Assessment of How the Use of Biometric Voter Registration (BVR) System Affect Independent Electoral and Boundaries Commission (IEBC) Employees Performance

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Abstract: The main objective of this study was to assess how the use of Biometric Voter Registration (BVR) system affects Independent Electoral and Boundaries Commission (IEBC) employees' performance in Kenya. The study used descriptive survey research design. The target population of the study was the 203 permanent Independent Electoral and Boundary Commission employees working in Nairobi Region and the IEBC headquarter. The study used sampling formula recommended by Nassiuma (2000) to arrive at 98 of employees working in Nairobi Region and headquarters leaving out other regions because the researcher works at the headquarters in Nairobi where he easily co-ordinated data collection. Respondents were randomly picked to form the 98 sample. The researcher used close ended questionnaires based on Likert Scale as the main mode of data collection. The data was analyzed through the use of descriptive statistics and inferential statistics. The relationship between use of Biometric Voter Registration (BVR) system and employees performance was tested using a Pearson's Correlation. The study was important since Kenyans expressed complaints from the public about the electoral technology in the 2013 general election, the study therefore will analyze whether use of Biometric Voter Registration (BVR) system was important in enhancing employees performance. The study established that When the IEBC employees continue to upgrade their skills in the use of BVR technology in voters' management; there will be increase in their performance in terms of efficiency, work quality, timely delivery and high productivity.

Keywords: Electronic Voting System, Biometric Voter Registration, Employees Performance.

INTRODUCTION
Literature

Election is the process that gives the citizens the rights to select candidates to represent them in a democratic pattern. Election deals with the democracy and freewill of citizens, for this reason voting process is considered to be very critical and sensitive process, therefore election implementation must serve many requirements in order to deliver a trustworthy election. These requirements can be defined as user conventions requirements and delivery of secure voting process requirements [1].

The introduction of electronic voting has been the biggest change in electoral process. E-Voting may soon become a global reality or a global nightmare. Besides reliable e-Voting technologies, there is a dire need for international standards to govern the technology, the software reliability and accuracy, the processes and algorithms deployed within the technology, and the verification of all hardware, software and protocols involved. Such standards will eventually allow elections to proceed in any part of the world without the need for monitoring bodies [2].

The electoral processes in Sub-Saharan Africa have experiencing a lot of irregularities because most of electoral systems have been manual associated with post-elections conflicts as were the case Kenya"s 2007 general election [3]. Manual electoral system has many limitations; Redundancy in voter information or bloated registers is a delicate and ever present is-sue, voters" information appearing more than, under or over registration of different segments of the population, unaccounted for ballot papers stuffed in ballot boxes among many other challenges. A good electoral technology therefore should satisfy a number criteria including a high degree of security and accuracy, eligibility and authentication, integrity, verifiability and auditability, reliability, flexibility and scalability, all of which makes employees work easier and therefore increases employees performance [3]. In the 2013

general election, the Independent Electoral and Boundary Commission adopted electronic voting systems using many technologies; Biometric Voter Registration System (BVR), Electronic Voters Identification Device (EVID), Electronic Results Transmission (ERT) System and Electronic Voter Verification (EVV) System which were meant to overcome the above challenges associated with manual voting system.

Employee performance is a reasonable outcome directly associated with the extent of internal fit among HR practices. Internally aligned HR practices operate to influence employee abilities, motivation, and opportunities (AMO) in a potentially harmonious manner [4]. The fact that manual electoral systems is associated with negative outcome like tideous information search, voting process and physical results delivery is lowers performance of employees who work with such systems.

Some studies have been done on the procurement of the electoral technologies used in the 2013 Kenya general election [5], shortcomings of IEBC during the 2013 general elections [6] but none has been conducted on electronic electoral voting systems and its effect on employees performance leading to limited research that has been carried out specifically to determine from IEBC employees on the effect of the electoral technologies on their performance. Therefore to bridge this gap, the study seeks to analyze effect Biometric Voter Registration System (BVR on employees' performance by IEBC in Nairobi County. The hypothesis of the study was HO_1: The use of Biometric Voter Registration (BVR) system does not have significant effect on IEBC employees' performance

Theoretical Framework
Corporate Accountability Theory

The study adopts corporate accountability theory that will address IEBC accountability on electoral results delivery. This theory holds that corporations are responsible to and subject to the will of the people, that is to say, society. The managers and executives of corporations are the employees of the business's shareholders (public) [7]. As such, they have a contractual and moral-responsibility to their employers: That responsibility is to conduct the business in accordance with their desires, which generally will be (according to this study) to conduct free and fair elections while conforming to the basic rules of the society, both those embodied in law and those embodied in ethical custom [8]. Thus, it is the moral duty of corporate executives to carry out the wishes of the shareholders, who invest in order to make a profit.. Managers cannot morally engage in any activity that reduces the corporation's profitability. Dawn [9] believes corporations to be on the same level as government, by necessity they must be limited:

Corporations are effectively like states, private governments with vast economic, political, and social impact. According to Friedman [8], democratic society, even if it encourages such groupings for private economic purposes, should not suffer such public power without public accountability. The corporate accountability theory rests upon two major assumptions. The first is that corporations are "creatures of the state," This assumption means that corporations are created by, and indeed could not exist without, government charters. The second assumption is that corporations, because of their size and economic power, are on the same level as governments. They possess as much "public power" as do states; therefore they, like governments, must be constitutionally limited [8].

Biometric Voter Registration System

According to Krimmer [10] the introduction of a new voting technology to an existing electoral process requires more than taking the paper-based process and making it e-enabled. Developers must also change the whole back-office process and reorganize the whole business process. As in e-government, supporting the complexity of e-voting requires an expansion of thinking. Technological progress and developments in the field of e-voting are increasing over time, and so are abilities of application of this technology.

Applying ICT to such processes comes with several crucial questions, for example the problem of how a system can guarantee fundamental principles is central. In controlled environments, poll workers check the eligibility of voters against the voter register, and the workers also use dedicated machines to record the cast votes in an electronic ballot-box. In uncontrolled environments, checking eligibility is a bit more complicated, because the workers must unequivocally determine the voter's identity while preserving the voter's anonymity [10].

Wayman and Kirnberling [4] observe that Biometric Technologies use physical characteristics, such as voice tone or hand shape, to identify people automatically. Behaviors, such as handwriting style, can also be used by computers in this way. The term "identify" is used here quite loosely. There is actually nothing in your voice, hand shape or any biometric measure to tell the computer your name, age or citizenship, or to establish your eligibility to vote. External documents (passport, birth certificate, naturalization papers) or your good word establishing these facts must be supplied at the time you initially present yourself to the biometric system for "enrollment". At this initial session, your biometric characteristic, such as an eye scan, is recorded and linked to this externally-supplied personal information. At future sessions, the computer links you to the previously supplied information using the same physical characteristic. Even if the biometric system works perfectly, the personal data in the computer, such

as your voting eligibility, is only as reliable as the original "source" documentation supplied.

To solve the registration problems in Ghana and other Sub Saharan Africa, it is propose that registration of voters be carried out electronically by the election officials. Hence a biometric-based voter registration should be a feasible idea despite its expensive nature. This could be the take-off point for the EC of Ghana in their quest for transparency and credibility. The EC of Ghana can adopt the biometric registration system for the next general elections in 2012. Biometric registration is defined as the use of technologies like fingerprinting and photo identification to uniquely identify an individual during the registration process. Whilst biometrics are not 100% guaranteed, their use will enable duplicate registration to be easily detected and also avoid impersonation, thereby rendering the voter register more credible. The fingerprint scan is the cheapest and most common of the biometrics. It is being used widely in most countries of the world, Ghana and SSAs not an exception.

Some of the strengths of finger scan according to Nanavati, Nanavati & Thieme [11], include: a) A mature and proven technology; b) Deployable in a range of environments; c) Easy to use devices; d) High level of accuracy. The finger scan identification has associated problems with its use as pointed out by Moore [12]. He argued, alongside Nanavati *et al*. [11], that the devices get dirty and degrade with time. Besides, scars, cuts and burns will obviously affect the scan results [13]. Finger scans could be cheap, but can the ECs of SSA countries afford it? Do they see it as useful? Will it be easy for them to use as defined?

The administrative tool of voter registration software provides the following capabilities: Register and Remove Registration Officer, Registration Assistant and Data entry operator. Setup polling stations, Load polling station data, Restore polling station data. Anyone with access to such capabilities has the ability to effectively remove voters, transfer voters, edit voter data, and replace voter ID functions. There is no auditing/monitoring or logging requirement in tender process for any of these functions. It is technically infeasible to use asymmetric algorithms to encrypt several bytes of data due to how complex asymmetric algorithms are designed; it is typically very labor intensive thus the reason why it is used to encrypt only small blobs of data. If public/private key pairs are to be used what specific mechanism is to be implemented, what algorithms will be used, what are the key strength requirements? EC Biometric Tender process document states that each polling station will have it own key pair, in this instance, what secure key management is the EC proposing to ensure that encryption keys do not fall into wrong hands and are properly restricted? Access to centralized servers should be restricted and logged.

Biometric technologies, allowing the automatic identification of people using voice patterns, eye scans, handwriting style, faces, hands or fingerprints, have been suggested for use in the election process for eliminating fraud [14]. Fingerprinting, hand shape, and eye scanning have been used in the United States in driver licensing. Fingerprinting systems are being introduced into the election process in several countries, such as the Philippines, Jamaica, Argentina, and Cambodia [14]. Voting process in today's era is behind its time in respect of the usage of modern ICT. The voting process is being seen mostly as a manual and paper based one. This process can be overwhelming, time-consuming and prone to security breaches by hackers and electoral fraud.

As a pilot program for Kenya's 2013 Presidential Election, Electoral Services International Inc. (ESI) successfully registered 1.5 million Kenyans in 1600 registration sites in 18 of Kenya's 210 voting constituencies. Completed in time for a 2010 Kenyan referendum, participants were able to use their new voter cards for the first time to vote in the referendum. Kenya chose fingerprint and facial biometrics for voter identification, and to ensure a clean voter list also elected to do multi-biometric matching. As part of the exercise, a pilot project in selected constituencies using biometric voter identification was also conducted to avoid ballot stuffing. Kenya, ICTs is not left out, the Electoral Commission of Kenya (ECK) recorded increased participation by registering the highest number of voters in the elections with an informed mind [15].

The BVR system is used for registering voters. It comprises a laptop, a finger print scanner and a camera. BVR captures a voter's facial image, finger prints and civil data or Personally Identifiable Information (PII)-Name, gender, identity card/passport number, telephone number etc. The registration takes place at the registration centres where an individual is expected to vote. The BVR method of registration was the only system deployed by IEBC to register voters just before the 2013 general elections [16].

Electronic registration of voters in Kenya began in 2009 with a pilot project that involved 18 constituencies countrywide. The pilot program was a big success. Some voters, who had registered manually in constituencies adjacent to the 'BVR constituencies' were enticed by technology and demanded that they too be registered "properly" using biometric features. Encouraged by this success IEBC rolled out a fresh, all biometric voter registration, in all the 290 constituencies in the country, in 2012. It was important that the registration personnel have the prerequisite skills in the use of the technology. A total of 15,000 BVR kits were deployed to 24,614 registration centres. The Commission recruited 30,000 registration clerks to conduct the exercise for thirty days. 1,450 Voter

Registration Assistants (VRAs) were recruited to assist in the supervision of registration clerks and coordination of registration at the county assembly ward level. In barely a month, IEBC managed to register 14,352,545 voters. The machines were found to be fast and reliable [16].

Conceptual framework
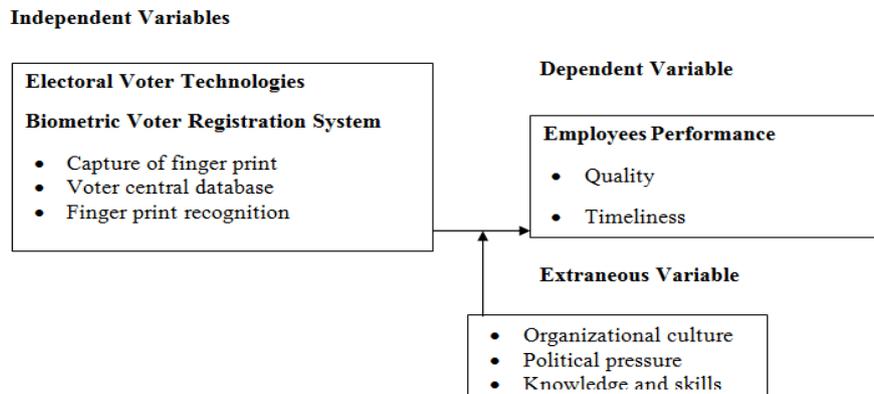
Fig-1: Biometric Voter Registration on Employees' performance; Source: (Researcher, 2017)

The independent variables are the electoral systems are Biometric Voter Registration System (BVR). The dependent variable is employees' performance measured in terms of efficiency while conducting electoral related jobs, quality of job output, timeliness of delivering the job and productivity of the employee. The moderating variables are organizational organization culture, political pleasure and knowledge and skills in using the electoral technologies. The study hypothesizing that when Biometric Voter Registration System (BVR) is used by employees in managing electoral process then the employees job performance will increase due to systems speed, accuracy and secure transmission controlling organization culture, political pressure and knowledge and skills in using the electoral technologies.

METHODS
The Study Location
This study was conducted in Independent Electoral and Boundary Commission (IEBC) in Headquarters and Nairobi Region. Nairobi County houses the employees working in Nairobi Electoral Region and IBC headquarters.

Study design, population and sample selection
The research design that the study adopts is descriptive survey design. This is because descriptive survey design provides information about naturally occurring characteristics of a particular group.

The target population was 203 employees working in headquarters and Nairobi Region comprising of Nairobi Region with a total of 51 employees including regional coordinators, constituency co-ordinators and other support staff whereas the headquarter has a total of 152 staff including the Chief Executive Officer, head of departments and all other support staff.

The study used sampling formula recommended by Nassiuma [11] to obtain the 98 sample of the study.

Study Instruments
The study used close ended questionnaires based on Likert Scale as the main mode of data collection. The use of questionnaires was justified because they assured an effective way of collecting information from a population in a short period of time and at a reduced cost.

DATA ANALYSIS
The relationship between Biometric Voter Registration and employees performance was tested using a Pearson's Correlation.

RESULTS
Descriptive Analysis

Table-1: Advantages of Using BVR by IEBC Employees

Biometric Voter Registration System (BVR)	SA	A	NS	D	SD
I know all components of BVR	43	48	0	5	4
I can quickly map voter details BVR	40	35	0	12	13
I can register voter from anywhere	39	37	5	16	3
The system recognizes voters finger prints	41	38	0	14	7
BVR transmitted to data central database	35	38	0	16	11
BVR makes my work output without any error	39	43	0	10	8
BVR immediately give electronic voters card	45	31	0	19	5

BVR information is tamper free	48	46	0	3	3

Table 1 was used to discuss how Independent Electoral and Boundaries Commission (IEBC) used BVR to enhance their performance. The study established that majority of respondents 91% agreed that they knew all the components of BVR compared to 9% who did not know all the components. Majority 75% agreed that BVR kit could easily map out voters details including the biometrics compared to 25% disagreed.

Concerning location of registration, majority of respondents 76% agreed that BVR kit could be used to register voters anywhere and anytime compared to 19% who disagreed and 5% who were not sure. This finding indicated that BVR made voter registration to be mobile and also taking registration to voters compared to manual registration where voters were required to register at a static location. Majority of respondents 79% agreed that the BVR kit recognized voters finger prints compared to 21% who disagreed. This finding indicated that although BVR was designed for biometrics, some employees still did not understand fully its operation. The finding is supported by Wayman and Kirnberling [4] who established that Biometric technologies use physical characteristics, such as voice tone or hand shape, to identify people automatically. They also observed that the recognition of voting as a "right", however, separates it from the identified "privileges" of driving and receiving social service benefits. The finding is further supported by Nanavati, Nanavati & Thieme [11] who identified the benefits of BVR to include: a) A mature and proven technology; b) Deployable in a range of environments; c) Easy to use devices; d) High level of accuracy. The finger scan identification has associated problems with its use as pointed out by Moore [12]. He argued, alongside Nanavati *et al*. [11], that the devices get dirty and degrade with time. Besides, scars, cuts and burns will obviously affect the scan results [13].

Concerning data transmission, the study established that majority of respondents 73% agreed that BVR could transmit the voter details to a central system where the information could be stored for further processing compared to 27% who disagreed. Majority of respondents 76% agreed that BVR technology made their work quickly with no error as it in most cases occur in manual system compared to 24% disagreed. This finding indicated that BVR enhanced employees work output by reducing errors which are key indicators in employees' performance. Majority of respondents 86% agreed that BVR kit could produce voters cards which are given to the voters immediately compared to 14% disagreed. Majority of respondents 94% agreed that BVR kit was tamper proof and therefore could be trusted to be valid compared 6% who disagreed.

Table-2: Employees Performance

Performance	SA	A	NS	D	SD
Efficiency	46	43	0	5	6
Work quality	37	46	0	9	8
Timeliness	31	38	7	14	10
Productivity	48	39	0	5	8

Table 2 was used to present the analysis of IEBC employees' performance brought about by BVR technology. The study established that majority of respondents 89% agreed BVR enabled them to be efficient in their voters related work activities including; using little effort to achieve huge results, delivering their job objectives beyond expectations and streaming their job workflow due to BVR technology compared to 11% who disagreed.

Concerning work quality, the study established that majority of IEBC employees 81% agreed that their work quality output improved due to the use of BVR technology in terms of; work delivery based on standards, precise delivery, organization standards replicated in BVR technology and employees accountability on their delivery compared to 19% disagreed.

In pursuit of timeliness delivery, the study established that majority of respondents 69% agreed that they delivered their work on time since the introduction of BVR technology more specifically; using less time to achieve high delivery, effective time management and quickly adjusting to timed delivery compared to 31% who disagreed. Majority of respondents 87% agreed that since the introduction of BVR technology, they have become more productive in terms of; improved productivity, productivity equivalent to their rewards, innovative productivity and collaborative productivity.

Hypothesis Test

Table-3: Correlation between use of BVR technology and employees' performance

		BVR Technology	Employees Performance
BVR Technology	Pearson Correlation	1	.815[**]
	Sig. (2-tailed)		.000
	N	98	98
Employee Performance	Pearson Correlation	.815[**]	1
	Sig. (2-tailed)	.000	
	N	98	98
	Sig. (2-tailed)	.000	

HO_1: The use of Biometric Voter Registration (BVR) system does not have significant effect on IEBC employees' performance

The analysis to test HO_1 was conducted using Pearson's Correlation. The results are shown in Table 3. The study established a strong positive correlation(r=0.815) and significant relationship (P=0.000≤0.05) between use of BVR technology and IENC employees performance indicating that BVR technology significantly affected IEBC employees' performance. Hence, the HO_1 was rejected. When the IEBC employees continue to upgrade their skills in the use of BVR technology in voters' management, there will be increase in their performance in terms of efficiency, work quality, timely delivery and high productivity.

CONCLUSION

The aim of this empirical study was to establish the effect of the use of BVR technology on IEBC employees' performance. The study established that generally the employees understood BVR technology and quickly adapted to its use. The employees observed that since the technology was introduced, their work performance have also improved in terms of; efficiency, work quality, timely delivery and high productivity. The study using Pearson Correlation tested that hypothesis that the use of Biometric Voter Registration (BVR) system does not have significant effect on IEBC employees' performance and rejected the null hypothesis by confirming that When the IEBC employees continue to upgrade their skills in the use of BVR technology in voters' management, there will be increase in their performance in terms of efficiency, work quality, timely delivery and high productivity.

REFERENCES
1. Ahmed TK, Aborizka M. Secure Biometric E-Voting Scheme. Intelligent Computing and Information Science. 2011:380-8.
2. Njogu JI. E-Voting System: A Simulation Case Study of Kenya.2014.
3. Dagne T. Kenya: Current Condiitons and the Challenges Ahead. DIANE Publishing; 2006.
4. Wayman, Jim and Kirnberling, William C. Using Biometric Identification Technologiesin the Election Process. Office of Election Administration Federal Election Commission Washington, USA. 2001.
5. Achieng M, Ruhode E. The adoption and challenges of electronic voting technologies within the South African context. arXiv preprint arXiv:1312.2406. 2013 Dec 9.
6. Kegoro, George and Maina, Wachira and. The IEBC did not conduct a credible or fair election, The Daily Nation 16 March. 2013.
7. Barberis P. The new public management and a new accountability. Public Administration. 1998 Jan 1;76(3):451-70.
8. Friedman M. The social responsibility of business is to increase its profits. Corporate ethics and corporate governance. 2007:173-8.
9. Oliver D. Law, politics and public accountability. The search for a new equilibrium. Public Law. 1994:238-.
10. Krimmer R. The evolution of e-voting: why voting technology is used and how it affects democracy. Tallinn University of Technology Doctoral Theses Series I: Social Sciences. 2012;19.
11. Nanavati S, Thieme M, Nanavati R. Biometrics: identity verification in a networked world. John Wiley & Sons; 2002 Apr 29.
12. Adams J, Aggarwal MM, Ahammed Z, Amonett J, Anderson BD, Arkhipkin D, Averichev GS, Badyal SK, Bai Y, Balewski J, Barannikova O. Experimental and theoretical challenges in the search for the quark–gluon plasma: The STAR Collaboration's critical assessment of the evidence from RHIC collisions. Nuclear Physics A. 2005 Aug 8;757(1-2):102-83.
13. Liu S, Silverman M. A practical guide to biometric security technology. IT Professional. 2001 Jan;3(1):27-32.
14. Gentles D, Sankaranarayanan S. Biometric secured mobile voting. InInternet (AH-ICI), 2011 Second Asian Himalayas International Conference on 2011 Nov 4 (pp. 1-6). IEEE.
15. Kenya. ICT Polls; 2007. http://allafrica.com/stories/200711050191.html 18/11/07, (Accessed 13th May 2016).

16. Independent Electoral and Boundary Commission.
    Electoral Laws. 2016.