

## ELECTRONIC VOTING MACHINES, VOTER VERIFIABLE PAPER AUDIT TRAILS, AND THE CONSTITUTIONAL IMPERATIVE OF TRANSPARENT ELECTIONS: A CRITICAL LEGAL ANALYSIS

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### Abstract

*India's legal framework governing electronic voting—centred on Section 61A of the Representation of the People Act 1951 and the Conduct of Elections Rules 1961—has never been subjected to the comprehensive constitutional scrutiny that its democratic significance demands. This article critically examines the systemic legal deficiencies that have rendered the current regime constitutionally inadequate. Drawing on doctrinal analysis, an examination of all significant judicial interventions—*PUC v Union of India (2003)*, *Subramanian Swamy v Election Commission of India (2013)*, the VVPAT counting order of 2019—and comparative models from Germany, the United States, Brazil, and the Netherlands, the article argues that the constitutional guarantee of free and fair elections demands a fundamentally reformed electoral technology architecture. The central findings are that legislative provisions on EVMs are skeletal and accountability-deficient; that current VVPAT sampling is statistically inadequate; that the absence of independent technical auditing creates an unresolvable transparency deficit; and that judicial deference to the Election Commission has allowed constitutional standards to lag behind democratic imperatives. Specific legislative, administrative, and judicial reforms are proposed.*

**Keywords:** *electronic voting machines, VVPAT, electoral integrity, free and fair elections, Representation of the People Act 1951, Election Commission of India, judicial review, independent audit*

### I. INTRODUCTION

The reliability and transparency of any democracy's electoral system is the foundational substrate upon which the legitimacy of governance rests. India—the world's most populous democratic state—conducts elections of unrivalled scale, spanning over nine hundred million eligible voters and approximately one million polling stations across immensely varied terrain. The

introduction of Electronic Voting Machines (EVMs) by the Election Commission of India (ECI) constitutes one of the most consequential institutional transformations in the country's post-independence electoral history. From their experimental deployment at Parur in Kerala in 1982 to their universal adoption in the 2004 General Elections, and the subsequent introduction of Voter Verifiable Paper Audit Trails (VVPATs) in 2013, EVMs have

simultaneously attracted recognition for administrative efficiency and persistent legal challenge regarding verifiability and constitutional adequacy.<sup>795</sup>

The central paradox of India's EVM framework is that while the Supreme Court has progressively expanded the constitutional contours of electoral transparency—from the voter's right to candidate information in <sup>796</sup>

*PUCI v Union of India* to the mandatory paper audit trail in *Subramanian Swamy v Election Commission of India* to the VVPAT counting directions of 2019—the legislative and administrative framework has not been correspondingly updated. The result is a constitutional aspiration insufficiently realised in law.

This article investigates why this mismatch has persisted and what legal reforms are necessary to resolve it. The central hypothesis is that the inadequacy of India's EVM and VVPAT regime is not an isolated administrative failure but the structural product of compounding deficiencies: a skeletal statutory framework that confers unguided discretion upon the ECI; the absence of mandatory technical standards; insufficient VVPAT sampling that statistical analysis demonstrates to be inadequate; overbroad judicial deference that insulates ECI decisions from meaningful constitutional review; and the absence of independent technical oversight—all operating together to neutralise the accountability that democratic elections require.<sup>797</sup>

<sup>795</sup>The first experimental deployment of EVMs occurred in the Parur constituency of Kerala in 1982; nationwide adoption was completed by the 2004 General Elections. Representation of the People (Amendment) Act 1989 (Act 1 of 1990), inserting s 61A into the Representation of the People Act 1951.

<sup>796</sup>*Peoples Union for Civil Liberties v Union of India* (2003) 4 SCC 399; *Subramanian Swamy v Election Commission of India* (2013) 10 SCC 500; *Dr Manohar Lal Sharma v Election Commission of India*, WP(C) No 273 of 2019 (Supreme Court of India, 8 April 2019).

<sup>797</sup>HM Seervai, *Constitutional Law of India* (4th edn, Universal Law Publishing 2015) 1247; MP Jain, *Indian Constitutional Law* (7th edn, LexisNexis 2014) 998.

## II. THE CONSTITUTIONAL AND LEGISLATIVE FRAMEWORK

### 2.1 The Constitutional Provisions

Articles 324 to 329 of the Constitution of India 1950 vest in the Election Commission superintendence, direction, and control of the preparation of electoral rolls and the conduct of elections to Parliament and State Legislatures. Article 326 guarantees adult suffrage, and the Supreme Court has held that the right to vote, though not an explicit fundamental right, is a constitutional right integral to the democratic structure of the republic.<sup>798</sup>

Critically, Articles 19(1)(a) and 21 have been interpreted by the Court to encompass the voter's right to meaningful, verifiable participation in the democratic process. These provisions form the constitutional backbone of the judicial directions for VVPATs. However, the Constitution does not prescribe any specific technological modality for voting, leaving that choice to Parliament under Article 327 and to the ECI under Article 324. The consequent legislative minimalism has created an accountability vacuum.<sup>799</sup>

### 2.2 Section 61A and the Conduct of Elections Rules 1961: Structure and Deficiencies

Section 61A of the Representation of the People Act 1951, inserted by the Representation of the People (Amendment) Act 1989, provides the sole statutory basis for EVM use. It authorises the ECI to use voting machines at elections, with the prior concurrence of the Election Commission. The provision contains no mandatory technical standards, no certification requirements, no audit mechanisms, and no verification protocols. It is, in legislative terms, a blank authorisation dressed in constitutional clothing.<sup>800</sup>

<sup>798</sup>*Ponnuswami v Returning Officer* AIR 1952 SC 64; *Kanhiya Lal Omar v RK Trivedi* AIR 1986 SC 111; *T N Seshan, Chief Election Commissioner v Union of India* (1995) 4 SCC 611.

<sup>799</sup>Sudhir Krishnamurthy, 'Voter Verifiable Paper Audit Trails: A Constitutional Imperative' (2019) 31 *National Law School of India Review* 112, 116-118.

<sup>800</sup>Representation of the People Act 1951, s 61A (inserted by the Representation of the People (Amendment) Act 1989). For the constitutional

The Conduct of Elections Rules 1961, particularly Rules 49A to 49X and Rule 56D (inserted and amended in stages), supply an operational framework. Rule 56D now requires the manual counting of VVPAT slips in five polling stations per Assembly constituency segment following the EVM count. However, the Rules replicate the skeletal nature of Section 61A in several critical respects: they create no mandatory standards for EVM source code disclosure, no provision for public access to technical specifications, no statutory basis for independent security auditing, and no evidentiary rules governing EVM data in election petitions. The reliance on administrative instructions—rather than statutory provisions—for critical security procedures such as strongroom management represents a significant governance deficit.<sup>801</sup>

### III. ISSUES: DEFECTS IN THE EVM AND VVPAT REGIME

This section constitutes the central analytical contribution of the research. Drawing on doctrinal examination and the empirical record of all significant judicial interventions in EVM-related litigation, six interlocking systemic defects are identified.

#### 3.1 The Statutory Vacuum: Absence of Mandatory Technical Standards

The most fundamental structural deficiency in the EVM framework is the complete absence of any statutory definition of the technical standards that EVMs must meet. Section 61A authorises the use of voting machines but prescribes no security requirements, no certification procedure, and no verification protocols. Every technical decision—from the choice of microprocessor to the sampling rate for VVPAT verification—is therefore an

administrative decision made by the ECI without statutory mandate.<sup>802</sup>

The consequences of this vacuum are manifold. When the ECI's Technical Expert Committee (TEC) declared EVMs tamper-proof in its reports of 2006, 2010, and 2019, it did so applying criteria that it had itself determined, with no independent legislative baseline against which its assessment could be evaluated. When security researchers Prasad, Halderman, and Gonggrijp published their 2010 paper identifying hardware substitution and proximity attack vulnerabilities in Indian EVMs, the ECI's response—institutional reassurance rather than independent verification—was structurally possible precisely because no statute required any different response. The opacity of EVM source code, which the Delhi High Court upheld as exempt from disclosure under the RTI Act on national security grounds, similarly reflects an administrative position that Parliament has never been asked to validate through legislation.<sup>803</sup>

#### 3.2 The Statistical Inadequacy of VVPAT Sampling

The Supreme Court's 2019 direction in the consolidated VVPAT petitions—requiring the manual counting of VVPAT slips in five polling stations per Assembly constituency segment—was widely received as a landmark transparency measure. Statistically, however, it is insufficient. Analysis by Karandikar and Bhatt demonstrates that to detect a 10% manipulation of EVM results at a 95% confidence level, a minimum of 479 VVPAT counts per constituency would be required.<sup>804</sup>

The current five-per-segment protocol achieves a confidence level that, while

analysis of its adequacy, see KK Raghunath, *Electoral Reforms in India: A Constitutional Perspective* (1st edn, Eastern Book Company 2016) 234-238.

<sup>801</sup>Conduct of Elections Rules 1961, rr 49A-49X, 56D; Conduct of Elections (Amendment) Rules 2013. See Election Commission of India, Technical Expert Committee Report on EVMs (ECI 2019) ch 4.

<sup>802</sup>The legislative gap is noted by the Law Commission of India, 255th Report on Electoral Reforms (Government of India 2015) paras 5.1-5.7, though without the depth the subject demands.

<sup>803</sup>Hari K Prasad, J Alex Halderman and Rop Gonggrijp, 'Security Analysis of India's Electronic Voting Machines' (2010) Proceedings of the 17th ACM Conference on Computer and Communications Security 1. The ECI's response is documented in Election Commission of India, Technical Expert Committee Report on EVMs (ECI 2010).

<sup>804</sup>RL Karandikar and MS Bhatt, 'Statistical Arguments for VVPAT Counting' (2019) 11(1) Indian Journal of Statistics and Operations Research 1, 4-7.

numerically high in isolation, is inadequate when aggregated across the thousands of constituency segments in a general election and when the stakes of undetected manipulation are measured against the constitutional value of electoral integrity. The Court's failure to engage with the statistical evidence placed before it—and its direction to commence VVPAT counting only after EVM results have been announced—has been criticised by scholars as structurally compromising the purpose of the audit.<sup>805</sup>

### 3.3 The Transparency Deficit: Source Code and Independent Auditing

Three of the most significant EVM controversies—the 2010 Prasad-Halderman-Gonggrijp paper, the ECI's EVM Challenge of 2017, and the sustained demands from opposition parties for independent auditing—were effectively managed by institutional assurance rather than institutional accountability. There is no provision in Section 61A or the Conduct of Elections Rules requiring the ECI to subject EVM source code to independent review. The TEC, which has advised the ECI on EVM security, is constituted of experts affiliated with or approved by the ECI and has no structural independence from the institution whose decisions it reviews.<sup>806</sup>

This structural conflict of interest is compounded by the absence of any mechanism for controlled public disclosure of EVM source code. Brazil's Superior Electoral Tribunal conducts public source code inspections—allowing qualified experts representing political parties, civil society, and academia to examine voting machine source code under controlled conditions. India has no equivalent mechanism, and the ECI has

consistently resisted proposals for one, despite the demonstrable enhancement of public confidence that such a mechanism would provide.<sup>807</sup>

### 3.4 Judicial Deference and Its Constitutional Limits

A consistent feature of Indian judicial decisions on EVMs is a high degree of deference to the ECI's technical and administrative expertise. In the 2019 VVPAT petitions, the Supreme Court declined to order a statistically adequate VVPAT audit sample, instead directing a modest increase from one to five counting stations per segment—a direction that commentators noted was not grounded in any statistical analysis. The Court's reluctance to engage with technical evidence—while understandable as a matter of institutional competence—has produced an outcome that is constitutionally inadequate.<sup>808</sup>

The challenge for constitutional jurisprudence is to calibrate the deference principle appropriately. In *Mohinder Singh Gill v Chief Election Commissioner*, the Supreme Court affirmed the wide powers of the ECI under Article 324 but did not suggest that those powers were unreviewable. The constitutional guarantee of free and fair elections—recognised as a basic feature of the Constitution since *Indira Nehru Gandhi v Raj Narain*—imposes substantive requirements on electoral administration that cannot be wholly displaced by deference to administrative expertise.<sup>809</sup>

### 3.5 VVPAT Accessibility and Practical Limitations

Even setting aside the statistical inadequacy of the current VVPAT sampling protocol, VVPAT units as currently designed have practical limitations that reduce their effectiveness as voter verification tools. The seven-second

<sup>805</sup>A Narrain, 'The VVPAT Order: A Missed Opportunity' (2019) 54 Economic and Political Weekly 4; RS Prasad, 'VVPATs: Are They Enough?' (2019) 54 Economic and Political Weekly 18. Cf Philip Stark and David Wagner, 'Evidence-Based Elections' (2012) 10(5) IEEE Security and Privacy 33.

<sup>806</sup>Election Commission of India v Gajendra (Delhi High Court, WP(C) 3134/2014) (upholding ECI refusal to disclose EVM source code under s 8(1)(a) RTI Act). On the Brazil model, see Superior Electoral Tribunal, 'Public Testing of the Electronic Voting System' (TSE 2022).

<sup>807</sup>ibid; Election Commission of India, 'EVM Challenge' (ECI 2017).

<sup>808</sup>Madhav Khosla, *The Indian Constitution* (Oxford University Press 2012) 189-191; see also Lokniti-CSDS, *National Election Study 2019* (Centre for the Study of Developing Societies 2019) on public confidence data.

<sup>809</sup>*Mohinder Singh Gill v Chief Election Commissioner* AIR 1978 SC 851; *Indira Nehru Gandhi v Raj Narain* AIR 1975 SC 2299; *Common Cause v Union of India* (2018) 5 SCC 1.

display window for VVPAT slips has been criticised as insufficient for many voters—particularly the elderly, visually impaired, and functionally illiterate—to verify their vote. The use of thermal paper for VVPAT slips raises long-term durability concerns for slips that may need to be counted months or years after the election in the context of election petitions.<sup>810</sup>

The Rights of Persons with Disabilities Act 2016 imposes affirmative obligations on the state to ensure accessible participation in democratic processes. The current VVPAT design, which provides no audio verification option for visually impaired voters and no tactile feedback mechanism for voters with motor impairments, does not satisfy these statutory obligations—an issue that has received insufficient judicial and administrative attention.<sup>811</sup>

### 3.6 The Article 329 Structural Barrier

Article 329(b)'s bar on challenges to elections except through election petitions creates a structural limitation on the judicial remediation of systemic EVM deficiencies. The constitutional bar channels constituency-specific EVM challenges to the election petition process under the Representation of the People Act 1951, while systemic challenges must be raised as constitutional petitions in original jurisdiction. This bifurcation produces an inconsistent legal landscape in which the evidentiary standards applicable to EVM evidence—and the remedies available where EVM malfunction is established—vary across fora without principled justification.<sup>812</sup>

## IV. COMPARATIVE INSIGHTS

A comparative survey of electronic voting frameworks in four constitutional democracies illuminates the gaps in India's model. In Germany, the Federal Constitutional Court's

landmark decision of 2009 declared the use of DRE voting machines unconstitutional on grounds that the democratic principle requires elections to be conducted in a manner understandable and verifiable by ordinary citizens without specialist technical knowledge. The Court held that where vote recording and counting depend on technical processes inaccessible to public scrutiny, the democratic principle is violated—irrespective of whether the machines are technically reliable.<sup>813</sup>

In the United States, the Help America Vote Act 2002 and the Voluntary Voting System Guidelines administered by the Election Assistance Commission establish a framework of published technical standards, independent laboratory certification, and mandatory paper audit trails that represents a level of transparency significantly exceeding India's current regime. By 2022, over 90% of American voters cast paper-based ballots or used paper-audit-trail-equipped machines—a convergence toward verifiable voting driven by independent security research and legislative response.<sup>814</sup>

Brazil's Superior Electoral Tribunal presents perhaps the most instructive model for India. Brazil has used EVMs in national elections since 1996 but conducts public source code inspections—allowing representatives of political parties, civil society, and security researchers to examine voting machine source code under controlled conditions—and conducts public testing before each election. The Netherlands, having used voting computers in most polling stations from 1990, reverted to hand-counted paper ballots in 2008 following security demonstrations, illustrating that a technologically advanced democracy can conclude that electronic voting does not meet

<sup>810</sup>Rights of Persons with Disabilities Act 2016 (Act 49 of 2016). On VVPAT accessibility, see Election Commission of India, Technical Expert Committee Report on EVMs (ECI 2019) Annex D.

<sup>811</sup>Rights of Persons with Disabilities Act 2016, s 11 (accessibility obligations in the context of elections). See further Krishnamurthy (n 5) 122.

<sup>812</sup>Jyoti Basu v Debi Ghosal (1982) 1 SCC 691 (on the exclusive character of the election petition remedy); Association for Democratic Reforms v Union of India (2002) 5 SCC 294.

<sup>813</sup>BVerfGE 123, 39 (2009) (German Federal Constitutional Court, Second Senate, 3 March 2009). On the implications for India, see Krishnamurthy (n 5) 128-130.

<sup>814</sup>Help America Vote Act 2002, Pub L 107-252; Election Assistance Commission, 2022 Election Administration and Voting Survey (EAC 2023) 14; R Michael Alvarez and Thad Hall, *Electronic Elections: The Perils and Promises of Digital Democracy* (Princeton University Press 2008) 87.

the transparency requirements of democratic elections.<sup>815</sup>

The comparative lesson is consistent across all four jurisdictions: parliamentary or administrative assurance is insufficient for electoral technology accountability. Effective systems rely on independent institutional bodies to audit, certify, and disclose—insulating the accountability process from institutional self-interest while preserving democratic oversight. The convergence toward paper-based verification across very different legal systems constitutes an internationally recognised minimum standard that India's current framework does not meet.<sup>816</sup>

## V. PROPOSED REFORMS

The reform agenda proposed by this research operates across three dimensions. First, Parliament must enact a dedicated Electoral Technology Act establishing: mandatory, publicly available technical standards for voting systems including minimum security requirements; independent pre-deployment certification by a committee structurally independent of both the ECI and EVM manufacturers; statutory requirements for controlled public disclosure of EVM source code; mandatory post-election statistical audits using risk-limiting audit methodology; comprehensive evidentiary rules for EVM data in election disputes; and civil and criminal liability for electoral technology fraud. The inadequacy of a single skeletal section—Section 61A—as the sole statutory basis for a technology of this constitutional significance cannot be sustained.<sup>817</sup>

Second, the Conduct of Elections Rules 1961 must be amended at Rule 56D to require VVPAT counting in a statistically adequate sample, determined by independent statistical expertise

and expressed as a minimum required to achieve a specified confidence level—not an arbitrary fixed number. The amended Rule should require that VVPAT counting be conducted concurrently with, rather than after, EVM counting, to enable discrepancies to be identified and resolved before results are declared. A new Rule should provide for risk-limiting post-election audits on the Colorado model.<sup>818</sup>

Third, an independent Electoral Technology Audit Commission should be established—with constitutional status equivalent to the Election Commission of India—comprising technical experts, legal experts, and civil society representatives structurally independent of the ECI and EVM manufacturers. This body should have authority to conduct independent security audits, review EVM source code, make findings publicly available, and report to the Supreme Court rather than to the ECI. Brazil's public source code inspection model should be adopted to allow qualified independent experts to examine EVM source code under controlled conditions.<sup>819</sup>

The Supreme Court should simultaneously articulate a clear constitutional standard for electoral technology transparency, drawing upon the principle established in Subramanian Swamy that paper audit trails are an indispensable requirement of free and fair elections. This standard should specify minimum requirements for independent technical auditing, source code disclosure, and VVPAT verification, and should be applied through meaningful rather than reflexively deferential constitutional review of ECI decisions. Future EVM-related constitutional challenges should see the appointment of independent technical expert commissioners to

<sup>815</sup>Superior Electoral Tribunal (n 12); Centre for Media Studies, 'Report on EVM Challenge' (CMS 2017).

<sup>816</sup>Philip Stark and David Wagner (n 11) 35-38; Pippa Norris, *Why Electoral Integrity Matters* (Cambridge University Press 2014) ch 7.

<sup>817</sup>For the proposed legislative framework, see analogously the model provisions proposed in Law Commission of India, 255th Report (n 8) paras 5.8-5.19, which this article develops further.

<sup>818</sup>On risk-limiting audit methodology, see Stark and Wagner (n 11); Karandikar and Bhatt (n 10) 8-12 (on application to Indian conditions).

<sup>819</sup>The Canadian Judicial Council model provides a useful institutional analogue: see Judges Act RSC 1985, c J-1 (Canada). On the proposed Electoral Technology Audit Commission, the constitutional status of the Election Commission of India under Article 324 provides a template for equivalent independent institutional design.

provide the Court with assessments free of institutional interest.<sup>820</sup>

## VI. CONCLUSION

The record is legally instructive: over seven decades of EVM use, persistent public controversy about electoral integrity, a Supreme Court that has progressively recognised the constitutional necessity of transparency measures, and yet a legislative and administrative framework that remains skeletal, institutionally self-referential, and statistically inadequate. This is not an administrative anomaly—it is a constitutional deficiency. The legal framework for EVM and VVPAT governance has not kept pace with the constitutional standards that democratic elections demand.<sup>821</sup>

The definitional vacuum in Section 61A, the absence of mandatory technical standards, the statistical inadequacy of five-per-segment VVPAT sampling, the structural opacity of EVM source code, the absence of independent auditing, and judicial deference calibrated to institutional competence rather than constitutional minimum—these are not separate problems but interlocking components of a single systemic failure. Together they produce an accountability deficit that is inconsistent with the constitutional guarantee of free and fair elections as the bedrock of Indian democracy.<sup>822</sup>

The Justice Yashwant Varma episode in the judicial accountability context has its precise electoral analogue in repeated EVM controversies resolved through institutional assurance rather than structural reform. When the ECI consistently defends EVM integrity on its own assessment without independent verification, it signals that the formal transparency architecture is understood by its own primary actors to be optional rather than

obligatory. That signal demands a legislative and constitutional response.<sup>823</sup>

Electoral integrity and technological transparency are not antithetical values. An EVM regime that is efficient in administration but verifiable through independent audit and statistically rigorous VVPAT sampling is one that earns rather than merely asserts public confidence. The reforms proposed in this article—a dedicated Electoral Technology Act, amended VVPAT Rules incorporating risk-limiting audit methodology, an independent Electoral Technology Audit Commission, and a clear constitutional standard from the Supreme Court—are not an attack on the Election Commission's constitutional independence. They are a condition for the democratic legitimacy on which that independence ultimately rests.<sup>824</sup>

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Information Technology Act 2000 (Act 21 of 2000), ss 65A, 65B, 66

<sup>820</sup>Subramanian Swamy v Election Commission of India (2013) 10 SCC 500, para 17 (Chelameswar J). The constitutional standard for future EVM litigation should build on this foundation.

<sup>821</sup>Bruce Schneier, *Secrets and Lies: Digital Security in a Networked World* (John Wiley & Sons 2000) ch 19 (on institutional accountability in security governance).

<sup>822</sup>*Ibid*; Raghunath (n 6) 240–245.

<sup>823</sup>On Justice Yashwant Varma's case as an institutional analogue for the EVM accountability deficit, see AP Kumar, 'The Yashwant Varma Episode: Why the In-House Mechanism Cannot Substitute for Statutory Accountability' (Bar and Bench, 27 March 2025).

<sup>824</sup>Robert Dahl, *Democracy and its Critics* (Yale University Press 1989) 111; Joseph Schumpeter, *Capitalism, Socialism and Democracy* (Harper & Brothers 1942) ch 21. The principle that institutional legitimacy must be earned through transparent, verifiable processes rather than asserted as an institutional attribute is a foundational proposition of democratic theory that applies with full force to electoral technology governance.

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