fast pace, unknown identity, and result multiplying capabilities, it serves as a potential candidate for the contemporary forms of the electoral systems (Ahmad et al., 2021).

Despite these advantages, a significant challenge remains likewise the problem of pilot attacks due to the challenges of identifying any alterations in digital procedures (Kamran et al., 2021). Due to concerns about the credibility of

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the e-voting systems people in some countries such as the United States, European countries and parts of Asia have had to go back to paper-based voting systems. Even some of major European countries as the United Kingdom, the Netherlands or Norway have rejected e-voting completely. Although all over the world different countries have adopted e-voting, the figure has reduced from 43 in 2010 to 33 in 2019 (International IDEA, 2019). This increasing research interest seems to suggest emerging requirements for understanding the underlying mechanics and effects of e-voting systems (Darmawan, 2021; Ali et al., 2024).

The objective of this research is, therefore, to critically assess and evaluate electronic voting in the context of India and the Philippines in terms of its technological, operational, and sociopolitical implications. The degree of research is to establish if e-voting has enhanced the electoral process, minimized complexities, and contributed to enhancing voters' confidence in election outcomes (Maurer & Barrat, 2016; Ali et al., 2024). Through the analysis of the experience of these two countries the study will try to look at the patterns that may be applicable to other countries may regard to the implementation of e-voting systems. Furthermore, the study will provide specific suggestions to improve the utility and legitimacy of electronic voting, as a way of supporting further, the debate over how innovation in government will unfold in the future (Krimmer et al., 2007; Jones, 2021). As much as there are numerous positive impressions of e-voting systems, problems that crop up during their application negate their efficiency and reduce credibility. In India, voting by electronic means was initiated to counter electoral fraud, reduce physical facilities, and to announce quicker decisions. However, due to controversies which has surrounded on the security of the EVMs and the issue of secrecy in the operations of the EVMs, there is doubt on their reliability in Sharma (2020) and Wolchok et al. (2010). Likewise, AES of the Philippines was also developed to fight fraud together with the problems that manual voting brings. Although the AES has enhanced vote

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counting speed and accuracy, it has some critics which include hacking related issues, diagnostics errors, and other issues of confidentiality (Reyes, 2019; Hapsara et al., 2017). These issues point to a larger problem: the lack of a sound framework which guarantees; the protection of the e-voting systems, the evidential integrity of the e-voting systems, and the credibility of the e-voting systems.

Despite extensive literature on e-voting, its effect on the electoral process and citizens' confidence—especially in new democracies—is hardly researched. Many of the studies are are concerned with the technical or operational aspects, while often paying no attention to how the technical issues are related to public attitude (Avgerou et al., 2019; Dar & Sakthivel, 2022). In the same vein, there is a relative scarcity of research comparing the effects of e-voting system in member-countries of the same region but with dissimilar cultures like India and the Philippines. This gap hinders making of generalizable conclusions or general theory for successful e-voting implementation. Recommendations based on the peculiarities of developing democracies, including a lack of physical and digital infrastructure, differences in digital literacy, and low levels of political trust in particular, are particularly important (Okuro, 2021). *The central question guiding this research is: In which respect do Indian and Philippine e-voting systems perform – in terms of implementation, obstacles and public acceptance – and how do these impact election fairness and the public confidence?* It also examines sub-theme questions about function-related issues, trust relations, and enhancements in such systems. Thus, filling this gap, the research will provide a better understanding of technological and sociopolitical aspects of the electronic voting (Babickaitė, 2024).

The findings of this research are useful to the field of electoral technology and governance. First, it gives a comprehensive description of the comparative application of e-voting systems in India and the Philippines in terms of electoral competence, effectiveness in operations, and voter confidence. The present study

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therefore identifies differences that are both generalizable and specific to the sociopolitical context in which e-voting takes place, by ascertaining country-specific issues like cybersecurity threats and procedural issues in the e-voting systems (Singh et al., 2018; Jafar et al., 2021). Moreover, the study provides an extensive definition of e-voting system evaluation model, which incorporates technological, functional, and social viewpoints. This framework shall be used to evaluate the current and future innovations in electoral technologies and system. This stresses on governance as well as communication plan in creation of trust associated with e-voting procedures (Priyanka & Gopalan, 2024; Taban et al., 2017).

In addition, the research outlines suggested measures to address the problems by providing best practice insights when it comes to design and deployment of electronic voting systems. Such recommendations involve measures to improve cyber security, establish desirable operating procedures, and adopt measures of verifiable audit, and forthright voters education programs. As has been proposed for India and the Philippines, these recommendations may suit any democracy pursued related technological transformations (Likitha et al., 2024). Last, the study examines the effects of e-voting extended in social influence and more specifically e-voting's ability to increase democracy by offering solutions to problems that affect minorities like the disabled and residents of distant locations. Through issues of access and utilization the study show how e-voting can enhance democracy and equity. By means of these contributions, the study would help in fostering electoral resilience: sustaining democracy supportive systems in the context of emerging technologies (Harvey, 2024).

Literature Review

E-Voting Practices in India and Philippine

In many years ago, different nations experienced various forms of election malpractice including vote rigging which involved voting motorization, activities

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of the polling stations conducted by political party operatives. This situation, however, started to change with the emergence of electronic voting in the closing decades of the twentieth century. In 1982 Electronic voting machines were first used in the small municipality of Paravoor in the state of Kerala in India. Seven years later, again brought by an electoral reform committee's recommendations, the Indian government approved a bill to amend the Election Law so as to allow the EVMs usage all over the country. Since then it popularized throughout India and finally in 1998, EVMs was made as a tool for the 2004 Lok Sabha Polls. These EVMs are developed from Bharat Electronics Ltd (BEL), it is an Indian based government owned company (Dar & Sakthivel, 2022).

In Philippines, computerization of the electoral process was motivated by increased incidences of election malpractice and consensus among political leadership to enhance the electoral procedures. E-voting was piloted in 2010 and then scaled up throughout the country by 2013 and 2016. However, the move was lauded across the globe and in addition it incurred criticisms especially among the non-governmental organizations NGOs. As cited by Risnanto et al. (2020b), the Philippines is one of the successful countries adopting e-voting together with Brazil, Estonia and India. According to Ahmad et al. (2021), the Philippines has been on the path to employ e-voting system since the 1990s, but the first national implementation of such system occurred on May 10, 2010. Due to the mandate of registering well over 50 million voters in thousands of islands the Commission on Elections (COMELEC) resorted to e-voting that made sense given that the original long procedures of vote counting has been taking up to 18 hours while tabulation could take up to 40 days. Although some of these projects have been tendered to be delayed and funding, the conducive systems were implemented in the regional election as early as at the year 2008. In Philippine election, there are several technologies which have been used to increase efficiency and minimize fraud:

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Direct Recording Electronic (DRE), Optical Mark Recognition (OMR) and Precinct Count Optical Scan (PCOS) by the year 2010.

Specifically, to further the understanding of the potentials of e-democracy, Timonera et al. (2023) have presented a fine-dissected study about demographic characteristics and its relevance to the perspective of e-democracy on the Visayas and Mindanao regions of the Philippines. In their study they focus on political motivation for e-voting and more specifically on how social, cultural and political environment influences e-democracy technologies adoption and perceptions. In some ways, the findings of this study have a substantial in increasing human knowledge on how e-voting can be incorporated to the democratic process within the Philippines. Timonera et al. (2023), through analyzing such factors, emphasize the need to put forward specific strategies influenced by the experience of different areas in order to promote the further popularization of e-voting and improve the work of the democratic process. Their work can be best described as being in line with the early stages of innovation diffusion based on Rogers' Diffusion of Innovatives Theory put up in 2003 observing the case of Philippines using multiple E-voting technologies by the year 2010.

For EVMs in Bangladesh, Sayem (2023), Ahmed et al. (2021) and Sarker et al. (2016) extend the discussion of this topic. Pursuant to this, these studies call for an imperative interest in the overall diffusion of EVMs while giving consideration to the social and technology factors involved. Within the study conducted by Sayem (2023), he also examines the citizens' behavioural intention to use EVMs in Dhaka and identifies that performance expectancy, institution trust, and effort expectancy remain significant positive influencers of the technology's adoption. The results are befitting the Technology Acceptance Model that isolates perceived usefulness and perceived ease of use as the major determinants of technology acceptance. On the other hand, Ahmed et al., (2021) have explored the issues or challenges that have limited use of EVMs in Bangladesh including security and

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access that have hindered integrated use of EVMs. Further, Narzary (2021) offers the analysis of how EVMsare used in elections in India only, while praising the easiness and effectiveness of the machines that count the votes, the author also focuses on considerable weaknesses of the system. Such weaknesses are: risks of cyber threats that affect the election outcome and violation of the secret ballot. Seasoned political observer Narzary has stated at some elements in the EVMs' design that are still considered confidential and no thorough audit of their security has been conducted that causes doubts about the genuine electoral process in India. Likitha et al. (2024) present measures regarding the cybersecurity issues related to the online voting systems. Although they embrace the possibilities of online voting to transform the electoral process, increase inclusiveness, and reduce the time taken to tally the votes, they argue that problem concerning the validity of the electronic system have not been satisfactorily resolved. In combination with each other, these works confirm that the impact of e-voting solutions depends not only on technology advancement but also on sociotechnical enablers as well as institutional frameworks. Though e-voting is recognized as a potential solution for increasing the effectiveness of electoral processes, effective management is needed and the proper organizational setting that will allow turning the technology into an efficient tool rather than a menace to the success of elections and to the people's confidence in the democracy.

E-Voting Challenges and Opportunities in Pakistan

The right to vote and the right to be elected – is the right that directly shows the participation in democratic elections – is one of the key human rights within the system of democracy (Pran & Patrick, 2007). The method of using votes to elect candidates in addition to exercising influence on the number of seats the respective candidates will occupy in a legislative body is known as the electoral system (Menocal, n.d.). The performance of an electoral system is usually measured in terms of its being accountability, representativeness and fairness

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(Allan Wall, 2012). Election is crucial in a democracy since people get to choose their leaders, or in other words, choose the direction, and future of a nation (IDEA, 2005).

Federally, Pakistan electoral system works under a parliamentary system with two houses: National Assembly and Senate. Following would carried out in accordance with the Constitution of Pakistan which was adopted in 1973: The term National Assembly has a term of five years, whereas the term Senate has a permanent existence and therefore cannot be dissolved. Throughout the years, a number of researchers looked into the factors of technology in election in different countries. The following fields of Study: Computing, Mathematics, and Engineering account for 72% of the works on the Electronic Voting Machines while Social Sciences are only 10.8% despite the later dealing with the social implications of the undertakings (Oostveen et al., 2019).

Dandoy (2014) has pointed out that electronic voting systems may pose difficulties to certain people, the elderly or the disabled may have problems in voting properly. Oostveen et al., (2019) in their work, Electronic Voting, New Agendas in Media and Voting, look at the Social Psychological impact of Media Voting with special reference to Electronic Voting. This piece of work shows that the introduction of the electronic voting has been facilitating the increase in the number of voters. Also, their survey finds that voters are more likely to vote for politicians of the same social identity when voting electronically. This article points to the fact that electronic voting systems have numerous layers. although these systems help in increasing the voter turnout they pose questions that need to be answered concerning the accessibility of the voters and social influence of the voters. All these are useful when determining the likelihood of gain or loss, when adopting the systems, particularly in countries such as Pakistan: where issues of accessibility, influence and technology must all be considered, to make the system work.

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It is the study done by Oostveen Anne-Marie, Van den Besselaar Peter and Oostveen and Van den carried out that explains why the social aspect of EVMs lacks much attention. Their research show that in developed democracies, research about e-voting is more fair in that it considers both the technological and social sides of the system. On the other hand, the establishing democracies focus more on anticipating the technological advancements, its factors for e-voting, with minimal emphasis on the societal factors. This is also due to limitations such as the utilization of Scopus database search, which does not include all the research materials in the subject area. The authors also call for a wider perspective in this regard in order to grasp dimensions of social and cultural change that e-voting may bring to emerging democracies (Zafar & Pilkjaer, 2007). Pakistani elections occur in a political environment which is hostile to free and fair elections and the necessary conditions for them (Haq, 2022). Unfortunately, the political motives of Pakistani political parties prioritize personal political gains, which contributes to impracticable electoral reform to address the common national interest of the country. Imrana (2022) suggested that government should encourage political parties to come together and start formulating a strategy that has a view to restoring the electoral reforms that would want to enhance the fairness of the election.

Vassil and Weber (2011) have shown that voter turnout is affected positively by e-voting that also brings people into contact with politics. This shift, they say, results to an increase in social equity in the society since more of the citizens are able to exercise the democratic privilege. Analyzing their works it can be stated they prove that e-voting systems improve political nonattendance and therefore makes the electoral system more democratic and democratic (Malik et al., 2024). Collectively, these papers underscore the need to address the technological and the social aspects of e-voting systems. Importantly, it can be acknowledged that the primary focus of certain technological improvements is to increase the

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accessibility and efficiency of the electoral process – however, the process itself is social and political: it is the social and political contexts for adopting the technology for e-voting which holds the key to smooth functioning of a more inclusive electoral process. Using e-voting technologies must thus be done with consideration to the technological changes involved, as well as the social impact of those changes for the effective enhancement of democratic participation. Hence this study hypothesized that:

H1: The implementation of electronic voting systems in Pakistan will face significant technological, operational, and sociopolitical challenges, similar to the experiences observed in India and the Philippines.

H2: Public trust in the electoral process and voter participation will improve in Pakistan with the successful implementation of electronic voting, provided that transparency, security measures, and voter education are effectively integrated into the system.

Methods

Data were collected through convenience sampling using a cross-sectional survey, which is appropriate in a study where one wishes to assess the connections between different variables at a certain time step. This design enables a large amount of data to be collected and is best suited for determining the extent of relationship between independent variables (e.g.; performance expectancy, trust in technology) and an overall dependent variable (intention to use e-voting).

To this end, the study employed a self-developed questionnaire to measure important constructs relevant to the adoption and use of e-voting in Pakistan. The elements of this questionnaire have based on the theory's research, focusing on the aspects that determine the technology utilization, especially in dual function electronics voting systems. The questions were derived mainly from other well-established scales from TAM and UTAUT models and other studies that identified perceptions towards technological innovations. For example Venkatesh et al.,

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(2003) User Acceptance of Information Technology, and Public Trust in technology from McKnight et al., (2002). Performance expectancy is defined as the perception that a particular system will improve productivity or meet a person's need. In this study, performance expectancy was measured by items borrowed from TAM and UTAUT developed by Venkatesh et al. (2003) to measure perceived usefulness and the effectiveness of the technology to the accomplishing of tasks.

Ease of use is taking into account the level of effort that people assign to the use of the e-voting system. This construct was adopted from the UTAUT model developed by Venkatesh et al. (2003) where the major concern is on the extent of comprehensible and straightforward usage of technology or whether or not the system is friendly. Perceived normative beliefs are defined as the extent to which individuals think family, peers, experts, and other people whom they know should adopt the e-voting system. The scale used herein for capturing the amount of social influence was constructed from both the TAM and the UTAUT, which indicate that the social impacts have a significant impact on the adoption process. Perceived technological trust refers to the extent of confidence that a person has in the technological support systems of the developed e-voting systems, on matters of security, privacy, and reliability. All the items on this scale were derived from general trust models that are captured within the technology adoption literature. Perceived website credibility measures participants' trust in the sources in charge of the election the e-voting is aiming at conducting. This scale was used from the political and institutional trust studies.

Conditions that facilitate adoption is another area, which deals with the requirements that could be environmental, infrastructural as well as the organization requirements, in order to support e-voting system implementation as well as usage. This construct was adapted from the UTAUT and Diffusion of Innovation (DOI) model.

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Perceived likelihood of future usage of e-voting is proposed as the dependent variable in the study and captured by intention to use e-voting. The scale for this construct was adopted from the technology acceptance model TAM and the uses and technology acceptance and uptake model UTAUT. In this study population targeted eligible voters from the Khyber Pakhtunkhwa region of Pakistan with differential technology exposure. This region was chosen because of the continuing debates over e-voting and because the government may be interested in testing e-voting in future elections. In all 383 participants took part in the study and the sample size was calculated based on the standard sampling formular where the size was presumed based on the total number of voters within this region. The sample size was computed using the Estimate for Total Population (EPT) calculated from the Pakistan Bureau of Statistics survey carried out in 2017 with the population size of N = 589,231. Yamane (1967) formula of determining the sample size yielded a figure of 398 and 383 respondents were administered.

The study used probability sampling technique; simple random sampling method was used so that each and every eligible voter was equally likely to respond to the questionnaires. This approach means that the sample is typically acquired in such a way that prejudices are eliminated and the results can be generalized.

The data were obtained by a structured questionnaires administered through self-completed questionnaires to 383 respondents. Depending on the literacy level of the population and readiness to use technologies, the surveys were conducted in a face-to-face, online or using both, blended approach. Last, the response data were analyzed by using Statistical Package for Social Sciences (SPSS) version 24 in order to extract more meaningful information from the responses made by the participants.

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Results

Table 4.1: Reliability Statistics

Construct	Items	Cronbach's Alpha (α)	Interpretation
Performance Expectancy (PE)	4 items measuring perceived usefulness	0.85	Excellent reliability (α > 0.8)
Effort Expectancy (EE)	3 items measuring ease of use	0.82	Good reliability (α > 0.7)
Social Influence (SI)	4 items measuring social pressure to adopt	0.78	Acceptable reliability (α > 0.7)
Trust in Technology (TT)	4 items measuring confidence in technology	0.88	Excellent reliability (α > 0.8)
Trust in Election Commission (TEC)	4 items measuring trust in the election body	0.79	Acceptable reliability (α > 0.7)
Conditions that Facilitate (CF)	4 items measuring infrastructure readiness	0.81	Good reliability (α > 0.7)
Intention to Use e-Voting (I_EV)	4 items measuring intention to use e-voting	0.86	Excellent reliability (α > 0.8)

Performance Expectancy (PE), Effort Expectancy (EE), Trust in Technology (TT), and Intention to Use e-Voting (I_EV) have excellent to good reliability, as indicated by Cronbach's alpha values above 0.8. These scales measure key dimensions of technology adoption and e-voting use intention and are robust for measuring their respective constructs. Social Influence (SI) and Conditions that

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Facilitate (CF) also have good reliability, with Cronbach's alpha values slightly above 0.7, suggesting that the items are consistent in measuring social pressure and the enabling conditions for e-voting adoption. Trust in Election Commission (TEC) shows acceptable reliability with a Cronbach's alpha of 0.79, which is still within an acceptable range for social science research. The reliability table confirms that the scales used in this study have acceptable to excellent internal consistency, making the data collected using these instruments reliable for analyzing the constructs related to e-voting adoption.

Table 4.2: Correlations

		I_E_V	P_E	E_E	S_I	T_EC	T_T	C_F
I_E_V	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	383						
P_E	Pearson Correlation	.852**	1					
	Sig. (2-tailed)	.000						
	N	383	383					
E_E	Pearson Correlation	.744**	.633**	1				
	Sig. (2-tailed)	.000	.000					
	N	383	383	383				
S_I	Pearson Correlation	.892**	.809**	.577**	1			
	Sig. (2-tailed)	.000	.000	.000				
	N	383	383	383	383			
T_EC	Pearson	.858**	.928**	.591**	.865**	1		

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	Correlation	.000	.000	.000	.000			
	Sig. (2-tailed)	383	383	383	383	383		
	N							
T_T	Pearson	.946**	.834**	.649**	.946**	.881**	1	
	Correlation							
	Sig. (2-tailed)	.000	.000	.000	.000	.000		
	N	383	383	383	383	383	383	
C_F	Pearson	.866**	.900**	.749**	.768**	.861**	.802**	1
	Correlation							
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	383	383	383	383	383	383	383

**. There is a 0.01 (2-tailed) statistically significant association.

The Intention to Use E-Voting (I_Ev) was strongly, significantly and positively associated with the Performance expectancy (P_E), ($r = 0.852$, $p < 0.05$). The Intention to Use E-Voting (IUEv) was strongly, significantly and positively associated with the Effort expectancy (E_E), ($r = 0.744$, $p < 0.05$). The Intention to Use E-Voting (IUEv) was strongly, significantly and positively associated with the Social influence (S_I), ($r = 0.892$, $p < 0.05$). The Intention to Use E-Voting (IUEv) was strongly, significantly and positively associated with the Conditions that Facilitate (C_F), ($r = 0.866$, $p < 0.05$). The Intention to Use E-Voting (IUEv) was strongly, significantly and positively associated with the Trust in election commission (T_EC), ($r = 0.858$, $p < 0.05$). The Intention to Use E-Voting (IUEv) was strongly, significantly and positively associated with the Trust in Technology (T_T), ($r = 0.946$, $p < 0.05$). All predictors are significantly associated with the criterion variables. Among all these variables, Trust in Technology (T_T), showed highest correlation value on intention to use e-voting. Scholar accepts the hypothesis that all these variables significantly, positively and strongly associated with the people's intention to use e-voting in Pakistan.

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Table 4.3: Regression Statistics

Table a) Model Summary[b]

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics					
					R^2 Change	F Change	df1	df2	Sig. Change	F
1	.968[a]	.937	.936	.241	.937	937.656	6	376	.000	

a. Predictors: (Constant), C_F, E_E, S_I, P_E, T_EC, T_T

b. Dependent Variable: I_E_V_RC

The summary of the model in the preceding table shows that however much variation each predictor variables can impact the dependent variable. The outcomes variable's modification as a result of the predictors can be observed in the R^2. This result of 0.937, or 93.7 percent or about 94 percent, showed that the predictors in their entirety were significant predictors of the dependent variable, Intention to Usage of E-voting (I_Ev).

Table b: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.340	.063		-5.356	.000
	P_E	.105	.050	.085	2.084	.038
	E_E	.182	.028	.133	6.396	.000
	S_I	.021	.048	.018	.437	.662
	T_EC	-.146	.050	-.124	-2.936	.004
	T_T	.757	.049	.711	15.473	.000
	C_F	.213	.036	.212	5.957	.000

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a. Dependent Variable: I_E_V_RC

Standardized coefficient beta readings were listed next to each factor in the table labelled "Coefficient." The Trust in Technology (T T) standardized coefficient beta score (=.711, or 71%, and p .05) was the highest among all predictors' roles in the Dependent Variable: Intention to Usage of E-voting (IUEv). Standardized coefficient beta scores for Trust in Election Commission (TiEC) demonstrated that participants do not have faith in our Election Commission, as indicated by their negative value (= -0.124 or -12).

Discussion of Study Findings

This research critically assesses the prospect and impediments of e-voting in Pakistan and traces a comparative review with the conditions in India and Philippines. It defines the nature of technological, operational, and sociopolitical forces that lead to e-voting and its success or failure with special reference to Pakistan.

Challenges of E-Voting in Pakistan

In the Pakistani context, the introduction of e-voting brings the following challanges:. Some of the challenges include; Poor infrastructure which limits the capacity of large demographic groups to either adopt or engage the e-voting systems. Lack of adequate physical network, particularly in the rural areas, and low e-literacy are major challenges to e-voting. New technology may be difficult for many voters, especially those in underdeveloped areas, and this weakens the chances of level playing field provision (UNDP, 2020). These challenges are further exacerbated with doubts about the electoral process as this was an issue of controversy in Pakistan because of regular complains of rigging therein (Hussain & Raza, 2021).

Another remarkable barrier is a trust in the technology that is utilized in the process. This assertion is similar to the reason why people of India and the Philippines are reluctant to accept e-voting systems because they feel that their

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votes might be changed by somebody or might be hacked. To tackle such issues, the principles of transparency and accountability are all important. Then, they stated the readiness of the public in adopting the system more if it is secure and cannot be tempered with (Norris, 2006). But this is contingent on secure structures and the timely disclosure of results in e-voting systems securing the populace's trust; otherwise, people will remain skeptical, and the usage low as Binns (2019) pointed out.

Comparative Insights from India and the Philippines

Pakistan needs an understanding of electronic voting system and its functioning based on previous implementation done in India using their Electronic Voting Machines. While innovative, Indian political leaders introduced EVMs step by step from the end of the 1980s, with the EVMs becoming essential in the national elections of 2004 (Ghosh, 2014). Albeit EVMs have paved their way accomplishing the problems of vote modifying and ineffectiveness, strains regarding security and effectiveness of EVMs have contended. The controversy about the appropriateness of EVMs in India shows the need for separate inspection and certification mechanisms that are necessary to convince people of the work's honesty (Goel & Sharma 2019).

Likewise, the Philippines too has had both positive and negative experiences with AES—adopted nation-wide in 2010 known as the Automated Election System. The AES has enhanced and accelerated the tallying of results so that instead of taking days it only takes hours (La Vina, 2010). Nevertheless, operational mistakes, risks of hacking, and system failures have raised questions on the system's stability (Buenafe, 2016). These are not problems in the Philippines alone and Pakistan may well fall foul of them when e-voting is introduced if proper measures are not put in place. At the same time, Philippines' experience shows that e-voting is capable of improvements, including efficiency and elimination of fraud. In comparing these two nations, the following similarities

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have been deduced: All of the three countries are having some issues with the trust in the technology, security measures as well as transparency. Hence like India and the Philippines, success in e-voting implementation Pakistan will depend on its ability to properly respond to these issues.

Building Public Trust and Ensuring Electoral Integrity

The study therefore stresses comprehensively that the fundamental issue often deciding the efficacy of e-voting in a country like Pakistan is the extent of public confidence in the electoral process. Confidence in the technology, confidence in the electoral commission, and confidence in the system information are the key factors for the attitude toward e-voting. Considering the fact that mistrust in the election process has always been an issue in Pakistan, it become imperative that the e-voting systems are seen as secure, efficient and over sighted. This can be done with the help of independent audits, carrying out some awareness programs among the public, and ensuring that people see the election commission as unbiased institution (Sharma & Bhattacharya, 2013).

Transparency instruments including, public availability of comprehensive information on the voting and counting process as well as readable audits are crucial in enhancing public confidence. This means that, as long as there is no transparency, then any electronic system whatsoever is going to remain open to charges of fraud regardless of actual robustness of the system (Norris 2006). Also, in terms of voter behavioral change, enhancing people's understanding of how e-voting is actually done could go along way in reducing people's cautiousness and citizen participation (Georgiadou, 2018).

Opportunities for E-Voting in Pakistan

However, there a number of chances for improving the electoral system in Pakistan through the implementation of e-voting. One major benefit is the enhancement of access it is assumed to bring, especially to such social groups as the physically challenged or persons in remote regions. These systems also hold

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the promise of increasing the participation from these groups by removing physical barriers to the polling stations; increasing representation and inclusiveness of the elections (UNDP, 2020). However, e-voting systems have some advantages like fast counting of the votes and compilation of the results on the Pakistan's election process. This would also lower the burden on the election authorities and facilitate faster announcement of the results which is an important part for continuing the public trust in the entire election procedure (Rao & Sheshadri, 2020). It also means that digital technology could be used to enhance the process of voter registration, the voters' list, and eliminate the cases of interference from humans in the voting process. Thus there exist certain problems in using e-voting which are yet to be solved, the advantages that e-voting offers to the electoral process in Pakistan with special reference to accessibility, efficiency and controlling the fraud as pointed out by Alvarez, 2010 are considerably huge.

Recommendations for Pakistan

In order to take advantage of these opportunities, Pakistan has to pay much attention to several factors. First, the generic infrastructure and awareness of the actual uses over the country to make all the citizens enabled for e-voting systems. This might include enhanced campaigning for better Internet connection, particularly in the rural and the remote regions, the promotion of digital electoral education among voters (UNDP, 2020).

Second, the security of the e-voting systems should be highly paramount. Pakistan may pick ideas from India and Philippines by establishing and asserting independent audits and certifications, as well as security certification tests, to reduce the fact that hacking or meddling with these systems is easy (Ghosh, 2014). Enhancing cybersecurity and ensuring that people have an understanding of these measures is likely to encourage public trust within that system (La Vina, 2010). Finally, raising the last need for equal opportunities to promote e-voting infrastructures for elderly people, persons with disability, or other citizens who

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have troubles with new technologies, living in zones with restricted access to Internet. This could include the creation of the graphic interfaces and offering support to those that may experience some difficulty in operating on the electronic systems (Georgiadou, 2018).

Conclusion

Thus, in spite of all the challenges that are connected with e-voting systems in Pakistan, such as the lacks of infrastructure, the problems of confidence, and security the usage of this system is orientated towards the purpose. The writing has established that Pakistan can avoid many of the aliments related to e-voting through emulating the strategies of India and the Philippines. However, if security is ensured and transparency is made possible while having proper infrastructure and winning the confidence of the people it may turn out to be a significant feature in carving the efficiency of the Pakistani election. By adopting e-voting in a systematic manner Pakistan can increase voter turnout, achieve more accurate and fast results of elections and subsequently, can increase the audience trust on the country's electoral system.

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Appendix Questionnaire

Performance Expectancy on Intention to Use E-Voting

1. Do you think electronic voting is the future of voting in elections?
2. Rural people have less confidence in ICTs.
3. Use of ICTs can help improve the efficiency of the electoral process.
4. E-voting performance is better than the traditional voting system.
5. E-voting would help in reducing the time of vote count.

Effort Expectancy on Intention to Use E-Voting

6. If you were a voter, would you prefer electronic voting over traditional paper voting?
7. Would you prefer voting through a website or an app over physically going to a voting machine?
8. Do you think electronic voting would greatly decrease the time of the Australian election process?
9. E-voting can reduce the time it takes people to cast their votes.
10. E-voting can require less energy to cast a vote.

Social Influence on Intention to Use E-Voting

11. Media can change people's perception of e-voting.
12. Social relations can influence people's perception of e-voting.
13. Social media campaigns can mold public perception to accept e-voting.
14. Peer groups can influence others to agree on using e-voting.
15. Social groups can reduce people's misperception about the use of technology in elections.

Facilitating Conditions on Intention to Use E-Voting

16. E-voting systems require certain conditions to function effectively.
17. Pakistan lacks the basic requirements for implementing e-voting.
18. Low literacy levels are a hurdle in implementing e-voting.
19. Rural people have less confidence in e-voting.

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Trust in the Election Commission on Intention to Use E-Voting

20. Do you trust the Election Commission of Pakistan?

21. Do you believe the Election Commission of Pakistan is responsible for rigging?

22. Can the Election Commission reduce allegations about the electoral process in Pakistan?

23. Is the Election Commission responsible for free and fair elections?

24. Is the Election Commission functioning as an independent institution?

Trust in Technology on Intention to Use E-Voting

25. Would you trust an electronic voting machine with your vote?

26. Traditional paper ballots could go missing or show suspicious results in elections.

27. Electronic voting could be open to hacking or leaks.

28. How safe do you think electronic voting is compared to paper ballots?

29. Do you think electronic voting would be controversial?

Intention to Use E-Voting

30. E-voting will be a good initiative.

31. E-voting will help ensure free and fair elections.

32. E-voting will reduce allegations of rigging in elections.

33. Media plays an important role in creating awareness about e-voting.

34. The future of elections is e-voting.