

*Facts and Perceptions*  
*on*  
***ELECTRONIC VOTING MACHINE***  
***(EVM)***



*(More than **87%** Say “Very User-Friendly”)*

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# Facts and Perception on ELECTRONIC VOTING MACHINE (EVM)

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## **A**bstract

Elections allow the general voters to choose their representatives and express their preferences and concerns on how they wish to be governed. As a result, the integrity of the election process is fundamental to the integrity of democracy itself. The election system must be sufficiently robust to withstand a variety of fraudulent behaviours and must be sufficiently transparent and comprehensible that voters and candidates can accept the results of an election.

This paper comprises of two parts: the first part provides a broad overview of the subject associated with Electronic Voting Machines (popularly known by its acronym – EVM), giving in particular, emphasis on its usability and effectiveness which is a key to free and fair elections. There is also a brief discussion on the advantages and simplicity of the EVM as compared to the paper-based voting method.

In the second part of the paper, the acceptance of the EVM machines by different user groups of voters from the 20 Dzongkhags (male and female; both educated and uneducated lots; urban and rural; rich and poor; voters under three regions; occupation and age), differences in their uses of the

EVM machine, and their opinions of accepting it as more user-friendly are discussed.

The empirical evidences for voter acceptance and perceptions related to EVM are based on the data collected through a national ‘survey’ carried out in 2014 by the Election Commission of Bhutan related to *Voter’s Choice and Women’s Participation in Elective Offices*.

An encouraging aspect of the practice and handling of EVMs in the Bhutanese democratic process is the acceptance of the EVM by the voters primarily based on finding it user-friendly and simple to understand. The observation from the empirical data analysis indicated that more than 87% of the total respondents accepted it as being ‘very user-friendly’. As a result, introduction and implementation of electronic voting system in the country is found to be credible and enjoys a high level of public trust and confidence.

## **1. Introduction**

Free and fair election is the basic foundation of a democratic polity. The Election Commission of Bhutan is duty bound to fulfill the Constitutional aspiration to ensure that elections are conducted in free and fair manner and that the voting system adopted in the country is user-friendly (can be used

by any voters), further manifesting the will of people. The role of the Commission within the bounds of the law in force has to be analyzed to see as to how far such aspirations have been fulfilled. It thus becomes very necessary for the Commission to make the right choice of election methodology and ensure the technology applied is sound, reliable and acceptable. Above all technically and legally it should be such that it cannot be faulted.

When the Kingdom of Bhutan transformed into the Democratic Constitutional Monarchy under the Constitution of the Kingdom of Bhutan, the Election Commission was responsible to prepare and establish an election management system that is capable to conduct the Parliamentary elections, and elections to the Local Government and National Referendum in the country. Of the many technologies available in the world, Bhutan made the decision to use the Indian EVM as the best and right choice over the conventional ballot paper method as well as sophisticated networked digital systems used in other countries. The decision was made in view of the EVM's simplicity and ease of use, portability, being battery-powered as well as its convenience, speedy and reliability in counting. It played a fundamental role in the smooth and efficient voting process during the conduct of the first ever National Parliamentary Mock Election 2007 and thereafter in the first and second round of Parliamentary Elections in 2008 and 2013, and Local Government Elections in 2010-2011 conducted so far in the country. The election results were announced on the day of poll in all the constituencies within a few hours of the start of

counting. The Royal Government of Bhutan, Voters and Electoral Personnel were pleased with the use of EVMs as they were easy to comprehend, use and generate reliable outputs.

## 2. Definition and Measurement of EVMs

EVM is a simple electronic device used for casting, recording and counting of votes in place of ballot papers and boxes which were used earlier in conventional voting system. EVM was first used in 1982 in the bye-election to Parur Assembly Constituency of Kerala for a limited number of polling stations (50 polling stations). It is thus the end product of considerable experience and extensive trials under the guidance of the Election Commission of India. The tamper-proof technological soundness of the EVM has been then endorsed by technical experts. Furthermore, it had passed the scrutiny of several courts, including the Supreme Court of India which stated 'none can tamper the machine'. In fact, the Karnataka High Court has hailed the EVM machine as '*a national pride*'. Similarly, the Madras High Court, rejected allegations that the EVMs could be tampered with.

## 3. Objectives

Since EVM machine is one of the core component of the democratization processes in the Bhutanese context, it is thus an essential to examine and consider both descriptive and empirical evidence with the following objectives:

1. Provide comprehensive information on the differences and benefits of EVM in place of paper-based voting method.

2. To create a credible electoral process through public trust and confidence in EVM.
3. To generate a sense of pride, participation and ownership of EVM.
4. Make sure that EVM machine is the most appropriate, acceptable, and user-friendly.
5. Some evidence through empirical data analysis indicating that voters are satisfied with EVM for its user-friendly and easy to use by all.

**4. Unique Features of EVM in Place of Paper-based Method**

EVM machine retains all the characteristics of voting by ballot papers, while making polling a lot

more expedient. It is a simple machine that can be operated easily by both the polling personnel and the voters. Being fast and absolutely reliable, the EVM saves considerable time, money and manpower. Being a standalone machine without any network connectivity, nobody can interfere with its programming and manipulate the result. And, of course, affirms total voting secrecy, which is a primary concern of the ballot papers.

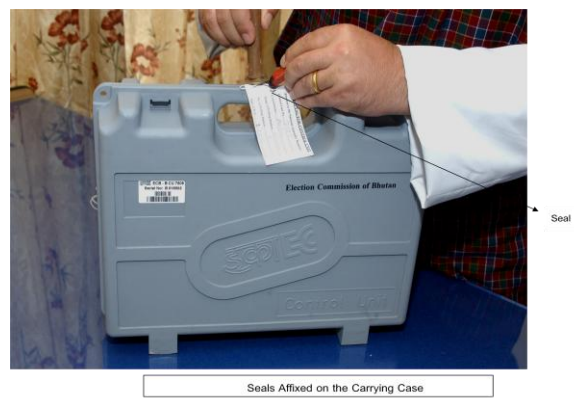
It is therefore important to choose the right system for the right context by carefully weighing the advantages and disadvantages when compared to traditional paper-based voting method as stated hereunder:

**Table 1: EVM Machine in Place of Ballot Paper Method**

Electronic Voting Machine (EVM)	Conventional Ballot Paper Method
<p>Why EVM machine into the democratic process in Bhutan:</p> <ol style="list-style-type: none"> <li>1. It completely rules out the chance of invalid votes which, in many cases, are the root causes of controversies and election petitions.</li> <li>2. It makes the process of counting of votes much faster than the conventional system.</li> <li>3. It reduces to a great extent the quantity of paper used thus making the process of eco-friendly (avoidance of spoiled ballot papers).</li> <li>4. Is capable of saving the considerable cost of printing, as only one sheet of ballot paper required for each polling station.</li> <li>5. Reliable, user-friendly, portable, simple to operate and can be installed in a short time.</li> <li>6. Re-usable by simply erasing votes recorded in earlier poll.</li> </ol>	<p>Why not the paper-based voting method into the democratic process in Bhutan:</p> <ol style="list-style-type: none"> <li>1. Would involves printing of huge volume of ballot paper.</li> <li>2. Accounting and issue of ballot paper would be a tedious work and error prone.</li> <li>3. Manual counting of votes may require large manpower, time and possibly be prone to human error.</li> <li>4. Re-counting will be time consuming, particularly, when counting is done immediately after the close of polls.</li> <li>5. Segregation of invalid votes will be burdensome and may lead to disputes fights.</li> <li>6. Manual voting may be prone to mal-practices and not tamper-proof.</li> <li>7. Storage and distribution of ballot paper may require large manpower and security.</li> </ol>

EVM (vs.) Paper-based Method

1. It will be easier to transport the EVMs compared to ballot boxes as EVMs are lighter, portable and come with special carrying cases.
2. In Bhutan, where illiteracy is still a factor, may find EVM much easier and simpler than ballot paper system.
3. In the conventional method, one has to put a (mark) by pen on the space provided against the candidate's photo and symbol of his/her choice, methodical folding of ballot paper, and casting votes into the Ballot Box.
4. In EVM, a voter has to simply press 'button' against the candidate and symbol of his/her choice and the vote is recorded.
5. The voting information once recorded is retained in its memory even when the power pack is removed. The Control Unit can store the result in its memory for 10 years and even more.
6. It is independent of electricity and requires special power pack (battery) only to activate the EVMs at the time of polling and counting.



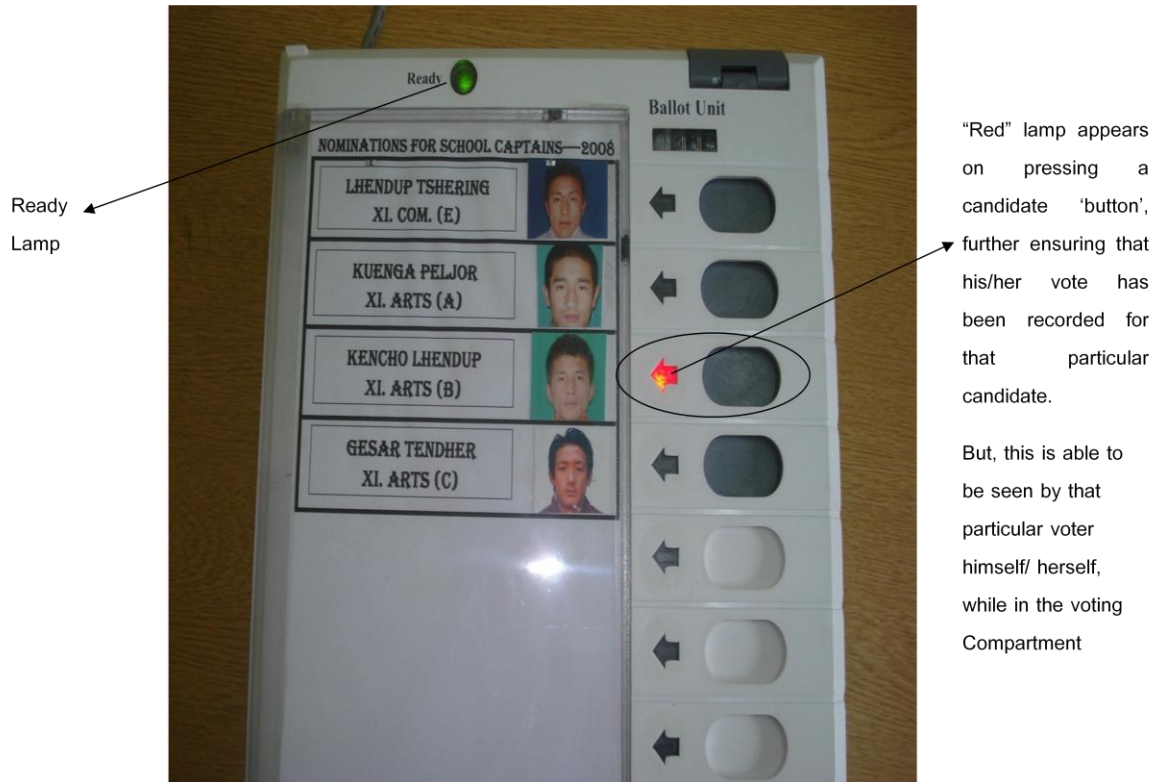
Provision is made on all the sub-units for sealing to ensure that the units are not tampered with. Moreover, the candidate/parties or their representatives cannot only witness all activities that

take place in and on an EVM machine at polling and counting places, but they can insist on putting their signatures and seal on the machine and its accessories at every stage in the processes.



It is not possible to vote more than once by pressing the button again and again. As soon as a particular button on the Balloting Unit is pressed, the vote is recorded for that particular candidate and the

machine gets locked. Even if one presses that button further or any other button, no further vote will be recorded. This way the EVMs ensure the principle of “one person, one vote”.



Moreover, the machine confirms that a vote has been cast and is recorded. As soon as the voter presses the ‘button’ against the candidate or political party of his/her choice, a tiny lamp on the left side of the symbol or photograph of the candidate glows red and simultaneously a long beep sound is heard as illustrated in the **Figure** above. Thus, there are both *audio* and *visual* indications for the voter to be assured that his/her vote has been recorded. It, therefore, safeguards the purity of the ballot and ensures efficiency in the recording of votes. On the other hand, the Ballot Unit has a place for display of the name of a political party or candidate in Dzongkha and English,

election symbol of a party or candidate and his/her photograph, so that no voter will make an error in casting his/her vote for the party or candidate of his/her choice

In addition, elaborate administrative measures and procedural checks are in place to make the EVM doubly safe against any possible tampering or misuse. First of all a Returning Officer, must allow any candidate or party or their authorized representatives to inspect the EVMs before an election. Second, on a poll day, before the beginning of the poll, the Presiding Officer, in the presence of polling officials and the candidates of their polling

representatives, conducts a Mock Poll to verify and ensure that the EVM machine is empty at the beginning of the Poll. This is done by pressing the 'clear' button for erasing the data recorded and all counts set to zero. At the end of poll, the presiding officer presses the 'close' button to close the polling operation after which no further votes can be accepted. So, it is completely tamper proof.

Finally, the EVM machine facilitates a quick and accurate counting. On pressing the 'result' button shall ascertain the total number of votes cast and total votes recorded against each of the candidates or political party is displayed sequentially. It is possible to declare the results on the same day, after the closing of the poll, so no doubts need to be harbored

## 5. Empirical Evidence: EVM is "Very User-friendly"

### 5.1 Research Methodology

The data used in this study is based on the national survey carried out by the Election Commission of Bhutan on *Voter's Choice and Women's Participation in Elective Offices*. The survey was carried out with a nationally representative sample of 1,600 voters selected through appropriate sampling method. Of these, 1,546 individual voters were successfully interviewed on the characteristic background, covering all the 20 Dzongkhags and 47 National Assembly *Demkhongs*.

### 5.2 Dependent and Explanatory Variables

In this study, the dependent variable is the usage of EVM, which was further classified into 4 categories: (i) very user-friendly; (ii) not user-friendly; (iii) Neutral; and (iv) nervous to use. The survey data,

as it is not necessary to store ballot over night. The machine is designed to allow reading of the result in a transparent manner to the satisfaction of all parties concerned. Every display of a result will be announced by the machine itself with a *BEEP* sound. More importantly, while counting the election results, the Counting Supervisor and counting assistants will 'ensure' that the total votes recorded in the EVM, the total number of voter turnout recorded by (polling officer -1) and polling representatives of candidate/party as per the voter's list of that particular polling station, signature/thumb impression received by (polling officer-2), and total voter's slip received by (polling officer- 3), *ALL* should '*TALLY*'.

therefore, consists of the explanatory variables such as the level of education, place of residence, sex, age, occupation, wealth status, region, voting experience, 20 Dzongkhags, etc.

### 5.3 Methods of Statistical Analysis

In this present study, the descriptive and univariate analysis were performed to describe respondent's characteristics and also to inspect the frequency distribution of the variables. Furthermore, the univariate analysis was employed to establish statistical strength of relationship or association between the variables. The level of significant level was determined by the probability values at *p-value* < 0.05. This meant that the variables are statistically significant if less than 0.05.

#### 5.4 Results

In this study, brief descriptions on the characteristics background of the selected variables were presented. The table below indicates that the total samples of male and female respondents are relatively proportionate and nationally representative of the general voters. About 51% were male and 49%

were female. The majority of the respondents are in the age categories of 25-34 and 35-44 years, consisting (23% & 20%) respectively. The least number of respondent are under the age category of 75 years and above, which is about (2.8%) of the total sample respondent.

Table 2: EVM and other Selected Explanatory Variables

Characteristics		Number	Percent
EVM	Very user-friendly	1343	86.9
	Not user-friendly	57	3.7
	Neutral	114	7.4
	Nervous to use	32	2.1
	<b>Total</b>	<b>1,546</b>	<b>100.0</b>
Sex	Male	793	51.3
	Female	753	48.7
	<b>Total</b>	<b>1,546</b>	<b>100.0</b>
Age	18 – 24	209	13.5
	25 - 34	352	22.8
	35 – 44	311	20.1
	45 - 54	272	17.6
	55 - 64	233	15.1
	65 - 74	125	8.1
	75 and above	44	2.8
	<b>Total</b>	<b>1,546</b>	<b>100.0</b>
Educational Attainment	No Education	797	51.6
	Non Formal Education	132	8.5
	Primary	192	12.4
	Lower Secondary	143	9.2
	Middle Secondary	99	6.4
	Higher Secondary	126	8.2
	College/University	57	3.7



	Total	1,546	100.0
Wealth Status	More Comfortable	227	14.7
	Equal	1078	69.7
	Less Comfortable	241	15.6
	Total	1,546	100.0

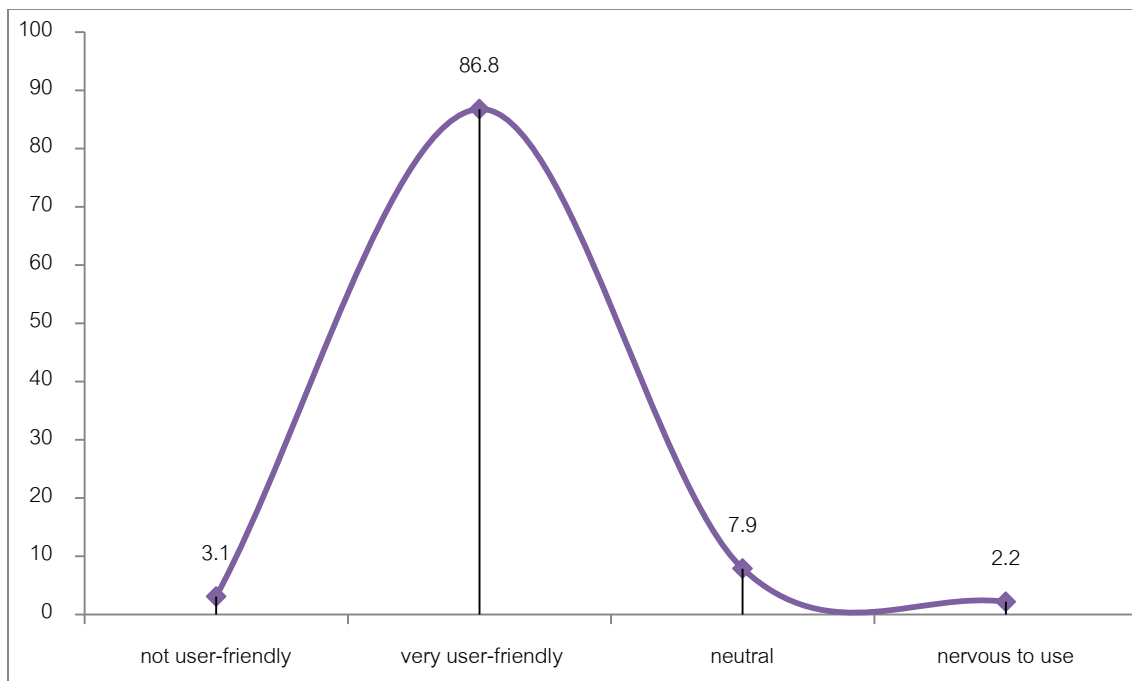
The findings in the **Table 2** also indicate that majority of the respondents had no education (51.6%), followed by primary education (12.4%), while only 3.7% had tertiary/college education. When asked about their wealth status compared to neighbour, almost of sample (69.7%) said that they have equal

wealth status, 14.7% said 'very comfortable' and 15.6% said 'less comfortable.'

**5.5 Univariate Analysis**

The purpose of this analysis is to examine and identify if there exist a significant bivariate association and statistical differences between the dependent variable and explanatory variables.

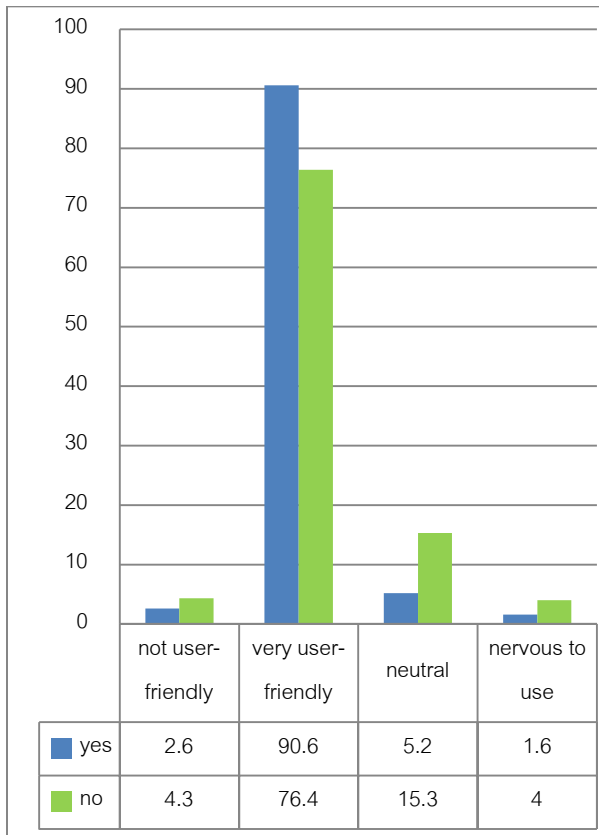
**Figure 1: EVM Machine: A very User-friendly**



Overwhelmingly, in regard to their experience on the use of Electronic Voting Machines, the **Figure 1** reveals that more than 87% of the total respondent accepted EVM as 'very user-friendly', while only 3% of

the respondents said 'not very user-friendly', 2.2% of them were 'not confident' on the use of EVM machine and 8% of the respondent responded as 'neutral.'

Figure 2: EVM and Voter Education



The Figure 2 is the percentage of voter education attended versus not attended by voters on the use of electronic voting machines. It is clearly indicated that the majority (90.6%) of the voters who have “attended” the voter education and awareness program conducted by the Election Commission and

Dzongkhag Election Offices in the 20 Dzongkhags accepted EVM machine as ‘very user-friendly’ compared to 76.4% of the total voters who have ‘never attended’ personally of any such program. This indicates that the voters who have attended such awareness program and hands on training in the usage have more confidence in EVMs and found them easy to use on the poll day. The higher percentage of voter who said ‘not user-friendly’ and ‘nervous to use’ are the one who have not attended such voter education and awareness program conducted so far in the country. Notably, 15% of the respondents who have not attended the voter education, and only 5% of total respondent who attended such program said ‘neutral/ not sure.’

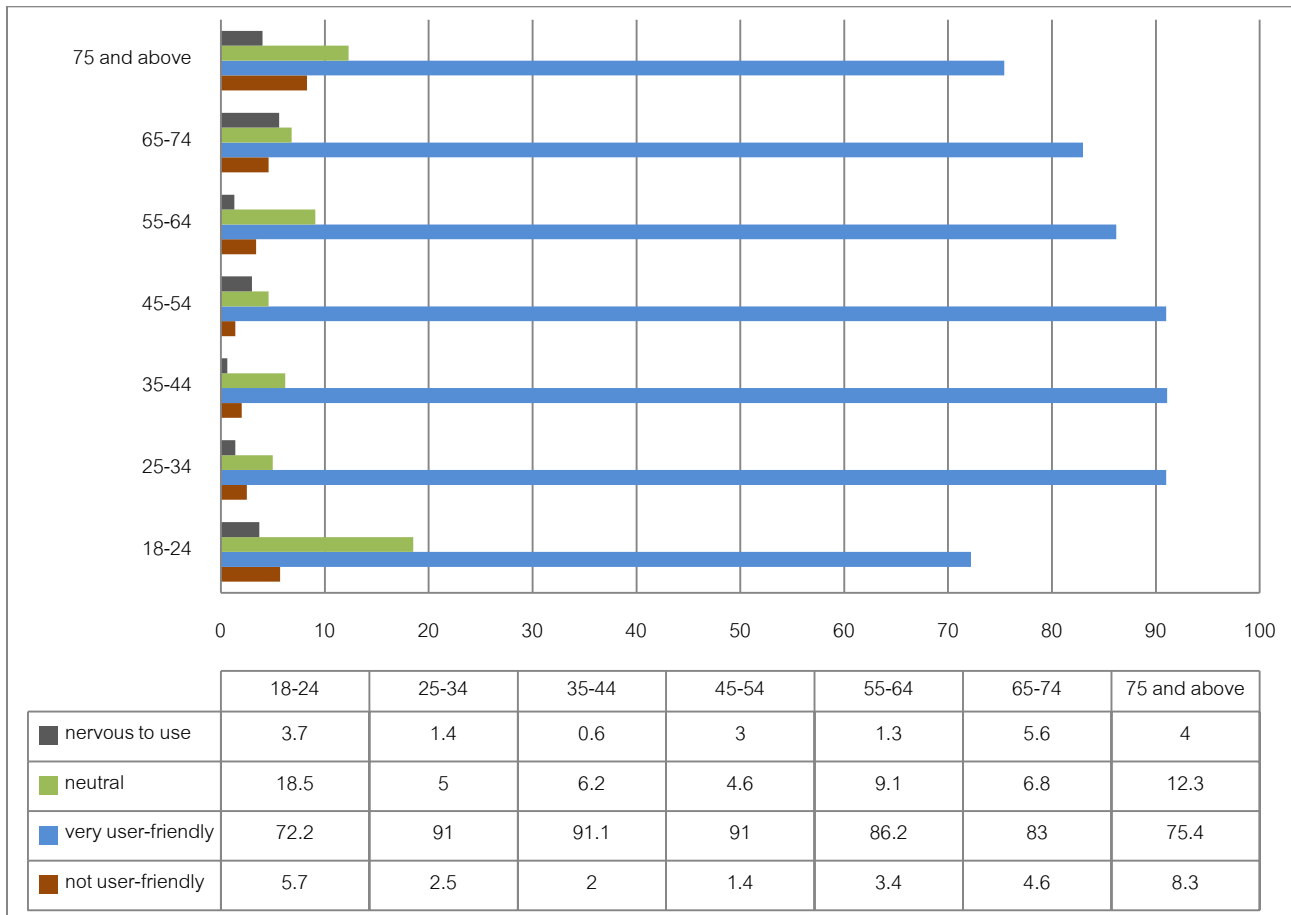
The statistical analysis test reveals that there is a significant association established between the voters education and usage of EVMs (at  $p < 0.05$ ), further indicating that more the number of voter education and awareness program they would have attended personally, the higher the confidence, respect and regard of the EVM as being user-friendly.

Table 3: Use of EVM Machine by Sex

Sex	Electronic Voting Machine				Total
	Very User-friendly	Not User-friendly	Neutral	Nervous to Use	
Male	87.1%	3.1%	7.5%	2.3%	100.0%
Female	86.5%	3.0%	8.3%	2.1%	100.0%

More importantly, about 87% of all male and 86.5% of all female respondent in Table 3 accepted that EVM machine is ‘very user-friendly,’ while, 8% of female and 7.5% of male said they are ‘neutral,’ followed by 3.1% of male and 3% of female who said EVM is ‘not user-friendly’. Notably, the data further indicates that only 2.3% of male and 2.1% of female said that EVM machine is ‘nervous to use.’

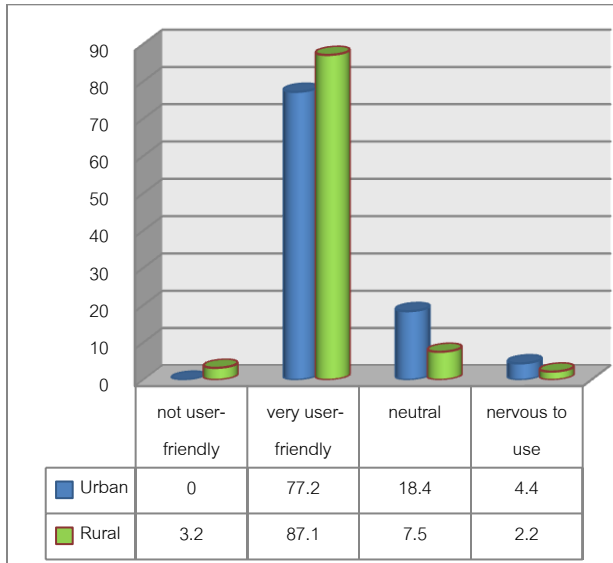
Figure 3: Percent Distribution of Use of EVMs by Age



The analysis reveals that the majority (more than 90%) of the total respondents under the age categories of (i) 25-34 years; (ii) 35-44 years; and (iii) 45-54 years, ALL accepted that EVM machine is 'very user-friendly'. This could be possible because majority of the voters under these age categories had the

highest percentage of voter turnout both in Parliament and Local Government elections, indicating more experience and knowledge in voting through EVM. Notably, on average, a high percentage of respondents of ALL different age categories accepted that EVM machine is more 'user-friendly'.

Figure 4: EVM and Place of Residence



The Figure 4 shows that about 87% of respondent in the rural area accepted that EVM machine is more 'user-friendly' as compared to the voters residing in urban areas (77%). This is not surprising because voters in the rural are more likely to vote through EVM machine than voters in the urban areas. This is followed by (18.4%) in the urban who said neutral and 7.5% in the rural. Notably, 4.4% of the total respondent in urban said EVM is 'nervous to use' and about 2.2% in the rural areas.

Table 4: Percent Distribution of EVM and Education

Education	Electronic Voting Machine				Total
	very user-friendly	not user-friendly	neutral	nervous to use	
No Education	88.7%	3.1%	5.7%	2.6%	100.0%
Non Formal Education	91.1%	1.4%	7.5%	0.0%	100.0%
Primary Education	91.1%	3.1%	4.8%	1.0%	100.0%
Lower Secondary	86.5%	4.5%	6.8%	2.2%	100.0%
Middle Secondary	70.2%	2.9%	23.7%	3.2%	100.0%
Higher Secondary	77.5%	3.2%	16.7%	2.6%	100.0%
College/ University	78.0%	4.5%	11.5%	6.1%	100.0%

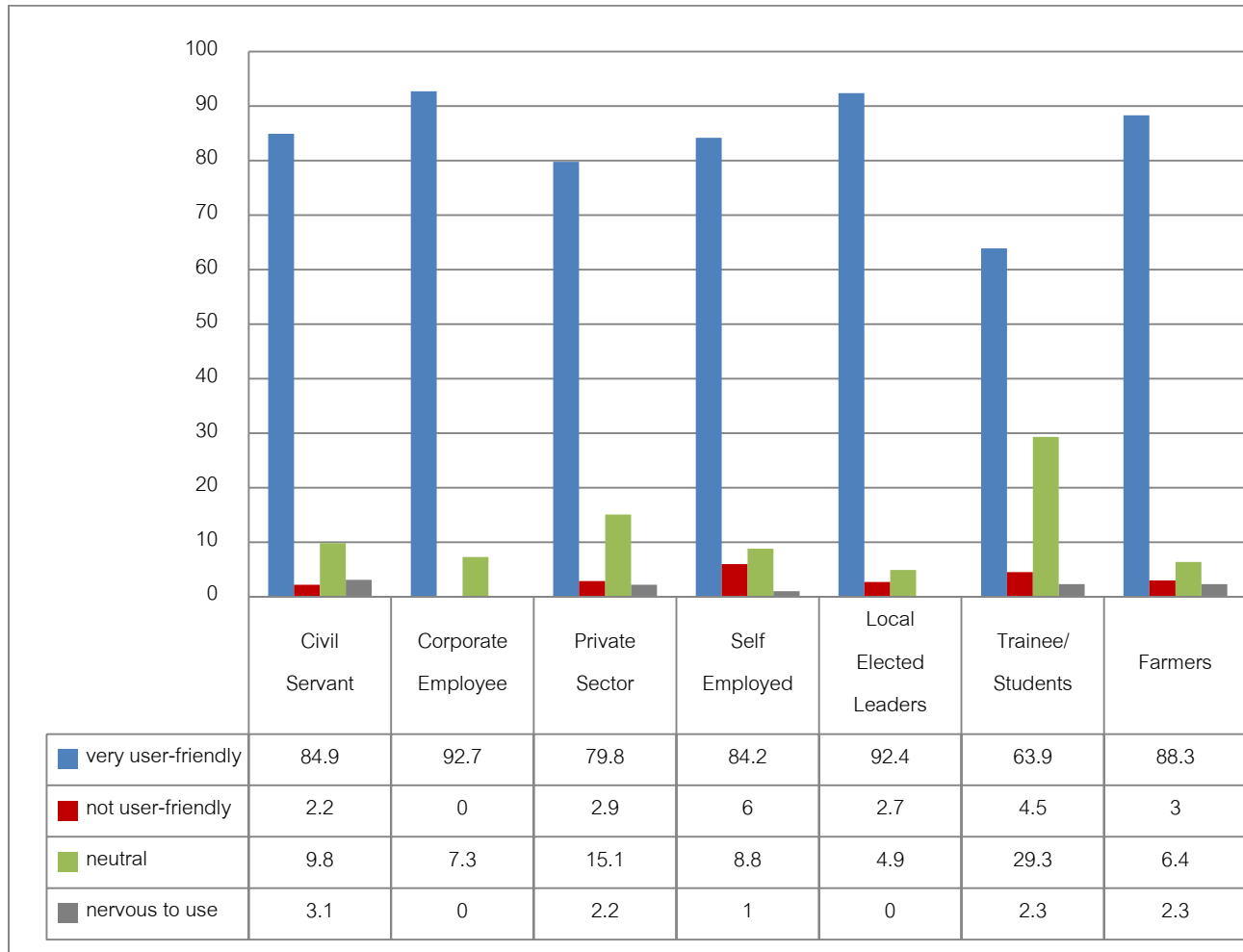
A significant difference of all comparisons of level of education indicates that the majority of the respondents (91%) with non-formal education and primary education said EVM is 'very user-friendly', followed by no education (88.7%), lower secondary (86.5%) and college/university at (78%). Most surprisingly, the percentage of total respondents who said that EVM is user-friendly decreased sharply as the level of educational attainment increases. This

could be possible firstly; because people with higher educational background are generally postal voters and don't go in person to vote in their polling stations. Secondly, as many of them would not have attended the voter education and hands-on-training since many of them use the postal ballot facilities. Thirdly, experiencing only by watching/ seeing through media/news would not have provided enough bases for confidence and trust.

A statistical analysis also reveals that there is a significant association at  $p < 0.05$ ; this means that EVM machine is simple and easy to use even by a common man. Moreover, it further indicates that voters having no or low education and residing in the rural

places must have more voting experience (in person) through EVM as compared to the voters in urban areas, giving more added points in terms of confidence and accepting it as being user-friendly.

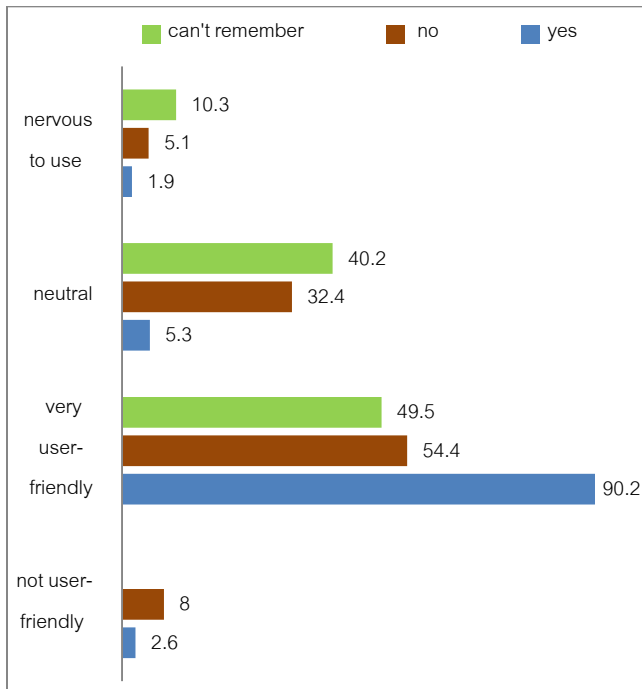
Figure 5: Percent Distribution of EVM and Occupation



It is important to note in the Figure 5 that there are no significance differences when compared between the different layers of occupation. On

average the majority of the voters (80-90 percent) said that EVM is 'very user-friendly' irrespective of their occupational background.

Figure 6: Vote in LG & Parliamentary Elections



Overwhelmingly, the Figure 6 indicates that more than 90% of the total respondent who have voting experiences in the real elections through EVM accepted it as 'very user-friendly' compared to 54.4% of those voters who have not voted in election. This indicates that people who have more voting experience through EVM found it more user-friendly than those who have not voted through EVM.

Statistical significant was established at  $p < 0.05$ , indicating that people who have voted in 2011 Local Government elections and 2013 Parliamentary elections are more likely to have more confidence and are comfortable with EVM than people who have never voted.

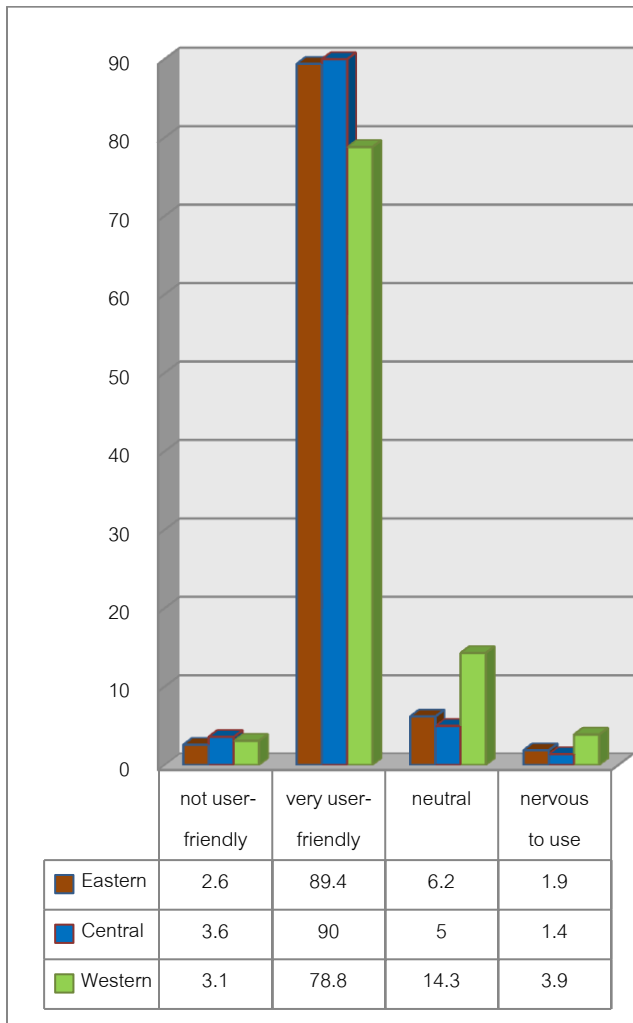
Table 5: Percent Distribution of EVM and Wealth Status

Wealth Status	Electronic Voting Machine				Total
	very user-friendly	not user-friendly	neutral	nervous to use	
More comfortable	93.1%	0.8%	4.8%	1.2%	100.0%
Equal	86.4%	3.6%	8.1%	2.0%	100.0%
Less comfortable	83.1%	3.0%	9.7%	4.2%	100.0%

The Table 5 indicates that the respondent with good wealth status appears slightly to have higher user-friendliness (93%) compared to those who have moderate (86.4%) and poor wealth status (83%).

Nevertheless, it is very important to note that very high percentage of the respondents from both rich and poor backgrounds have accepted that EVM machine is very user-friendly and *NOT* nervous to use.

Figure 7: Use of EVM Machine in Region

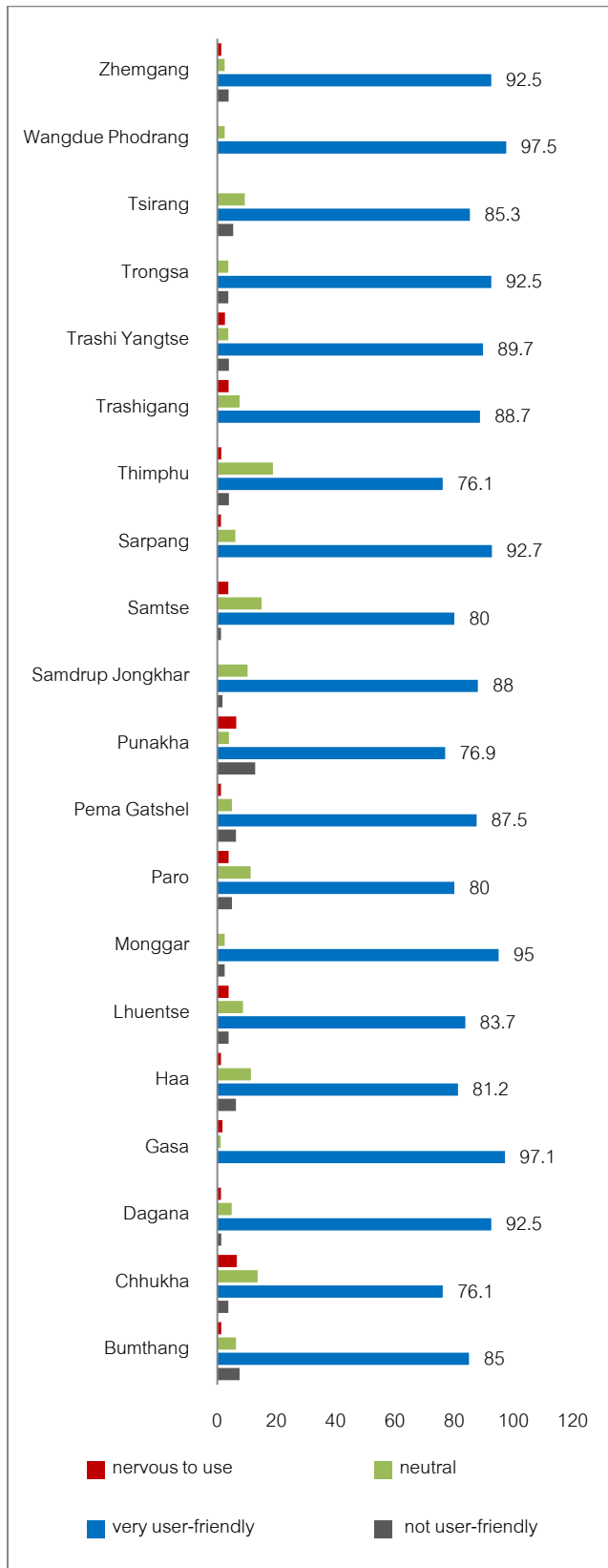


It is very significant to note in Figure 5 that in all the three regions of the country, almost all the respondents accepted that EVM is 'very user-friendly'.

The eastern region consists of (Lhuentse, Monggar, Pema Gatshel, Samdrup Jongkhar, Trashigang and Trashy Yangtse); the central region consists (Bumthang, Dagana, Gasa, Punakha, Sarpang, Tsirang, Trongsa, Wangdue Phodrang and Zhemgang); and the western region consist (Chhukha, Haa, Paro, Samtse and Thimphu).

There were significant differences across the region in term of accepting EVM machine as more user-friendly. The central region reveals slightly higher percentage of respondents (90%) who said EVM machine is user-friendly than eastern region (89.4%) and western region at 79%. However, the 'user-friendly' perception is very high (79-90 percent) throughout the country with common acceptance of the EVM as convenient and easy to use.

Figure 8: Use of EVM in the 20 Dzongkhags



The very important statistical findings in Figure 8 is that high percentage (all most all the respondent) in the 20 Dzongkhags accepted that EVM machines are easy to use and found very user-friendly

However, there were statistically significant differences across Dzongkhags on the level of their acceptance of the EVM as easy to use, simple and more user-friendly. Among the Dzongkhags, the highest percentage of respondents (more than 97%) who accepted EVM machine as ‘very user-friendly’ are from Gasa and Wangdue Phodrang Dzongkhags respectively. This could be possible because the highest percentage of voter turnout both in National Council and National Assembly elections 2013 was from the Gasa Dzongkhag. Moreover, it is important to note that Lunana Gewog was controlled, and survey was not carried out because of the lack of adequate time and resource, although the National Assembly *Demkhong* was covered through coverage of *Khamaed Gewog*.

The Chhukha, Punakha and Thimphu Dzongkhags have the lowest percentage (more than 76%), who said EVM is ‘user-friendly’. As observed in Figure 8, about 95% of respondent under Monggar Dzongkhag said ‘very user-friendly,’ followed by Dzongkhags like Dagana, Sarpang, Trongsa and Zhemgang (more than 92%). Notably, most of the respondents (80-to-89 percent) highly consider EVM machine as easy to use and found user-friendly.



## 6. Conclusion

The study concludes that EVM machine is generally seen as a tool for making the electoral process more efficient and for increasing trust in its management. Properly implemented EVM can increase the security of the ballot, speed up the processing of results and make voting simple.

Furthermore, the present study concludes that EVM is effective and efficient as it is portable, convenient to carry and simple to use. The logistics and transportation costs are reduced significantly. Countless ballot boxes are not required for voting. Large number of ballot paper need not be printed that would have otherwise required considerable cost and work of printing, transporting, storage facility and counting personnel. It uses battery; therefore, it can be used even in places where there is no electricity supply.

Moreover, the votes can be cast, recorded and counted reliably and speedily with minimal skills. It is possible to verify that votes are correctly counted yet no one would be able to determine how any individual voted. It leads to increased voter turnout and high confidence of all stakeholders, thus ensuring Free, Fair and Democratic elections in the country.

Finally, given all these positive attributes, more than 87% of the total respondents in the 20 Dzongkhags accepted EVM machines as 'very user-friendly,' further demonstrating the high level of confidence and trust for contributing and ensuring a vibrant democracy in the country.

## 7. Journey

The voting system can most easily be introduced and strengthened when there is political consensus about the benefits of the electronic voting system. Few political actors may, however, oppose electronic voting for many reasons, either in principle, because they have real technical concerns, or because they fear that voting through EVM machine is an advantage for their opponents; or because they believe that other parties may receive more credit for voting through EVM machine; or just because they do not trust in the independence of those implementing the system. Facing such opposition, successful confidence building may be difficult or impossible.

At the same time, concerns of the key social actors, such as non-governmental organizations (NGOs), Media houses, stakeholders, and technical experts need to be seriously considered, because it is important to hear and address their concerns by clarifying misunderstanding and correcting weaknesses. In additions, the following considerations are deemed important on the path of journey towards bringing trustworthiness and inconceivable democratic system in the country:

- Required acceptance from all sectors of society, but socio-political acceptance of it should realistically be expected to take much longer to fully trust and have confidence based on their own experience and knowledge.
- Preparations or ensuring a continued supportive socio-political environment is a very important factor for the successful

implementation of voting process through EVM machine for now and hereafter.

- Maintain as standalone, with no network connectivity to ensure tamper-proofness.
- More capacity building and awareness at all levels of the key players in the political arena as well as with other key stakeholders.
- Finally, a comprehensive civic and voter education campaign is important. Citizens need to learn more than simply how to cast their votes electronically. They also need to understand the rationale for the specific EVM machine choice adopted and the

trustworthiness in place of paper-based voting method.

## 8. Acknowledgement

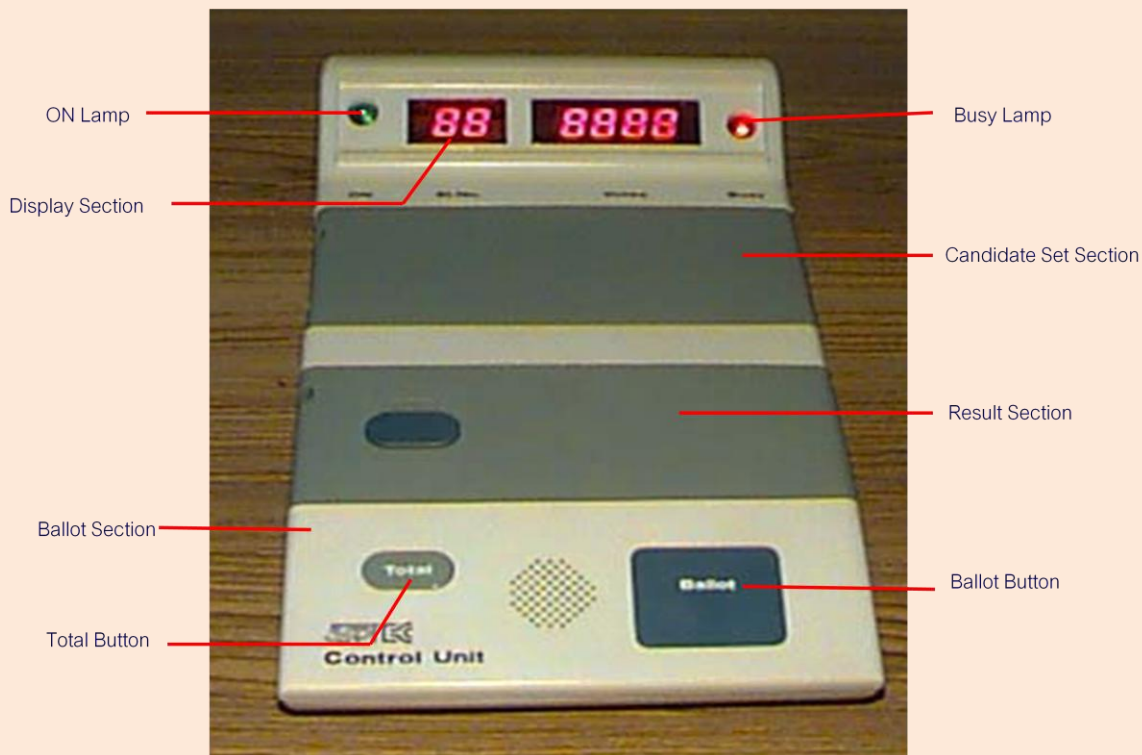
The author would like to express the most sincere thanks and gratitude to the Election Commission of Bhutan for this great opportunity accorded, besides all their unparalleled supports, incredible guidance and wonderful supervision. It is my pleasure to extend my grateful appreciation for those who have extended their suggestions and valuable insights that have been so helpful in bringing the present shape of this paper.

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Control Unit



*A simple machine but a highly secure data*

