DIKTUM JURNAL SYARIAH DAN HUKUM

Dictum: Journal of Sharia and Law Volume 23 No 1 2025

Ensuring Sharia-Based Electoral Integrity: Lessons from Brazil's E-Voting System for Indonesia's Digital Democracy

ARTICLE INFO

Article history
Received: January, 28 2025
Revised: February, 18 2025
Accepted: April, 13 2025
Published: April, 13 2025

Keywords
***E-Voting* System**
Readiness
Elections

ABSTRACT

The use of conventional voting systems in electoral processes continues to face significant vulnerabilities, including ballot manipulation, vote tampering, and human error. As a digital alternative, electronic voting (e-voting) offers a promising solution to enhance electoral integrity, efficiency, and transparency. While Indonesia has begun experimenting with e-voting—particularly in village head elections—it has yet to scale the system to national-level elections. This study aims to analyze Indonesia's readiness to implement a national e-voting system by drawing comparative insights from Brazil, a country that has successfully adopted e-voting in its federal elections. Using a normative legal approach and library-based research, the study evaluates the infrastructural, legal, and technological challenges facing Indonesia's electoral modernization. The findings indicate that a major barrier to nationwide implementation lies in the technological dependency on devices such as laptops and touchscreen computers, which require stable electricity—an issue in Indonesia's underdeveloped and remote regions. The study highlights the need for infrastructural equity and policy reform to support digital electoral governance. Theoretically, this research contributes to global debates on digital democracy, offering lessons on how socio-technical readiness shapes the adoption of e-voting in emerging democracies

1. *Introduction*

The current practice of implementing elections uses conventional mechanisms. Such a mechanism has several procedural stages, where every citizen who has the right to vote comes to the polling station on the day of the election. The election is carried out by casting ballot papers and then putting them in the ballot box. After the voting process is complete, a tiered vote counting process is carried out. There is no ivory that is not cracked, the implementation of conventional elections is still considered to have several weaknesses, namely the occurrence of fraud in the implementation of elections, such as spoiled ballots, lost ballots, money politics, and others. Steven F. Huefner says that election fraud can be committed by dishonest candidates who clearly have a motive to do so if they find the opportunity to do so. It can also be committed by poll workers or other election organizers who usually have greater opportunities. Electoral fraud can also

Author correspondence email: nurulkhalifahtamsul@gmail.com
Available online at https://doi.org/10.35905/diktum.v23i1.12910

be committed by isolated individuals or organized groups of voters whose motives and opportunities are weakened.

Another problem in the implementation of elections is related to *human error*. These problems include the confusion of the voter list, the large number of invalid votes due to many voters who gave the wrong mark in the election process, then the slow process of tabulating the results of the vote count from the regions, and the large budget is considered as a result of the ineffective implementation of the election so that it does not create an optimal democratic party and then has implications for reducing the level of satisfaction with the implementation of the election.

The implementation of *electronic voting* or *e-voting* in general elections can be a solution. The Agency for the Assessment and Application of Technology (BPPT) as a pioneer in the development of *e-voting* in Indonesia defines electronic voting (*e-voting*) as a method of voting and vote counting in an election using electronic devices. In detail and operationally, BPPT defines an *e-voting* system as a system that utilizes electronic devices and processes digital information to create ballots, cast votes, count votes, send vote results, broadcast votes, maintain and generate audit trails. From the above definition, it can be understood that *electronic voting* or *e-voting* is broadly interpreted as a means of voting using electronic devices.

The discourse on the implementation of *e-voting* in the 2024 elections was proposed at the Election Digitalization Coordination Meeting for Hybrid Digitalization of Indonesia from Bali, Wednesday (23/3), by Minister of Communication and Information Johnny G. Plate by arguing that the adoption of digital technology in elections has the benefit of realizing effectiveness and efficiency in the process of *legitimate* political contestation, both in the stages of voters, voter identity verification, voting, vote counting, and transmission and tabulation of election results.

The implementation of *e-voting* provides advantages such as faster vote counting, saving the cost of printing ballots, simpler voting, and equipment that can be used repeatedly. It also anticipates obstacles such as damaged ballot boxes during distribution to the regions, minimizing fraud such as *human error* and DPT confusion, as well as the slow process of tabulating data on vote count results from the regions. In addition, reflecting on the case of the 2019 elections, the implementation of *e-voting* can be used to anticipate the number of casualties from the committee due to fatigue. Data shows that the total number of officers who died during the 2019 elections reached 554 people, both from the KPU, Bawaslu, and police personnel. From the Voting Organizing Group (KPPS) officers who died as many as 440 people, while 3,788 officers were sick. Seeing this phenomenon, the Minister of Communication and Information Technology (Menkominfo) some time ago proposed voting in the 2024 Election to implement an *e-voting* system.

Many countries around the world have made efforts to adopt *e-voting* in the last few decades such as India, Brazil, the United States, Belgium, and others. The following is Risnanto's research on *e-voting* implementation experiences in various countries:

a. Fully implemented *e-voting*: India, Brazil, Philippines, and Estonia.
b. Partially implemented *e-voting*: Argentina, United States, Belgium, Canada, Japan, Mexico, France and Peru.
c. Canceled the implementation of *e-voting* after various trials: Australia, Costa Rica, Finland, Guatemala, United Kingdom, Ireland, Italy, Kazakhstan, and Norway.
d. Stopping or discontinuing the implementation of *e-voting*: Netherlands, Germany, and Paraguay.
e. In the process of piloting *e-voting*: Bangladesh, Bhutan, Ecuador, Mongolia, Switzerland, Nepal and Indonesia.

Of the countries that have fully implemented *e-voting*, there are some differences in the use of technology as shown in Table 1.1 below:

Table 1.1 Differences in Technology Use in Countries that Fully Implement *E-Voting*

Technology	**Country**			
	India	**Brazil**	**Philippines**	**Estonia**
Device	*EVM (Electronic Voting Machine)*	*GX-1 Integrated Processor*	PCOS	None *(Gadget voters/internet voting)*
Paper Audit Trail	*VVPAT Machine*	No	Conventional ballots	Digital receipt
Internet Connection	No	No	Yes (for calculation only)	Yes
Wi-Fi/USB	No	No	Yes (for calculation only)	Yes
Power	Battery	Battery	Batteries and electricity	Batteries and electricity
Results	Success without problems	Success without problems	Successful but with many negative comments/claims	Successful but with many negative comments/claims

Table 1.1 above shows that the implementation of *e-voting* in India and Brazil went better than in the Philippines and Estonia. Looking at the differences above, this study chose Brazil as a comparison. Brazil was chosen because it has a similar legal system with Indonesia, which both use a *civil law* legal system based on written law or legal codification where legal rules are compiled in the form of laws that become the main source of law. Similar to Indonesia, Brazil is also a democratic country that uses a presidential system of government where the president is elected through direct elections by the people. In addition, Brazil is also included in the list of countries with the largest population along with Indonesia. Indonesia with a population of 278,696,200 is in fourth position and Brazil with a population of 221,289,000 is in seventh position.

According to the ACE Project, the *e-voting* mechanism was implemented in 1985 when the election of the chief justice of the Brazilian Supreme Court was computerized. After that, in 1986, the Brazilian government conducted a *feasibility study* on the use of *e-voting* technology. Then in 1996, the *e-voting* mechanism was introduced in local elections in the city of Santa Catarina, and in 1998, the *e-voting* mechanism was introduced nationally at the election level as a system for organizing elections. From 2006 until now, Brazil continues to develop the concept of democratic elections through *e-voting*.

The readiness of Indonesia to implement *e-voting* in elections has been discussed by many researchers. Among them is Karmanis, who in his comparative study concluded that *e-voting* can increase the effectiveness and efficiency of the election process. Then there is Wijaya, who through SWOT analysis (*Strength, Weakness, Opportunity, Threat*) concluded that Indonesia has a great opportunity to implement *e-voting*. In addition, Dewanti in her reflective study also concluded that *e-voting* in elections has the potential to speed up the recapitulation process and anticipate officer fatigue due to heavy workload.

The readiness of *e-voting* systems for elections in Indonesia can also be seen from the fact that some regions in Indonesia have already implemented *e-voting* systems. The use of *e-voting* systems is allowed as long as it fulfills the cumulative requirements as stated in the Constitutional Court Decision Number 147/PUU-VII/2009, namely:

a. not violate the principles of direct, public, free, secret, honest and fair;
b. The regions that implement *e-voting* are ready in terms of technology, financing, human resources and software, readiness of the people in the region concerned, and other necessary requirements.

Based on the above decision, to date, more than 2000 villages spread across 28 districts in 15 provinces have successfully implemented the *e-voting* system. Some of these areas are listed as follows:

- In 2013: Boyolali 7 villages, Jembrana 2 villages, Musia Rawas 2 villages.
- 2014: Musi Rawas 95 Villages.
- In 2015: Bantaeng 9 villages, Boalemo 30 villages, Banyuasin 160 villages, Empat Lawang 101 villages.
- In 2016: Bantaeng 9 villages, Boalemo 30 villages, Banyuasin 160 villages, Batang Hari 32 villages.
- In 2017: Bogor 1 village, Agam 28 villages, Boyolali 5 villages, Boalemo 17 villages, Bantaeng 25 villages, Banyuasin 45 villages, Mempawah 20 villages, Musi Rawas 16 villages, Indragiri Hulu 1 village.
- In 2018: Bogor 1 village, Sidoarjo 14 villages, North Luwu 3 villages, East Oku 40 villages, Pemalang 172 villages, Batanghari 15 villages, Sarolangun 39 villages.
- In 2019: Agam 35 villages, Boyolali 22 villages, Lumajang 2 villages, Situbondo 5 villages, Boalemo 17 villages, Magetan 18 villages, Oku Timur 8 villages, Bantaeng 16 villages, Indragiri Hulu 3 villages, North Toraja 87 villages.
- 2020: Sidoarjo, Sleman 49 villages, Banyuasin 80 villages, Batanghari 60 villages, Sarolangun 62 villages, Musi Rawas 42 villages, Mempawah 30 villages.
- 2021: Barito Kuala 43 villages, Sleman 35 villages, Bantaeng 9 villages, Indragiri Hilir 1 village.
- 2022: Bulukumba 1 village, Boalemo 16 villages, Central Lampung 5 villages, Pesawaran 1 village.
- Year 2023: Malinau 2 villages, Mempawah 19 villages, Agam 38 villages, Bantaeng 25 villages.

Despite growing global adoption of e-voting systems, Indonesia's progress towards e-voting implementation at the national level remains limited and fragmented. Existing studies primarily focus on e-voting implementation in village-level elections (Pilkades), leaving a significant gap in understanding the feasibility, readiness, and potential scalability of e-voting for national elections. Furthermore, while several countries have successfully implemented e-voting on a national scale, such as Brazil and India, comparative research examining how Indonesia can adopt lessons from these countries is scarce. The legal, infrastructural, and socio-political contexts between Indonesia and Brazil share notable similarities, particularly in terms of civil law traditions, presidential systems, and large, diverse populations, making Brazil a relevant comparison point. This research gap in exploring the comparative readiness between Indonesia and Brazil highlights the need for comprehensive analysis that combines technological, regulatory, and public readiness dimensions.

In the rapidly evolving digital era, the implementation of technology in electoral processes has become a crucial topic in enhancing the quality of democracy. Brazil's e-voting system has been widely implemented and serves as an interesting case study in understanding how technology can ensure electoral integrity. This study aims to analyze the implementation of e-voting in Brazil, evaluate its security, and consider its application in Indonesia's digital democracy based on Sharia principles. The significance of this research lies in providing insights into how e-voting technology can be adopted in Indonesia while maintaining integrity and Sharia values in the democratic process.

Brazil's e-voting system has faced various challenges, including software vulnerabilities that may affect electoral integrity. A study by Aranha revealed that Brazil's voting machines have significant security weaknesses that could be exploited to alter election results (Aranha et al., 2019). This research aims to explore the lessons that can be drawn from Brazil's experience in addressing these challenges and how Sharia principles can be applied to ensure transparency and fairness in Indonesia's e-voting system. Thus, this study is expected to contribute to designing a secure e-voting system that aligns with Islamic values.

The implementation of e-voting in Indonesia faces unique challenges, including infrastructure readiness and public trust in data security. This research aims to examine how Sharia principles can be integrated into the e-voting system to enhance participation and transparency in elections. The significance of this study lies in providing recommendations for policymakers and practitioners in developing an e-voting system that is not only efficient and secure but also aligns with the Sharia values upheld by Indonesian society.

4. Literature Review

Diffusion of Innovation Theory

The Diffusion of Innovation (DOI) Theory, introduced by Everett M. Rogers, explains how new ideas, technologies, or practices spread within a society or organization over time. According to Rogers, the adoption process consists of five key stages: knowledge, persuasion, decision, implementation, and confirmation. This theory is frequently applied to analyze the adoption of technological innovations in both public and private sectors, including electoral technology such as e-voting systems. DOI emphasizes that the adoption rate depends on several factors, including the perceived advantages, compatibility with existing norms, complexity, trialability, and observability of the innovation. These factors influence how quickly new technology is accepted and diffused across different user segments, from early adopters to laggards (Rogers, 2003). In the context of e-voting in Indonesia, DOI is particularly useful to understand how election officials, political parties, and voters perceive and respond to the introduction of digital voting systems. By exploring these perceptions, the theory helps explain why e-voting adoption in Indonesia remains fragmented despite technological advances.

In recent years, DOI has been expanded and refined to account for digital transformation and technological disruptions in governance and public services. Researchers have incorporated factors such as trust in technology, digital literacy, and institutional support as additional determinants influencing innovation diffusion (Khan et al., 2020). In the context of public sector innovation, studies emphasize the role of government communication strategies and participatory governance mechanisms in accelerating diffusion (Alraja et al., 2020). In developing countries, cultural context and socio-economic disparities have also been highlighted as factors that influence the speed and inclusivity of innovation diffusion (Rana et al., 2021). Particularly in the domain of e-government and digital public services, DOI has been integrated with technology acceptance models (TAM) to better capture individual user behavior alongside systemic institutional factors (Alkharashi & Shepherd, 2021). These developments show that innovation diffusion in governance settings, especially in democratic processes, is not merely a technical issue but a socio-political one as well. This broader understanding is critical for analyzing how Indonesia's diverse regions and communities adopt or resist e-voting technologies.

Recent studies applying DOI to electoral technology adoption highlight several consistent research patterns, particularly in emerging democracies and developing countries. Research by Khan et al. (2022) found that perceived ease of use, government transparency, and public trust significantly influenced the acceptance of digital voting

systems in South Asia. Similar studies in Latin America reveal that perceptions of electoral integrity, prior experiences with election fraud, and institutional credibility are key factors influencing e-voting adoption rates (Pereira et al., 2021). In African contexts, DOI-based research underscores the importance of localized social networks and community leaders in shaping public attitudes toward electoral technology adoption (Oni et al., 2022). Studies focusing on comparative e-voting adoption between Brazil and other developing democracies show that legal clarity, pilot testing, and visible success stories accelerate diffusion by building public trust and reducing uncertainty (da Silva et al., 2023). These patterns emphasize that e-voting adoption is not solely dependent on technical infrastructure but also on effective public engagement, regulatory clarity, and contextual trust-building measures.

In this study, DOI is used to analyze how e-voting innovations are perceived, promoted, and potentially adopted in Indonesia's electoral system. The theory helps examine how different stakeholders—government officials, election organizers, political parties, and voters—evaluate the relative advantages, complexity, and compatibility of e-voting systems. Through interviews, document analysis, and comparative review with Brazil, the study identifies which factors accelerate or hinder diffusion at both the institutional and societal levels. The perceived risks, especially related to transparency, security, and fairness, are analyzed using DOI to understand the barriers to adoption in Indonesia's pluralistic electoral context. Moreover, DOI helps evaluate the role of pilot programs in Indonesia's local elections (Pilkades) as a testbed for broader national adoption. By comparing these patterns with Brazil's successful nationwide e-voting diffusion process, DOI provides a comprehensive lens to assess Indonesia's current readiness and the conditions required for successful national implementation.

The theoretical framework derived from DOI for this research consists of five core dimensions: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage refers to the perceived benefits of e-voting compared to conventional voting systems, including efficiency, cost-saving, and fraud prevention. Compatibility focuses on the alignment between e-voting and Indonesia's socio-political culture, electoral laws, and administrative capacities. Complexity assesses the perceived difficulty in understanding and using e-voting technology, both by election organizers and voters. Trialability measures the extent to which e-voting can be tested in smaller pilot programs before national rollout, building confidence through incremental learning. Observability evaluates how successes and failures in local-level e-voting pilots are communicated to the broader public, influencing overall perceptions and willingness to adopt. These five dimensions form the analytical lens for assessing Indonesia's e-voting readiness in comparison to Brazil's successful diffusion process.

E-Democracy Theory

E-Democracy Theory describes the use of digital technology to enhance and transform democratic processes, including elections, citizen participation, transparency, and governance accountability. This theory emphasizes how digital platforms and technologies expand public access to political processes, facilitate two-way communication between governments and citizens, and improve the transparency of decision-making (Trechsel, 2021). In the context of elections, e-democracy refers to the digitization of voter registration, voting, vote counting, and election monitoring processes. The ultimate goal of e-democracy is to strengthen public trust in democratic institutions by ensuring fairness, efficiency, and transparency in all stages of governance (Garland & Terry, 2021). E-democracy theory is particularly relevant in countries undergoing digital transformation in governance, where technological innovations intersect with political, legal, and cultural complexities. In Indonesia, where digital governance efforts are expanding, the adoption of e-voting aligns with the broader shift toward e-democracy initiatives. Therefore, E-Democracy Theory serves as an essential

lens to evaluate how technology enhances democratic processes and influences public perceptions of electoral integrity.

Over the past five years, E-Democracy Theory has evolved significantly, particularly in response to technological advancements, cybersecurity concerns, and evolving citizen expectations. Scholars have increasingly focused on the relationship between digital inclusion, electoral transparency, and citizen trust in online electoral processes (Zuiderwijk & Janssen, 2022). In emerging democracies, research highlights the double-edged nature of digital technology, which can enhance participation while simultaneously introducing new risks, such as digital exclusion, manipulation, and disinformation (Minner & Steinbach, 2021). Comparative studies have emphasized the importance of regulatory frameworks that ensure both technological reliability and procedural fairness, especially in high-stakes national elections (Pradella et al., 2021). In multi-ethnic democracies, research explores how e-democracy can improve minority representation through inclusive digital platforms (Groshek & Engelbert, 2020). These developments indicate that e-democracy is no longer limited to digital voting alone but now encompasses a holistic approach to digital governance, citizen empowerment, and trust-building in public institutions. This expanded understanding is particularly relevant to assessing Indonesia's e-voting readiness within its evolving e-democracy agenda.

Recent research applying E-Democracy Theory to e-voting adoption and electoral reform shows several emerging patterns. Studies in Latin America and Southeast Asia highlight how e-democracy initiatives are often triggered by public demand for transparency after high-profile election irregularities (Anechiarico et al., 2022). Research from Brazil demonstrates that trust in e-voting systems correlates with citizens' prior experience with digital governance services, such as tax filings and social benefit programs (Pereira et al., 2021). In European democracies, studies emphasize that countries with strong digital literacy programs and proactive citizen engagement campaigns show higher acceptance of digital voting innovations (Minner & Steinbach, 2021). In contrast, countries with weak digital infrastructure or high levels of digital misinformation face stronger public resistance to e-voting adoption (Zuiderwijk & Janssen, 2022). In Indonesia, initial research on e-voting pilots in village elections (Pilkades) shows that technical success does not automatically translate to broader public acceptance without parallel investment in transparency, digital literacy, and stakeholder collaboration (Putra et al., 2023). These findings collectively suggest that e-democracy success depends not only on technology adoption but also on governance quality, citizen trust, and proactive public engagement strategies.

This research applies E-Democracy Theory to assess how e-voting adoption contributes to the broader democratization process in Indonesia. Specifically, the theory helps evaluate how digital election processes influence public perceptions of electoral legitimacy, transparency, and accountability. By comparing Indonesia's e-voting readiness to Brazil's mature e-voting ecosystem, this study examines whether e-voting adoption strengthens or weakens public trust in Indonesia's electoral processes. E-Democracy Theory also provides a framework to assess how digital literacy, public participation, and government transparency efforts shape public attitudes towards e-voting adoption. Furthermore, the theory allows for the analysis of how technology-driven elections intersect with traditional democratic values, such as fairness, inclusion, and procedural integrity. This dual focus—technological feasibility and democratic legitimacy—is essential for understanding whether e-voting serves as a catalyst for democratic strengthening or a potential trigger for further public distrust in Indonesia's electoral system.

The theoretical framework based on E-Democracy Theory consists of four core dimensions: technological transparency, public trust, digital literacy, and procedural fairness. Technological transparency assesses how e-voting systems disclose processes, ensure auditability, and allow external monitoring. Public trust measures citizen

confidence in the technology's ability to deliver accurate and unbiased results. Digital literacy evaluates the public's capacity to understand and effectively use e-voting systems, particularly in rural and digitally marginalized communities. Procedural fairness examines whether e-voting systems comply with established electoral principles—direct, public, free, secret, honest, and fair elections. These four dimensions collectively form the analytical lens through which this research evaluates the strengths, weaknesses, and potential of Indonesia's e-voting adoption compared to Brazil's system.

Institutional Theory

Institutional Theory explains how organizations, including governments and election management bodies, respond to external pressures from regulatory bodies, societal expectations, and professional norms. This theory highlights that organizational behavior is not solely driven by internal efficiency goals but also by the need to gain legitimacy within a broader institutional environment (DiMaggio & Powell, 1983). In the context of elections, institutional theory helps explain how election management bodies (EMBs) adopt e-voting technology not just for technical reasons, but to comply with regulatory changes, public demands for transparency, and international best practices (Scott, 2014). Institutional theory identifies three types of pressures: coercive pressures from laws and regulations, normative pressures from professional communities, and mimetic pressures where organizations copy successful peers to gain legitimacy. For Indonesia's General Elections Commission (KPU), these pressures shape how they approach the potential adoption of e-voting, balancing regulatory mandates, technical feasibility, and public trust. This theory is particularly relevant for understanding the dynamics between technology adoption and regulatory compliance in complex governance systems like Indonesia's elections.

In recent years, Institutional Theory has evolved to incorporate digital transformation and technology adoption processes in public sector institutions. Scholars have highlighted the importance of institutional alignment between regulatory frameworks, technological capabilities, and public expectations in shaping successful e-governance initiatives (Weerakkody et al., 2021). Modern adaptations of the theory emphasize how public institutions face simultaneous pressures to innovate, remain accountable, and align with global governance standards (Alshamsi & Murray, 2022). In the electoral context, recent studies examine how election commissions balance demands for technological innovation with legal mandates for electoral fairness and security (Mahler & Regan, 2022). Research also highlights the role of international election observer organizations in setting normative benchmarks for electoral transparency and technical integrity (Hoffmann et al., 2023). This expanded understanding of institutional theory highlights that the adoption of e-voting technology in Indonesia cannot be isolated from broader institutional forces, including the influence of ASEAN electoral cooperation and global democratic norms.

Recent research applying Institutional Theory to e-voting adoption and electoral modernization highlights several consistent patterns. Studies in Latin America show that electoral management bodies (EMBs) adopt e-voting technologies partly to align with international norms around election transparency and anti-fraud measures (Pereira et al., 2021). Research in Africa highlights that countries with strong regulatory institutions and professionalized election commissions are more likely to successfully adopt e-voting systems and gain public trust (Mwenda et al., 2023). In European contexts, studies demonstrate that the diffusion of e-voting is closely tied to regional integration efforts, where **countries align their electoral technologies with EU-wide digital governance standards (Meijer et al., 2022). Comparative research between Brazil and Indonesia highlights that Brazil's institutional success with e-voting stems from strong legal mandates, consistent regulatory oversight, and well-established technical infrastructure (da Silva et al., 2023). Collectively, these studies indicate that successful e-voting adoption is as much an institutional achievement as a technological one, driven by

effective regulatory design, public communication, and professional capacity building within electoral management institutions.

This research applies Institutional Theory to assess how regulatory, normative, and mimetic pressures influence Indonesia's readiness to adopt e-voting at the national level. By comparing Indonesia's evolving regulatory framework and institutional preparedness with Brazil's well-established system, the study examines how coercive pressures (laws, Constitutional Court decisions), normative pressures (best practices from ASEAN and global EMBs), and mimetic pressures (lessons from Brazil) shape Indonesia's approach to e-voting adoption. Institutional Theory also helps assess how the KPU, Bawaslu, and Ministry of Home Affairs respond to political, legal, and public demands for electoral modernization. Furthermore, this study analyzes how institutional alignment (between legal frameworks, technological systems, and administrative capabilities) influences the likelihood of successful e-voting implementation in Indonesia. This perspective highlights that e-voting is not merely a technological shift but an institutional transformation requiring changes to regulations, organizational processes, and public accountability mechanisms. Institutional Theory, therefore, provides a holistic framework for understanding how Indonesia's electoral institutions prepare for, and adapt to, digital transformation in the electoral process.

The theoretical framework derived from Institutional Theory consists of three core dimensions: regulative pressure, normative pressure, and mimetic pressure. Regulative pressure refers to the formal legal mandates, such as election laws, Constitutional Court rulings, and government regulations, that require or constrain e-voting adoption. Normative pressure reflects the influence of professional standards, international electoral guidelines, and technical recommendations from organizations like the UNDP, IFES, and ASEAN Election Monitoring Bodies. Mimetic pressure assesses the tendency of Indonesian electoral institutions to emulate successful e-voting practices from peer countries, particularly Brazil, as a reference model. These three dimensions shape how Indonesia's electoral institutions perceive, evaluate, and adopt e-voting innovations. Together, they provide a comprehensive framework for analyzing the institutional dynamics driving or hindering e-voting readiness in Indonesia's electoral context.

The Principle of Shura in Islamic Governance

Shura (consultation) is a foundational concept in Islamic political thought, derived directly from Qur'anic sources such as Surah Ash-Shura (42:38) and Al-Imran (3:159). It refers to the collective deliberation and involvement of the ummah (community) in governance and decision-making processes. Classical scholars such as Al-Mawardi and Ibn Taymiyyah recognized *shura* as an obligation for rulers, although they differed on its procedural bindingness. In modern discourse, *shura* is often aligned with democratic ideals, especially in areas such as public participation, transparency, and accountability. Scholars like El-Fadl (2004) and Kamali (2009) have explored *shura* as a dynamic principle that can be adapted to contemporary systems, including electoral democracy. However, *shura* is not equivalent to Western-style liberal democracy; it emphasizes moral responsibility, religious legitimacy, and communal welfare. This conceptual elasticity allows *shura* to accommodate mechanisms like e-voting that can enhance inclusive consultation.

The incorporation of *shura* into digital democratic practices, such as e-voting, has generated mixed scholarly reactions. On one hand, proponents argue that digital technologies can operationalize *shura* by broadening access and minimizing manipulation, thus aligning with Islamic ideals of justice and equity. On the other hand, critics such as Sardar (2012) and some contemporary fuqaha warn that uncritical adoption of Western electoral technologies may obscure spiritual and ethical dimensions of consultation. These scholars question whether digital systems prioritize procedural efficiency over moral deliberation. There are also concerns that algorithmic systems may lack the

transparency and communal ethics integral to *shura*. Nevertheless, there is growing acceptance that *shura* can be enhanced by modern technology if implemented within a framework rooted in *maqashid al-shariah*. The debates reveal a tension between embracing digital tools and preserving the authenticity of Islamic consultative traditions.

Empirical studies exploring the integration of *shura* and digital governance are still limited but growing. In Malaysia, studies by Fauzi & Othman (2018) examined how e-participation platforms align with Islamic governance principles, emphasizing transparency and public accountability. Research in Indonesia by Huda et al. (2021) highlighted that digital consultations in local Islamic councils showed promise in reinforcing participatory values rooted in *shura*. In Turkey and Brunei Darussalam, e-governance has been framed within Islamic ethical discourses, although not always explicitly referencing *shura*. Most of these studies remain descriptive, focusing on how Islamic values are referenced rhetorically in policy without analyzing the procedural mechanics. A few case studies have explored how e-voting mechanisms are perceived by Muslim voters, particularly regarding their fairness, security, and legitimacy. These studies underline that while technology can facilitate consultation, its design and implementation must reflect Islamic norms. Still, more comparative and theoretically grounded studies are needed.

Despite these developments, significant theoretical and empirical gaps remain. First, most studies treat *shura* as a static principle rather than exploring its potential evolution in light of technological change. Second, the literature often lacks a critical discussion of power dynamics and structural inequalities embedded in both digital systems and traditional *shura* practices. There is also insufficient attention to how marginalized voices, particularly women and rural populations, are included or excluded in digital consultation mechanisms. Furthermore, most analyses fail to systematically link *shura* to operational frameworks such as e-voting, focusing instead on general participation. The ethical implications of algorithmic governance, data security, and digital illiteracy are rarely discussed in an Islamic legal framework. Lastly, no current literature compares textual Islamic theory (e.g., *shura*, *maqashid*) with real-world technological governance models across Muslim countries. This creates a theoretical gap between normative ideals and empirical implementation.

This study addresses these gaps by positioning *shura* not only as a normative principle but as a practical framework to assess the implementation of e-voting in Indonesia. By comparing Indonesia's e-voting initiatives with Brunei Darussalam's Islamic digital governance, the article demonstrates how *shura* can be adapted to modern electoral mechanisms. It applies Islamic legal theory, particularly *shura* and *maqashid al-shariah*, to critically evaluate the ethical dimensions of digital voting. The article moves beyond rhetorical usage of Islamic terms by offering an analytical model grounded in classical and contemporary interpretations. It also interrogates how *shura* interacts with issues of access, transparency, and communal responsibility in the context of technological mediation. This framework can guide future policies that aim to harmonize religious legitimacy with democratic integrity in Muslim-majority societies. Thus, the study contributes both theoretically and practically to the evolving discourse on Islamic governance in the digital age

2. *Research Method*

This study adopts a normative legal research approach, which views law as a set of norms, principles, and doctrines that function to guide public conduct and institutional governance. The normative framework enables researchers to critically evaluate Indonesia's regulatory readiness to implement an electronic voting (e-voting) system. The primary focus is on analyzing statutory texts, legal principles, and doctrinal interpretations related to election law. This approach is combined with a library-based

method, relying on texts such as national laws, comparative legal documents, jurisprudential interpretations, and academic literature. Legal sources are categorized into primary sources (statutory regulations such as Law No. 7 of 2017 on General Elections), secondary sources (legal commentaries and scholarly articles), and tertiary sources (legal dictionaries and encyclopedias). The research also incorporates Islamic governance principles, especially the concept of shura (consultation), as a normative basis for ethical electoral reform. By combining classical legal theory and modern legal reform discourse, this study establishes a strong textual foundation for assessing the integration of e-voting in Muslim-majority societies.

To ensure comprehensive legal interpretation, this research employs three analytical approaches: the statutory approach, the comparative approach, and the case approach. The statutory approach is used to examine Indonesian legal instruments related to elections, including laws and KPU (General Election Commission) regulations. The comparative approach explores the e-voting experience of Brazil, a Muslim-majority nation that incorporates Islamic ethical values in its governance. By comparing Indonesia and Brunei, the research identifies regulatory challenges and lessons learned, especially regarding the integration of sharia principles in electoral design. The case approach focuses on village-level e-voting practices in Indonesia to understand technological and administrative barriers to national implementation. This includes legal challenges, budgetary limitations, and the uneven distribution of electricity that hinders the use of touch-screen voting devices. The combined approach enables the study to go beyond textual reading by situating legal analysis within broader policy and technological contexts. These approaches support the formulation of context-sensitive legal reform that aligns with Indonesia's constitutional and socio-religious landscape.

The analytical process involves qualitative content analysis, particularly thematic categorization and normative alignment with principles of Islamic public law. Maslahah (public interest), as a supporting analytical tool, is used to evaluate whether the legal and technical infrastructures meet the ethical requirements of fair and inclusive elections. The principle of shura is reflected upon as an essential element of participatory governance in Islamic political thought, especially in relation to accountability, transparency, and inclusivity. The researcher acknowledges their positionality as a legal scholar in a pluralistic democratic Muslim society, aiming to maintain interpretive neutrality while honoring Islamic ethical priorities. Potential bias is addressed by triangulating legal sources and considering multiple viewpoints across secular and Islamic electoral discourse. This research also reflects on the limits of textualism, acknowledging the need for adaptive reasoning in the face of rapid technological change. Ultimately, the normative analysis is not only descriptive but also prescriptive, providing recommendations for policy-makers and religious authorities to co-develop a just and accountable e-voting framework.

3.Results

A.Implementation of E-Voting System in Brazil Election

Discussions about *e-voting* in Brazil started in 1994 by the *Tribunal Superior Eleitoral* (TSE). The TSE sought a solution to the manipulation practices that often occurred at the vote recapitulation stage. The TSE, as well as election participants, voters, and *stakeholders*, viewed the previous method of vote recapitulation as inefficient, overly complicated, lengthy, and a source of abuse of the principles of election administration. However, only TSE saw the use of technology as a solution. Armed with strong public trust in the TSE, as well as previous positive experiences in the use of technology in the voter registration and recapitulation stages between 1994-1995, the TSE stipulated in the Election Law that elections be conducted electronically.

Diktum: Jurnal Syariah dan Hukum
Vol. 23, No. 1, Januari 2025, pp. 102-131

In short order, Brazil's Parliament approved the TSE's proposed election law, although the law does not detail the qualifications of *e-voting* machines or how they should work. The law only requires that voters select candidates by entering the number of their preferred candidate, and that each candidate's photo be displayed on a layer of monitors. The law also mandates that 120 days before the election, TSE facilitates political parties or companies contracted by parties to audit the code used in *e-voting* machines.

After Law No. 9,100 of September 29, 1995 was passed, the TSE began to implement the electronic *voting* system or *e-voting*. For the first practice, in 1996, the *e-voting* system was only applied to elections at the local level. However, in 1998, with the passing of Law No. 9,504 of September 30, 1997, the *e-voting* system was already applied to elections at the national level.

The *e-voting* machine used in Brazil is the *GX-1 Integrated Processor*, a microcomputer designed specifically for elections. The machine is physically robust, small in size, lightweight, independent of electricity supply because it uses an internal battery and is equipped with an external battery in case the internal battery runs out, and is also

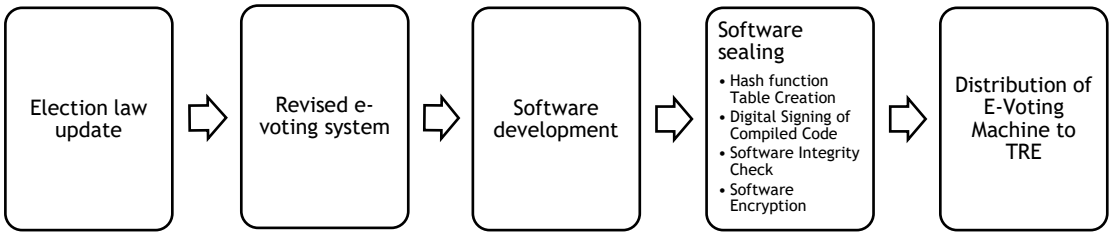
Figure 1, Control Panel for TPS Officers

Figure 2, Voting Panel for Voters

designed to facilitate voters with disabilities. Candidate visualization is displayed on the machine's monitor, braille is installed on the machine's keypad, audiodescription, and Libras (Brazilian sign language). The Brazil *e-voting* machine has 2 parts, the control panel operated by the polling station officer and the voting panel for voters.

The control panel for polling station officers has; 1) a *keypad* consisting of numbers for officers to record voter registration numbers, 2) a screen that displays the voter's name when the voter's number has been entered, and 3) a voter identification feature with biometric technology. And the voting panel for voters has; 1) a numeric keypad for voters to enter the candidate number of their choice, 2) a screen to display the name, number, and photo of the candidate when the voter has entered the candidate number of their choice, 3) a button to not vote for any candidate or a blank vote, 4) a button to delete if the voter has entered the wrong candidate number of their choice, and 5) a button to send or confirm the choice that has been entered by the voter.

In an effort to ensure the reliability of the e-voting system, the Superior Electoral Tribunal (TSE), implements a series of strict procedures in the development, testing, and implementation of software and hardware used in elections. Every stage from planning to implementation is overseen by various parties, including IT experts, political parties,



and civil society representatives, to ensure that the system used is in accordance with applicable regulations.

Figure 3, Development Process and Security of E-Voting System in Brazil

Elections in Brazil always take place in October. In December of the year before the election, the TSE submits a draft resolution to parliament to update the electoral law. This resolution also identifies the software changes to be used, so that the law can be applied to the new version of the e-voting system. Within one month, TSE revised the system in accordance with the requirements specified in the approved resolution. Software development was completed 180 days before the election. Changes to the source code were then made available to the political parties' IT experts with the aim of checking whether the system complied with the law or not.

Sixty days before the election, the software is sealed in a public ceremony, where political parties and civil society representatives are invited to participate. During the ceremony, a series of tasks took place. First is the creation of a table of *hash* functions, which is used to prevent the software source code from being modified. Second is the digital signing of the compiled version of the software code. Third is the integrity check of the software that has been uploaded to the *e-voting* machine, by authorized representatives of political parties, using their digital signatures. Next is the encryption of the software, which is then distributed to the *Tribunal Regional Electoral* (TRE). Public participation in this ceremony is a form of transparency that ensures that the software that will be used in the election is completely free from manipulation or unauthorized changes.

A few days before the election, each TRE loads the *e-voting* machine with candidate information (name, number, party or coalition abbreviation, and photo), voter data, and software applications. Political party representatives were required to attend this loading process. Validation tests are conducted on a three percent sample of the total number of *e-voting* machines randomly selected by the representatives. The day before the election, *e-voting* machines were placed at the election site. A portion of these machines were brought back to TRE for reliability tests with simulated voting sessions. If no malfunctions are detected, each machine must be returned to the site before 7.00am on election day.

Elections in Brazil take place from 8 a.m. until the last voter in line is received, with a deadline until 5 p.m. However, preparations began long before voting began, because the polling station had been prepared since 07.00 with the arrival of voting officers at their respective places.

The polling station is operated by six polling officers appointed by the election judge, consisting of one polling station chairman, two first and second officers, two secretaries, and one reserve officer. In this place, electronic voting machines are placed. Polling stations are arranged in such a way as to allow for the smooth movement of voters. Supporting facilities, such as a list of candidates along with their numbers, are installed to be accessible to voters who do not bring a list of candidates they want to vote for.

Diktum: Jurnal Syariah dan Hukum
Vol. 23, No. 1, Januari 2025, pp. 102-131

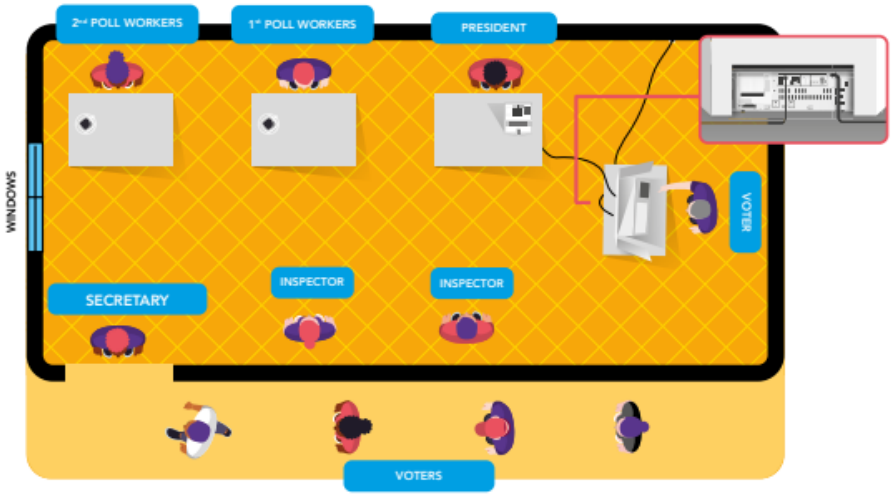


Figure 4, Shape of TPS Locations in Brazil

On polling day at 08.00 am, in the presence of party representatives and witnesses, the polling station Chairperson turned on the *e-voting* machine and printed a *zeroth* report. This document serves to ensure that no votes have been registered for any candidate inside the voting machine before the voting process begins. Both of these documents must be signed by the head of the polling station, the polling officer, and the supervisor of the party or federation that wants to sign it. After that, the document must be installed in a visible place at the polling location.

Voters who are already at the polling station present their registration number to the polling officer, and they are directed to identify themselves using fingerprints or ID cards on the biometric machine. Once the voter's name and number are confirmed, the voter goes to the voting booth to enter his/her preferred candidate number on the *e-voting* machine. It is forbidden to enter the voting booth with mobile phones, cameras, video recorders, radio equipment, or other devices that may endanger the confidentiality of the voice. When the voter enters the candidate number of his/her choice, the *e-voting* machine screen will display the name, number, and photo of the candidate, if it is appropriate, then the voter can send his/her choice by pressing the confirmation button on the *e-voting* machine.

At 5pm, the polling stations are officially closed. Right after the polling stations are closed, the *e-voting* machine prints the data in the machine in the form of a *barcode*, which can be downloaded by anyone. The printed *barcode* is signed by the polling station official to ensure the synchronization of the data sent to the tabulation center through the network system with that printed at the polling station. In addition, the *pen drive* (a kind of *hard drive*) is removed from the *e-voting* machine and sent to the TSE data center at that time. So the data is stored on three things: the machine, the *barcode*, and the pen *drive*. After 15 minutes after the polling station closes, the officials can go home, pack up their equipment, and fold the voting booth cardboard. The vote recapitulation can be watched online and in *real-time* through TSE's *YouTube* Media Center.

B. *Implementation of E-Voting System in Pilkades in Indonesia*

Professor Gede Winasa, who served as the Regent of Jembrana from 2000 to 2010, proposed implementing *e-voting* because he was dissatisfied with the previous election system, which caused many problems and riots. The Regent saw an opportunity to develop *e-voting* from the Jembrana *Smart School* (JSS) system, an integrated academic system that has been implemented in several schools in Jembrana. The JSS system has a food

ordering feature that is used in the school canteen. By using a student card, students can use this feature. Seeing this, in 2009, the Bupati tasked the Department of Transportation, Communication and Information to modify the JSS system by changing the food menu to village head candidate options. For the voter identification and verification process, they used *e-KTP* which they called J.ID *(Jembrana Identity)*. Meanwhile, Jembrana's legal department issued Regional Regulation No. 1/2009, which regulates *e-voting*. The regulation states that the purpose of *e-voting* is to achieve quality elections that are independent, confidential, honest, fair, and democratic as mandated by the 1945 Constitution of the Republic of Indonesia.

In accordance with the mandate of the Law that the implementation of elections must meet the principles of direct, public, free, confidential, honest, and fair, the application of the e-voting method must ensure that every vote given is valid and confidential, and there is no interference or manipulation from any party. Therefore, the e-voting system needs to be equipped with strict security.

The method of securing the e-voting system in regional head elections in Indonesia involves various technologies and practices to ensure the security, confidentiality, and integrity of votes. Here are some of the main methods used:

1. Data Encryption
   The use of strong encryption algorithms is very important in the e-voting system. The RSA (Rivest-Shamir-Adleman) algorithm is often used to encrypt transaction data, protecting voter and voting information from unauthorized access. In addition, symmetric key cryptographic algorithms such as Twofish are also implemented to secure the system's private keys.
2. Multi-Factor Authentication
   The e-voting system is expected to implement multi-factor authentication that requires some form of voter identity verification. For example, a combination of passwords and codes sent via SMS or an authenticator app can be used to ensure that only legitimate voters can vote.
3. Use of Captcha
   The application of captcha in the e-voting system serves to prevent automatic filling of forms by computer programs, as well as to avoid brute force attacks on the login page. This ensures that only human users can access the system.
4. Session Management
   Each user session is checked to ensure that only eligible individuals can access certain pages in the e-voting system. If any user has a fake session, they won't be able to access sensitive information.
5. Blockchain Technology
   Blockchain can be used to improve security and transparency in e-voting systems. With its decentralized and transparent nature, any vote cast can be recorded securely and irreversibly, giving voters the ability to independently verify their votes.
6. Strong Legal Framework
   The importance of a legal framework that supports personal data protection and cybersecurity is also emphasized. Law Number 27 of 2022 concerning Personal Data Protection is an important foundation in providing a sense of security for voters.

The *e-voting* process in Jembrana begins with the determination of the Permanent Voters List (DPT) by the Election Committee using source data from the Population, Civil Registry, Labor and Transmigration Office, namely DP4 (List of Potential Electoral Voters), at least 15 days before the election. The D4 data received by the Election Committee is

then updated by taking into account the aspirations of the community in order to produce an optimal DPT and accommodate all citizens who are entitled to vote.

The results of the data validation are then submitted back to the Population, Civil Registry, Labor and Transmigration Office no later than 4 days before the election. DPT must have been compiled no later than 3 days before the election, and for DPT who do not have *e-KTP*, it is prioritized to make it in the local sub-district no later than 1 day before the election. However, if on the day of the election there is still a DPT that does not have an *e-KTP* or the KTP is damaged, it can be repaired or reprinted KTP at the mobile car for making *e-KTP* that has been provided by the Population, Civil Registry, Labor and Transmigration Service at the polling station.

After finalizing the DPT, the next process is to prepare the polling stations. The polling station consists of a place to verify the DPT, a place to give *v-tokens* in the form of *smartcards*, a voting booth, a ballot box for voting *receipts*, a witness area, and a waiting area for the DPT. The *e-voting* equipment at the polling station consists of an *e-KTP* verification machine with biometric technology, a laptop for election officials to verify the DPT, a *smartcard* reader, a CPU, an *e-voting* machine in the form of a PC with *touch screen* capabilities, an audit machine, an election machine for people with disabilities, an LCD projector and projector screen to display election results, and other wireless equipment. The polling station does not only function as a voting place, but also a place to socialize the implementation of Pilkades by e-voting. So, before the election day, the Department of Transportation, Communication and Informatics introduces the *e-voting* system to the community, as well as conducting simulations of e-voting elections.

a. Laptop, this technology is used to open the DPT application. If the voter's *e-KTP* is verified, the voter attendance on the DPT application will be filled in automatically.
b. e-KTP *reader*, this technology is used to verify the identity of voters by scanning data on *the voter's* e-KTP.
c. Touchscreen monitors, this technology is used as a medium to provide sound. This technology will display the candidate's name, number, and photo, there is also an option for a blank voice. After making a choice, the technology will display a "yes" button to confirm and a "no" button to cancel.
d. Smartcard reader, this technology functions to read *the v-token* used to activate *the e-voting* machine. If *the v-token* is confirmed, the *e-voting machine* will be activated and immediately display the candidates.
e. An audit tool, this technology is used to print paper that is used as proof that the voter's choice is recorded.
f. Accessibility tools for people with disabilities.

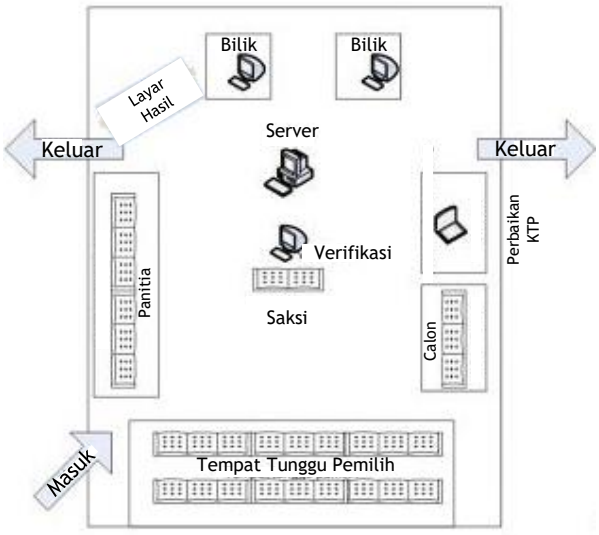


Figure 7, Shape of TPS Location at Jembrana Regional Elections, Bali

On the day of voting, voters come to the polling station with their *e-KTP*. Voters are then directed to verify their personal data using *e-KTP* and fingerprints on the verification machine, if the voter is registered as DPT, the name and photo of the voter will appear on the DPT application on the laptop operated by the election officer. This verification machine works automatically to record voter attendance, and can also detect voters who have previously voted. This of course prevents invalid votes due to double voting. After their personal data is confirmed as DPT, voters are given a *v-token* to activate the *e-voting* machine in the voting booth later. Next, voters headed to the voting booth. To be able to vote, the voter first activates the machine by inserting the *v-token* into the *smartcard* reader. After the activation is complete, the *e-voting* machine will immediately display a ballot paper containing the candidate's number, name and photo, as well as a blank ballot option. Voters only need to touch the picture of the candidate of their choice or cast a blank vote, then confirm by selecting the "yes" button, if the voter wants to change the choice, the voter can select the "no" button and the machine will automatically display the ballot again. In this case, voters can only vote for one candidate and the number of voters who have voted will appear on the projector screen installed at the polling station. After the choice is confirmed, the audit machine will issue a proof of voting *receipt* containing a *barcode*, the *receipt is* then inserted into the ballot box. This *receipt* serves as comparative data if there is a difference between the number of DPT and the number of voters who voted.

After voting is completed and the polling station is closed, the results of the vote can be immediately displayed and viewed on the projector screen. The election results displayed include the number of votes for each candidate, abstentions, abstentions, the number of votes cast, and the number of permanent voters (DPT). The results will be sent directly to the General Election Commission website.

5. Discussion

Comparative Implementation and Governance of E-Voting in Brazil and Indonesia

The implementation of e-voting in Brazil demonstrates a mature, centralized, and legally structured electoral system backed by high public trust in the electoral authority (TSE). Since its introduction in 1996, Brazil has continuously refined its technology and legal framework, institutionalizing transparency through public audits, biometric verification, and independent oversight by political parties and civil society. The success of Brazil's system lies in its consistent legal updates, decentralized technological adaptation across regions, and participatory legitimacy in all stages of software sealing and deployment. Unlike Brazil, Indonesia has only applied e-voting at the village level (Pilkades), which reflects a limited institutional scale and fragmented regulation, such as Perda Jembrana No. 1/2009. While both systems utilize biometric verification and secure transmission, Brazil's design—battery-powered, accessible machines with legally mandated transparency rituals—demonstrates a readiness for national implementation, unlike Indonesia. Moreover, Brazil's elections benefit from real-time monitoring and immediate result display, a feature not yet optimized in Indonesian Pilkades. This contrast shows that Indonesia's system still depends on regional initiatives and lacks a unified national commitment like Brazil's model.

From a legal-institutional perspective, Brazil's electoral law clearly assigns accountability to the Tribunal Superior Eleitoral (TSE), while Indonesian implementation is driven by local government policy, without national electoral law recognition. The absence of standardization in Indonesia presents challenges to scalability and public trust, which is critical in national elections. Although Indonesia has made notable technical innovations—such as integrating e-KTP and smartcard tokens—these efforts are often hampered by uneven infrastructure, limited legal mandate, and lack of nationwide testing protocols. Meanwhile, Brazil ensures legal validity of its system by mandating pre-election auditing and transparency ceremonies, which establish public trust. This underscores the importance of institutional independence and public legitimacy in electoral governance, which Indonesia still struggles to achieve at the national level. Brazil's model illustrates that legal preparedness and procedural integrity are as critical as technological tools in securing democratic elections. Therefore, Indonesia must prioritize a stronger legal and institutional backbone if it aims to expand e-voting beyond Pilkades.

Another important comparison lies in the inclusion and accessibility features embedded in Brazil's system, which considers voters with disabilities and illiteracy through audiovisual aids and Braille keypads. This inclusive design aligns with Islamic principles of shura and justice, ensuring that all citizens can participate without systemic barriers. Indonesia's system, while attempting to be inclusive through smartcards and audit receipts, has yet to fully address accessibility needs at a national scale. Furthermore, while both countries implement biometric verification, Brazil complements this with hash encryption, multi-level digital signatures, and blockchain-aligned architecture, thereby enhancing system integrity and auditability. Indonesia's system, in contrast, still lacks legally binding post-election auditing processes and remains vulnerable to regional technical disparities. In light of this, Brazil's design could serve as a reference for Indonesia not only in terms of technology, but in building an electoral ethics framework that guarantees inclusive and secure participation. The comparative gap highlights that Indonesia's current model is suitable for local use but insufficient for national political legitimacy.

Theologically, the principle of shura (consultation) in Islamic governance aligns with Brazil's procedural inclusion of political party audits and community involvement in pre-election verifications. This indicates that e-voting, when implemented transparently and with public involvement, is not merely a technical matter but a reflection of ethical

governance rooted in justice (ʿadl) and trust (amānah). In contrast, Indonesia's Pilkades system lacks this normative grounding in participatory governance, which could be further reinforced through sharia-based electoral ethics. The implementation of e-voting in Muslim-majority societies like Indonesia must not only meet legal-technical standards but should also embody maqāṣid al-sharīʿah principles such as preservation of rights (ḥifẓ al-ḥuqūq), protection of public welfare (maṣlaḥah), and participatory justice. Therefore, integrating shura into electoral design could transform e-voting into a vehicle of ethical legitimacy, beyond mere efficiency. As e-voting becomes a future electoral norm, grounding it in Islamic governance values will be essential for social acceptability in contexts like Indonesia. Brazil's procedural integrity, although secular, exemplifies the spirit of shura through structured consultation and validation, offering an adaptable model for Muslim-majority countries.

In conclusion, the Brazilian e-voting model offers critical insights for Indonesia's electoral development, particularly in the areas of legal clarity, technological robustness, procedural transparency, and inclusive access. The Indonesian experience in Pilkades is commendable for its innovation and potential, yet remains institutionally fragmented and technologically constrained for national scalability. The theological principles of shura and maṣlaḥah should be positioned not only as ethical guidelines but as frameworks to strengthen democratic legitimacy in the digital age. To advance, Indonesia must adopt a centralized regulatory system with mandated national standards for e-voting, coupled with Islamic ethical principles to foster trust and participation. The lesson from Brazil is clear: successful e-voting requires more than machines—it requires law, legitimacy, and inclusive consultation. Future reforms must bridge the gap between technical progress and ethical governance in line with Islamic and democratic values. This alignment is critical not only for Indonesia but for all pluralistic Muslim societies navigating the path toward digital democracy

While the technological advancement of e-voting systems in both Brazil and Indonesia appears promising, a critical tension lies in the disconnect between innovation and governance capacity. Brazil's centralized electoral authority (TSE) allows for coherent implementation and oversight, while Indonesia's fragmented and regionally autonomous structure creates inconsistency and risk. The Indonesian case highlights a potential technocratic bias—assuming that technology alone can resolve deeply rooted issues of electoral malpractice, without addressing institutional distrust or political fragmentation. Moreover, the Indonesian e-voting initiative, though innovative, may inadvertently reinforce digital divides, excluding rural or underserved populations lacking digital literacy or infrastructure. Without accompanying reforms in voter education, transparency, and participatory oversight, e-voting may worsen rather than resolve democratic deficits. This problem is not technological in nature, but sociopolitical—emphasizing that electoral technology must be contextualized within socio-legal systems. Hence, the e-voting discourse must shift from digital efficiency to ethical and inclusive electoral governance.

Previous studies on e-voting, such as those by Alvarez & Hall (2008) and Marda (2020), highlight both the democratic potential and the institutional risks of electronic election systems. Much of the literature emphasizes either technical security or legal reform, but few engage with the sociological and normative tensions within pluralistic societies. This article contributes by combining comparative institutional analysis with Islamic ethical frameworks such as *shura* and *maṣlaḥah*, providing a novel intersection between technology, law, and faith-based governance. Unlike prior works that present e-voting as a universal solution, this research shows that e-voting cannot be detached from local traditions, legal legitimacy, and religious-cultural context. While studies on Brazil praise its transparency rituals and security protocols, this article situates these practices within Islamic values to evaluate their adaptability in Muslim-majority societies like Indonesia.

In doing so, the study expands the scope of e-voting research into interdisciplinary and comparative dimensions that better reflect real-world complexities.

Theoretically, this study demonstrates how Islamic principles—particularly *shura* (consultation) and *maṣlaḥah* (public interest)—can inform not only legislative discourse but the very architecture of electoral systems. It calls for a move beyond procedural legality toward substantive legitimacy, where electoral practices resonate with the moral and ethical frameworks of the governed population. Practically, the findings suggest that countries like Indonesia must develop national regulatory bodies equivalent to Brazil's TSE, with binding authority to manage and oversee e-voting across all levels. Additionally, electoral reforms must prioritize inclusive digital access and transparent validation processes through citizen and party engagement. This research thus provides a model for integrating religious values into public governance without compromising democratic innovation. In the long term, adopting a sharia-informed e-voting policy could reinforce trust, reduce manipulation, and promote participation—particularly in societies balancing tradition, modernity, and democratic aspiration.

Opportunities and Challenges of E-Voting System Implementation in Indonesia's Elections

For years, *stakeholders* have been offering to implement *e-voting* systems in Indonesia's elections, but to this day, the offer has not been realized on the grounds that Indonesia is not ready. Meanwhile, the application of *e-voting* itself has been successfully implemented by many regions in Indonesia within the scope of village head elections (Pilkades). Although the application is still at the local level, this success provides an early illustration for *e-voting* to be applied to elections at the national level.

Referring to the practice of *e-voting* Pilkades in Jembrana and in Brazil that successfully implemented *e-voting* at the national election level, the following outlines the opportunities and challenges faced by Indonesia to implement *e-voting* at the election level based on the *e-voting* readiness framework compiled by Risnanto when conducting research on the implementation of *e-voting* systems from various countries.

1) Law and Policy

Indonesia does not yet have rules that specifically regulate e-voting systems, including KPU Regulations regarding the technical implementation, which is an obstacle for Indonesia itself to implement *e-voting* at the election level. Nonetheless, the discourse to implement *e-voting* in elections has not stopped being discussed until today. Given that Indonesia itself has the opportunity to do so. The success of *e-voting* in village elections in various regions is a bright spot for the obstacles faced by Indonesia.

The implementation of the Regional Elections with *e-voting* by various regions relies on the Constitutional Court Decision Number 147/PUU-VII/2009 which officially legalizes *e-voting* as one of the methods in conducting regional head elections, where previously elections could only be done by voting or conventional methods. In the Constitutional Court Decision No. 147/PUU-VII/2009, it is stated that *the e-voting method* can be used as long as it meets the conditions 1) it does not violate the principles of direct, public, free, confidential, honest, and fair; and 2) regions that implement *the e-voting* method are ready in terms of technology, financing, human resources and software, the readiness of the community in the area concerned, and other necessary requirements.

The Constitutional Court in 2009 with its authority has examined, adjudicated, and decided on the application for Testing Law Number 32 of 2004 concerning Regional Government and produced a decision that includes the implementation of elections to technology-based regions. The Constitutional Court's Decision No. 147/PUU-VII/2009 contains the results of the Constitutional Court's consideration of the application for

testing the constitutionality of Article 88 of Law No. 32 of 2004 against the 1945 Constitution of the Republic of Indonesia.

In the case of the material test of Article 88 of Law Number 32 of 2004 which reads "Voting for the election of regional heads and deputy regional heads is carried out by voting for one of the candidate pairs in the ballot", the Petitioners in one of their applications requested the Constitutional Court to revoke Article 88. This is because the petitioners want to implement e-voting in the election of regional heads in Jembrana in 2010. However, because Article 88 only regulates "voting" as a method of voting in the election of regional heads and does not regulate the method of "e-voting", the article is expected to hinder the e-voting process and may cancel the results of e-voting that has been carried out.

The fundamentals are in accordance with the mandate of Article 18 Paragraph (4) of the 1945 Constitution of the Republic of Indonesia that "Governors, Regents, and Mayors as heads of local governments of Provinces, Regencies, and Cities are democratically elected" which is then further regulated in Article 56 Paragraph (1) of Law Number 32 of 2004 concerning Regional Government that "Regional Heads and Deputy Regional Heads are elected in one pair of candidates which are carried out democratically based on the principle of direct, public, free, confidential, honest and fair", the petitioners argued that Article 88 of Law Number 32 of 2004 prevents the use of the method of voting elections based on information technology which should have considered the progress of science and technology, namely with the e-voting system. Therefore, the petitioners proposed to legalize e-voting as a general election transformation from conventional general elections.

The Constitutional Court in providing justice to the petitioners paid attention to Article 28C Paragraph (1) of the 1945 Constitution which reads "Everyone has the right to develop themselves through their basic needs, the right to education and the benefits of science and technology, art and culture, in order to improve the quality of life and for the welfare of mankind" and Article 28C Paragraph (2) of the 1945 Constitution which reads "Everyone has the right to advance himself in fighting for his rights collectively to build the community, nation, and country". Through these two articles, there is no obstacle to the implementation of e-voting as a transformation of general elections from conventional general elections.

Considering that many regions in Indonesia have not been able to accommodate the e-voting system because their people are not familiar with technology and the limitations of other facilities such as electricity, internet networks, and others, the revocation of Article 88 of Law No. 32 of 2004 will cause a quite difficult legal situation. Therefore, the Constitutional Court decided not to repeal Article 88. If Article 88 is repealed, there will be a legal vacuum. Because Article 88 is not repealed, regions that cannot conduct elections by e-voting can still conduct elections conventionally, namely by cheating or voting.

After the issuance of the Constitutional Court Decision No. 147/PUU-VII/2009 dated March 30, 2010 on the examination of Law No. 32 of 2004 concerning Regional Government, amendments were made to the regulations on the Regional Elections in Law No. 1 of 2015 concerning the Stipulation of Regulations in Lieu of Law No. 1 of 2014 concerning the Election of Governors, Regents, and Mayors into Law. Provisions regarding the Regional Election system are included in Article 85 which reads:

(1) Voting for the Election can be done in the following ways::
   a) marking the ballot once; or
   b) vote through Electronic voting equipment.
(2) The giving of a one-time mark as intended in paragraph (1) letter a is carried out based on the principles of facilitating voters, accuracy in vote counting, and efficiency in the implementation of elections.

(3) Further provisions regarding the voting procedure as referred to in paragraph (1) are regulated by the KPU Regulation.

Furthermore, in the second amendment to the Pilkada law, to be precise. Law Number 10 of 2016 concerning the Second Amendment to Law Number 1 of 2015 concerning the Stipulation of Government Regulations in Lieu of Law Number 1 of 2014 concerning the Election of Governors, Regents, and Mayors into Law there are changes in articles so that between Paragraph (2) and Paragraph (3) of Article 85 2 paragraphs are inserted, namely Paragraph (2a) and Paragraph (2b) thus, Article 85 reads as follows:

(1) Voting for the Election can be done in the following ways::
a) Mark the ballot once; or
b) vote through Electronic voting equipment.
(2) The giving of a one-time mark as intended in paragraph (1) letter a is carried out based on the principles of facilitating voters, accuracy in vote counting, and efficiency in the implementation of elections.
(2a) Electronic voting as referred to in paragraph (1) b is carried out by considering the readiness of the Regional Government in terms of Infrastructure and community readiness based on the principle of efficiency and ease.
(2b) In the event that there is only 1 (one) pair of candidates who register and based on the results of the research the pair of candidates is declared eligible, voting for the Election as intended in paragraph (1) is carried out by voting as intended in Article 54C paragraph (3).

The election system using the e-voting method can be used as an alternative in the voting process to replace the conventional method as regulated in the law above. However, it also needs to be regulated by the KPU Regulation as explained in article 85 Paragraph (3) of Law Number 10 of 2016, namely further provisions regarding the voting procedure as referred to in paragraph (1) regulated by the KPU Regulation. This means that the KPU is given space to implement the arrangement regarding the implementation of e-voting in the implementation of the Regional Elections, but until now it has not been implemented by the KPU.

Based on the above statement, legally, the e-voting method can be used, but only in regional elections. To use the e-voting method in the national election, it is first necessary to revise the regulations on Law Number 7 of 2017 concerning Elections. This revision must include the addition of provisions that explicitly regulate the e-voting mechanism, ranging from definitions, implementation procedures, to the security standards of the technology used. In addition, derivative regulations are needed in the form of government regulations or General Election Commission (KPU) regulations that technically regulate the implementation of e-voting, including a voter identity verification system, audit procedures, and an electronic-based dispute resolution mechanism for election results. With these changes and adjustments to the law, e-voting can be legally and effectively applied to national elections, while still ensuring the principles of transparency, accountability, and fairness in the democratic process.

2) Public Trust

Public trust is one of the components that must be met before choosing to implement *e-voting* in higher-level elections. Increased public trust will increase public participation in elections. This is because elections are the main milestone to realize the dignity of democracy in the concept of the Indonesian rule of law.

The practice of the e-voting system has been proven to be able to encourage the level of public participation. This is as per a study conducted by Suleman, Hendarso, Isyanawulan, and Adyatma (2018) in the regional elections in Banyuasin III, South Sumatra, where the voter participation rate increased to 77% compared to the conventional system

which was no more than 60%. In addition, research conducted by Deri and Dadang (2023) in Batu Gajah Village, Pasir Penyu District, Indragirihulu Regency also produced a positive impression on e-voting practices. The Community and Village Empowerment Office as the executor of the election in the village considers that the implementation of elections by the e-voting method is more effective than the conventional method as before, this system also minimizes errors and fraud that usually occur, this is because all stages of activities are programmed by the system. In the first e-voting practice in this village, the voter participation rate reached 59% of the total DPT input, while the other 41% were people who were not present to conduct the election.

Despite all the advantages of e-voting, the weakness of *e-voting* in terms of security has become a public question. Given the increasing sophistication of science and technology, many are concerned that the system is vulnerable to cyber-attacks such as hacking, data manipulation, and voter identity theft.

To gain public trust, Indonesia can learn from Brazil's elections. In Brazil, sixty days before an election, a ceremony is held with political party representatives and civil society representatives. During the ceremony various activities to secure the software on the *e-voting* machine are carried out, ranging from the creation of a *hash* function table, digital signing of the compiled version of the software, checking the integrity of the software that has been uploaded to the e-voting machine, to encrypting and sealing the software. All of these activities were conducted in the presence of representatives of political parties and civil society, essentially aiming to gain and increase public trust

3) Technology Infrastructure

The *e-voting* technologies used in Pilkades in Indonesia include *e-KTP* verification machines with biometric technology, laptops, CPUs, PCs with *touch screen* capabilities, *smartcard* readers, auditing machines, and LCD Projectors. All of these technologies require adequate infrastructure to support them to operate smoothly. The success of *e-voting* in Pilkades in various regions indicates that the technology used is safe. BPPT also claims that their technology is fully ready and the technology will be operated *offline* so that it will avoid cyber attacks. Since the technology used is proven to be safe, the problem is the infrastructure of the technology, where infrastructure is lacking or even inadequate in remote areas because it is not reached by electricity, making it impossible to use *e-voting* technology.

Indonesia as a country with a very strategic geographical location makes it a country consisting of thousands of islands, so many remote areas are not reached by technology due to lack of infrastructure. On the other hand, Indonesia's population density makes many people decide to live in these remote areas. This is a consideration for Indonesia to implement *e-voting*.

In this aspect, Indonesia can refer to the *e-voting* technology used by Brazil, which is specifically designed only for elections. The technology is in the form of a micro-computer that does not depend on electricity supply because it uses batteries and also operates *offline* so as to avoid cyber-attacks. If Indonesia successfully adopts Brazil's *e-voting* technology, then remote areas that are not covered by electricity will be able to implement *e-voting* during elections.

4) Human Resources

Indonesia is currently in the era of *society* 4.0. In this era, humans adopt advanced technology and automation for various areas of life. This is an opportunity for Indonesia to implement *e-voting*. Indonesia took advantage of the opportunity and successfully used it in the government sector. The success of the Pilkades with the *e-voting* method is proof of this success. Because Indonesia is technologically ready, BPPT as a technology expert also claims that their technology is safe. Thus, there is a discourse to implement *e-voting* at the election level. However, if implemented at the election level, it would involve all

Indonesian citizens without exception, while as many as 57 million Indonesian citizens are still technology illiterate.Click or tap here to enter text.

To succeed the discourse of implementing *e-voting* at the electoral level, it is not enough just to have technological infrastructure, but also technological understanding. Understanding of technology is not only for voters, but also for *stakeholders* and election officials. The understanding of technology is not only about technical understanding, so that people can use technology according to its function. Rather, more than that, a better understanding of technology can prevent forms of misuse of technology for purposes that are contrary to the public interest.

The understanding of technology to *stakeholders*, election officials, and the public can be provided by using the digital transformation readiness model which consists of three stages, including *envision*, *enable*, and *enact*.

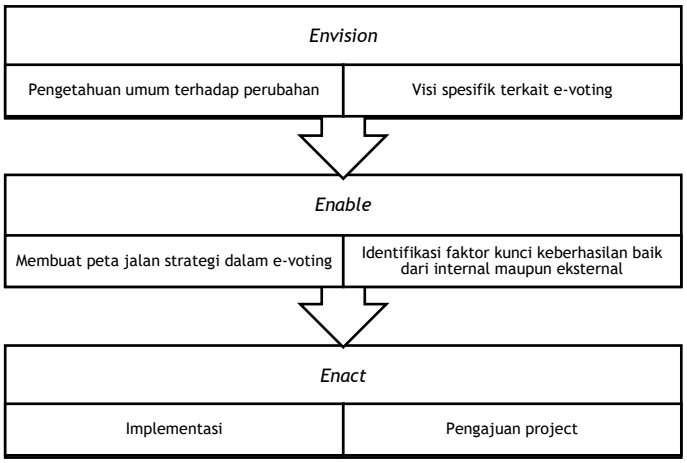


Figure 8, Digital Transformation Readiness Model

Based on this context, to be able to improve human resources towards *e-voting*, KPU as the election organizer, at least does these three things; namely 1) *envision* which is done by socializing and popularizing *e-voting* in a massive and structured manner, 2) *enable* which is done by making a *roadmap* regarding the *e-voting* implementation strategy, as well as identifying its internal and external key success factors, and 3) *enact* which is done by proposing *e-voting* projects to relevant *stakeholders*.

Shura, Maslahah, and Digital Ethics in E-Voting Governance

The electoral system from the perspective of Sharia must be based on the principles of justice, consultation (shura), and trust (amanah)(Mokodompis et al., 2018). Islam teaches that leaders should be chosen based on their capacity, integrity, and piety, rather than mere popularity or group interests. In Islamic history, the concept of leadership selection was implemented during the era of the Rightly Guided Caliphs (Khulafaur Rasyidin), where leaders were chosen through consultation and pledging allegiance (bai'ah), rather than through fraudulent or unethical means such as vote-buying. Therefore, in the context of modern democracy, an ideal electoral system in accordance with Sharia is one that ensures leaders are elected fairly and responsibly.

The principle of shura (consultation) is a fundamental basis for leadership selection in Islam. In the Qur'an, Allah commands that the affairs of Muslims should be conducted through mutual consultation (Surah Ash-Shura: 38) (Alqhaiwi et al., 2023). This indicates that public participation in electing leaders is part of Islamic teachings. However, elections in Islam should not merely focus on worldly interests but must also consider moral and spiritual aspects. Candidates must meet criteria such as being just, honest,

possessing leadership capacity, and being able to uphold law and justice according to Islamic principles.

In practice, an electoral system that aligns with Sharia must ensure the freedom to vote without coercion or manipulation. Islam strictly prohibits all forms of fraud, bribery, and transactional politics that could undermine the fairness of elections. Furthermore, every elected leader must view leadership as a responsibility and an amanah (trust) that will be held accountable before Allah. Therefore, any nation seeking to implement an electoral system from an Islamic perspective must ensure that the entire election process is transparent, fair, and rooted in Islamic values to establish leadership that benefits the people.

Moreover, the electoral system from a Sharia perspective must also consider the principle of maslahah (public interest). Elections are not merely a competition for power but a process to select leaders who can bring prosperity and justice to society. Therefore, the electoral mechanism should be designed to produce leaders who are truly competent and trustworthy. In this regard, political education for the public is crucial so that voters can make informed decisions based on the quality and capability of candidates, rather than being influenced by pressure, identity politics, or short-term interests (Myaskur, 2020).

Beyond selecting good leaders, Islam also emphasizes the importance of monitoring and holding those in power accountable. In Islamic history, caliphs were advised and criticized by scholars and the public to ensure they remained on the right path. This demonstrates that the Islamic electoral system does not end with electing a leader but also involves active public participation in overseeing governance (Bris et al., 2021). Thus, an electoral system in line with Sharia should reflect Islamic democratic values based on justice, transparency, and responsibility, ultimately fostering leadership that brings blessings and prosperity to the people.

The findings reveal that Brazil's e-voting system was implemented through a carefully regulated, phased approach led by the Superior Electoral Tribunal (TSE). Initial adoption in 1996 focused on local elections, followed by national implementation in 1998 after the passage of comprehensive electoral laws. Brazil's e-voting machines were designed with physical durability, biometric voter identification, and accessibility features such as Braille keypads and audio descriptions to ensure inclusivity. The regulatory process required extensive pre-election audits, source code reviews by political parties, and public sealing ceremonies to ensure system transparency and accountability. Through these measures, the TSE built strong public trust in the system, emphasizing transparency, technical reliability, and cross-sectoral oversight. The consistent application of public participation in auditing, digital verification processes, and legal codification contributed to the successful national rollout of e-voting. Ultimately, Brazil's e-voting implementation highlights the importance of combining regulatory oversight, public engagement, and technological innovation in securing electoral integrity.

The successful implementation of e-voting in Brazil is causally linked to a strong institutional framework, technological readiness, and a consistent commitment to transparency and public oversight. The public's initial trust in the TSE, derived from its successful use of technology in voter registration and vote recapitulation, fostered early acceptance of e-voting technology. Legal certainty through the establishment of clear laws and regulations, including pre-election audits and political party involvement, minimized allegations of manipulation or system vulnerability. The integration of biometric voter identification reduced the risk of double voting and identity fraud, further reinforcing public confidence in the system. The technical design of Brazil's e-voting machines, including both voter and polling station officer interfaces, ensured ease of use while maintaining security and auditability. Regular updates to the electoral legal framework and continuous involvement of political parties and civil society in auditing processes further sustained trust. These combined factors created a virtuous cycle where

public trust, technological improvements, and institutional credibility reinforced each other to ensure successful and sustainable e-voting implementation.

From the perspective of Diffusion of Innovation Theory (DOI), Brazil's e-voting adoption reflects a well-managed innovation diffusion process facilitated by the TSE's proactive communication, trialability through local elections, and compatibility with existing electoral practices (Khan et al., 2022). The relative advantage of reducing fraud and speeding up vote counting created strong incentives for adoption, while public audit ceremonies and transparent governance enhanced observability. From the lens of E-Democracy Theory, Brazil's system supports the principles of transparency, public participation, and technological accessibility, aligning with global best practices for digital democracy enhancement (Trechsel, 2021). Institutional Theory further explains how coercive regulatory pressures (laws and resolutions), normative pressures (international electoral standards), and mimetic pressures (learning from smaller-scale digital governance projects) shaped TSE's decision-making process and technical design choices (Weerakkody et al., 2021). Collectively, these three theories illustrate how technological innovation, legal adaptation, and public legitimacy co-evolved to enable the successful nationwide adoption of e-voting. The institutionalization of transparency mechanisms, such as public sealing ceremonies and source code audits, exemplifies how institutional trust-building underpins technological adoption in democratic governance.

Compared to Brazil, Indonesia's e-voting readiness remains fragmented and uneven due to regulatory ambiguity, uneven technological infrastructure, and varying levels of public trust in electoral institutions. While Brazil established a clear legal framework mandating e-voting and embedding auditing requirements, Indonesia's regulatory landscape relies heavily on localized pilot projects (Pilkades) without clear national guidelines (Putra et al., 2023). Brazil's success stemmed from early integration of biometric voter identification and standardized voting machines nationwide, while Indonesia's pilots vary significantly across regions in terms of technology and process. Brazil's strong institutional capacity within TSE, combined with its proactive public engagement strategies, created a conducive environment for e-voting acceptance, whereas Indonesia's election management bodies face more public skepticism due to past irregularities (da Silva et al., 2023). Brazil's mandatory public audit ceremonies, involving political parties and civil society, served as critical trust-building measures, which Indonesia has yet to institutionalize at the national level. Learning from Brazil's phased approach, transparency protocols, and regulatory harmonization can significantly enhance Indonesia's future e-voting adoption efforts.

This study's findings highlight a novel dimension of how public trust, legal certainty, and technological innovation must converge to create sustainable digital election systems. Unlike many previous studies that focused solely on technological capabilities, this research emphasizes the importance of integrating legal, technological, and participatory processes into a single cohesive e-voting governance model. The combination of pre-election transparency ceremonies, mandatory political party involvement, and real-time system audits in Brazil represents a holistic governance innovation that has rarely been examined in the context of emerging democracies (Pereira et al., 2021). Furthermore, the inclusion of specific accessibility features, such as Braille keypads and audio descriptions, demonstrates a novel intersection between electoral technology and inclusive governance. This study also offers a unique comparative lens by juxtaposing Brazil's centralized and legally codified approach with Indonesia's decentralized and partially experimental e-voting trials. By highlighting the interdependence between regulatory harmonization, institutional trust-building, and technological adaptation, this research contributes new insights into the governance preconditions necessary for e-voting adoption in pluralistic democracies like Indonesia.

Theoretically, this study reinforces the importance of integrating DOI, E-Democracy, and Institutional Theory to understand how technological adoption unfolds in complex

electoral ecosystems. It underscores that technological readiness alone is insufficient without complementary regulatory frameworks and institutional trust-building mechanisms (Weerakkody et al., 2021). Practically, the findings offer policy recommendations for Indonesia's General Elections Commission (KPU), urging the adoption of public audit ceremonies, transparent code verification processes, and enhanced voter education campaigns to build public trust in e-voting systems. Strengthening institutional capacity through specialized training for election officials, particularly on digital security and system audit techniques, will also be crucial (Zuiderwijk & Janssen, 2022). Establishing a permanent e-voting regulatory framework, rather than fragmented local experimentation, can provide legal certainty and accelerate diffusion. Furthermore, collaboration with ASEAN electoral bodies to develop regional standards for digital elections can enhance normative alignment and regional credibility. In sum, Brazil's experience highlights that e-voting success depends not only on technological innovation but also on the institutionalization of transparency, accountability, and public participation throughout the electoral process.

The application of Islamic legal and ethical principles such as *shura* (consultative decision-making) and *maṣlaḥah* (public interest) provides a critical lens for evaluating the ethical dimensions of digital governance, particularly in the implementation of e-voting. At its core, *shura* emphasizes participatory legitimacy, where decisions—especially those concerning public affairs—must involve broad consultation and collective input. In the context of e-voting, this principle requires not just technical transparency but also active involvement of citizens, political actors, and civil society in the design, testing, and auditing of voting technologies. Brazil's model aligns with *shura* in its public audit ceremonies, pre-election software disclosure, and multi-stakeholder oversight, providing a procedural manifestation of consultative governance.

Maṣlaḥah, on the other hand, grounds technological decisions in the moral imperative to serve the common good. Within Islamic jurisprudence, especially through the lens of al-Būṭī's textualist framework, *maṣlaḥah* must be rooted in and not contradict Qur'ān, Sunnah, ijmāʿ, or qiyās. The use of e-voting systems thus must enhance *ḥifẓ al-dīn* (religion), *ḥifẓ al-nafs* (life), *ḥifẓ al-ʿaql* (reason), *ḥifẓ al-nasl* (lineage), and *ḥifẓ al-māl* (property). By ensuring the security, reliability, and accessibility of votes—especially for marginalized groups—e-voting technologies uphold these five core maqāṣid. In Indonesia, however, the implementation of e-voting (e.g., in Jembrana) lacks clear integration of these ethical principles into its design and regulatory framework. While e-KTP and biometric verification technologies promote integrity, they do not automatically fulfill *maṣlaḥah* unless their usage genuinely enhances voter confidence, equity, and inclusivity. Furthermore, the limited public consultation in technological decisions contradicts the ethos of *shura*, raising concerns over technocratic imposition without deliberative legitimacy.

Bringing *shura* and *maṣlaḥah* into digital electoral systems thus demands more than symbolic alignment. It calls for a structural ethic that embeds transparency, inclusiveness, and justice at every level—from machine certification to legal frameworks. This ethic also requires acknowledging power dynamics and digital divides, ensuring that electoral innovations do not marginalize rural or underprivileged voters. A Sharia-informed digital ethics, therefore, bridges normative Islamic values with the demands of modern governance, offering a holistic approach to building trustworthy and spiritually grounded e-governance systems. By embracing *shura* as a participatory ethos and *maṣlaḥah* as a guiding normative filter, Muslim-majority democracies can develop e-voting systems that are not only technically sound but also morally resonant and culturally legitimate. Such an approach reorients digital governance from a purely functional project to an ethical pursuit aligned with divine principles and community empowerment.

4. *Conclusion*

This study identifies four key dimensions in assessing Indonesia's readiness for implementing an e-voting system: legal framework, public trust, technological infrastructure, and human resource capability. Legally, the absence of a comprehensive regulation dedicated to e-voting remains a significant barrier, as current policies still rely on constitutional interpretations rather than forward-looking statutes. Technologically, successful pilkades experiments like those in Jembrana show that local innovation can produce secure and functional voting platforms. From a comparative lens, Brazil's experience demonstrates how public trust can be built through transparent software auditing and procedural openness. The novelty of this study lies in synthesizing technical, legal, and ethical dimensions—particularly integrating Islamic principles of *maṣlaḥah* and *shura*—to propose a contextually grounded roadmap for electoral reform in Indonesia.

The inclusion of shura as a theoretical lens reframes the e-voting discourse beyond technical readiness, emphasizing ethical participation, deliberative governance, and inclusivity. While maṣlaḥah ensures that technological adoption aligns with public welfare and Islamic moral objectives, shura demands that the design, implementation, and oversight of e-voting systems be consultative, transparent, and socially accountable. Brazil's model exemplifies this principle in practice through public code audits and multi-stakeholder monitoring. Indonesia can expand its democratic ethos by embedding shura-inspired mechanisms—such as community consultations, party-based digital verification, and religious-civic dialogue—into its legal and administrative electoral infrastructure. Thus, e-voting is not merely a modernization project, but a spiritual-ethical reform aligning technology with divine justice and communal responsibility.

This study is limited in that it does not yet explore broader socio-political resistance or the financial feasibility of nationwide e-voting infrastructure. Future research should examine the local variance in digital literacy and electricity access, as well as investigate how religious institutions might be involved in enhancing digital ethics through shura-based education. Moreover, interdisciplinary studies that integrate Islamic jurisprudence, political science, and information technology are essential to create a governance model that is both technologically robust and normatively sound. A formal legal framework—perhaps inspired by Brazil's binding electoral laws—must also be developed to institutionalize public trust and transparency in e-voting. With appropriate legal, technical, and ethical scaffolding, Indonesia's journey toward digital democracy can become a model for Muslim-majority nations seeking to harmonize faith, governance, and innovation

.

5. References

Juaningsih, Imas Novita, Muhammad Saef El-Islam, and Adit Nurrafi. "The Application of E-Voting in the General Election System as an Optimization of Public Services in the Era of the Industrial Revolution 4.0." *SALAM: Journal of Syar-i Social and Culture* 7, no. 1 (2020): 141–62. https://doi.org/10.15408/sjsbs.v7i2.14720.

Kaspari, Arialdi. "Constraints of the General Election Commission of West Sumatra Province in Efforts to Implement the E-voting System in the West Sumatra Governor Election." Andalas University, 2023.

Kliwantoro, D.Dj. "E-voting from a Regulatory and Cybersecurity Perspective." *ANTARA*, March 26, 2022. https://www.antaranews.com/berita/2783521/e-voting-dari-kacamata-regulasi-dan-keamanan-siber.

Setiawan, Andri. "Implementation of E-Voting System in the Era of Society 5.0 as a Result of Constitutional Court Decision Number 147/PUU-VII/2009." *National Law Magazine* 53, no. 1 (2023): 49–72. https://doi.org/10.33331/mhn.v53i1.217.

Risnanto, Slamet, and Yahaya Abd Rahum. "E-Voting: Technology Requirements Mapping." *TEM Journal* 11, no. 3 (August 2022): 1282–90. https://doi.org/10.18421/TEM113-37.

"List of countries by population." In *WIKIPEDIA*, 2024.

Karmanis. "Electronic-Voting (E-Voting) and General Elections." *Mimbar Administrasi* 18, no. 2 (2021): 11–24. http://dx.doi.org/10.56444/mia.v18i2.2526.

Wijaya, Junior Hendri, Achmad Zulfikar, and Iman Amanda Permatasari. "Implementation of E-Voting System to Improve the Quality of Democracy in Indonesia." *Journal of Government and Policy (JPK)* 1, no. 1 (2019): 51–59. https://doi.org/10.18196/jpk.v1i1.7841.

Lubis, Mhd. Ansor, Wenggedes Frensh, and Fitri Yanni Dewi Siregar. "Application of Election Principles to Electronic Voting (E-Voting) in the 2024 Election." *Scientific Journal of Law Enforcement* 9, no. 1 (2022): 44–56. https://doi.org/10.31289/jiph.v9i1.6491.

(Persero), Public Relations of PT INTI. "Successfully Completing Electronic Pilkades in Thousands of Villages, INTI Group is the Only Legal Holder of e-Voting System." *INTI*, June 14, 2023. https://www.inti.co.id/?p=12076.

Pratama, Heroik M., and Nurul Amalia Salabi. *Guide to the Implementation of Voting and Counting Technology in Elections*. Edited by Antony Lee. South Jakarta: Association for Elections and Democracy (Perludem), 2019.

Hompimpa! "E-Voting and E-Counting in Elections in 7 Countries, What are the Results?" February 2017. http://www.hompimpa.id/2017/02/e-voting-dan-e-counting.html.

Avgerou, Chrisanthi. "Explaining Trust in IT-Mediated Elections: A Case Study of E-Explaining Trust in IT-Mediated Elections: A Case Study of E- Voting in Brazil Voting in Brazil." *Journal of the Association for Information Systems* 14, no. 8 (2013).

Mantalean, Vitorio, and Diamanty Meiliana. "Bawaslu's Story of Monitoring Brazil E-voting: Recapitulation Takes 5 Hours, KPPS Only Paid for Lunch." *KOMPAS.com*, October 10, 2022. https://nasional.kompas.com/read/2022/10/10/18172041/cerita-bawaslu-pantau-e-voting-brasil-rekapitulasi-beres-5-jam-kpps-hanya.

Hartami, Aprilia, and Putu Wuri Handayani. *ECEG2012-Proceedings of the 12th European Conference on e-Government: ECEG*. Edited by Mila Gasco. Vol. 1. Barcelona: Academic Publishing International Limited, 2012.

Darmawan, Ikhsan, Nurul Nurhandjati, and Aevida Kartini. *Understanding E-Voting Reflecting on the Experiences of Other Countries and Jembrana (Bali)*. 1st ed. Jakarta: Yayasan Pustaka Obor Indonesia, 2014.

Syaifullah, Ananda. "Electronic Election Stages." *Indonesiabaik.id*, 2019. https://indonesiabaik.id/motion_grafis/tahapan-pemilihan-elektronik.

Risnanto, Slamet, Yahaya Bin Abd Rahim, Nanna Suryana Herman, and Abdurrohman. "E-Voting Readiness Mapping for General Election Implementation." *Journal of Theoretical and Applied Information Technology* 98, no. 20 (October 31, 2020): 3280-90.

Tim. "57 Million Indonesians Untouched by the Internet." *CNN Indonesia*, February 1, 2024. https://www.cnnindonesia.com/teknologi/20240201072314-213-1056988/57-juta-warga-ri-belum-tersentuh-internet.

Susanto, Arif. "Challenges of E-Voting: Issues of Public Trust and Election Integrity." *JSI (Journal of Information Systems) Suryadarma University* 11, no. 2 (2024): 129-42.

Falah, Anta Ibnul, and Kurnia Rheza Randy Adinegoro. "Opportunities and Challenges of E-Voting Adoption in Regional Head Elections in Indonesia." *Responsive* 5, no. 3 (2022): 159-71.

Alqhaiwi, Z. O., Bednall, T., & Kyndt, E. (2023). Excellence in leadership in the Arab world: Islamic principles and tribal values. Evidence from Jordan. *International Journal of Cross Cultural Management*. https://doi.org/10.1177/14705958231212742

Aranha, D. F., Barbosa, P. Y. S., Cardoso, T. N. C., Araújo, C. L., & Matias, P. (2019). The return of software vulnerabilities in the Brazilian voting machine. *Computers and Security*. https://doi.org/10.1016/j.cose.2019.06.009

Bris, A., Wang, T. Y. H., Zatzick, C. D., Miller, D. J. P., Fern, M. J., Cardinal, L. B., Gregoire, D. A., Shepherd, D. A., Westphal, J. D., Shani, G., Troster, C., Van Quaquebeke, N., Lanaj, K., Hollenbeck, J. R., Ilgen, D. R., Barnes, C. M., Harmon, S. J., Feldman, E. R., DesJardine, M. R., … Sangiorgi, F. (2021). KNIGHTS, RAIDERS, AND TARGETS - THE IMPACT OF THE HOSTILE TAKEOVER - COFFEE,JC, LOWENSTEIN,L, ROSEACKERMAN,S. *JOURNAL OF BANKING & FINANCE*.

Mokodompis, S., Bukido, R., Salim, D. P., & Makka, M. M. (2018). Money Politic In Elections: Islamic Law Perspective. *Jurnal Ilmiah Al-Syir'ah*. https://doi.org/10.30984/jis.v16i2.708

Myaskur, M. (2020). Implementation Of Sustainable Prophetic Electoral Rights In The General Election Process. *Prophetic Law Review*. https://doi.org/10.20885/plr.vol2.iss1.art6