An analysis of the adoption of e-voting systems at the University of Mpumalanga, South Africa

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Abstract

This paper analyses the adoption of e-voting systems at the University of Mpumalanga (UMP) during the 2018 Student Representative Council (SRC) election. The paper used in-depth interviews with Independent Electoral Commission (IEC) officials and the university electoral committee. The study adopted a case study method. The trust theory was adopted as the theoretical framework for this study. The study found that an e-voting system was not adopted during the election because of the students' lack of trust in the IEC and university electoral committee and their negative attitude and belief regarding the e-voting system. Despite the rejection of an e-voting system, the outcome of the SRC election was not influenced by any political parties. The election was successful because of the high level of voter education performed and the competencies of electoral officers demonstrated during the election. However, the paper recommends the adoption of an e-voting system in the future based on the authenticity, reliability, security and completeness of an e-voting system.

Keywords: e-voting, University of Mpumalanga, South Africa

Introduction

This paper seeks to analyse the adoption of an e-voting system by students at University of Mpumalanga (UMP). Factors such as trust in the Independent Electoral Commission and the university's electoral committee, attitude and belief, voters education, influence of political parties, authentication, privacy, security and audit trail, and the skills and knowledge of the electoral officer regarding electoral

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management were investigated. According to Habibu, Sharif and Nicholas (2017), e-voting comprises the use of Information Communication Technology (ICT) for voting purposes. It encompasses several different components, including both the electronic means of casting a vote and electronic means of counting votes (Achieng and Ruhode, 2013, 10). Jamnadas and Farik (2015) define e-voting as the use of electronic computerised tools to aid in the casting and counting of votes. E-voting implies combining technology during a democratic voting processes to make voting efficient and convenient for voters (Nu'man, 2012). According to Gibson, Krimmer, Teague and Pmares (2016) an e-voting system depends on some electronic technology for its correct functionality.

University of Mpumalanga (UMP)

The UMP is a comprehensive university established in 2015 by the South African government in terms of the Higher Education Act, No.107 of 2007. The university is located in Mbombela, Mpumalanga Province. Students at the University of Mpumalanga are enabled, in terms of the Constitution of the UMP Student Representative Council (SRC), to elect their own representatives.

The e-voting process

The following processes were set to be followed for processing the first e-voting system at UMP.

- It was agreed that student cards would be used as a basis of student identification processes.
- After successful identification and authentication, a ballot sheet was issued for every student who was eligible to vote in the election.
- Invalid votes would be determined by either not selecting any choices or by selecting too many.
- The ballot would be used at the end of the election to check whether everyone's vote was counted.

According to Nzoka, Muthama and Mungithya (2013:71), technology and specifically computers andcomputerised processes have been applied in many countries to improve the efficiency and credibility of voting processes.

Voting process

The project was divided into three phases, firstly the pre-voting, secondly the voting and thirdly the post-voting phase of the project

Usability test

The test of the e-voting system was piloted using twenty students to check whether they will be able to execute a successful voting system. Students were selected from different schools such as Development studies and Agriculture. The system met the requirement of an e-voting system such as security, authenticity, reliability and an audit trail.

Vote eligibility check

Only students registered for the 2018 academic programme approved by the University Council of the UMP were eligible to vote. Only authenticated voters were allowed to vote. Voters were required to prove their identity and eligibility to vote (Shinde, Shukla and Chitre, 2013:204). The voters' roll was printed to verify all registered students. The process of printing the voters' roll required all students to be checked before the voting process.

The e-voting system was designed in such a way that all students could monitor the election process. After the voting system was conducted, verification was done of all the cast votes. This is alluded to by Ya'acob, Azize, Yusof, Sarnin, Naim, Rohaizad (2018) and Daramola, Adefuminiyi and John (2016) who stated that voter identification and authentication is vital and can be applied using both student cards and students' signatures.

The importance of e-voting

According to Shinde, Shukla and Chitre (2013, 203) e-voting has the advantages of lower costs, faster tabulation of results, greater accuracy, a lower risk of human error and mechanical errors, and improved accessibility for people with disabilities. More students including disabled students have opportunities to access the system. An e-voting system also provides multi- language support for a ballot.

An e-voting system is essential to prove completeness, privacy, non-reusability, eligibility, fairness, verifiability and robustness, receipt-freeness and non-coercion. According to Kogeda and Mpekoa (2013), an e-voting system increases the participation of more students to vote. Habib, Sharif and Nicholas (2017) state that e-voting is a form of empowerment. E-voting has the ability to reduce the logistical and the administrative costs. The university will not spend many resources to print ballot papers to be used during the election.

Problem and purpose of the study

In the past, the manual voting system at UMP has led to missing ballot papers, invalid votes, costs in terms of numbers of ballots printed and miscounts and delays in announcing the election

In the light of the g challenges listed above it was deemed important by the University to introduce e-voting that addresses these challenges and ensures that students vote in comfort and improves the accuracy of election results by eliminating human error. According to Shinde, Shukla and Chitre (2013), several South African universities have not yet developed or implemented e-voting systems.

The purpose of this study is to analyse the adoption of e-voting systems at the University of Mpumalanga (UMP) during the 2018 Student Representative Council (SRC) election. This will be achieved by answering the following research questions:

- What was the credibility of the IEC and electoral committee to conduct free and fair elections?
- How did the political parties influence the voting process?

Theoretical framework and literature review

The research applied the trust theory. The perception of trustworthiness relies on the cognitive and emotional capacity that individual students bring to bear on their experience of service. Avgerou (2013) claimed that trust in e-voting highlights the importance of students' perceptions of the trustworthiness of both the technology of

the system and the electoral authorities when e-voting is being developed and implemented.

Pelletier and Couture (2018, p.301) state that if institutions have low levels of legitimacy, there is no expectation for students to 'trust the system'. The fundamental values and norms that they defend do not coincide with our own, and trust in them therefore cannot be high. The level of political trust that lasts for some time should cause concern.

According to Kogeda and Mpekoa (2013) a trustworthy e-voting system will include elements such as anonymity, authenticity, integrity, accuracy, democracy, verifiability, multi-user, accessibility, availability, simplicity, multilingualism and reliability. A good voting system must be tamper-proof and also assure the anonymity of the voters for their protection and safety (Suwandi, Nasution and Azmi, 2018). According to Anane, Freeland and Theodoropoulous (2009), accuracy, privacy, individual and universal verifiability, eligibility, transparency and fairness are the properties which need to be considered during the process of voting.

Relevant to my research on trust theory in e-voting is the literature on trust in e-voting systems. The trust theory has drawn a distinction between trustworthiness as a set of properties possessed by the trustee and the perception of trust-worthiness. This theory informs this study because students showed high level of lack of trust on the election processes (Independent Electoral Commission, electoral officer, voting process).

The review of the literature is based on the following sub-themes.

Trust in the IEC and electoral committee
The IEC is responsible for all matters pertaining elections (Lai 2010, p.212). IEC stakeholders, including voters, political parties, observers and others, must trust the independence and neutrality of the commission tasked to oversee the election (Jamnadas and Farik 2015, 340). One way in which the IEC are likely to be suspicious is if the members or people in charge of management are appointed by the vice-chancellor of a university (Kimbi, Nkansah-Gyekye and Michael, 2014).

Attitude and belief

The study conducted by Alomari (2016, 530) indicated that attitudes and beliefs influence the adoption of e-voting. This statement is alluded to in other studies (Fukuyama, 1995, Gefen, Rose, Warkentin and Pavlon, 2005: 56) who indicated that the adoption of an e-voting system is dependent on belief or culture. The behaviour of students influenced the intention to adopt the e-voting system. Adesina and Ojo (2014) emphasise the significant role of attitudes and beliefs in change in social communities. Research conducted in the Jordan during their general election revealed that the highlevel of positive attitudes regarding e-voting contributed to the voters' adoption of an e-voting system (Beroggi, 2014). The voters' perception of the benefits and obstacles of voting technology can be a challenge for organisations in deciding to adopt the e-voting system (Jamnada and Farik, 2015).

Voter education

Voter education plays a role in creating the awareness of the importance of democracy, voting, accountability and transparency (Mapuva, 2013). According to Jamnadas and Farik (2015, 340) the usability of a voting system is essential for a democratic student election. There are perceptions or concerns that the educational level of voters may influence students' acceptance of the voting system (Achieng and Ruhode, 2013).

Absence of voting awareness can do little to promote democratic citizenship and processes (Nicholson 2003:403). Student awareness of elections may grow when there is an increase of news media coverage (Nicholson 2003: 404). During voters' education, political parties compete to inform voters about student leaders. In that sense, voter education can be viewed as an information campaign. Voter education can be achieved through marketing and advertising candidates' activities within the universities (Bakon and Ward, 2015).

Influence of political parties

According to Adekitan, Matthews, John and Uzairue (2018), student politics and elections are partisan, and this could be further intensified by various vested external interests. This statement is alluded to by Parreira, Tavana and Harb (2019: 5), who view the university elections as a site for the contention between different party

agents competing for future electoral supporters and active members. The intervention of political parties in the student elections and elsewhere could be responsible for the resilience of *status quo* politics (Parreira, Tavana and Harb, 2019).

Authentication

Any voting system has sufficient capabilities to authenticate users as eligible voters (Ghatol and Mahale, 2014). In e-voting, digital signatures are applied to authenticate the voters as eligible (Ghatol and Mahale, 2014).

Privacy

Introducing e-voting system technology requires the acceptance by a wide range of students and is related to the sensitive issue of the election (Nu'man, 2012: 144). The e-voting system raises questions linked to lawful security and privacy concerns (Habibu, Sharif and Nicholas, 2017). The review of literature shows that voters raised concern about the protection of privacy, counting accuracy and the resources and tools needed for the electoral system (Yao and Murphy, 2017: 107). According to Clarkson, Chong and Meyers (2007) anonymity or secrecy of votes should be maintained to ensure that voters are not to be coerced. A central issue impeding the successful implementation of e-voting is the prevention of fraud and the promotion of voter privacy (Heichler, 2003).

Security and audit trail

The serious concern about e-voting elections is information security (Jamnadas, Farik, 2015). The review of literature conducted by Kogeda and Mpekoa (2013) found that security management and an audit trial are the concerns on the implementation of an e-voting system. Security issues relating to an e-voting system are concerns and there are many possible threats which may be difficult to mitigate (Ghatol and Mahale, 2014)

Skills and knowledge on electoral management

Staff responsible for the management of elections should possess Information Communication Technology (ICT) skills such as programming and systems design to manage elections (Jamnadas and Farik, 2015: 341). Staff who are not properly trained in election management may cause delays of electoral processes such as the

counting of ballots from boxes and the announcement of election results (Achieng and Ruhode, 2013). Alomari (2016) in his adoption model stated that embracing e-voting is influenced by the level of staff with ICT skills. Contrary to this finding, Salimonu, Osman and Shittu (2014) found that there was no link between e-voting systems and ICT at the election held in Nigeria. Hence, Bakon and Ward (2015) stressed that staff who are deployed to oversee elections need to attend formal training and workshops on election management.

Research methodology

The present study adopted a qualitative research method in the form of a case study. *Case studies* are used in exploratory research and help the researcher to generate new ideas and represent an important way of illustrating theories and assisting different aspects of conducting election systems. Case study research is also good for contemporary events such as conducting an election. The author fully explained the study to proposed participants in advance. Clear and accurate information about the research study was given to all participants prior to the start of the research. Participants were informed about the aim and objectives of the study and their decision to participate in the study. The selection of participants was determined by the research purpose, questions, and theoretical context. These include accessibility, resources, and time available. The research strategy was to select a focus group such as people involved in the election processes. Two staff members were from the Independent Election Commission (IEC) and three from the University committee. The strategy of selecting the sample for the study was purposive. The participants were selected based on their familiarity with the legal background of election management and their experience and understanding of the electoral laws such as the Electoral Commission Act 51 of 1996. The primary resource of data for this study were document analysis for the literature review, and interviews.

Qualitative techniques were employed in data collection using focus interviews. These allow participants the time and scope to talk about their opinions respecting an election. Participants were asked about their perceptions, opinions, beliefs and attitudes towards election processes. Before embarking on the data collection

process, we sought permission from the research department and authorisation to carry out research at the University of Mpumalanga.

The data is analysed based on the research objectives. Selected verbatim utterances from participants are represented in the findings. In order for the researcher to keep the participants anonymous, symbols (e.g. R1 to R5) were used to show the responses of participants

Findings

The findings relate to the two research objectives as categorised below

How credible were the IEC and the electoral committee to conduct free and fair elections?

The IEC and electoral committee need to demonstrate experience, knowledge and understanding of the processes of conducting free and fair elections. The fact that the IEC and electoral committee have extensive experience of conducting elections in South Africa and other parts of Africa shows the creditability of the IEC to conduct elections in South Africa. The IEC and electoral committee were accepted by the student political bodies to conduct elections in universities, a demonstration of the acceptance of conducting student elections in South Africa.

Trust in the IEC and electoral committee

Participants were asked their level of trust and expressed the following views with regard to the IEC and electoral committee conducting e -voting

R1   "The adoption of e – voting is dependent on the trust of both students and various student political organisations".

R2   "The IEC and Electoral Committee are to be trusted by students and student political organisation on handling elections".

R3.   "To remain open on the process of voting processes."

R4.   "IEC and Electoral Committee possessed skills to handle student voting."

R5.   "E-voting system reduces human error elements". The results imply that the adoption of e -voting is dependent on the IEC and electoral committee being trusted by students and political student formations.

The findings reveal that the IEC and university electoral committee members preferred the adoption of an e-voting system over a paper-based system. They viewed an e-voting system as a method of reducing human errors caused by electoral officers on the voting day. There was a perspective that students' organisations had less trust in the IEC and electoral committee.

Attitude and belief

Participants were asked their views with regard to attitude and belief relating to conducting elections. Participants expressed the following views:

R1   "The adopting of e-voting should reduce long queues of voters waiting to cast their votes".

R2   "Attitude and belief determine the level of adoption of an e-voting system"

R3   "What if students reject an e-voting system?"

R4   "No cheating of votes through e-voting"

R5   "It will be a challenge to embark on the first e-voting system in South African universities."

Based on the results, it seems that there was some students developed negative attitudes towards e-voting. There was also the perception that students viewed an e-voting system as a form of manipulation by the university management to promote certain student political organisations.

Voter education

Participants were asked their views with regard to the effectiveness of voter education. The participants answered as follows:

R1   "It was a way of promoting transparency, accountability and democracy"

R2   "It was a nice way to conduct voter education"

R3   "Students understand what is expected from them"

R4   "Voting education was necessary for the students to understand electronic voting"

R5   "It was a platform for students to understand the processes of handling ballot boxes, electoral rules and procedures"

Based on the results, voter education plays an essential role for students and student political organisations to understand the importance of voter education such as understanding an e-voting system, process and procedures, the importance of voting, conducting election in a free process and procedures.

It seems that voter education plays an important role in influencing students to vote. The large number of students who voted during the SRC election shows that voter's education played a role in the meaning of voting and promotion of democracy. The findings indicated that digital media were used as a form of political communication to various stakeholders to encourage students to vote for a particular political organisation. The research found that during the election period, there was high media coverage regarding voter education.

How did the political parties influence the voting process?

Participants were asked questions about their views on political parties influencing the election. Participants answered as follows:

R1 "Every students formation understands the role of student political movements"

R2 "Political organisations are not allowed on the university campus during the
        election period"

R3 "Political manifestos to be presented by student political bodies"

R4 "Main political organisations are not to campaign on behalf of their student
        formations".

R5 "Political organisations (ANC and EFF) have no influence on student politics"

This findings imply a lack of political influence by the political parties during elections. The findings revealed that no political parties influenced the voting pattern during the elections. Political parties such as the ANC and EFF only provided students with T-shirts as a form of campaigning.

Authentication

Participants expressed the following views with regard to the authentication of ballot papers during the election period:

R1 "Duplication of ballots is to be avoided"

R2 "Control mechanism of voters' rolls is in place"

R3 "The office of the Registrar was contacted in order to retrieve a list of students eligible to vote during elections"

R4 " Students with a criminal charge or guilty of any offence were not allowed to vote"

R5 "Verification of all information is done to ensure that the election process is legitimate".

Based on these results, it seems that the election was conducted in a free and fair manner. This implies that the issue of reliability and accountability was taken into consideration. This also means that cheating of votes was limited. Voters' rolls and student cards were thoroughly checked by the electoral officers to ensure eligible voters were the ones who cast votes. The authentication was used to avoid any duplication of votes. A "one student one vote" principle was applied during the voting day. Students without a student card or identity book as a form of identity were not allowed to vote.

Privacy

Participants were asked about the privacy of the voters. Some of the participants said the following:

R1   "Privacy of students during the election was protected".

R2   "Vote remain secret during the voting processes"

R3   "One person in a voting booth should be allowed to cast a vote"

R4   "All students to be protected by an electoral laws and rules and regulations of the elections.

R5   "Secret voting to be maintained during the election processes"

Based on the above results, privacy during the election was a priority. The privacy of individuals was protected during the voting process by allowing one student in the voting booth area at a time during the day of election. Privacy provided an opportunity for students to vote for their own student choices without any intimidation.

Security and audit trail

When participants were asked about security during election, they indicated the following:

R1   "The demarcation area will be marked during voting"

R2   "Signage next to the election area to be installed"

R3   "Advantages of the e – voting is that electoral system verify the people who casted the vote"

R4   "All election materials such as ballot boxes, voters rolls were viewed as security materials"

R5   " Protection of any form of tempering of the materials"

The findings imply that information security was a priority during the student elections. The e-voting system tracks all forms of audit trail during the election period. The lack of trust in an e-voting system is a challenge experienced by the student political organisations such as the EFF and SASCO. There was a perspective that students were not sure about the security and privacy of the technology to be used during the election. It seems that students felt that the use of technology could influence the outcome of the SRC elections. All voting documents and spoiled ballots were filed after the results of the elections were announced, in case some individuals or parties lodged any complaints against the election processes.

Skills and knowledge on electoral management

When participants were asked about their skills and knowledge on election management, answers were as follows:

R1   "It is my second year to manage electoral processes"

R2   "I have extensive experience to run election even in other Africa countries".

R3   "I worked for the Independent Electoral Commission as a Chief electoral Officer"

R4   "This is my first time to embark on an SRC election"

R5   "I know how to run an election even at the national level".

These results indicate that electoral officers possess skills and knowledge to adequate to manage successful SRC elections. The skills and knowledge of election management include issuing ballot papers, the verification of candidates and management of election stakeholders. However, it was a concern for the University

that some electoral staff were appointed without experience and knowledge of voting systems.

Discussion

Trust in the IEC and Electoral Committee during election

The success of an SRC election is dependent on a level of trust by students. It seems that most of the students had little trust on the IEC and the electoral officer to conduct free and fair elections. This implies that the level of mistrust must be taken into account during an election. However, the analysis shows that the IEC plays a role to promote accountability and transparency in elections even though there was a lack of trust by students. The IEC and electoral committee reviewed the student voters' roll to check and verify all the students' details during election. This was done to limit complaints during the announcement of results.

Attitude and belief

Student behaviour during and after an election determines the adoption or rejection of the election. This means that attitudes and beliefs influence interpretation and response to a voting system. Given that the University of Mpumalanga conducted SRC elections, it was essential to determine a culture of acceptance or adoption of SRC elections. This statement is alluded to by Netshakhuma (2019b), who indicated that understanding of organisational culture and the implementation of an electronic records management system is essential even though in this case it is referring to an e-voting system. The attitudes and beliefs against the e-voting led to the lack of adoption of an e-voting system. However, the acceptance of the final election result by all students demonstrates the students' belief in the electoral staff. In future elections, it is essential for the University to benchmark an electoral system with the University management.

Voters' education

The mandate of the electoral officers was to ensure voter education to ensure free and fair elections. The electoral officers conduct voter education on the handling of ballot papers, election rules and procedures and voting. It seems that voter education

contributed to a high turnout. The voter education promotes transparency and democracy and enables students to understand and interpret all processes of voting. Thus the majority of the electorate have been aware of manual voting as a results of voter education. The fact that students rejected an e-voting system indicates that awareness was not enough to convince students and political organisations to participate in a specific voting system. This suggests that voters' awareness level is not adequate to have a significant impact on the electorate's readiness.

Influence of political parties

The political parties such as the African National Congress (ANC) and Economic Freedom Fighters (EFF) were expected to assist student bodies such as the ANC Youth League, the South Africa Student Organization (SASCO) and the Economic Freedom Fighters Student Command (EFFSC) during campaigns and other political activities. This means that mother bodies such as ANC and EFF assist student political organisations with financial and logistical support such as t-shirts. Such environments create the reality of inefficient and complacent governance, which has been demonstrated — and demonstrated against — across campuses countrywide.

The negative perceptions regarding the influence of political parties was some of the reasons students voted for political organisations which were not their preference. It is therefore advisable that universities investigate how best to enhance positive dimensions of partisan student politics with greater political transparency, while regulating the negative dimensions.

Authentication

The level of transparency during voting was important but was often an overlooked factor. Universities adopted rules governing transparency to protect election integrity. This statement is alluded to by Yablon (2017) who stated that voting regulations are to be transparent. The university student election frameworks provide for oversight and enforcement to make administrators and participants accountable to authentic votes to be legitimate. Continuous oversight of the process by internal and external mechanisms helps detect problems in the system and identify the groups or individuals responsible.

Privacy

A consideration of privacy during elections influence the credibility of elections. The right to an anonymous vote is a cornerstone of elections. It was essential in terms of Protection of Personal Information Act 2013 for students' personal information to be protected during elections. However, the IEC and election officers relied to a certain extent on a student's personal data to verify eligible voters. They also relied on voters' data to inform their decision-making about eligible voters. The voters roll used during Election Day contains private information such as a student's name and surname, and student number. When the IEC and electoral officers verified personal information it raised an issue of the privacy of such information. This statement is alluded to by Netshakhuma (2019a, b) who indicated that privacy of information is to be protected in line with the Protection of Personal Information Act of 2013.

Security and audit trail

With the spotlight on election security, IEC and electoral officers ensured security during elections. Security and audit trails are factors that can undermine election integrity. The placement of a demarcation board during elections assisted the IEC and election committee to ensure information security. Furthermore, ballot papers were audited to ensure the integrity of the election. The ballot audits were conducted to ensure the accuracy and accountability of the election. The election audit was conducted before official results were certified by an election officer. The procedure that keeps the audit trail complete and intact was secured. Inspections of paper ballots or audit logs to verify the security of ballot papers was conducted. The election observers witnessed the counting of ballot papers. An audit trail provided voters a guarantee that an audit record of their vote was created. Even though students were aware of voting, there should be thorough and massive education on security and the benefits of introducing e-voting so that students are aware of other aspects of electronic voting systems as also emphasised in a related study(Netshakhuma ,2019) which emphasised security of information.

Skills and knowledge on electoral management

Knowledgeable and skillful electoral officers contributed to the successful implementation of an e-election. Voters tend to trust an officer who has previously worked on the election process. The skills personnel contributed to accurate counting of votes were without favour to any political organisation. The electoral officers contributed to the success of the 2018 election.

Conclusion and recommendations

The manual system conducted by IEC and electoral commission led to a successful election. However, the manual voting system is time consuming, a waste of resources, and requires more staff. The successful implementation of a voting system requires the following elements to be considered: authentication, privacy, security and an audit trail, skills and knowledgeable staff.

Recommendations

- Build effective stakeholders relations to improve free and fair election.
- To create an environment of trust during election period by ensuring appropriate structures are in place such as the Independent Electoral Commission and election observers.
- The researcher recommends a further study on e-voting to be conducted at other South African universities.
- The e-voting system should be tested during South Africa's national election.

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