ELECTRONIC VOTING MACHINES AND INDIA: A STUDY ON CURRENT TRENDS OF THE WORLD'S LARGEST DEMOCRACY ELECTIONS

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India is the world's largest democracy, with a population of around 1.4 billion, according to the 2011 census. It is perceived as charismatic as it accommodates cultural, regional, economic, and social disparities and can still lead the world toward democratic representation. The country had more than 90,87,17,791 general voters (including the NRIs) covering 543 parliamentary constituencies as per the 2019 election summary report (ECI, 2019). Election voting is the bridge between the governed and the government, as the individuals should pass the verdict of the general public to get into the seats of power. Voting is the expression of choice through the ballot. Elections are a fundamental pillar of leadership selection in any democracy, especially for India is the largest democracy and emerging economic and political power; nations worldwide closely scrutinize the elections in India. Free and Fair elections to select political representatives were people's fundamental human right according to Article 21 of the Universal Declaration of Human Rights (UDHR). In India, the elections are conducted by the Election commission of India, an autonomous constitutional body responsible for administering the union and state election processes in India as by the powers vested by the constitution of India. Other than this, voter education and electoral participation are integral to its election management. The current world trade is a credible election for anything.

Electronic Voting in India:

The Election Commission of India (ECI) prepares the electoral roll through an intensive revision as it conducts house-to-house enumeration is done, and voters residing in the house are officially registered. During the traditional election systems, the ECI followed before the 2004 elections; the nationwide ballot consumed approximately 8,000 tons of paper and around 400,000 vials of indelible ink. It required some 2.5

million strong boxes to store under heavy security until the votes were counted per election, as observed by Kumar et al. (2012) and Aditya et al. (2004). The electors must submit their identity proof with a voter card or Aadhar card. They should get their left forefinger marked with indelible ink and sign the voters' register when voting. The manual counting of votes polled by voters is observed to be easily manipulated to favor a particular candidate. But later, the innovations in the Information and Communications Technology (ICT) produced an affordable and unique solution that made the e-government advances feasible.

The technological solution has made earlier fraudulent activities like rigging and impersonation less possible with different authentication stages for proving the authenticity of voters. One innovative use of ICTs in e-governance is the electronic-voting (e-voting). There are many approaches to conducting e-voting, and there hasn't been a uniform global procedure for this. Countries such as India, the USA, Japan, South Korea, and Brazil have embraced modern technologies to create an efficient and more secure voting system for their respective elections. The countries either develop their e-voting equipment like India or import the technologies from other countries like Nepal, Bhutan, Namibia, and Bangladesh (The Hindu, 2014). The urge for e-voting has been described as the inevitable future of electioneering in many countries worldwide.

There are many different approaches to conducting e-voting, like machine-readable ballot systems, direct recording electronic (DRE) voting machines, mobile devices, and Internet voting systems, as observed by Aditya et al. (2004). While the popular EVMs are restricted to minimal software computation, the emerging fields of technology are introducing many varieties of electronic voting, like the utilization of Blockchain in voting, which has the potential to eradicate election fraud where the software maintains transparency, and also ensures the personal identity of the voter undisclosed providing the instant results with no election fraud (Alam et al. (2020). Indian EVMs use an extremely simple design with a small software TCB. Previous studies have observed that the problems are caused by the software complexity and hence proposed minimizing the size of the trusted computing base (TCB). In India, the ECI developed the country's EVMs in partnership with two government-owned companies, the Electronics Corporation of India (ECIL) and Bharat Electronics Limited (BEL). The introduction of Section 61A to the Representatives of the Peoples Act, 1951, along with the several amendments made to the Act and Conduct of Election Rules, 1961, enables the ECI for smooth usage of EVMs/VVPATs in the country.

EVM was first used by ECI in fifty polling stations for election to No 70 Parur Assembly Constituency in Kerala on May 19, 1982. The first-generation EVMs were developed in the early 1980s by the government-owned ECIL using the Hitachi 6305 microcontrollers; they were used in certain parts of India used experimentally in three elections of state assemblies of Madhya Pradesh, Rajasthan, and Delhi on a limited basis in 1998 but never adopted for nationwide elections (ECI, 1999). The second-generation EVMs were introduced in early 2000 by both ECIL and BEL and have been utilized in India since the general elections of 2004 nationwide. The pre-2006 era EVMs are known as "M1 EVMs", while EVMs manufactured between 2006 and 2010 are called "M2 EVMs"; the latest generation of EVMs produced since 2013 is known as "M3 EVMs". Subsequent newer generations EVMs which the ECIL and BEL manufacture by incorporating the

necessary suggestions from ECI. It should be understood that even though these companies are government-owned, they are not controlled by the ECI but are profit-seeking enterprises that want to profit from marketing them globally to earn more bucks. The Standardization Testing and Quality Certification (STQC), an accredited third-party entity under the Ministry of Information and Technology, conducts the standardization and certification of EVMs produced by the manufacturers. Each EVM undergoes a mock poll minimum of 3 times before use in the poll, while the functionality checks are performed in the presence of political parties and their representatives.

While the use of similar paperless DREs has been discontinued in other elections like California, Florida, Ireland, the Netherlands, and Germany, the Indian counterpart has reaffirmed its faith in the infallibility of the EVMs as the fully tamper-proof as ever, as observed by Wolchok et al. (2010). The Netherlands was one of the first countries to introduce electronic voting systems and used the DREs started using from 2006. Still, it is observed from the 2019 Dutch provisional elections that a security-based authentication problem exists, and the possibility of replacing Erasable Programmable Read Only Memory (EPROM) with tampered ES3B to favor particular contestants is observed. In 2016, the United States accused the government of Russia of cybersecurity interference in the US elections. Russia was alleged to have rigged the 2016 presidential election to favor a Republican nominee, Mr. Donald Trump, by tampering with digital ballots. It should be observed that Mr. Trump, a business tycoon turned politician, has won the 2016 elections opposing the popular verdicts. The Federative Republic of Brazil, the largest country in South America and Latin America, introduced electronic voting in the 1996 municipal elections using the Advanced Encryption Technique (AET).

Still, it was later observed from the findings that the most in-depth compromise of the official large-scale voting system is performed (Adekunle, 2020). But in India, ECI supports EVMs and even welcomes the political parties and other bodies to prove the faults if opposed to implementation. The current EVMs used are built from inexpensive parts and cost approximately $200 for each set of units which is considered far cheaper than the other DREs used in countries like the USA, which cost several thousand dollars. The EVMs are made several threats like booth capture, which is common electoral fraud observed in the country, ineffective by limiting the rate of vote casting to five per minute.

The Indian EVMs have two main components which include necessarily two components which are the Control Unit (CU) which is used by the poll workers where the storing and accumulation of votes happen; the Ballot Unit (BU) is located inside the electoral unit, which the voters use to cast their votes. The two units are connected by a 5 m cable attached to the ballot unit at one end. The system is observed to be powered by the battery pack inside the CU. The ballot unit has 16 candidate buttons which, if unused, will be covered with a plastic masking tab inside the unit. Suppose the constituency is observed to be contested by more than 16 candidates. In that case, the additional ballot unit can be connected, which like up to four BUs, can be connected by connecting to other BU for a maximum of 64 candidates. For a better understanding of India's illiterate population which as of 2018 stood at 25.63%, the poll workers attach the paper label that shows the

names of the candidates and their party symbols next to candidate buttons. The poll workers can check the count at any time, so seals are placed on various parts of the control unit to block access to the counting and clearing function until the end of the allocated voting time.

To increase the credibility of EVMs to voters participating, the ECI introduced the Voter Verified Paper Audit Trail (VVPAT), which is an independent vote verification system that allows the voter to see whether their vote was cast correctly, the ballot system prints a paper slip with the name of the candidate, serial number and the symbol of the party which they are representing. The VVPAT machine has a transparent window where a voter can see the printed slip containing the name and symbol of the party they voted for about 7 seconds, verifying whether their vote is taken into account for their intended candidate. After 7 seconds, it goes inside a sealed ballot compartment of the machine, which will be counted if any allegation is raised over vote fraud or miscalculation. When VVPAT slips are counted, the paper slips will be considered to hold precedence over the EVM results. The VVPAT machine was introduced in the 2014 elections in India by the ECIL and BEL as a fail-safe method. The VVPATs were first used in a by-election for 51-Noksen AC in Nagaland. The EVMs and VVPATs are separate entities and do not connect to any network due to security concerns (ECI, 2022).

In the Supreme Court (SC) judgment on a case filed collectively by popular political leaders from 21 opposition parties, including N. Chandrababu Naidu, Sharad Pawar, and other national and regional party chiefs, the SC has ordered the ECI to increase the VVPAT from one EVM to five EVMs per assembly segment which in its own words "would be of greater satisfaction not only of political parties but also for the entire electorate" (Mathur, 2019).

The popular perception of EVMs:

Research works of Chauhan et al. (2018) and other researchers have shown that the EVMs are not tamper-proof and are vulnerable to several attacks that could compromise the ballot and integrity of the results, which raises doubt on the credibility of the results and the institution conducting them. Here, it should be remembered that the political parties in India have always contested to raise objections on the use of EVMs, and even the parties which have supported their use doesn't have the whole leadership supporting the claim. The literature focuses on the importance of trust in technology and perceived security as the key factors of internet-based technologies' acceptance by the people at large. Venkatesh et al. (2003) and other literary works on electronic voting have supported the argument that the views of the people in the social circle, opinion makers, and the word of mouth affect the citizen's behavioral intention to use EVMs.

The paperless DREs have been discredited in the academic security literature even though the ECI continues to utilize them in the nationwide elections, even though it is observed that the Indian EVMs use far fewer software complexities and less TCB. It is observed by the independent review by Wolchok (2010) that dishonest insiders and other criminals who have the access to machines legally or illegally can insert malicious hardware which can have the possibility of stealing the votes for the machine's lifetime, which in India generally exceeds more than 15 years which in election terms, more than 3 general elections and it

should also be understood that the EVMs are also used in multiple elections like state and local elections conducted by State Election Commissions. The design of India's EVMs relies entirely on the physical security of the machines and the integrity of election insiders. Another important argument is that even though the EVMs have reduced the concerns of some types of electoral fraud, other forms may have emerged where the election officials must stay vigilant about electoral malpractice involving liquor, money, intimidation at polling booths, and technology attacks on EVMs.

The positive benefits of the introduction of electronic voting are observed in the following studies. A joint study conducted with the help of the Indian School of Business (ISB), Indian Statistical Institute (ISI), and the Brookings Institution (Now the Centre for Social and Economic Progress) in 2017 using post-poll survey data between 2000 and 2005 from independent Centre for the Study of Developing Societies (An Indian Council of Social Sciences Research (ICSSR) supported research institute) have observed that the EVMs strengthened the weaker and the vulnerable sections of the society (especially women and the scheduled castes and tribe). It also observed that electronic voting has made the electoral process more competitive, where winning parties' winning margin and vote share has declined.

The study shows that the EVMs significantly declined crimes, such as murder and violence against women (including rape) (Debnath et al.2017). It has been sure that the introduction of EVMs has reduced the violence attached to the elections. According to a South Asia Monitor Report, 70% of polling booths in Bihar were declared sensitive or hypersensitive (prone to violence), which with the introduction of EVMs, has reduced the tensions as the booth capturing is made difficult with the limitation of votes per minute and the technological impediments. With EVMs, there also observed an increase in the supply of public goods to appease the voters as alternative options were alienated by ECI (Jogelakar and Sood, 2018). EVMs are associated with dramatic declines in invalid votes and corresponding increases in votes for minor candidates.

The ECI has recently proposed a mechanism to facilitate remote voting for domestic migrants with the help of the Remote Electronic Voting Machine (RVM), which can be used for up to 72 constituencies simultaneously from a single remote polling booth. The ECI takes this initiative to include one-third of voters who didn't turn up to vote in 2019 General Elections (67.4 & voter turnout), as the ECI believes the majority of them are migrants, as the country has around 14 crore internal migrants, according to the 2017 Economic Survey. But the hurried movements of the ECI are raising tension as it wants to start using the RVMs as early as 2023. This comes when the public trust in EVMs is still not strengthening.

As many as 17 opposition parties, including the Indian National Congress (INC), Trinamool Congress (TMC), and others, have often attributed the Bharatiya Janata Party's (BJP) victories in the state assembly elections to EVMs (Chatterji & Ramachandran, 2018). The BJP has confirmed to attend the demonstration of a prototype of RVMs. In contrast, the INC responded that they won't be attending the demonstration and requested the ECI to "restore trust" in the election process. With tension rising on the authenticity of EVM results and parties questioning the autonomy and integrity of ECI, the road ahead for the ECI is more difficult than ever, and it is important to have a close watch on how it moves forward to conduct inclusive democratic elections

by withstanding the support of the electorate. But the ECI, which has implemented various successful initiatives like NOTA, EVMs, and VVPATs, the constitutional body, continues to play an important role in India's future.

Conclusion:

It is observed that the election commission of India should perform dual functions, which are investing in ensuring the security features of EVMs and also increasing the awareness of the EVM features and the benefits of transition and integrity of technologies to a wider base of the audience through print, television, social media, government portals, and special events. The section function should be a shared function that should be carried out by all the members involved in the elections, including the state institutions, political parties, and media partners, as the election results determine the direction of the country's growth. Without the voters being convinced about the integrity of the elections, democracy wouldn't survive.

Implementing secure electronic voting is not as simple as employing normal counting software; the elections of a large democracy like India include the issues like accuracy, privacy, receipt-freeness, eligibility, elimination of double voting, accountability, and security requirements which the conducting institutions must answer. This is especially important when a mode of electronic voting is inevitable. The most popular requirement is the integrity of the elections, and acceptance of the results by the voters should be satisfied. The country with 08 national and 57 state political parties as on January 2023, along with the other stakeholders like media entities, Think Tanks, and the electorate at large should command the ECI to conduct free and fair elections, which is a universal human right for all individuals.

REFERENCES

1. Adekunle, S. E. (2020). A Review of Electronic Voting Systems: Strategy for a Novel. *International Journal of Information Engineering & Electronic Business*, *12*(1).
   https://www.mecs-press.org/ijieeb/ijieeb-v12-n1/IJIEEB-V12-N1-3.pdf

2. Aditya, R., Boyd, C., Dawson, E. and Lee, B. (2004) 'Implementation issues in secure e-voting schemes', *Proceedings of the 5th Asia-Pacific Industrial Engineering and Management Systems Conference*, Goldcoast, Australia, pp.1–14.

3. Alam, M., Khan, I. R., & Tanweer, S. (2020, April). Blockchain technology: A critical review and its proposed use in E-voting in India. In *Proceedings of the International Conference on Innovative Computing & Communications (ICICC).*
   https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3570320

4. Chatterji, S & Ramachandran, S, K. (2018). 17 Opposition parties to ask poll panel to use ballot papers for 2019 elections. *Hindustan Times*.
   https://www.hindustantimes.com/india-news/17-opposition-parties-to-ask-poll-panel-to-use-ballot-papers-for-2019-elections/story-Wp98rSBO0eRPkgqnFoBoKK.html

5. Chauhan, S., Jaiswal, M., & Kar, A. K. (2018). The acceptance of electronic voting machines in India: A UTAUT approach. *Electronic Government, an International Journal*, *14*(3), 255-275. https://www.researchgate.net/profile/Arpan Kar/publication/326642813_The_acceptance_of_electronic_voting_machines_in_India_A_UTAUT_ approach/links/5b8e532545851540d1c4e032/The-acceptance-of-electronic-voting-machines-in-India-A-UTAUT-approach.pdf

6. Debnath, S., Kapoor, M., & Ravi, S. (2017). The impact of electronic voting machines on electoral frauds, democracy, and development. *Democracy, and Development (March 16, 2017)*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3041197

7. Election Commission of India. (1999). *Use of Electronic Voting Machines During General Elections, 1999,* http://eci.nic.in/eci_main1/current/cp.19990625.pdf.

8. Election Commission of India. (2019). *State wise numbers of electors.* https://eci.gov.in/files/file/10977-9state-wise-number-of-electors/

9. Election Commission of India. (2022). *Legal history of EVMs and VVPATs: A compilation and analysis of case laws.* https://eci.gov.in/files/file/14525-legal-history-of-evms-and-vvpats/

10. Jogelekar, Y & Sood, A. (2018). Does Electronic Voting Machines Work for Indian Voters? *ISBINSIGHT*. https://isbinsight.isb.edu/do-electronic-voting-machines-work-for-indian-voters/

11. Kumar, D. A., & Begum, T. U. S. (2012, March). Electronic voting machine—A review. In *International Conference on Pattern Recognition, Informatics and Medical Engineering (PRIME-2012)* (pp. 41-48). IEEE. https://ieeexplore.ieee.org/abstract/document/6208285

12. The Hindu. (2014). *BEL Voting machines star in Namibia polls.* https://www.thehindu.com/news/cities/bangalore/bel-voting-machines-star-in-namibia-polls/article6683043.ece

13. Mathur, A. (2019, April 8). Supreme Court orders EC to increase VVPAT verification from one EVM to five. In *India Today*. https://www.indiatoday.in/elections/lok-sabha-2019/story/supreme-court-election-commission-increase-vvpat-verification-evm-1496819-2019-04-08

14. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478. https://www.jstor.org/stable/pdf/30036540

15. Wolchok, S., Wustrow, E., Halderman, J. A., Prasad, H. K., Kankipati, A., Sakhamuri, S. K., ... & Gonggrijp, R. (2010, October). Security analysis of India's electronic voting machines. In *Proceedings of the 17th ACM conference on Computer and communications security* (pp. 1-14). https://dl.acm.org/doi/abs/10.1145/1866307.1866309