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Implementing Biomatric Voting System In Pakistan: An Anaytical Review

Abstract

Credibility of General Elections in less-stable developing countries has mostly remained a bone of contention. State machinery or political parties are held responsible for election related violence/irregularities/systematic manipulations/rigging. In Pakistan, after general elections of 2013, a number of political parties demanded electoral reforms, including the introduction of Electronic Voting Machines (EVM)/ Biometric Voting System (BVS), to limit opportunities for election rigging. Several academic studies, conducted by private/ non-institutionalized members or political activists on the subject of Electoral Reforms, propose the use of Biometric Verifications and Electronic Voting. However, keeping in view the ground realities the Election Commission of Pakistan pointed out that, it lacks the capability/capacity to support such an initiative due to technological and technical limitations. Those constraints include enormous cost of induction, maintenance and reliability of machines, connectivity issues in far flung areas and non-availability of mega speed servers to support the massive two-way data-flows, in a speedy, effective and uninterrupted fashion, giving expeditious results of the voters' identification/ verification. Clearly, such a situation poses serious challenge to an apparently effective and smart looking solution, when put to test on ground.

Although Election Commission maintains that Biometric Voting Systems are quite safe and most temper-proof equipment is available in the world. However, still numerous security flaws have been observed in these machines. Several security analysts have rejected such equipments for being 'vulnerable to fraud.' Refuting the 'temper-proof' claims by the supporters/ proponents of the idea, many have also been questioning the efficacy of these machines under real-time/ load-prone situations. A host of technologists believe that these machines/equipments could be hacked and manipulated, or face malfunctions/ technical difficulties or major breakdowns as was demonstrated in other countries.Thus, although, at conceptual level, such initiative appears to be constructive, but due to some technical and structural flaws it can be counterproductive. Therefore, due to concerns about the viability and reliability of Electronic Voting Systems some developed countries are reverting back to a paper-based system of voting.

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Introduction

Neutrality and credibility of the Election Commission of Pakistan (ECP) has been questioned after most of the general elections in Pakistan. After the general elections of May 2013 a debate was triggered due to accusations of a large scale, organized election rigging.[1] Consequently the government constituted a Parliamentary Committee for Electoral Reforms in 2014, which invited proposals/ suggestions on electoral reforms covering various aspects of the electoral process.[2] The committee further invited general public as well as stakeholders to give their recommendations to improve the conduct and procedure of general elections, including the use of latest technologies like the Electronic Voting Machines (EVM)/ Biometric Voting System (BVS), which will be the core focus of this research study.

Although each system has its flaws and limitations thus, going beyond the realm of idealizing these impressive ideas, the decision regarding employment of these systems should be taken only after close scrutiny and evaluation of these systems and their functioning, costs and technical viability in contextual environment. This study will analyze the technical, financial and functional strengths and weaknesses of this system in order to suggest the way forward.

Furthermore, the manufacturer of EVM will be a vendor and Election Commission of Pakistan (ECP) will just act as a user/ facilitator. In case any malfunction, breakdown or irregularity occurs, responsibility will be thrown on the ECP, thus triggering a controversy, unnecessary dragging in state and government bodies. Foregoing in view, the implementation of biometric verification will be a hectic exercise. A serious, coherent and long-term strategy may have to be adopted to prove the credibility, efficacy and transparency of the system. Any miscalculated step can lead to confusion before and after its implementation. Moreover ECP will also have to ensure adoption of acceptable version of EVM having effective hacking and manipulation immune software through a public sector company along with accurate and authentic functioning.

1. Electoral System of Pakistan: An Overview

An electoral system is defined by its procedural framework. Authentic and accurate implementation of such system is pertinent for valid, systematic counting of votes and subsequent yielding of final results. Through this procedure voters make a choice among various electoral candidates. Nonetheless, there is always a room for improvement in the system in order to enhance effectivity, efficiency and credibility of the whole electoral process. Therefore, countries do change and modify their electoral processes.

Electoral reforms are priority of ECP to make forthcoming election comparatively more acceptable and fair. Therefore it will be suitable to analyze certain broader parameters of the subject process; especially in comparison with states applied those electoral reforms.

1.1 **Vulnerabilities**

Stakeholders of electoral process of Pakistan have consensus over the implementation of electoral reforms. However, some differences exist over the nature, scope and implementation of these reforms. For example, the European Union Election Observer Mission (EUEOM), in its report on 2013 General Elections in Pakistan pointed out that "fundamental problems remain with the legal framework and with the implementation of certain provisions." Such a situation leaves the future of electoral processes vulnerable to malpractice and irregularities.[3] United Nation Development Program (UNDP) conducted nationwide survey covering 4,535 people. That survey reflects that 45 percent voters voiced their dissatisfaction with the existing electoral system, while 55% emphasized the need for electoral reforms.[4]

Electoral process in Pakistan is already founded on photo ID cards (Computerized National Identity Card- CNIC) and fingerprints for authentication. The 2010 amendments to the legal framework have effectively linked National Database and Registration Authority (NADRA) with electoral rolls by requiring the voters to obtain a Computerized National Identity Card (CNIC) which is a pre-requisite for voting now. The CNIC records contain electronic photograph and fingerprints and are connected with the electoral rolls. This enables National Database and Registration Authority (NADRA) and Election Commission of Pakistan (ECP) to prevent the duplication of records, multiple voting, effectively conduct authentication of eligible voters, and allow polling officials to verify voters by checking photo IDs in the shape of CNIC.

However, the prevailing system does not allow proper, real-time voters' verification using fingerprints so far, as Pakistan is not using electronic fingerprint scanners at polling stations. Manual capture and analysis of fingerprints by polling officials mostly proves ineffective. Moreover, the poor quality of fingerprints prevents effective post-election audits. When this aspect came into limelight, political parties, ECP and other stakeholders started advocating the introduction of electronic technology for biometric verification of voters – Electronic Biometric Verification (EBV) or the Biometric Verification System (BVS).[5]

1.2 **A Temporal Review of Electoral Reforms**

Pakistan has taken certain serious steps towards the adoption of Electronic Voting System. In November 2009 "The Electronic Voting Machine (EVM) Committee," was established by the Chief Election Commissioner of Pakistan (CECP). It comprises of various national and international experts[6] (eg. International Foundation of Electoral System- IFES). His committee conducted a feasibility study to introduce EVMs in Pakistan. No conclusive decision could be taken as EVMs only facilitate the voting process and expedite the vote counting mechanisms. However, it stops short of enabling electoral staff to verify voters' identities in a real time environment, which is the primary focus of the ongoing controversy. Hence, EVMs only partly solve the problem, leaving extensive space for continued electoral malpractices/ irregularities and ever-intensifying controversy over Pakistan's electoral process.[7]

Election Commission of Pakistan (ECP) has prepared Final Electoral Rolls (FER) with the help of National Database Registration Authority (NADRA) which is a list containing names of all the registered voters holding Computerized National Identity Card (CNIC) issued by NADRA in a particular area. NADRA currently holds one of the world's largest Citizens' Biometric Database (CBD) which ECP used as its baseline in order to carry out door-to-door verification. Traditionally, electoral rolls were prepared only through door-to-door visits and counting. There was no authentic backup data for the listing process. However, under the current system, electoral rolls are compiled by the Election Commission of Pakistan and then handed over to the National Database and Registration Authority (NADRA), which prepares the draft electoral rolls on the basis of available CNIC data. These rolls are then sent to Election Commission of Pakistan (ECP) for door-to-door verification through ECP appointed Verifying Officials.[8]

In the process of updating all the electoral lists, Election Commission has also introduced Form A to register names and details of those eligible voters whose names were missing or left out from the draft rolls and were identified during door-to-door verification process. On the other hand, another document titled Form B is used to delete the names of those voters who were found to have died since last up gradation of electoral rolls. Afterwards this updated/verified data is sent to NADRA for preparing Preliminary Rolls that, in order to ensure transparency, are put on display for 21 days at Display Centers established across the country.

These centers were publicized on media and general public was invited to visit and verify information related to them and subsequently, file claims for inclusion of their names, seeking correction of own particulars and raising possible objections over the names of wrongly registered voters. The ECP's appointed Revising Authorities settle these objections acting on the applications for correction. Through this procedure, the Preliminary Electoral Rolls are revised and sent to NADRA for updating and printing of the Final Electoral Rolls which will be used as electoral baseline.

In collaboration with NADRA, Election Commission of Pakistan (ECP) has also introduced a unique Short Messaging Service (SMS) through which all registered voters can send their CNIC number to a phone number "8300," in reply to which the sender receives a message containing his name, electoral area and the serial number of his registered vote in electoral rolls. These services help the general public to check the status of their vote conveniently, without having to physically visit any centre, like before. According to NADRA, over 32 million (3.2 crore) people across Pakistan have verified their polling stations and voter registration details through the SMS.[9]

NADRA has also developed software to help 4.5 million overseas Pakistanis to cast their votes in future elections.[10] During the elections 2013, a few polling stations were also set up on experimental basis in designated missions and a biometric system was installed to avoid casting of bogus votes. Constituency-wise aggregate results were printed by the Election Commission and faxed to concerned returning officers for inclusion in preliminary results.

2. Electoral Reforms

Legal framework and administrative processes for elections need to be seen as structural and evolving, requiring regular reviews, modifications and assessment of vulnerabilities and strengthens. This is important not only to ensure compatibility with international standards but also to ensure credibility and efficiency of the democratic system. This can be done by ensuring that electoral processes remain responsive and all inclusive, and in line with expectations of all the stakeholders.[11] A number of reforms proposed by ECP have remained pending since previous Governments did not prioritized them, or could not develop consensus over them during their democratic tenures. It was after the PTI-led street agitation that on 10 Jun 2014, Prime Minister Nawaz Sharif asked the speaker of National Assembly to constitute the Parliamentary Committee on Electoral Reforms.[12]

As the result, on 25 May 2014, Speaker National Assembly constituted a 33-member Parliamentary Committee on Electoral Reforms[13]:-

a. To evaluate the shortcomings of previous elections and recommend reforms to ensure future elections as free, fair and transparent.

b. To draft legislation or constitutional amendments, and recommend ways to improve the electoral system including adoption of latest technology.

The committee had a mandate to present its recommendations within a period of three months; a time frame which the government thought was necessary to complete the task suitably, while opposition felt it did not reflect urgency on the part of Government. The Committee, on its invitation, received and reviewed 1283 proposals from various organizations, institutions and individuals on electoral reforms covering diverse facets of the electoral process.[14] The committee further invited general public as well as various stakeholders to give certain recommendations to bring positive improvement in the conduct and procedures related to the conduct of general elections, by adopting latest technologies, including automatic registration of voters, issuance of CNIC, biometric identification of voters, through Biometric Voting System (BVS) and use of Electronic Voting Machines (EVM).

The Parliamentary Committee picked a very efficient and powerful, Senator Ishaq Dar as its Chairman. However, almost two years completing, the Committee has yet to finalize and present its electoral reform proposals. A number of important proposed reforms are awaiting consideration and finalization by the Parliamentary Committee, and eventually their adoption by the Parliament itself. Introduction of new methods in the voting process to pre-empt voter impersonation is just one of those vital electoral reforms without which future elections will have poor credibility.

The Parliamentary Committee on Electoral Reforms has also constituted a Legal Framework Committee (LFC). The LFC has been working since 2010 to carry out necessary amendments in the national legal and constitutional framework to provide legal and constitutional cover for the

5

implementation of the electoral reforms related proposals of the Committee. The Committee (LFC) had prepared a full package of around 100 legal and constitutional amendments for consideration, finalization and implementation.[15]

In this context, it may be noteworthy that the government has already introduced 22nd Amendment in the Constitution regarding regulating and governing the Election Commission of Pakistan (ECP).[16] Some pertinent provisions are following:-

(1) Any seasoned civil servant or technocrat can also be appointed as Chairman of ECP. [17]

(2) Introduction of Senate like rotation in ECP i.e. 5 years tenure with half retiring every 2½ years to maintain organizational continuity and stability.

(3) Appointment of the next senior most ECP member as Chairman ECP during absence of Chief Election Commissioner, instead of a Supreme Court Judge which was a cumbersome process, etc.

Various non Governmental Organizations such as UNDP, PILDAT, and FAFFIN ETC presented and debated various suggestions for electoral reforms. Those suggestions were based on their surveys and analysis of elections 2013.[18]

3.   The Relevance of EVM/BVS

The electoral irregularities or alleged mass-scale rigging during 2013 General Elections raised queries regarding the usefulness of ECP. As the result, major political parties have been suggesting electoral reforms, with few of them even resorting to agitation. Moreover, as a result of such recurring situations, a need has also been felt to carry out comprehensive electoral reforms, like those being considered in the Post-2013 elections scenario. In this context a host of ideas have also been debated in public, media and at technical levels, including the use of latest technologies like Electronic Voting Machines (EVMs) or Biometric Verification Systems (BVS).

As per the common perception, EVM or BVS can effectively and massively prevent electoral irregularities, manipulations and large scale rigging on polling day. It is assumed that implementation of electronic voting and biometric verification systems may be a game changer to purify and strengthen the existing electoral processes. However, one has to analyze this possibility in coherent context. Rationally before biometric and Electronic voting can become a reality, there are a number of technical, financial, functional and transparency-related issues which need serious consideration, prior to moving on to adopt such a high-technical and complex system.

Traditionally, biometric tools have been used for a long time by law enforcement agencies and for national population registry purposes. The biometric records were aimed at developing technical specifications for forensics and fingerprint databases. However, with the development of Information Technology (IT) sector and its data-storage and data processing capabilities, Government decided to expand their scope and coverage.

Building up of such massive databases and their diverse applications in areas like tax structures, health records, national security and law enforcement, etc as well as the election process has given a fresh impetus to debates and concepts regarding use of latest technology for electoral transparency. However, before moving on it would be pertinent to take a look at the conceptual framework of Electronic Voting Machine/ Biometric Voting Systems.

While apparently and conceptually, Electronic Voting Machines (EVM) and Biometric Voting Systems (BVS) are mutually complementing technologies supposed to be used together. However, in real life these are two mutually independent systems, often used separately. Electronic Voting Machines (EVM) are just a vote casting and counting device which facilitate the process of vote-casting and vote-counting, significantly reducing the paper-work and paraphernalia attached to the process. On the other hand, Biometric Voting Systems (BVS) is a personal verification system which confirms and authenticates the true identity and personal details of a potential voter. This is done on the basis of forensic record maintained in the shape of a vast database (like NADRA's database in case of Pakistan).[19]

In May 2016, Secretary Election Commission while briefing the National Assembly Standing Committee on Parliamentary Affairs revealed that the Election Commission of Pakistan (ECP) will purchase 400 Electronic Voting Machines and 300 Biometric Verification Units under recommendations of the Parliamentary Committee on Electoral Reforms, for which a proposal has been submitted to the Prime Minister Nawaz Sharif. The Secretary ECP informed that dedicated staff would be appointed and their training will also be arranged. He also stated that a separate wing for registration of women voters has been established in the ECP. [20]

Thus, both the systems are based on two different and divergent concepts and aimed at achieving a different set of objectives. For the same purpose, the decision regarding their use (both or either of the two) is taken separately on the basis of need assessment, stipulated objectives and technological/ financial resources available.[21]

Electronic Voting Machine (EVM) or Biometric Voting System (BVS) are not just a "technical up gradation" but it is a substantial electoral reform, altering the whole process that has legal and operational consequences. While, legal structures are beyond the scope of ECP and remains to be a multi-stakeholder issue, comparable to the relatively simpler aspects like the introduction of CNIC in electoral process, mainly involving NADRA. The responsibility of modifying the existing legal framework is Parliament's domain.

However, ECP could take the lead on technical issues and provide expert advice, administrative requirements and technological options for consideration. But the whole process will have to start from focusing on a detailed definition of the problem that one needs to solve with this technology. Characterizing the problem as "vote rigging" does not provide sufficient details on the specific contours of the problem and perceived solution. Thus, the definition of the problem must be as specific as possible. Only after specifically defining the

problem one would be able to properly define the functions and objectives of using of EVM/ BVS technology.

It must be kept in mind that EVM is essentially a voting facilitate equipment, which leaves no trail of the votes casted. Similarly, BVS is a technically complex, expensive and ambitious venture having its own problems and limitations. Therefore, failure to give due diligence to these aspects could produce a system which performs the same functions as existing, but at a much higher cost, also posing new and formidable operational challenges.

Here are some examples of international standards for EVM/ BVS: [22]

- biometric vocabulary

- testing methodology

- finger, signature and iris image data formats

- physical characteristics and test methods for ID-cards

- jurisdictional and societal considerations for commercial applications

- security specifications

- user interfaces

- machine readable travel documents

- Cryptography and security mechanisms

3.1   **Technical Aspects**

In order to implement any such technology, the electoral staff as well as the voters will need substantial effort to adjust with the new system. Its technical requirements, limitations and effective use will require concerted effort and training. Simultaneously, preventing its misuse by certain individuals, groups or state machinery will also be an issue. The success of the biometric voting system, in addition to the above mentioned issues also depends on availability of continuous power supply throughout the voting sessions in existing load shedding environment. Also enhanced capacity of the main servers of NADRA, due to their large scale access from all over Pakistan in a very short span of time will be imperative. Above all, the most serious factor of availability of huge finances vis-à-vis smooth installation of the project remains point of concern.

As indicated above too, to operate real-time biometric databases to detect duplicates and prevent bogus vote casting, IT system must have the capacity to process and compare each fingerprint with all data base held fingerprints in a very short span of time. For example, if there are 90 million voters in the database, the system will have to check each print against each finger in the database and make 89,999,999 (89.999 Million) comparisons every few seconds. In case multiple fingers are being checked, this number increases exponentially to, say 450 million.

8

Such comparison can only be effectively conducted by extremely powerful computers and servers. Moreover, introduction of any such new technology in election processes will also require extensive training for those using the systems in addition to massive technical support.[23]

Additionally, potential vendors will demonstrate how their devices perform in a controlled environment, creating a perception that these devices are easy to operate and effective enough. However, the real environment will not be as smooth and ideal, thus, host of problems are likely to occur. A rigorous training process is also required for capacity building of the concerned staff. Issues related to managing backup data, alternate options and technical snags have been observed in virtually every country where biometric verification was introduced. Technical equipment and devices or polling officials have often failed. Especially in cases where biometric verification is used for the first time, paper electoral rolls should serve as a backup to avoid breakdown of voting processes.

The infrastructure that supports the use of biometric technology for voter verification is completely different from that used for paper based elections. Similarly, handling, delivery, installation, maintenance, and operation of electronic devices require continuous electrical power, backup batteries, and replacement devices.

Implementation of any such electronic technology restricts opportunities for necessary monitoring and observation. Even to ensure that the machines and working "properly or honestly", it becomes difficult in a real-time environment. Digital electronic records cannot be verified like the paper votes and thus, post election audit options are limited. Data transfer aspect becomes even more sensitive part of the electoral process, requiring temper detecting measures/ checks which is another very challenging aspect.[24]

Although Election Commission maintains that Biometric Voting Systems (using different types of equipment) are quite safe and most temper-proof equipment is available in the world. However, still numerous security flaws have been observed in these machines. Several security analysts have rejected such equipments for being 'vulnerable to fraud.' Refuting the 'temper-proof' claims by the proponents of the idea, many have also been questioning the efficacy of these machines under real-time situations. A host of technologists believe that these equipments could be hacked and manipulated, or face malfunctions or major breakdowns as was demonstrated in other cases.

3.2 **Advantages & Disadvantages**[25]

Faced with the challenges of eliminating electoral fraud through modernization of the electoral operations, election authorities place unrealistic expectations in technology. It is often a mistake to expect that technology will resolve a range of systematic failures and corrupt practices. Technology advocates often overstate the possible benefits. Elimination of the "human factor" in election operations does not eliminate the possibility of corrupt practices; rather, it merely

changes the nature and the methodology of corrupt practices. A brief comparison of advantages and disadvantages is given below;

Advantages

(a) Preventing bogus votes/ electoral irregularities.

(b) Live and real time voter/ data verification possible.

(c) Prevent political controversies, thus tussle/ instability.

(d) Enhance credibility of electoral/ democratic process.

(e) Systematic and user friendly operation sequence.

(f) Expeditoy process reducing long queues at polling stations.

(g) Counting is automated giving immediate elections results.

(h) Reduced human intervention/ manipulation in electoral system.

(i) Eliminates speculation of possible rigging.

(j) The system eliminates spoiled/ rejected ballot papers.

(k) EVMs/ BVS eliminate human factor, plus human error.

(l) Faster vote count and result tabulation, with greater accuracy.

(m) Efficient handling of complicated electoral drills/ procedures including laborious vote counting.

(n) Prevents and eliminates result delays and repeated counting.

(o) Greater convenience for voters, as well as electoral machinery.

(p) Potential benefit of increased voter participation and turnout.

(q) Prevention of fraud during polling, counting transmission of result.

(r) Perceived potential long-term cost savings through savings in man-hours, work, ballot printing, handling costs etc.

Disadvantages[26]

(a) Lack of transparency due to no paper trail/ record.

(b) Limited understanding of the complex system for non-experts.

(c) Expensive/ high-tech equipment with massive recurring costs.

(d) Real environment limitations over use, handling, storage and maintenance of such equipment.

(e) Possibility of tempering/ manipulation/ malfunction of machines/ equipment.

(f) Potential violation of secrecy of the vote, especially in systems which perform both voter verification and vote casting.

(g) Risk of hacking/ manipulation by insiders having privileged access to the system.

(h) Our society's capacity to absorb such a technology is very limited.

(i) Combination of high technology, equipment purchase dependence and extensive start-up/ recurring costs makes it non-viable/ unsustainable.

(j) Even the basic/ start-up cost of the system is estimated at around Rs 100 billion which is too high and can be used for certain other vital projects like health, education, etc.

(k) This cost excludes the massive recurring costs year after year. Here it may be noted that the cost of holding a general election under the current system is estimated at mere Rs 5-6 billion, which is about 1/20th of the estimated cost under EVM/ BVS systems.

(l) Mismatches in required infrastructure and environmental aspects eg; with regard to uninterrupted power supply; telecom connectivity issues; climate/ temperature/ humidity etc may result in equipment's malfunctioning/ inaccuracy.

(m) Increased security requirements for protecting the voting system during elections and transportation, storage and maintenance.

(n) Need for additional extensive voter education and training campaigns, besides ECP and electoral staff's training.

3.3 **Case Studies**

3.5.1 **Venezuela:** Venezuela introduced Biometric Voting System for 2005 general elections on experimental/ partial basis to check and verify the voters. Even years after introduction of the system, about 11% voters' fingerprints could not be matched with fingerprints of the electoral records/ rolls. This among other things, meant that the system did not completely block/ prevent casting of irregular, if not bogus votes. The system did prevent multiple voting, but not with the precision which was originally perceived. Moreover, if election authorities had not allowed voting by voters with incomplete or no records, many voters would have been disfranchised. Thus, while on one hand, the system allowed polling officials to correct weaknesses; on other hand, it undermined trust of the stakeholders and real purpose of the system. Moreover, since EVM and BVS were inter-linked, about 25% of the voters did not believe that their vote/ ballot process was secret.[27]

3.5.2 **Kenya:** Presidential candidates and Political parties in Kenya insisted on introduction of BVS called Electronic Voters' Identification Drive (EVID), citing voter impersonation and multiple voting as the main source of electoral fraud. Since, electoral rolls did not include fingerprints, Kenyan election authorities launched a massive campaign towards biometric voter registration process. Introduction of the EVID

system commenced near Election Day, and this delay effected procurement procedures, hardware receipt, configuration, and training of polling officials. On election-day, polling officials had to revert to the paper-based electoral rolls as more than half of the polling stations EVID failed to function properly.[28]

3.5.3   **Brazil:** Brazil was one of the first countries to introduce electronic biometric verification. In contrast to Kenyan example, Brazilian authorities initiated a gradual change in 2008, and started with several pilot projects. After testing in three cities, Brazilian electoral authorities expanded the system to 1.1 million voters (out of 142 million registered voters) in 60 municipalities. In the second stage, which completed in April 2012, over 7 million voters in 235 new municipalities were also included. Currently, over 11 million voters are covered in the scheme. Brazil's target date for 100% coverage of biometric verification is 2018, ten years after it was first tested. However, in this case, it is worth noting that Brazil's population to financial resources to technological environment combination is largely reverse from that of Pakistan, hence not much relevant/ applicable here.[29]

3.5.4   **France:** France experimented with electronic voting systems in 2007 Presidential elections. The introduction of electronic voting machines required a few changes in rules and procedures. On arrival, voters were required to identify themselves before casting their vote. Afterwards, they would go to the polling booth to cast his vote using an electronic voting machine. The voters selected the name of their chosen candidate on screen and confirmed their vote before signing the electoral register and leaving. This reduced the level of secrecy and transparency of the electoral procedure. Moreover, there was no way to ensure that electronic voting machines were behaving honestly and accurately. Therefore, an average voter thought that his voter rights were being infringed upon as compared to the old fashioned paper ballot put in a transparent ballot box. The traditional paper ballot guaranteed secrecy of the vote, while transparent ballot boxes ensured that they were not already stuffed with votes prior to the opening of polls. Post election reviews also revealed that polling stations using electronic voting systems faced more voting discrepancies than polling stations using traditional paper votes, which became a topic of heated discussion between various groups campaigning for free and transparent elections.[30]

3.5.5   **United States**: A similar debate has been going in United State of America with certain groups advocating the use of electronic voting machines. Ironically, the key proponents of this idea are an American company named ES&S Voting Systems, who manufacture such equipment. People supporting the machines claim the machines save on paper, time and the number of volunteers required to count votes. However, another group of academicians and computer scientists has been opposing electronic voting machines. They argue that voting machines replace a widely accepted, well established and easily

understandable voting/ counting process, instead of blindly trusting machines. Opponents also list a number of weaknesses and discrepancies that have occurred in other countries using voting machines. They also exposed the vulnerability of electronic voting machines to wireless/ electronic hacking and manipulation.

3.5.6 **India**: While Biometric Voting still remains a distant dream largely, Electronic Voting has been employed in few countries till date. India is the only large country having similar election environment to Pakistan where electronic voting machines have been used on partial/ experimental basis. However, only selective approach has been adopted and the EVMs used in India are basically Direct Recording Electronics (DREs), which do not leave a paper trail of polled vote. Hence, there is no method available to verify a vote except machine data/ record. Moreover, despite tall claims, the possibility of hacking/ tempering with EVMs cannot be ruled out. Additionally, under rough environment, poor handling and improper storage, the possibility of a mechanical failure/ malfunction will also be there, multiplying the vulnerability/ error proneness of the system/ equipment. Due to its extremely large electorate/ population, Indian elections are the world's largest electoral exercise operation around well over Indian Rs 100 billion per elections. Thus owing to this factor and technical/ environment limitation, only Electronic Voting Machines (EVM) are being used in Indian General and State Elections since 2004. India never tried to experiment with the Biometric Voting System (BVS), even when there are serious issues in the matter like non-availability of computerized ID cards, no central database like NADRA, no method of voters' verification etc. Even in case of EVMs, studies have shown that India's EVMs do not provide necessary transparency/ backup records, so voters and election officials have no reason to be confident that the process and results are accurate. Even India's Supreme Court called for the need to maintain a paper trail as an indispensable requirement of free and fair elections.[31]

3.4 Use of BVS in NA-19 (Haripur-Pakistan)

On 16 Aug 2015, ECP conducted its pilot project regarding use of Biometrics in NA-19 (Haripur) by-elections as recommended by Parliamentary Electoral Reforms Committee. This pilot project was run with assistance from National Database and Registration Authority (NADRA) and Pakistan Telecommunication Authority (PTA). Extensive training session's were conducted for the polling staff with a full-scale demonstration of the step-by-step method of using biometric machines.

At the end of the polling, Presiding Office would count the Non Biometrically Verified (NBV) and Biometrically Verified (BV) votes and submit these statistics to the Returning officer. However, there were several limitations that hindered the success rate of the pilot project. The machines, set-up in 30 polling station, resulted in only 46% success rate and 54% miss rate. This was due

to weak telecom signals, mismatching of thumb impression, and other technical issues. According to ECP's post trial, some serious issues had surfaced regarding PTCL's capacity, connectivity issues and excessive load of simultaneously accessing NADRA database at Islamabad. Unless ECP agrees on a new paradigm like providing NADRA database in a secure server at each polling station, the project/ proposal appears to be difficult.

Even if so done, a new and equally complex set of serious issues will pop-up. Which may include issues like security of servers, their handling and storage, data-loading and processing, accuracy and reliability of verification results etc, which in no way makes the whole system more useable, viable and acceptable.[32] In order to implement any such technology, the electoral staff as well as the electorate/ voters will need substantial effort to understand/ adjust with the new system. Its technical requirements/ limitations and correct/ effective use/ will require concerted effort and training. Simultaneously preventing its misuse by certain individuals, groups or state machinery will also be an issue.

Furthermore, the manufacturer of EVM will be a vendor and ECP will act just as a user/ facilitator. In case any malfunction, breakdown or irregularity occurs, responsibility will be thrown on the ECP, thus triggering a tussle/ controversy, unnecessary dragging in state and govt organizations. Foregoing in view, the implementation of biometric verification will lead to a hectic exercise. A serious, coherent and long-term strategy may have to be adopted to prove the credibility efficacy and transparency of the system. Any miscalculated or hurried step can create chaos and confusion before and after its implementation. ECP will also have to ensure adoption of acceptable version of EVM having effective hacking and manipulation immune software through a public sector company along with 100% assurance of accurate and authentic functioning.

CONCLUSION/ RECOMMENDATIONS

Although, at conceptual level, the EVM/ BVS appear to be having a strong and favourable case, but in reality these methods entail certain serious flaws as highlighted in the above discussion. Therefore, after all the experimentation, developed nations are reverting back to a paper-based system of voting because there have been concerns about the viability and reliability of the Electronic Voting Systems.

The implementation of EVM/ BVS on experimental basis during a by-election in Haripur NA-19, presented discouraging results. The whole process and its outcome failed to convince the Parliamentary Committee regarding the effective use of EVM/ BVS technologies. Electronic voting mechanisms do not leave any paper trail, and may compromise voters' secrecy right. This has forced many countries to discard the system and revert back to paper ballot. Moreover, in case of ECP opting for a vendor-supplied voting system, the technicalities of the system would be in the hands of the developer. Therefore, potentially those machines were only as honest as their human users.

14

EU has also advised Pakistan against introducing EVM/ BVS in the next general elections arguing the system will not help achieve the stipulated objectives of ensuring free, fair and transparent elections aptly pointing out that a lack of administrative capacity and other structural deficits in the electoral system cannot be substituted by a computerized voting system. Thus, adding that instead of making huge investment in a potentially expensive and problematic system, Pakistan should focus on strengthening the Election Commission (ECP) and enhance its administrative capacity.

Officials of Election Commission of Pakistan told the Parliamentary Committee that EVM/ BVS softwares could be manipulated to affect the results. They further added that the equipment was also vulnerable to hacking via Bluetooth/ wireless connectivity.[33]

Moreover it significant to understand that gap in administrative and operational governance cannot be substituted by adopting complex and high tech solutions like introduction of EVM/ BVS which will create more complexities and controversies. There are strong reservations about NADRA's database, as many biometric machines did not function properly in real time environment, and provided flawed results despite the fact that NADRA's own staff was operating those machines. The problem extends to NADRA's database which does not have accurate fingerprint data of many people who obtained their CNIC before 2004.

EVM have been employed in very few countries till date. India is the only large country having similar elections environment to Pakistan where electronic voting machines have been used. However, only selective approach has been adopted on experimentation basis. These EVMs are Direct Recording Electronics (DREs), which do not leave a paper trail of polled vote. Hence, there is no method available to verify a vote except machine record, actually reducing the level of transparency.

Also electoral staff as well as voters will need substantial effort to understand the new system. Simultaneously preventing its misuse by certain individuals, groups or state machinery will also be an issue. Furthermore, the manufacturer of EVM will be a vendor and ECP will act just as a user/ facilitator. In case any malfunction, breakdown or irregularity occurs, responsibility will be thrown on the Election Commission, thus triggering a controversy.

Foregoing in view, implementation of biometric verification will lead to a hectic exercise. A serious, coherent and long-term strategy may have to be adopted to prove its viability, efficacy transparency. Any miscalculated step can create chaos and confusion before it gets practical. ECP will also have to ensure acceptable version of EVM installed with hacking and manipulation immune software through a public sector company along with assurance of 100% accurate and authentic electronic voters' list by NADRA. [34]

The success of the biometric voting system also depends on availability of continuous power supply throughout the voting duration in existing load

shedding environment. In addition, enhanced capacity of the main servers of NADRA will be required due to their large scale access from all over Pakistan in a short and specified span of time. Above all, the most serious factor will be of availability of huge finances vis-à-vis smooth installation of the project that remains to be a point of concern.

Although Election Commission maintained that EVMs are quite safe and most temper-proof equipment available in the world. However, still numerous security flaws have been observed in these machines. Several security analysts have rejected EVMs as 'vulnerable to fraud.' Refuting the 'temper-proof' claims by the supporters/ proponents of the idea, many have been questioning the efficacy of these machines.

It is virtually impossible to generalize the cost of introducing electronic biometric systems in order to make quick benefit and costs analyses. Each system will depend on multiple factors such as: Biometric Verification vs. Electronic Biometric Verification Voter verification with photo ID is simple and does not require electronic technologies. The cost analysis must take into consideration factors beyond the cost of fingerprint scanning devices. For instance the initially estimated cost of biometric registration in the Democratic Republic of Congo was US$285 million, while the final cost was over US$546 million. The equipment itself was less than US$45 million.

In the face of numerous challenges regarding eliminating electoral fraud through technological upgradation/ modernization, people/ authorities place unrealistic expectations in technology. Technology cannot resolve a range of corrupt practices, which can only be addressed through sustained reforms in the electoral processes, building administrative capacities and strengthening governance related aspects - which will be the need of the hour.

ECP needs to make a serious, coherent and long-term strategy to work towards possible introduction of EVM/ BVS and similar other technologies, in view of their inherent advantages and disadvantages. Any concrete decision to move towards any such system may thus be taken only after due deliberations on all the aspects. In the long-term, ECP will have to lay the foundations and monitor the outcomes of any technological upgradations/ reformation of the system. Constant vigilance and systematic evaluation of the whole system will be imperative with a view to carry out practical and effective upgradation/ reforms in the electoral system and ensure their positive outcomes.

In order to further evaluate/ strengthen the electoral systems, after conduct of each election, ECP may randomly select ballot papers from each constituency to match their thumb impressions with NADRA records and identify flaws in NADRA database/ electoral rolls. This will help in scrutinizing the performance and prevent false voting/ voter impersonation in future too.[35]

Therefore pilot tests for the introduction of electronic system (EVM/ VVPAT/ BVS) may be conducted with paper electoral rolls as a reserve option during by-elections. These trials will act as a crucial phase in evaluating the

systems and determining their potential strengths and weaknesses. Results of such trials must be made public.

Gradual upgradation/ implementation of electoral equipment (EVM/ VVPAT/ BVS) may only be considered after assessing the overall costs involved, technological efficacy, real-time performance etc. ECP could gradually implement the system(s) after building its capacity to procure, operate and oversee its functioning. The ECP should also develop and publish schedule of implementation of any such proposals. Input from other stakeholders may also be incorporated in decision making process.

Despite elaborate safeguards, EVM/ BVS equipment is vulnerable to serious internal and external attacks and tempering/ manipulation. Thus, there may also be a need to conduct comprehensive trials of such technical equipments in different environments and at different levels (urban, rural, most remote areas) before taking a final decision.

LIST OF ACRONYMS

BV	Biometrically Verified
CBD	Citizens' Biometric Database
CEC	Chief Election Commissioner
CECP	Chief Election Commissioner of Pakistan
CERS	Computerized Electoral Rolls System
CNIC	Computerized National Identity Card
DG	Director General
DREs	Direct Recording Electronics
DRO	District Returning Officer
EBV	Electronic Biometric Verification
ECP	Election Commission of Pakistan
ERTS	Electronic Result Transmission System
ESG	Election Support Group
EUEOM	European Union Election Observer Mission
EVID	Electronic Voter Identification Device
EVM	Electronic Voting Machines
FEA	Federal Election Academy
FER	Final Electoral Rolls
FGD	Focus Group Discussions
IFES	International Foundation for Electoral Systems
JPEC	Joint Provincial Election Commissioner
LFC	Legal Framework Committee
NADRA	National Database and Registration Authority
NBV	Non Biometrically Verified
NICOP	National Identity Card for Overseas Pakistanis
OMR	Optical Mark Reader
PEC	Provincial Election Commissioner
PILDAT	Pakistan Institute of Legislative Development and Transparency
PTA	Pakistan Telecommunication Authority
REC	Regional Election Commissioner
RMS	Results Management System
RO	Returning Officer
SMS	Short Messaging Service
UNDP	United Nations Development Program
UPK	Universal Polling Kits
VPAT	Voting Paper Auditable Trail

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18

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