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Exploring the interconnected dynamics of the digital divide, cybersecurity, and trust in enhancing e-democracy effectiveness

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Abstract: E-democracy is born of the undeniable transformation that has occurred in governance as a result of digital technologies, constituting part and parcel now, even more than ever before. It proposes to improve citizen participation, transparency, and inclusiveness in decision-making practices. However, its implementation faces various challenges, including the digital divide, cybersecurity and privacy concerns, institutional resistance, and socio-cultural barriers. In this paper, we critically scrutinize these barriers and their strategic resolutions that are well discerned in the ecosystem of sustainable digital governance (SDG) by considering the technology development of democratic values. Grounded in multiple theoretical frameworks and illustrated by recent case examples, the paper argues for a more holistic set of considerations, including inclusivity, transparency, security, adaptability, and collaboration. The study concludes that addressing these challenges is essential for ensuring that e-democracy contributes to more equitable and resilient governance systems. The paper closes by proposing directions for future empirical research to validate and refine strategies for sustainable digital governance across varied socio-political contexts.

Keywords: Cybersecurity, Digital authoritarianism, Digital divide, E-democracy, Inclusivity, Sustainable digital governance

1. Introduction

Democracy is undoubtedly a longstanding and evolving concept in political thought and philosophy, becoming an eternal issue (Lansford, 2020). Electronic democracy, as a digital extension of democratic practice, was formally put forward in the 1990s. Over the past three decades, it has significantly influenced global governance and political participation (Bennett & Segerberg, 2019). Now it has gone through nearly 30 years, and its influence is still significant. The academic circle has studied it more and more deeply (Bennett & Segerberg, 2019). Many recent studies have taken informatization as the backdrop for social development, discussing the influence of e-democracy on political life. These studies provide profound insights, ranging from explaining political problems to formulating practical solutions (Norris & Inglehart, 2019).

First, for instance, in the Chinese context, digital network technology facilitates rapid communication, access to national policies, and engagement in public discourse, potentially stimulating wider political participation (Boulianne, 2020). Yet, misuse of online spaces can disrupt social unity by spreading radical ideologies (Chen & Lin, 2021), demonstrating the dual-edged nature of e-democracy tools. In contemporary society, persons lacking knowledge are susceptible to being swayed by radical ideologies, hence impacting the functioning of the Chinese Communist Party (CCP) and the governing bodies (Xu, 2019). Thus, it has become crucial in the present period to prevent these negative consequences and guarantee the unrestricted expression of public opinion and autonomous engagement in political activities on the Internet.

Second, the network contributes to enhancing political communication and transparency. In order to achieve this goal, not only the integration of political forces but also technical support is needed to allow more people to participate in political life and promote the reform of the political system. Citizens have provided many valuable suggestions for the construction of socialist political civilization by means of electronic network technology (Tang & Li, 2019). At the same time, the majority of citizens' right to know, right to supervise, and right to participate have also been greatly guaranteed through electronic network technology, which has gradually become an important force promoting the construction of political civilization in our country (Chen & Xu, 2020). Speaking from political practice, it has a very important realistic meaning to advance the construction of political civilization using electronic network technology.

Moreover, integrating e-democracy into political processes is essential for enhancing transparency, accountability, and citizen engagement. Recent advancements in digital technology have allowed for the development of sophisticated e-governance systems that facilitate real-time interaction between the government and citizens, thereby fostering a more inclusive and participatory political environment. Implementing e-democracy tools such as online voting platforms, digital public forums, and mobile applications for civic participation has been shown to significantly improve democratic engagement and trust in governmental institutions (Smith & Tolbert, 2020; Gibson & Cantijoch, 2019). As China continues to modernize its political system, the strategic use of e-democracy can strengthen the linkage between the government and the public, ensuring that governance is more responsive and aligned with the needs and aspirations of the people (Zhang & Wang, 2021).

Although there has been notable progress in information technology, the successful execution of e-democracy encounters considerable obstacles, especially in terms of the digital divide and cybersecurity protocols. The digital gap, encompassing inequalities in the digital divide, digital literacy, and economic standing, has a substantial influence on the level of citizen engagement in e-democracy platforms. Individuals lacking dependable internet connectivity or sufficient digital literacy are less inclined to participate in online political endeavours, hence restricting the inclusivity of e-democracy (van Deursen & van Dijk, 2019). This discrepancy not only contradicts the democratic principle of equal participation but also intensifies socioeconomic stratification (van Deursen & van Dijk, 2019).

Furthermore, misinformation and orchestrated disinformation campaigns can threaten the legitimacy of e-democracy, particularly when robust cybersecurity and content moderation measures are lacking (Alvarez & Hall, 2021). These emerging threats, along with concerns around digital authoritarianism (Freedman, 2018), underscore the complexity in realizing the full promise of e-democracy.

2. Literature review

2.1. E-democracy

The scholarly literature on e-democracy explores the intricate relationship among government, citizens, and technology, emphasising the use of digital platforms to enhance democratic participation. Chadwick (2020) states that e-democracy allows for more frequent and involved political participation through digital means, whereas Gil de Zúñiga et al. (2019) describe it as a tool for improving democratic decision-making and public engagement. The Hansard Society asserts that e-democracy is a definitive manifestation of increased political participation (Hansard Society, 2020).

Experts, like Smith and Tolbert (2020), recognise the growing importance of e-democracy in governing systems when considering its societal significance. Advocates claim that e-democracy fosters a resilient e-community that actively participates in political processes and policy-making. E-democracy, as defined by Boulianne (2020), is a cost-effective and flexible approach to political participation that provides a universal platform for expressing opinions. This considerably aids the democratisation process.

However, some scholars emphasize that the rise of digitally enabled participation also opens doors for authoritative control and manipulation, coining the term "digital authoritarianism" to describe the use of advanced technology for surveillance and control (Morozov, 2012). This highlights a tension between liberating and controlling potentials of ICT in democratic processes.

Nevertheless, the actual uses of e-democracy are diverse. In his work, Martin Hagen (2018) classifies e-democracy into two main categories: television democracy and network democracy. He highlights that e-democracy goes beyond being only a technological tool and has the potential to bring about significant changes in political involvement. As per the works of Cass Sunstein (2003) and Delia (2006), e-democracy encompasses a spectrum of activities, from just sharing information

to actively participating in policy-making. However, it is important to note that the final decision-making authority typically rests with the government.

This literature underscores the intricacies and diverse viewpoints on e-democracy, emphasising its possibilities and limitations in using technology to connect citizens with their governments. This statement highlights the importance of conducting a thorough analysis of the implementation of e-democracy in various cultural and political contexts. It emphasises the necessity of continuous changes to ensure that e-democracy effectively contributes to the process of democratisation.

2.2. Relationship between e-democracy content and democratic politics

In order to further explore the connection between e-democracy content and democratic politics, it is beneficial to analyse contemporary academic conversations and research that shed light on the utilisation of digital platforms in the democratic process and their impact on political involvement and decision-making. Presented below is a literature review that specifically examines these features, with a particular emphasis on contributions made between the years 2018 and 2021.

Wojcieszak and Smith (2018) found that e-democracy platforms can inadvertently foster polarizing "echo chambers," which raise questions about the quality of discourse. This resonates with broader concerns about misinformation and algorithmic biases on social media (Kim & Lee, 2020). In the Chinese context, Chen and Maruyama (2019) argued that adopting e-democracy tools (e-voting, digital forums, etc.) can enhance transparency but faces institutional constraints. Kim & Lee (2020) also highlight that young voters show increased political interest when interactive digital channels allow real-time engagement with representatives.

Kim and Lee conducted a notable study in 2020 to evaluate the influence of e-democracy on the political engagement of young voters. Research indicates that platforms that facilitate direct interaction with political figures and instant sharing of political content have a substantial impact on fostering political interest and activism among young people. This suggests that e-democracy content can effectively stimulate engagement among a demographic that has historically been perceived as indifferent towards politics. Alvarez and Hall (2021) offer an analytical perspective on the difficulties and possibilities associated with e-democracy, specifically focusing on content regulation, the dissemination of false information, and the potential manipulation of democratic procedures. Their research highlights the importance of implementing strong content control measures to guarantee that e-democracy platforms strengthen democratic values instead of weakening them.

In their 2019 publication, Bennett and Segerberg explore the notion of "connective action," which refers to the utilisation of digital platforms for both information dissemination and the organisation of political movements, without relying on hierarchical institutions. This study emphasises the transformation of political engagement through e-democracy content, which has led to a change away from old paradigms and towards a more personalised and content-driven approach. Finally, Papacharissi (2020) examines the concept of the virtual world and its impact on democratic politics. She conducts a thorough assessment of how the characteristics of e-democracy material, including its production, distribution, and consumption, influence public discussion and the democratic pro-

cess. Papacharissi contends that e-democracy possesses the capacity to democratise both information and participation. However, it necessitates cautious manoeuvring to evade the dangers of misinformation and shallow involvement.

2.3. Impact of technology on political engagement

Notably, new studies suggest that AI-driven governance and big data analytics, while improving efficiency, can also intensify surveillance and shape public opinion in ways that challenge democratic principles (Zuboff, 2019). These developments further highlight the intricate interplay among technology adoption, political engagement, and citizens' trust.

Nevertheless, the digital gap continues to pose a substantial obstacle to the general participation in politics in China. Despite the tremendous progress in technology, there are still significant differences in internet availability and knowledge of digital tools, especially between urban and rural regions (Liu & Zhang, 2018). This division hampers the capacity of numerous individuals to engage fully in e-democracy endeavours, hence strengthening prevailing social disparities. It is essential to address these inequalities in order to ensure that everyone in the population has equal access to the advantages of digital political engagement.

Cybersecurity concerns significantly influence political activity in China. The government has enforced rigorous cybersecurity protocols to uphold the integrity of its digital platforms and defend against cyber threats (Zhou & Pan, 2019). Although crucial for upholding trust in e-democracy systems, these measures can also result in heightened surveillance and regulation of online political activities. The Chinese government aims to strike a balance between encouraging digital involvement and safeguarding national security, which is why cybersecurity initiatives have a dual-edged aspect.

Trust in digital platforms has a crucial role in shaping political activity in China. Research has demonstrated a positive relationship between elevated levels of confidence in government-operated digital platforms and heightened engagement in political activities (Chen & Xu, 2021). Therefore, by making efforts to improve cybersecurity and narrow the digital divide, we may positively contribute to the establishment of trust. As citizens increasingly see these platforms as safe and dependable, their inclination to participate in online political activities is expected to rise, hence enhancing the overall efficacy of e-democracy in China.

3. Challenges in advancing e-democracy: Bridging the gaps

The development of e-democracy, while promising in its ability to enhance political participation and transparency, encounters significant challenges. These challenges include the digital divide, cybersecurity concerns, trust deficits, and misalignment with existing governance structures. These issues not only hinder the adoption of e-democracy platforms but also limit their potential in fostering inclusive and transparent governance.

3.1. The deep impacts of the digital divide

The digital divide remains one of the most pressing barriers to e-democracy, encompassing disparities in technology access, digital skills, and resource distribution. In China, these disparities are particularly evident between urban and rural areas, where differences in infrastructure, literacy, and economic capacity directly affect citizens' ability to engage with e-democracy platforms (Jin & Cheong, 2020). Urban regions benefit from higher internet penetration rates and advanced digital literacy, while rural communities face significant challenges accessing and using digital platforms (Liu et al., 2019).

Furthermore, the digital divide extends to socioeconomic and demographic factors. Lower-income groups and older populations often lack the necessary devices and skills to participate in e-democracy activities (Wang & Chen, 2021). Although government initiatives, such as the "Broadband China" program and digital education campaigns, aim to bridge this gap, their coverage and impact remain insufficient (Guo & Huang, 2020). Addressing the digital divide is essential for ensuring equitable access to e-democracy and fostering inclusive participation.

3.2. Cybersecurity and privacy concerns

Cybersecurity is a critical technical challenge in the implementation of e-democracy. Security issues not only threaten the operational stability of platforms but also directly affect public trust in their use (Rana & Dwivedi, 2021). China's 2017 Cybersecurity Law plays a significant role in safeguarding platform data, but it also raises concerns about privacy and surveillance (Huang & Madnick, 2021). This dual-edged nature of cybersecurity measures complicates the promotion of e-democracy.

Additionally, the vulnerability of e-democracy platforms to cyberattacks and information manipulation poses significant risks. For example, the spread of misinformation can undermine the quality of public discourse and the legitimacy of decision-making processes (Alvarez & Hall, 2021). The rise of deepfakes and AI-enhanced misinformation further complicates cybersecurity challenges in e-democracy platforms, requiring updated regulatory frameworks and enhanced digital literacy among citizens (Freedman, 2018). Transparent cybersecurity standards and enhanced regulatory oversight are critical for protecting platform integrity and building user trust.

3.3. Trust deficits and limited social acceptance

Trust is a cornerstone of successful e-democracy. Users need to believe that platforms can secure their data, uphold privacy, and ensure fairness (Mayer et al., 1995). In China, however, concerns about government surveillance and data misuse erode public trust in e-democracy platforms (Chen & Xu, 2020). Research indicates that a lack of transparent mechanisms and feedback channels significantly diminishes trust and deters participation (Zhang & Dong, 2019).

To address these concerns, China has implemented measures to increase transparency, such as open data-sharing platforms and real-time public feedback channels. However, the effectiveness of these measures remains to be seen. Scholars argue that overcoming trust deficits requires not only technical improvements but also policy reforms and cultural shifts (Li & Su, 2020).

3.4. Misalignment with governance structures

The effective implementation of e-democracy requires alignment with existing governance frameworks. In many contexts, including China, administrative and legal systems struggle to keep pace with rapidly evolving digital technologies (Lansford, 2020). For instance, while electronic voting systems enhance convenience, they often lack clear legal regulations, which can lead to disputes and reduced legitimacy.

Moreover, socio-cultural factors further challenge the adoption of e-democracy. In some regions, citizens may lack interest in digital political participation or perceive platforms as overly complex (Venkatesh & Bala, 2018). Addressing these issues requires incorporating user-centered design principles and providing educational programs to lower technical barriers and improve public engagement.

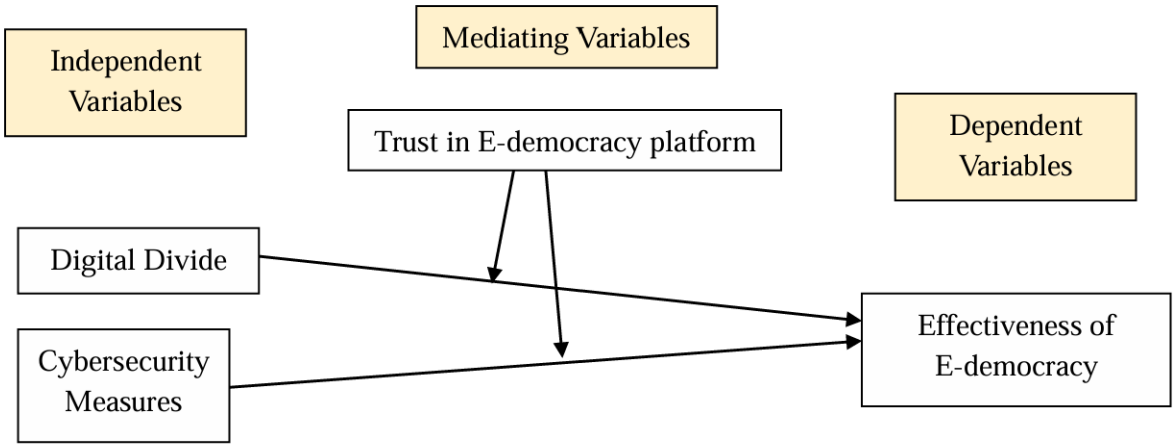
4. Theoretical framework

4.1. Integrated discussion of theories

The theoretical framework for this study is grounded in Digital Divide Theory, Trust Theory, Cybersecurity Measures, and the Technology Acceptance Model (TAM). Crucially, the combined perspective underscores that bridging digital gaps (access, literacy, infrastructure), ensuring data security and privacy, and fostering citizens' perceived usefulness (TAM) all feed into building higher trust, which in turn catalyzes stronger political participation online. This section will discuss the relevant theories and their application to the context of e-democracy in China. In Figure 1, A visual schema might place "Digital Divide" and "Cybersecurity" as independent factors, "Trust" as a mediating variable, and "E-Democracy Effectiveness" as the outcome. The impetus for or against the outcome can be further amplified by misinformation threats and digital authoritarian control, indicating the importance of legal and institutional checks. By conceptualizing these elements in a single integrated framework, we can better analyze how each factor interacts in practice.

The conceptual framework illustrated above highlights the interplay between the digital divide, cybersecurity measures, trust in e-democracy platforms, and the overall effectiveness of e-democracy. This framework posits that the digital divide and cybersecurity measures act as independent variables influencing the effectiveness of e-democracy, which is the dependent variable. Trust in e-democracy platforms serves as a mediating variable that enhances the relationship between the independent and dependent variables. By addressing the digital divide and implementing robust cybersecurity measures, the framework suggests that trust in e-democracy platforms can be strengthened, leading to greater citizen participation and more effective democratic processes. This integrated approach underscores the importance of ensuring equitable access to digital technologies and maintaining secure digital environments to foster trust and enhance the functionality of e-democracy systems.

Figure 1. The theoretical framework is grounded in Digital Divide Theory, Trust Theory, Cybersecurity Measures, and the Technology Acceptance Model (TAM).



4.2. Digital divide theory

The comprehension of discrepancies in digital access and involvement is greatly enhanced by the concept of the digital divide. According to Van Dijk (2020), the digital divide is a complex issue that involves various aspects such as access to technology, proficiency in digital skills, and possibilities for utilisation. This theory elucidates the reasons behind the limited participation of some groups in China, particularly those residing in rural areas or belonging to lower socioeconomic strata, in e-democracy platforms. Addressing the digital gap is crucial for ensuring fair and equal political participation and improving the overall success of e-democracy programmes.

4.3. Trust theory

Trust theory is fundamental in examining the mediating role of trust in e-democracy platforms. According to Mayer, Davis, and Schoorman (1995), trust is built on three primary factors: ability, benevolence, and integrity. In the context of e-democracy, trust in the platform's ability to safeguard data, its benevolence in ensuring fair participation, and its integrity in protecting user information are critical. Recent studies have emphasized the importance of these factors in fostering user trust and encouraging political engagement (Warren, Sulaiman, & Jaafar, 2020). Building trust through effective cybersecurity measures and equitable digital access can significantly enhance participation in e-democracy.

4.4. Cybersecurity and trust relationship

The relationship between cybersecurity measures and trust in digital platforms is well-documented. Strong cybersecurity measures are essential for protecting user data and ensuring the integrity of online interactions. When users feel that their personal information is secure, their trust in the plat-

form increases, which in turn promotes greater engagement (Rana & Dwivedi, 2021). This is particularly relevant in China, where concerns about data privacy and government surveillance are prevalent. Effective cybersecurity can mitigate these concerns and foster a more trusting and participatory digital environment.

4.5. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) developed by Davis (1989) is another pertinent theory for this study.TAM posits that perceived usefulness and perceived ease of use are the primary factors influencing technology acceptance (Davis, 1989). However, in the e-democracy context, "trust" in the platform's security and fairness is equally pivotal, linking TAM with trust theory in shaping individuals' intentions to participate in online governance (Rana & Dwivedi, 2021). Studies have shown that addressing the digital divide by improving digital literacy can enhance these perceptions, thereby increasing participation (Venkatesh & Bala, 2018).

Integrating these theories provides a comprehensive framework for analyzing the effectiveness of e-democracy. The digital divide theory highlights the barriers to access and participation, while trust theory and cybersecurity emphasize the importance of safeguarding user data to build trust. TAM offers insights into how perceptions of technology influence engagement. By combining these perspectives, this study can develop a nuanced understanding of the factors that affect e-democracy in China. This integrated approach allows for targeted interventions that address multiple dimensions of the problem, from enhancing access and digital skills to implementing robust cybersecurity measures.

4.5.1. Digital divide

The digital divide pertains to the disparity between persons who possess access to contemporary information and communication technology (ICT) and those who lack such access. This division can appear in different manifestations, such as disparities in internet connectivity, the calibre of digital gadgets, and the proficiency in utilising these technologies. The digital gap in China is evident in the contrasting access to digital resources and possibilities between urban and rural populations. Urban areas generally possess superior infrastructure and greater prospects for digital involvement, while rural regions lag behind in these aspects. This disparity not only hinders the acquisition of knowledge but also impedes individuals' involvement in digital platforms for political involvement and other social endeavours (Jin & Cheong, 2020).

Various metrics are typically employed to assess the extent of the digital divide. These factors encompass the proportion of the population having internet connectivity, the efficiency and dependability of internet connections, the accessibility of digital devices like smartphones and PCs, and the level of digital literacy across various demographic segments. Studies conducted in China have revealed a notable disparity in internet access and digital literacy between urban and rural areas. Urban regions exhibit high levels of internet penetration and advanced digital literacy, whilst rural areas significantly lag behind in these aspects. Liu, Li, and Zhang (2019) discovered that the level of internet access in rural areas is considerably lower compared to metropolitan areas, and there exists

a large disparity in the availability of high-speed internet services. The unequal access to digital resources directly hinders the participation of rural residents in e-democracy and other online activities.

Another crucial element of the digital divide is digital literacy, which pertains to the proficiency needed to utilise digital technologies. Digital literacy comprises a spectrum of abilities, ranging from fundamental capabilities such as operating a computer and surfing the internet to more sophisticated skills such as generating digital material and comprehending online security. Among older persons and individuals with lower levels of education in China, there is a significant disparity in digital literacy. The study conducted by Wang and Chen (2021) suggests that younger generations and persons with higher levels of education demonstrate greater proficiency in using digital technologies, but older adults and those with lower levels of education frequently encounter difficulties when performing fundamental digital tasks. The lack of knowledge and skills in using digital technology worsens the gap between those who have access to it and those who don't, and hinders the ability of digital platforms to be accessible to all.

In China, efforts to narrow the digital divide have involved government measures focused on enhancing digital infrastructure in rural regions and implementing programmes to improve digital literacy among marginalised populations. The Chinese government has initiated multiple initiatives aimed at enhancing broadband connectivity and elevating internet speeds in rural areas. Additionally, they have implemented training programmes to empower residents in acquiring digital proficiencies. These measures are essential for mitigating the digital divide and guaranteeing that all individuals can reap the advantages of digital technologies. Nevertheless, there are still obstacles that need to be overcome, especially when it comes to maintaining these initiatives and catering to the varied requirements of various communities (Guo & Huang, 2020).

4.5.2. Cybersecurity measures

Cybersecurity measures encompass the methodologies, technologies, and procedures devised to safeguard systems, networks, and data against cyberattacks, unauthorised entry, and other forms of cyber threats. Cybersecurity is of utmost importance in the realm of e-democracy to guarantee the reliability, secrecy, and accessibility of digital platforms employed for political participation and governance. Robust cybersecurity measures are vital for safeguarding personal information, fortifying online transactions, and thwarting the misuse of digital content. These procedures serve to protect the technical infrastructure and promote confidence among users, which is crucial for the success of e-democracy efforts (Oliveira et al., 2020).

Various metrics are typically employed to assess the efficacy of cybersecurity measures. These factors encompass the occurrence and intensity of security breaches, the adoption of security protocols like encryption and multi-factor authentication, and the degree of adherence to cybersecurity standards and regulations. The Chinese government has enforced many cybersecurity measures to safeguard its digital infrastructure, such as the implementation of the Cybersecurity Law of 2017. This law imposes strict data protection and security standards on organisations (Huang & Madnick, 2021). These procedures aim to mitigate the increasing risks presented by cyberattacks and guarantee the safe functioning of digital systems.

User awareness and behaviour are also crucial components of cybersecurity. Even the most effective technical safeguards can be compromised by inadequate human behaviours, such as using easily guessable passwords, falling victim to phishing attacks, and unintentionally exposing sensitive data. Therefore, cybersecurity education and training are vital elements of a comprehensive cybersecurity plan. In China, initiatives to enhance public awareness of cybersecurity have encompassed nationwide advertising and educational programmes designed to instruct residents on safeguarding their personal information and identifying potential risks (Zhou & Wang, 2020). These actions are essential for fostering a security-conscious culture that enhances the overall efficacy of cybersecurity measures.

The correlation between cybersecurity and trust in digital platforms holds significant importance, especially within the realm of e-democracy. Research has indicated that individuals are more inclined to interact with digital platforms when they have confidence in the security of their data and the protection of their privacy (Rana & Dwivedi, 2021). Trust is crucial in promoting political engagement and cultivating a feeling of digital citizenship. Ensuring this trust in China is particularly difficult because of apprehensions around government surveillance and data privacy. In order to tackle these concerns, it is crucial to adopt cybersecurity procedures that are transparent and responsible. These practices should not only safeguard data but also uphold user privacy and autonomy (Liang & Lu, 2020).

4.5.3. Trust in e-democracy platforms

The level of trust in e-democracy platforms is a crucial determinant of citizens' engagement and utilisation of these platforms. Trust is the level of faith users have in the platform's capacity to safeguard their data, guarantee privacy, and deliver precise and impartial information. Within the realm of e-democracy, trust involves various aspects, such as security, privacy, openness, and reliability. Building and sustaining trust is crucial for promoting extensive engagement and cultivating a feeling of digital citizenship (Bélanger & Carter, 2021).

Researchers frequently employ surveys and questionnaires to gauge confidence in e-democracy platforms. These assessments evaluate users' impressions of the platform's security, privacy policies, transparency in operations, and reliability in service delivery. An illustrative instance is utilizing a multi-dimensional scale by Gao and Lee (2020) to assess confidence in e-government services. This scale encompassed factors such as perceived security, privacy protection, and trustworthiness of the information given. These metrics can be customised to assess trust in e-democracy systems, offering significant understanding into the issues that impact user trust and involvement.

The correlation between cybersecurity measures and faith in e-democracy platforms is notably significant. Implementing robust cybersecurity protocols, like encryption, multi-factor authentication, and frequent security audits, can bolster customers' trust in the platform's capacity to safeguard their data and guarantee secure transactions. Zhang and Dong (2019) conducted a study that revealed a favourable correlation between the adoption of strong cybersecurity measures and the enhancement of trust in digital government services in China. This emphasises the significance of allocating resources towards modern cybersecurity solutions and implementing effective processes in order to establish and maintain user confidence.

Transparency is an essential element for building confidence in e-democracy systems. Transparency encompasses the degree of openness and clarity in the platform's operations, encompassing the decision-making process, data collection and utilisation, and integration of user feedback into the platform's evolution. In China, apprehensions around government surveillance and data privacy can erode confidence in e-democracy activities. Hence, it is crucial to enforce transparent policies that effectively convey the platform's data protection standards and establish systems for user feedback and responsibility. A study conducted by Li and Su (2020) demonstrates that the implementation of transparency in e-governance has a substantial impact on increasing public confidence and engagement. This finding suggests that comparable strategies can be employed in e-democracy platforms.

4.5.4. Effectiveness of e-democracy

The effectiveness of e-democracy refers to the extent to which digital platforms enhance democratic processes by improving citizen participation, transparency, and governmental accountability. Effective e-democracy platforms enable citizens to engage in political discourse, access governmental information, and participate in the decision-making process. The primary indicators of effectiveness include the level of user engagement, the diversity of participants, the quality of discourse, and the impact on policy outcomes. An effective e-democracy platform should facilitate inclusive and meaningful participation, ensuring that a wide range of voices is heard and considered in the political process (Norris, 2020).

To measure the effectiveness of e-democracy, several quantitative and qualitative metrics are employed. Quantitative measures include the number of active users, the frequency of participation, and the diversity of participants in terms of demographics such as age, gender, and socioeconomic status. Qualitative measures assess the quality of interactions on the platform, such as the depth of discussions, the civility of discourse, and the extent to which user input influences policy decisions. A study by Zhang et al. (2021) used both types of measures to evaluate the effectiveness of a Chinese e-democracy platform, finding that high levels of engagement and diverse participation were critical indicators of effectiveness.

The impact of e-democracy on policy outcomes is another crucial aspect of its effectiveness. This involves assessing how user input is integrated into policy-making processes and the extent to which online participation translates into tangible political changes. Effective e-democracy platforms should have mechanisms for collecting, analyzing, and acting on user feedback. Research by Liu and Qiang (2019) highlighted the importance of feedback loops in e-democracy platforms, showing that platforms that actively incorporate user input into decision-making processes are perceived as more effective by participants. This feedback mechanism ensures that citizen engagement is not merely symbolic but has real influence on governance.

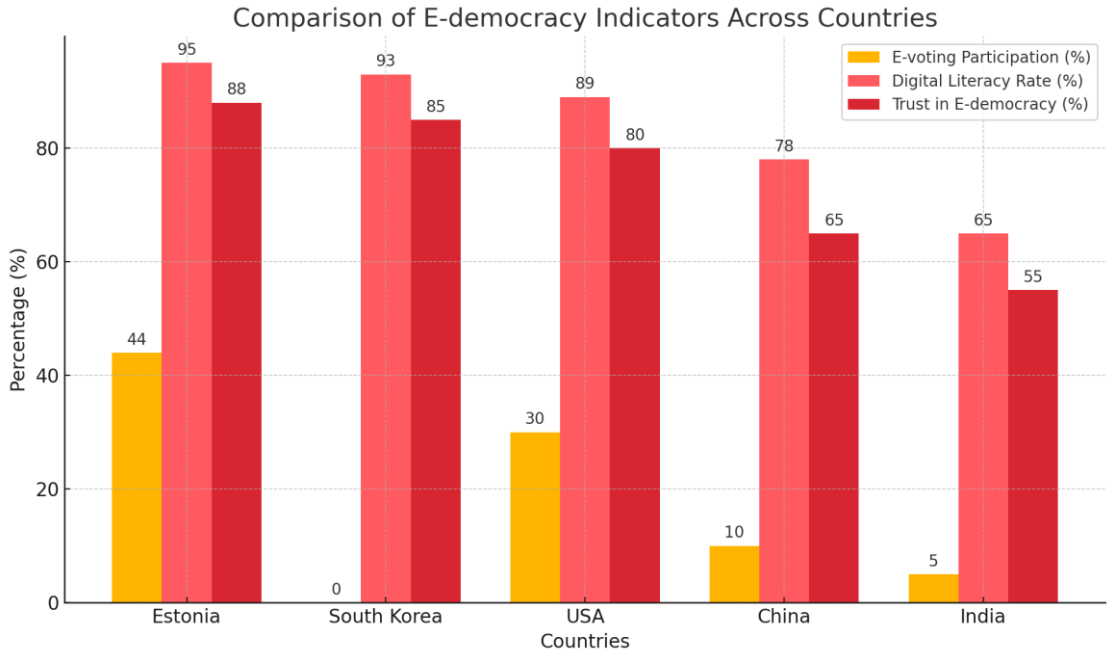
Trust in e-democracy platforms also plays a significant role in their effectiveness. As discussed previously, trust is built through transparency, robust cybersecurity measures, and user-friendly interfaces. A high level of trust encourages more citizens to engage with the platform, thereby enhancing its effectiveness. According to a study by Wei and Lu (2020), trust in e-democracy platforms

in China significantly influences user participation and the perceived legitimacy of online political activities. Thus, building and maintaining trust is essential for the effectiveness of e-democracy.

4.6. Empirical data and comparative case analysis

In order to strengthen the empirical grounding of this study and to facilitate meaningful cross-national comparisons, recent data on internet penetration, e-government development, and digital literacy rates have been collected from five contexts: the global average, China, the United States, South Korea, and India. These indicators offer insights into how varying levels of infrastructural capacity, policy initiatives, and socio-economic conditions impact the adoption and efficacy of e-democracy. Figure 2 presents the three indicators side by side for the period 2022–2024, thereby illustrating the interplay between connectivity, governmental digitalization efforts, and the population's ability to utilize online platforms effectively.

Figure 2. Comparison of internet penetration (%), E-Government Development Index (EGDI ×100), and Digital Literacy Rate (%) (2022–2024)



From Figure 2, it is apparent that South Korea achieves both a high internet penetration rate (95%) and a robust e-government framework (EGDI 95.62). This confluence is further supported by a relatively elevated digital literacy rate (75%), reflecting the nation's longstanding investments in digital infrastructure and systematic citizen education programs (Kang & Lee, 2021). By contrast, India's substantially lower internet penetration (45%) and digital literacy (40%) underscore the infrastructural disparities it confronts, thereby posing considerable challenges for inclusive e-democracy (Ramachandran & Ramesh, 2022).

China demonstrates fairly high internet penetration (78.6%) and a strong EGDI (89.95), indicative of the country's accelerated rollout of e-government services (Zhang & Wang, 2021). Nevertheless,

its digital literacy rate (60.61%) remains below the penetration level, suggesting that even with widespread network coverage, certain population segments—particularly older adults and rural communities—may not possess the requisite skills to effectively engage in online political processes (Liu et al., 2019). Meanwhile, the United States exhibits both extensive online access (89%) and an advanced e-government index (92.61), yet its 70% digital literacy rate implies that a notable fraction of the population still encounters difficulties using digital platforms for participatory governance (Smith & Tolbert, 2020). Notably, the global average for internet penetration (68%) is only marginally below China's figure; however, the corresponding EGDI (~63.82) indicates that numerous countries—especially those with emerging economies—continue to grapple with systemic barriers to implementing advanced e-government initiatives.

These comparative data reinforce a key contention of this paper: Internet access alone does not suffice to guarantee effective e-democracy if large portions of the population either lack digital proficiency or harbor security concerns (Rana & Dwivedi, 2021). In settings where users are inadequately trained or where cybersecurity breaches undermine public confidence, the mere availability of connectivity does not translate into high levels of online political engagement. This finding aligns with broader discussions on the digital divide: countries boasting substantial internet coverage can still exhibit profound literacy gaps that constrain genuine e-democratic participation.

Within this comparative framework, South Korea stands out as a noteworthy example of bridging both the "access gap" and the "skills gap," given its cohesive policy approach that integrates infrastructure investment, cybersecurity regulations, and citizen-focused digital education (Kang & Lee, 2021). By contrast, India illustrates how inadequate connectivity, underdeveloped rural infrastructure, and partial cybersecurity measures can collectively lead to varying levels of trust and platform adoption (Ramachandran & Ramesh, 2022). Consequently, the cross-national data examined in Figure 2 further support the earlier theoretical argument that unless the digital divide is narrowed and cybersecurity measures are sufficiently robust, high internet penetration alone will not translate into substantial online political participation. This empirical insight reinforces the integrated framework proposed in Section 4, where trust emerges as a critical mediator that shapes citizens' willingness to engage in e-democracy.

5. Conclusion and significance

5.1. Theoretical significance

Cross-national studies reveal that while Western democracies commonly treat e-democracy as supplementary to established governance, states with more centralized political traditions, such as China, leverage digital platforms to bolster limited but evolving participatory avenues. Understanding these contexts provides a deeper theoretical lens for analyzing how e-democracy is shaped by political structure (Bright, 2019). Moreover, new challenges like misinformation, digital authoritarian tendencies, and AI-driven decision-making demand integrated theoretical perspectives that encompass trust, technological acceptance, and robust cybersecurity. Therefore, this study's synthesis of multiple theoretical frameworks (Digital Divide Theory, Trust Theory, TAM, Cybersecurity) adds

value to the academic discourse, highlighting the multi-dimensional nature of e-democracy's success.

5.2. Practical significance

Electronic democracy provides an effective channel for governments and citizens to communicate public concerns, coordinate interests, and foster inclusive decision-making. By encouraging transparent information exchange, online consultations, and open feedback loops, e-democracy can alleviate social tensions and enhance the capacity to address complex socioeconomic problems. Scholars highlight that a well-designed digital platform not only respects citizens' rights to know and participate but also helps governments improve responsiveness and accountability (Wang, 2020). Moreover, practical implementation requires close collaboration among governments, civil society, and technological innovators. When each stakeholder invests in digital infrastructure, cybersecurity measures, and user-centered design, e-democracy initiatives become more equitable, accessible, and trustworthy (Chen & Xu, 2020). In turn, such initiatives can contribute to a more transparent governance environment, where policy decisions reflect diverse public voices and are tested against real-time citizen input. Yet, this process demands consistent policy support, continued digital literacy training, and robust data protection frameworks to maintain public confidence in online systems (Li & Su, 2020).

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Overall, the practical significance of e-democracy extends beyond mere technological adoption. It involves fostering a participatory culture, strengthening institutional transparency, and continuously engaging citizens through secure digital means. Aligned with the findings of this study, concerted efforts to reduce the digital divide, enhance platform security, and cultivate trust are vital to realizing the transformative potential of e-democracy in diverse socio-political environments.

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Author Contributions

Jiaqi Liu and Nur Ajrun Khalid collaborated closely throughout the manuscript development. As the first author, Jiaqi led the early phases, including data collection and drafting the initial manuscript. Nur Ajrun, as the corresponding author, validated the findings, reviewed the analysis, and enhanced the interpretation through discussions. While Jiaqi drafted the initial text, Nur Ajrun made significant revisions, contributing critical insights and improving the coherence of the manuscript.

All authors have read and agreed to the published version of the manuscript.

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