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E-Voting Systems Adoption by Voters in Developing Countries: A Literature Review and Analysis

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***Abstract* – E-voting, or electronic voting, entails the incorporation of technology into the electoral process in order to address the shortcomings of conventional voting systems. E-voting systems have evolved and are expected to advance further in the future. However, e-voting systems face varying degrees of acceptance and resistance across different countries due to various influencing factors which remain controversial and context dependent. Hence, the aim of this study is to review prevailing studies on e-voting adoption, leveraging on the PRISMA statement, to determine the theoretical frameworks and models utilized and to ascertain the factors influencing the adoption in developing countries over the past five years. The study identified 17 related articles from 10 different countries and investigated them in light of the research questions. The Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Acceptance Model (TAM) are identified as the top frameworks commonly employed. In addition, other theories and models like the Diffusion of Innovation (DOI) theory, the Theory of Planned Behavior (TPB), trust models, and ethnographic approaches are also commonly used for investigating e-voting adoption systems. To deepen understanding regarding the adoption of e-voting in emerging nations, it is crucial to conduct longitudinal studies to track its progress over time.**

Additionally, comparative evaluations across different regions and countries, with the integration of qualitative and quantitative research methods, are essential for a comprehensive analysis of e-voting adoption patterns.

***Keywords* – Developing countries, e-voting adoption, systematic literature review, TAM, UTAUT.**

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1. Introduction

In an election or referendum, voting is the method by which a question is answered or a choice made. This is the essential aspect of democracy, i.e., the right for an individual, group, or class to vote on options and choose representatives [1]. In general, the use of information technology (IT) affects internal processes within organizations, demonstrating its broader relevance in enhancing procedural efficacy, which may also be employed in electoral situations [2].

IT has been increasingly embedded in elections at every level of the voting process to make them efficient, secure, and transparent [3]. As such, 'e-voting' has become a generically used term for describing voting approaches where electronic devices are used in place of traditional paper ballots [4].

Broadly, e-voting involves IT usage throughout the entire electoral process – from voter registration, voting (casting), results tabulation to results publication. Therefore, e-voting requires multiple interconnected devices like computers, mobile phones, cameras, and monitors. Therefore, e-voting is expected to simplify the electoral procedure, reduce expenditures, and increase citizens' participation in electoral activities [5].

Compared to manual ballot marking, or the use of paper squares affixed to a form, e-voting systems improve vote-counting speed and accuracy. Furthermore, these systems provide improved access to information about the candidates and are inclusive for people with a disability to vote. In addition, at the time of voting, e-voting systems can enforce voting eligibility criteria that could be used to discourage unauthorized parties from casting ballots [6], [7].

Nevertheless, ensuring confidentiality, security, and freedom remain pertinent concerns, alongside the substantial initial investment required and the risk of fraudulent activities. By contrast, factors like security and privacy issues on top of potential resistance from less technologically savvy voters may also be one of the key challenges [8], [9], [10]. Notwithstanding, e-voting systems provide a safe alternative to traditional polling stations during lockdowns and social distancing measures [11]. Concerns about COVID-19 transmission through voting tools lead to smartphone-based e-voting solutions. However, the unilateral introduction of these technologies without consultation raises questions about impartiality and potential political favoritism [12], [5].

Several nations worldwide have adopted e-voting, with Estonia, India, Brazil, and the Philippines being among those that have fully implemented it. While Peru, France, Mexico, Japan, Canada, Belgium, the US, and Argentina have adopted it partially. However, some countries such as Norway, Kazakhstan, Italy, Ireland, the UK, Guatemala, Finland, Costa Rica, and Australia have cancelled e-voting after trials. Others like the Netherlands, Germany, and Paraguay did not continue with the implementation. Additionally, countries like Indonesia, Nepal, Switzerland, Mongolia, Ecuador, Bhutan, and Bangladesh are currently in the testing phase of the technology [13], [11].

The efficacy of deploying computer-based systems is contingent upon technological, organizational, and social factors [14]. Technological considerations encompass the ways in which inputs are transformed into outputs due to technology and business processes. Meanwhile, as emphasized by [15], organizational and social factors underscore the importance of comprehending individuals' values, skills, and attitudes, on top of their organizational dynamics.

Such understanding of how technological, organizational, and social factors interact is particularly relevant in examining e-voting adoption. Scientists from diverse backgrounds of knowledge (computer science, information systems, public administration, public policy, and political science) are exploring queries regarding the adoption of e-voting. They contribute to a multi-disciplinary understanding and comprehensive analysis of e-voting adoption along with their consequences in a variety of ways, using different approaches. The collaboration between different disciplines and the use of multiple approaches enhances the comprehension of the complexity related to e-voting adoption and offer valuable insights for policymakers and practitioners.

2. Objectives

The assessment of publication volume within a particular area is essential as it demonstrates the degree of research activity in this field [16], [17]. Hence, this study sets out to investigate the volume of e-voting adoption research articles published by developing countries between 2019 and 2024. The study further intends to identify and review the literature on e-voting adoption to examine the spectrum of e-voting acceptance in developing countries and explore factors influencing e-voting system adoption. The main research questions that this study addresses are:

- What is the current quantity and distribution of research literature regarding e-voting adoption in developing countries over the past five years?
- What are the predominant theoretical frameworks and models utilized in the existing literature to understand e-voting adoption in developing countries?
- What are the key factors influencing e-voting adoption in developing countries, as identified by the findings of the reviewed studies?

The identified frameworks, modified models, and factors from this research paper represent valuable insights that could be leveraged to improve the adoption of evidence-based e-voting systems. By understanding the frameworks and models utilized in previous research, as well as the factors influencing e-voting adoption, researchers, policymakers and stakeholders can gain valuable knowledge to inform the design and implementation of more effective e-voting systems. These findings provide a foundation for refining existing approaches, developing new strategies, and addressing potential challenges to improve the overall efficacy and acceptance of e-voting in electoral processes across developing countries.

This study adopted a systematic literature review (SLR) approach, whereby 17 journal articles were included in the review. All the included articles were extracted from various robust and reliable databases. Article selection and reporting of the findings all adhered to the PRISMA guidelines. The next section will discuss the motivation behind the research and relevant existing works. Next, the SLR methodology will be explained. The findings of the review along with the relevant analysis will be presented in the third section. Finally, the conclusion and recommendations will be presented in the fourth section.

3. Motivation and Related Works

Even with increasing research interest on the topic of e-voting, there has yet been much systematic review on the system's adoption models and determinants, specifically in the context of developing countries [4], [18], [19]. Nevertheless, various authors had examined the adoption of e-voting systems globally. For example, the corpus of literature was analyzed by [4] investigating e-voting researches published from 2000 to 2022, aiming to discern associations between publication frequencies and notable events within individual countries. Meanwhile, an analysis of studies conducted between 2005 and 2020 in various countries to investigate the development of e-voting research over a 15-year period [18]. In a separate investigation, 67 articles concerning e-voting adoption in developing nations published between 2000 to 2015 were investigated by [19]. This review paper hence sets out to address this gap by examining prevailing e-voting adoption models in the last five years. By doing so, this review hopes to enrich the knowledge of policymakers in emerging nations, particularly in designing e-voting systems which fulfill local requirements and challenges, and ultimately improving trust and participation in the democratic electoral process. Apart from merging multiple studies, this review also offers understanding regarding the determinants of e-voting adoption in emerging nations. In a systematic manner, this review performs a synthesis of data derived from various digital libraries so as to evaluate multiple e-voting adoption models from various developing countries. A deeper insight on e-voting adoption has become even more pertinent now where digital governance has taken precedence in the post-pandemic era.

4. Methodology

This study carried out a systematic literature review or SLR. The PRISMA statement was performed on standard SLRs as presented by [20] and [21]. This strategy has a defined plan to include research papers and report their results in a neutral fashion to prevent any subjective bias [22], [23].

This review starts off with a delineation of the research question and clarification of the inclusion and exclusion criteria for choosing the relevant works. Next, a search is carried out for related academic databases employing topic-specific keywords. The search results are then screened, firstly by the titles and abstracts, and then by a comprehensive review of possibly related studies based on the pre-defined criteria. Bias is reduced by conducting a multi-reviewer procedure, whilst any discrepancies are resolved by deliberations.

Data are then extracted from the chosen studies, concentrating on their main themes, methodologies, and findings. The selection process is documented using a PRISMA flow diagram which describes the identification, screening, and inclusion/exclusion procedures. Lastly, the results are synthesized by underscoring the patterns, gaps, and main insights, while clearly explicating the selection procedure.

The main goal of the PRISMA guidelines is to ensure a consistent method for selecting articles published in scientific journals. It is divided into three phases: Identification, Screening, and Inclusion as shown in (Figure 1). This will be explained in more detail in the subsequent sections.

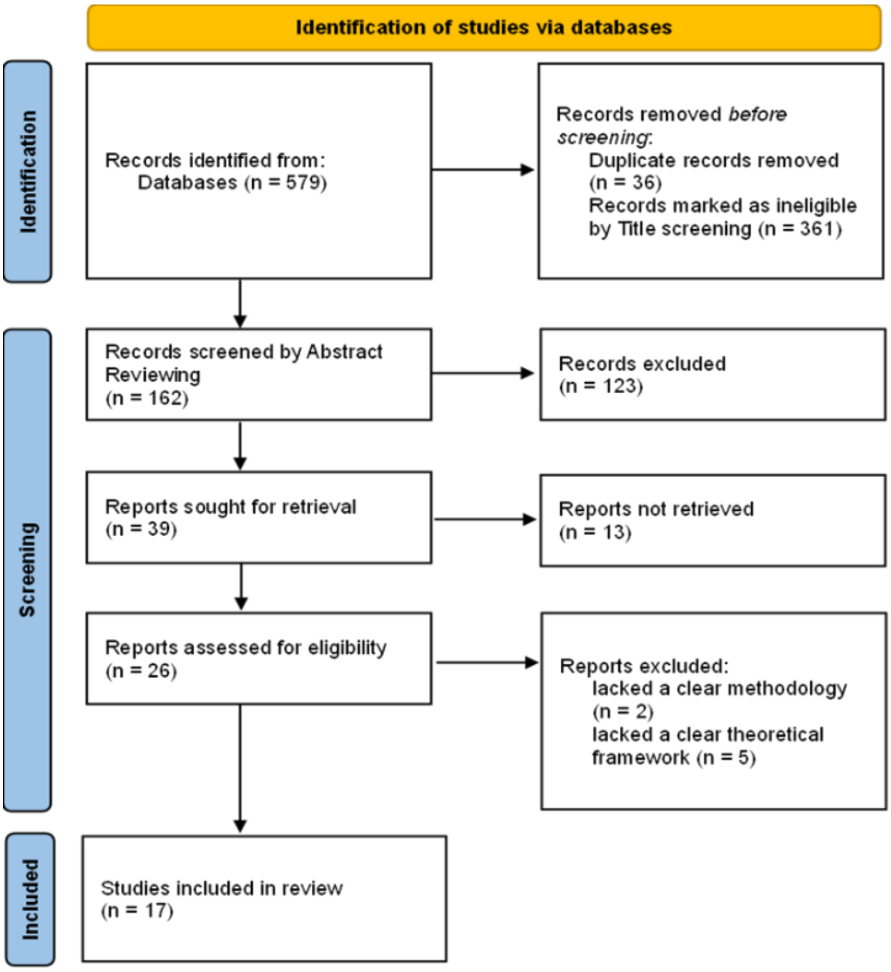

Figure 1. PRISMA flow diagram for e-voting adoption systematic literature review

4.1. Identification of the Literature

This study performed the search using multiple publication databases instead of focusing on just a few journals. This is to ensure the inclusion of articles from various disciplines, thereby enhancing the dataset [24], [25]. The databases utilized for sampling included IEEEXplore, ScienceDirect, ACM Digital Library, Web of Science, SCOPUS, and Google Scholar.

In order to fulfill the research objective, careful selection of search parameters was essential to ensure accurate and relevant results pertaining to e-voting adoption. The final search query incorporated key terms such as "e-vote", "electronic vote", "e-voting", "electronic voting", "internet voting", "internet vote", "adoption", "adopt", "acceptance", "accept", "developing countries", "developing country", and "developing nations".

The search across several databases identified 579 published articles relevant to the topic. These articles were selected from the search results and are listed, as per the database, in Table 1.

Table 1. Retrieved records vs databases for e-voting adoption research

#	Database	# Retrieved Records
1	Google Scholar	390
2	Web of Science	72
3	IEEEX	57
4	ACMD	24
5	Science Direct	19
6	Scopus	17
	Total	579

4.2. Screening the Literature

The first stage in narrowing down the literature entailed reviewing the article titles. After examining the titles, 381 articles were excluded for the following reasons: They discussed e-voting adoption in developed countries; they focused on general e-government, e-participation, e-service, or e-democracy; and they proposed Blockchain techniques for e-voting systems. Additionally, articles published in languages other than English were also excluded. After applying these criteria, 198 articles remained for further screening.

The remaining 198 records were gathered into a single repository to identify and remove duplicates. This process eliminated 36 redundant entries, leaving 162 unique articles for further analysis.

The abstracts of these 162 records were reviewed, resulting in the exclusion of 123 papers as their content did not align with the research questions. Therefore, further examination of the full text of these irrelevant studies was deemed unnecessary. As a result of this process, leaving 39 records that appeared more promising. However, access to the full text of these papers presented another challenge. Unfortunately, the full text for 13 of these records could not be accessed. Without complete access, their eligibility for the study could not be determined. After eliminating these inaccessible records, 26 records remained. Furthermore, research centered on e-voting adoption for non-general elections and Master's/PhD theses as well as the review papers were excluded, resulting in 19 remaining records.

These Records can now be thoroughly assessed for their suitability for the research. This final pool of studies was examined in detail to determine their adherence to the criteria for inclusion in the analysis.

4.3. Including Literature

To ensure their relevance to the research questions, the remaining 19 articles were subjected to a full-text review. This in-depth review resulted in the exclusion of 2 articles. The excluded articles lacked a clearly defined methodology or a well-founded theoretical framework. Following this final selection process, 17 articles were deemed suitable for inclusion in this study.

5. Results and Analysis

Over the last five years, there have been numerous publications focusing on e-voting adoption in emerging nations, with a total of 17 papers. Over this period, the publication rates varied. For instance, in 2019, only one article was published; in 2020, the number increased to seven. However, there was a decline in publication in 2021 and 2022, with only three and two articles published, respectively. The trend slightly improved in 2023, with four articles published. Notably, there was a substantial disparity between the highest and lowest publication frequency within a year. The lowest count occurred in 2019, with one article, whereas the highest was in 2020, with seven articles.

Utilizing the PRISMA approach for the systematic review in this study yielded a total of 17 articles originating from 10 different countries as per the set criteria.

This number of publications is considered reasonable compared to the breadth of publications on e-voting adoption across developing countries, as outlined in the study of [18] spanning 15 years from 2005. Figure 2 depicts the precise distribution of papers published by each country. Notably, Nigeria and Jordan lead the count with three published articles each, followed by Indonesia, Malaysia, and Ghana with two articles each, while the remaining countries contributed one published article each on e-voting adoption.

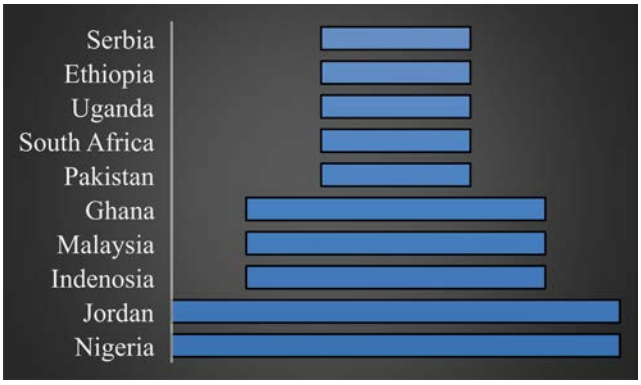

Figure 2. Number of published articles on e-voting adoption across the developing countries

It is crucial to understand the needs and acceptance levels of voters in order to advance the development of e-voting systems. Consequently, scholars are keen on identifying the factors influencing voters' acceptance or rejection of such systems. Over the past five years, researchers have employed numerous models and frameworks to elucidate the adoption of e-voting systems across various developing nations, as evidenced by the literature reviews. The following section offers an overview of the theories and models utilized in this regard over the past five years.

5.1. Studies Using TAM for E-voting Adoption

The majority of the articles, i.e., six out of 17, utilized the Technology Acceptance Model (TAM) to examine e-voting adoption in the selected emerging nations. In some cases, TAM was employed as the sole model to investigate the adoption level in a specific sample of the targeted population, while in others, researchers tended to integrate constructs from other technology adoption models and theories to develop their research model.

Through a questionnaire based on the TAM, the potential usage of a secure e-voting system by voters for Jordan's parliamentary elections was investigated [26]. Their paper showed that Jordanian citizens have a high acceptance and positive attitude towards using an e-voting system, with high scores in Perceived Usefulness (PU), Perceived Ease of Use (PEoU), Attitude Towards the System (ATS), Intention to Use (ITU), and Actual Use.

On the other hand, a study was conducted by [27] to explore what determines individuals' likelihood of using e-voting in Malaysia, focusing on a specific demographic of respondents born between 1981 and 1996. The proposed research model incorporates three theories namely the TAM, Diffusion of Innovation (DOI), and Web Trust (WT) in formulating the strategies to explore the impacts of their factors on e-voting adoption by individuals. The TAM is based on the user's acceptance behavior towards the given technology and subsequently their actual usage; in other words, their perception of the technology is where their acceptance and actual usage of the technology can be predicted accurately. The DOI theory, meanwhile, provides insight into how new ideas spread through a population, focusing on the nature of innovation as well as the process by which it communicates timing and the social system that they become part of. WT examines how confidently people use the Internet, which further influences their acceptability and usage of all kinds of services like e-voting.

Another study analyzed e-voting acceptance in Indonesia using the TAM, DOI, and WT [12]. The research aimed to identify the community's desire to use such a system and address concerns about data protection, privacy, and usability. The proposed model incorporated dimensions from all three of the models, a) Perceived Usefulness and Perceived Ease-of-Use from the TAM, b) Relative Advantage and Compatibility from the DOI model, and c) Trust in Government (which looks at the extent to which the respondents trust their government to operate an e-voting system securely and fairly).

Public confidence in the government was one of the key concerns voiced in the research as well. E-voting adoption does not automatically lead to a higher level of trust in the government. System security, data security, and communication network security are key to ensuring the success of the e-voting system and winning the public's confidence. Apart from that, to actually implement e-voting systems in Indonesia, it absolutely requires a well-established supportive ecosystem, capable election organizers who prioritize privacy, and data security settings.

The factors influencing e-voting adoption among youths in South Africa was investigated by [28]. Their research aimed to provide knowledge and insights that are important for election management, policy planning as well as further research in developing countries with comprehensive information and theoretical explanation of technology adoption. Their conceptual model was based on an integration of different theories namely the TAM, Theory of Planned Behavior (TPB), DOI Theory, Trust and Risk in e-government adoption, Access, Skills and Attitudes Framework, in addition to Carter and Belanger's e-government adoption model.

The study featured a model to explain what goes into a young person's decision to entertain the thought of using an e-voting system. This mix of models was anticipated to give some knowledge into the factors that may drive young people in South Africa towards e-voting adoption. The research concluded that Access to Technology, Skill in Using Technology, and a Positive Attitude towards e-voting are the determinants of young people's likelihood to participate in e-voting [28]. However, the research also indicated possible issues such as easier hacking and illegal voting while showing concerns about the ICT framework of the country and its access to technology, all of which could affect the feasibility of adopting e-voting in the near future.

Another study assessed the preparedness of Ugandan voters to undertake an e-voting process during the COVID-19 pandemic, taking into account the thrusts and strains imposed due the prevailing situational health crisis [5]. The theoretical model of the study was proposed by adapting the TAM along with the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). It also extended the model to incorporate Trust probability. The results indicated that Ugandan voters are moderately prepared to adopt electronic voting, but only if they perceive it to be helpful, easy to use, and trustworthy. The most significant impacting factor for adoption readiness was attitude towards e-voting. Trust level was the second main point affecting the integrity and reliability of the e-voting system. Perceived Usefulness (PU), including benefits like cost effectiveness and time saving, was demonstrated as another determinant of e-voting adoption readiness. However, the impact of Perceived Ease of Use on the willingness to adopt e-voting was much less than the other predictors.

A study on how voters in the 2023 elections in Nigeria responded to technology, culture, religion, and ethnicity was conducted by [29]. The study concentrated on IT adoption using the TAM which posits that when an individual considers new technology, he/she will decide (unintentionally or intentionally) to adopt it only if he/she believes that the technology is useful and easy for him/her. The study was based on a survey design entailing questionnaires and interviews for collecting data from eligible voters in Rivers State, Nigeria. Ethnicity was found to be a crucial determinant of voting as voter attitudes in Rivers State, Nigeria, are affected by religion, culture, technology, and ethnicity.

The studies which used the TAM as a research model either singularly or cooperatively with other adoption models and theories in developing a conceptual framework to study e-voting adoption in developing countries are summarized in Table 2.

Table 2. Articles that used TAM in investigating e-voting system adoption

Article Title	Authors	Used Theory	Nation
The Feasibility of Adopting a Secure E-voting Based Biometrics Authenticity: The Jordanian Parliamentary Elections	[26]	TAM	Jordan
The Determinants of Intention to Use E-voting System: The Case of Generation X in Malaysia	[27]	TAM, DOI, Trust	Malaysia
Conceptual Model of E-Voting in Indonesia	[12]	TAM, DOI, Trust	Indonesia
Intention to Adopt e-Voting: A Perspective of South African Youth	[28]	TAM, TPB, DOI	South Africa
Is COVID-19 threatening electoral democracy in Uganda?	[5]	TAM, Trust in Techno-logy	Uganda
E-Voting and Electorate Attitude in 2023 Election in Nigeria	[29]	TAM, culture, religion and ethnicity	Nigeria

5.2. Studies using UTAUT for E-voting Adoption

The acceptance of e-voting systems, focusing on the factors influencing people's likelihood of using e-voting was conducted by [30]. They utilized the UTAUT model, incorporating supplementary factors including Trust in the Internet and Computer Anxiety, tailored to the context of developing countries. Their questionnaire-based research revealed that Performance Expectancy and Effort Expectancy were significant determinants, highlighting the importance of system reliability and user-friendly interfaces. Surprisingly, Social Influence did not play a significant role in suggesting individual decision-making. However, Trust in the Internet emerged as crucial, emphasizing online security, while Low Computer Anxiety was strongly associated with increased adoption, indicating the importance of confidence in using technology for e-voting.

A model integrating concepts from the UTAUT with citizen trust in institutions to understand the success of e-voting systems was proposed by [31]. The study revealed that Performance Expectancy (PE) significantly determines e-voting usage readiness. Meanwhile, Effort Expectancy (EE) showed no direct effect on decisions regarding adoption. Meanwhile, EE positively influenced PE. Moreover, the level of trust in the institutions responsible for conducting elections had a favorable impact on both the PE and EE required for using e-voting systems. It also increased the desire of individuals to use such systems.

The UTAUT framework was utilized for examining the tendency to utilize e-voting systems in Jordan, specifically examining the intermediary function of perceived worth [32]. The findings indicated a positive relationship between PE, EE, social influence (SI), facilitating conditions (FC), and awareness with the ITU e-voting systems via Perceived Value (PV).

Table 3 outlines the studies which used the UTAUT independently or in conjunction with other models and theories to examine e-voting adoption.

Table 3. Articles that used UTAUT in investigating e-voting system adoption

Article Title	Author	Used Theory	Nation
Examining E-voting intention in an emerging nation: Towards a unified view	[30]	UTAUT, Trust in the Internet and Computer Anxiety	Malaysia
Impact of performance expectancy, effort expectancy, and citizen trust on the adoption of electronic voting system in Ghana	[31]	UTAUT	Ghana
The use of UTAUT to investigate the Intention to use E-Voting System in Jordan mediated by Perceived Value	[32]	UTAUT	Jordan

5.3. Studies using Other Theories for E-voting Adoption

A number of studies have studied the adoption of e-voting in different contexts employing other theoretical models. A list of these researches, their authors, and implemented nations is given in Table 4.

A model for examining the effect of digital divide on individuals' willingness to adopt e-voting in Jordan was developed by [33]. They adapted the model from previous research by [34], focusing on factors like age, education, income, and Internet usage.

The study found that only Internet usage significantly impacted people's willingness to adopt e-voting, while age, income, and education did not. This challenges previous studies that highlighted the significance of these factors in e-voting adoption.

The DOI theory was employed to explore political parties' attitudes towards internet voting in Ghana [35]. The study incorporated trust models to explain the parties' reluctance, citing concerns about technology and election authority trustworthiness. The findings underscored the need for extensive education and assurances of security and accuracy to gain political party support.

Another study aimed to understand e-voting adoption in Nigeria's 2011 General Elections using an ethnographic approach and a model combining various theories [36]. The study found that e-voting enhanced perceived election safety and credibility, dependent on technology functionality, public trust, and alignment with local customs.

Ethiopia's readiness for e-voting was also assessed, identifying gaps in ICT infrastructure, human resources, and legal measures [37]. The study found that Ethiopia was unprepared to adopt e-voting due to these gaps.

An e-voting model to gauge Serbia's readiness for electronic voting was proposed without relying on any specific technology adoption theory, highlighting reliability, accuracy, and security as crucial [38]. The survey found support for e-voting as well as concerns about security and technology trust.

The Oyo State citizens' perceptions of and readiness for e-voting, highlighting challenges with the current system and potential benefits of e-voting adoption in Nigeria was investigated by [39], employing the Technology Readiness Acceptance Model (TRAM). The study found that Ethiopia lacked the necessary ICT infrastructure, human resources, and legal frameworks.

The impact of religiosity, ethnicity, and social media usage on voting intentions was analyzed by [40] based on Social-Ecological Model (SEM). It was found that social media strongly influenced online voting intentions.

A customized trust in technology model of e-voting adoption, emphasizing security, usability, privacy, and validity, was explored by [41]. Their study in East Java, Indonesia revealed trust's crucial role in e-voting adoption, emphasizing the importance of usability.

Table 4. Articles using other models and theories in investigating e-voting system adoption

Article Title	Author	Used Theory	Nation
Toward a Significant e-Voting Adoption Model: The Digital Divide	[33]	Digital divide	Jordan
Political Parties and Internet Voting System Adoption in Ghana	[35]	DoI	Ghana
Factors for e-voting adoption-analysis of general elections in Nigeria	[36]	Multi-level innovation and adoption frameworks	Nigeria
Readiness for implementing an e-voting system in Ethiopia: A gap analysis from the supply side	[37]	Capacity gap analysis	Ethiopia
Scaffolding e-voting in developing countries	[38]	No standard theory	Serbia
Citizens' Readiness to Use Electronic Voting System in Oyo State, Nigeria	[39]	TRAM	Nigeria
Behavioral Tendency Analysis towards e-participation for voting in political elections	[40]	Social Ecological Model (SEM)	Pakistan
Examining multi-dimensional trust of technology in citizens' adoption of e-voting in developing countries	[41]	Customized trust-based model	Indonesia

6. Conclusion

This area of research has been demonstrated to be evolving based on the shifting trend in the number of studies on e-voting adoption specifically in developing countries in the last five years. Even so, a systematic review entailing 17 papers published in 10 countries was made possible using the PRISMA approach.

The review highlights the necessity to conduct more studies on various e-voting frameworks and models so as to improve understanding regarding the factors driving its adoption in developing nations.

A majority of the reviewed studies employed the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT).

The studies on Malaysia, Indonesia, Jordan, Uganda, Nigeria, and South Africa had successfully employed the TAM, concentrating on the variables of perceived usefulness and ease of use. Meanwhile, studies on Malaysia, Jordan, and Ghana had expanded upon the UTAUT by incorporating the variables of computer anxiety and trust in the internet.

Also contributing to a comprehensive understanding of e-voting adoption are the Diffusion of Innovation (DOI) theory, Trust Models, Ethnographic approaches, and the Theory of Planned Behavior (TPB), all of which underscore key determinants like the attitudes of political parties, digital divide, institutional trust, ICT infrastructure readiness, as well as cultural influences, i.e., factors that ensure successful e-voting planning and execution.

Clearly, there is a need for more comprehensive longitudinal studies on the trajectory of e-voting application and usage so as to clarify the factors driving the adoption patterns, the effectiveness of e-voting functions, and the system's sustainability.

To determine effective adoption strategies and patterns, e-voting adoption should be compared across multiple countries, regions, or socio-economic settings. Such comparative studies can improve insight on other determinants of e-voting adoption.

Additionally, a mixed-method approach could elucidate the multifaceted relationship between the formal and informal factors driving e-voting adoption. The amalgamation of qualitative and quantitative methods such as surveys, interviews, observations, and focus groups could reveal genuine user perceptions of e-voting.

Diverse stakeholder engagement holds pertinence to the success of e-voting. This entails data sharing, co-creating of solutions, and collaborative efforts between governmental agencies, electoral bodies, private tech vendors, civil society bodies, as well as users.

Last but not least, there is a necessity to evaluate socio-economic, political, and cultural stakeholders' practices. Impact assessments would enable the exploration of the larger impacts of e-voting, thus improving understanding for policy-making, capacity building, and institutional revisions. Such broad procedure must take into account stakeholder demands and welfare so as to guarantee the effective adoption of e-voting.

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