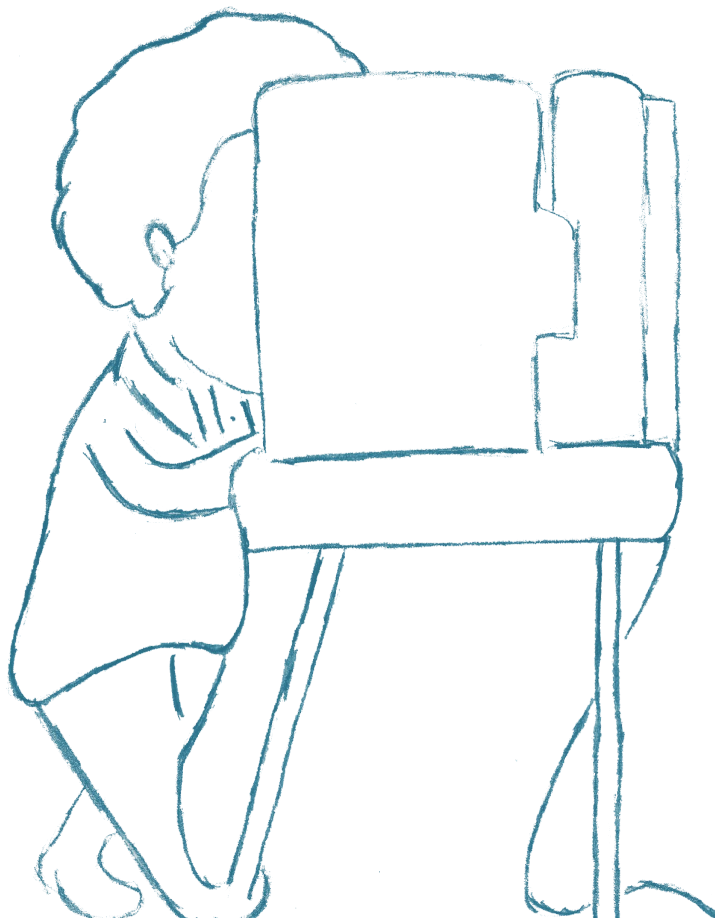


Pierre Michel Chéry

Executive Director, Xtra Consult
Haitien Kreyol Academy

Benefit-Cost Analysis

Feasibility of
Electronic Voting
in **Haiti**



Design by Etella Prosper - identity.gr@gmail.com



ANALYSIS ON THE FEASIBILITY OF ELECTRONIC VOTING IN HAITI

Haiti Priorise

Pierre Michel Chéry

Executive Director

Xtra Consult

Working paper as of February 17, 2017.

Translated from French by Alexandra Williams, professional translator.

© 2017 Copenhagen Consensus Center

info@copenhagenconsensus.com

www.copenhagenconsensus.com

This work has been produced as a part of the Haiti Priorise project.

This project is undertaken with the financial support of the Government of Canada. The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Government of Canada.

Canada

Some rights reserved



This work is available under the Creative Commons Attribution 4.0 International license ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)). Under the Creative Commons Attribution license, you are free to copy, distribute, transmit, and adapt this work, including for commercial purposes, under the following conditions:

Attribution

Please cite the work as follows: #AUTHOR NAME#, #PAPER TITLE#, Haiti Priorise, Copenhagen Consensus Center, 2017. License: Creative Commons Attribution CC BY 4.0.

Third-party content

Copenhagen Consensus Center does not necessarily own each component of the content contained within the work. If you wish to re-use a component of the work, it is your responsibility to determine whether permission is needed for that re-use and to obtain permission from the copyright owner. Examples of components can include, but are not limited to, tables, figures, or images.

About the Author

Pierre Michel Chéry,

- Masters in Information Technology (Commonwealth Open University, Online, 2002)
- Studies in linguistics (UEH / FLA, Port-au-Prince, Haiti, 1993)
- Bachelor of Business Administration and Management (UEH / INAGHEI, Port-au-Prince, Haiti, 1983)
- Diploma in Statistics and Informatics (Center for Training of Statisticians and Informaticians, Port-au-Prince, Haiti, 1980)
- Software Development :
 - o multi-currency accounting and management (KAMELEON)
 - o survey management (PMCQUEST)
 - o model of full employment by the Approach by Similarity
- Member of Akademi Kreyòl Ayisyen (Haitian Creole Academy)
- Novelist (Eritye Vilokan 2001, Bèbè Gòlgota 2008, Senfoni Nago 2012, Peleren 2015)
- Several articles on Creole culture and education in Haiti

Policy Summary

Overview

Located in the Caribbean Basin, the Republic of Haiti, in the west, shares the island of Hispaniola with the Dominican Republic in the east. Stripped of a 29-year-old dictatorship, Haiti has been struggling since 1986 to establish a democracy. The renewal of political personnel through elections is a key element in establishing this democracy. But, populated by more than 10 million people, with 6 million of voting age in 2015, Haiti faces increasingly major obstacles to be able to organize reliable elections, accepted by all. For the majority of the population, the desired stability can only come from good elections.

In this study, we have presented an incomplete list of all kinds of difficulties that the country faces in electoral matters. On the financial front, elections represent a burden for the Haitian economy: from less than \$US13 million in 1990, the election budget increased to \$US66 million in 2015, an increase of 407% in 25 years. The growth of the Gross Domestic Product did not keep pace. To this must be added the elections taken partly or entirely because of major disorders or fraud.

Moreover, since the 1995 elections, there has been concern about the low level of participation of the population in electoral contests. Less than 25% in the October 2016 elections... One wonders if the elected representatives really represent the popular will. Besides disenchantment arising from unfulfilled election promises, failure to respect citizens' votes in various forms: fraud, recurring irregularities, bad governance, must also be taken into account to explain the low level of participation observed.

Rationale for the Intervention

Thus, the Haitian electoral system must:

- 1) reduce its budget so as to gradually free itself from external dependence;
- 2) ensure the reliability of the vote by preventing fraud and irregularities to the extent possible;
- 3) facilitate operations for the voter;

4) reduce the delay of all operations in the processing chain.

These diverse challenges can be addressed by an electronic voting model.

- Electronic voting can make the use of paper newsletters superfluous, because everything that is put on paper can be carried on a touch screen and be managed more efficiently. Whether it's the numbers assigned to parties, photos, or party emblems, all this information can be managed by a programmed touchscreen. The mass of paper to be transported would be reduced to the transport of the necessary computer equipment at the polling station.
- Voters would no longer have to search for their name in the records of multiple polling stations, since the voter could vote in any center and at any polling station in his electoral district. It is the same with the verification of the identity of the voter, which will be made from his / her fingerprint. Even if a person were able to vote with someone else's card, they wouldn't have the same fingerprint as the cardholder.
- Once the voter has made his / her choices, his / her vote is automatically registered on the spot with an encryption code. Voting can be transferred to a regional or central server. At the end of the election day, votes are counted simultaneously at the polling station and in the central server. The results at the BV level must be identical to those of the central server.
- Such a system, well designed and properly implemented with the "relatively" adequate security measures, should greatly reduce processing times.

Reducing the volume of paper to be managed can save on the printing of newsletters but also on logistics, because the transport of sensitive materials accounts for a very heavy part in operations. Electronic voting eliminates the need to print 40 to 100 million electoral ballots of which only 25% will actually be used. The unused ballots are only pure losses in financial terms.

By multiplying checkpoints and checkpoints, e-voting should help the country to have more reliable elections, all things being equal, no voter can vote twice because it is possible to

associate a ballot Unique to each voter, accessible only after positive verification of the fingerprint.

Summary of the results of the analysis

As shown in Table 0-1 in Annex II, an investment of \$ US17 million in a dual-check electronic voting system (equipment and software) would make Haitian elections more efficient (speed of proclamation of results, reduced delays between the steps of the process, removal of some litigation management positions) and reliable, with very significant reduction of the possibilities of frauds and irregularities.

Among other benefits, e-voting will reduce direct spending with savings from elimination of ballot printing (US \$13 million), management of the tabulation center (CTV) (US \$4 million) The management of a plethoric staff (US \$2 million). The reduction of expenditure in these 3 items accounts for more than 70% in the reduction of expenses. Other smaller expenditures are also eliminated or reduced.

Moreover, the calculations showed that, thanks to electronic voting, gains of \$US6 million will be impacted by the shortening of the time between the different stages of the process. The effect of the change caused by electronic voting in increasing the number of voters (50% of voters represents an increase of more than 100% compared to the one million voters in 2016).

The amounts discounted at 5% of investments (\$US 17,000,000) and benefits (\$42 million vs. \$ US \$ 90 million) showed a benefit/cost ratio of 5.3. See table 0-1 in the appendix.

PV (5%)	\$17,068,000	\$90,954,010	5.3
---------	--------------	--------------	-----

1	INTRODUCTION.....	1
1.1	CONTEXT	1
1.2	INTERVENTIONS.....	2
2	CASE STUDIES - ELECTRONIC VOTING AROUND THE WORLD.....	2
2.1	ELECTRONIC AND ONLINE VOTING	2
2.2	A LONG PROCESS	3
2.3	RESISTANCE TO ELECTRONIC VOTING	3
2.4	CONCERNS	3
2.5	THE RISKS.....	4
2.6	SOME EXAMPLES OF COUNTRIES WHICH HAVE ADOPTED ELECTRONIC VOTING	5
	<i>Switzerland.....</i>	<i>5</i>
	<i>Estonia.....</i>	<i>6</i>
	<i>Brazil</i>	<i>7</i>
3	ANALYSIS AND PROPOSAL.....	8
3.1	FRAMEWORK FOR ANALYSIS	8
3.2	A RANGE OF POSSIBILITIES	8
	<i>Option 1: Phone card charging technology.....</i>	<i>8</i>
	<i>Option 2: The National Identification Card as an interface for electronic voting</i>	<i>9</i>
3.3	PROPOSED CHOICE: ELECTRONIC VOTING WITH DOUBLE VERIFICATION	12
	<i>What is electronic voting with double verification?.....</i>	<i>12</i>
	<i>Infrastructure required for electronic voting with double verification</i>	<i>12</i>
	<i>Double verification as a solution to process reliability.....</i>	<i>13</i>
4	COST-BENEFIT ANALYSIS.....	13
4.1	A BRIEF SUMMARY OF THE METHODOLOGY TO BE USED.....	13
	<i>Establishment of a basis of comparison of electoral systems</i>	<i>14</i>
	<i>Presentation of an alternative model.....</i>	<i>14</i>
	<i>Evaluation of the alternative model compared to the baseline 2016 CEP budget.....</i>	<i>14</i>
	<i>Development of indicators to determine the impacts (benefits) of the alternative model</i>	<i>14</i>
4.2	COMPARING THE CURRENT AND PROPOSED SYSTEMS.....	15
4.3	LIST OF EXPENSE ITEMS TO BE REMOVED AS PART OF THE PROPOSED SOLUTION	15
4.4	LIST OF EXPENSE ITEMS TO BE ADDED	16
4.5	LIST OF EXPENDITURE ITEMS MAINTAINED	17
4.6	ANALYSIS OF COST-BENEFIT RATIO	17

5	CONCLUSION	19
5.1	ORGANIZATIONAL FACTORS	19
5.2	ECONOMIC FACTORS	19
5.3	POLITICAL FACTORS.....	20
6	REFERENCES	20

Our thanks to Dr Frédérique Gérald Chéry and Dr. Brad Wong for their valuable contributions to the completion of this study.

1 Introduction.

1.1 Context

Since the fall of the Duvaliers, except on rare occasions, elections have always been a source of disappointment for the majority of the Haitian citizens. Very costly, generally very badly organized, they do not manage to bring the social and political stability hoped for by the Haitian population. On the contrary, they have disastrous political consequences for the country. The presence of MINUSTHA in the country is one of the consequences of the disputed results of the 2000 elections.

Electoral Councils have always been unable to prevent fraud and irregularities of any kind at the time of voting. Worse, they have always been unable to guarantee the reliability of the results proclaimed. These are some of the major causes of the lack of enthusiasm of Haitian voters for voting, with a turnout of less than 30% for the 2015 elections.

A well-developed electronic voting system can avoid most of the recurring pitfalls found in elections. If electronic voting can offer no protection against breakage, sabotage, fire, at least it can allow for reliable results where voting has not been physically disrupted by violent actions. The political class is very hesitant, initially, in relation to electronic voting, but are increasingly open to the solution.

However, electronic voting requires a different technological and organizational infrastructure than manual voting. Our purpose here is to show the feasibility of electronic voting in Haiti and the savings that the country can make and the guarantee of reliability, while presenting the risks of fraud that are also possible in electronic voting.

1.2 Interventions

The Haitian electoral system is very inefficient and costly at the same time. The inefficiency of the system stems from the fact that the Haitian state must mobilize the same levels of resources irrespective of the number of voters who turn out at the polls. At its lowest level, the electoral system is organized around the polling station (BV). Each BV must have a maximum of 400 voters. Therefore, at least 400 ballots are required by BV.

Moreover, the printing of ballot papers costs the Haitian State more than it should. This is because the greater the number of candidates in an electoral district, the larger the ballot.

In the information processing chain, upstream, voting materials are routed gradually to the voting center and so that they are available, year after year, at the time of voting. But the recovery of voting documents downstream is not done with the same level of professionalism found at the time of distribution of sensitive materials. Recovery operations do not follow, and this has serious consequences for the reliability of the documents reached at the Tabulation Center. It often happens that candidates have different copies of the same "single" minutes of a BV.

At the tabulation center (CTV), the electoral council must verify the minutes which may be falsified during the routing, unusable in certain cases of irregularities.

Un système de vote électronique bien étudié devrait permettre de résoudre la plupart de ces problèmes. Mais, le vote électronique n'est pas un panacée qui va résoudre tous les problèmes. Pour que les solutions proposées soit effectives, il faut que les agents du système à tous les niveaux donnent la preuve de leur volonté de collaborer à la réussite des élections.

2 Case Studies - Electronic voting around the world

2.1 Electronic and online voting

Electronic voting can be done in a number of different ways :

- It can be a manual vote with electronic counting (Argentina 2012, Cordoba)

- It may be a vote with an electronic machine not connected to the Internet
- It can be voting with connected machines in an intranet network totally independent from the Internet,
- It can be voting with machine connected in a private network Virtual Private Network exploiting the Internet network, while remaining isolated from it
- This may involve voting directly on the Internet, either by computer or by mobile phone (Estonia)

2.2 A long process

The implementation of an electronic voting system is a long process, about 10 years. No country has generalized such a voting system at first. Electronic voting systems have been tested, first, on a small scale in local or partial elections. In some countries such as Belgium and even Estonia, electronic voting is offered to citizens only as an alternative to traditional voting.

However, countries like Brazil and India have developed very simple but effective voting machines. But these machines, in their conception, do not take into account certain philosophical and democratic concerns which explain...

2.3 Resistance to electronic voting

In a study on the security of online voting sponsored by the Estonian National Electoral Committee, the authors identified the moral and democratic concerns and the risks associated with online voting. As online voting is at a much more advanced level than simple electronic voting, this analysis paper presents a comprehensive set of ethical and philosophical concerns about online voting and the risks associated with e-voting. Note that it is online voting or electronic voting on site, the questions are the same, except that the risks are greater with online voting.

2.4 Concerns

- The integrity of the vote is the guarantee that the results of the vote are correct and that they reflect the actual choices of the voters according to the law. The legal aspect concerns the following aspects: the voting authorization for the voter, the uniqueness of the vote (one voter, one vote), impossible falsification of the vote,

uniformity of vote (same system for all) To reverse with cancellation of the previous choice, hierarchy of the models (priority to the manual vote), possibility of the white vote.

- The secrecy of the vote, no one can be allowed to know for whom a voter has voted, if he has voted, etc...

The user-friendliness of the system, from a technical point of view, must be accessible and easy to use for all voters

The reliability of the system, the mechanisms must be transparent and public, and the voter must be able to ensure that his vote has been taken into account; authorized third parties must have the possibility to verify the conformity of the results with the votes. The recounting of votes must be possible without difficulty.

- The possibility of checking by other means, this concern requires the faithful duplication of the operations so as to be able to verify whether the results remain identical in all control points, and with other counting algorithms.

2.5 The risks

Most of the risks identified relate to the technological infrastructure (IT, telecommunications) used.

- The security requirement for the equipment used by the voter (computer, voting station, voting machine);
- The requirement for security at the public access point to the Internet;
- The need for security in the public network;
- The need for security at the central system level (reliability of the network of servers and computers);
- The inability to be able to serve all voters (the telecom network does not cover certain points of the territory, problem related to the capacity of the bandwidths, speed of execution on the network, recurrent crash of the computers because of the bottlenecks);
- Risks linked to the centralization of the process, possibility for individuals or groups

- (inside or outside) who control the technological environment of voting to sabotage or falsify results;
- Risks related to unauthorized changes in the basic data of the vote or results;
 - Risks linked to an approximate management of the system, software not thoroughly tested, incorrect parameterization of modules, weakness in the management of tasks, etc...

2.6 Some examples of countries which have adopted electronic voting

Switzerland

Switzerland is one of the most advanced countries in terms of electronic voting. The system was conceived as an extension of postal voting, already in use in the country. In voting by mail, the voter has two envelopes. An envelope with the address of the voter is used to receive a sealed envelope with the completed ballot. In this way, the secrecy of the vote is guaranteed, since the sealed envelope is only opened after being mixed with the other envelopes coming from the traditional system.

In order to use the electronic voting system, the Swiss voter, in 2016, only needed his voting card with electronic voting, his date of birth, his legal registration commune and a computer with a stable Internet connection.¹

- From his computer, he goes to the site of the vote: <https://www.evote-ch.ch/ge>
- He enters the number of his voting card
- He must confirm that he is aware of the criminal penalties incurred in case of fraud
- He makes his choice or his choice, in case of multiple votes ...
- It indicates its date of birth and commune of origin
- It checks after scratching if the secret code (hidden) of its card corresponds to what is presented by the computer
- He introduces his confirmation code to validate his vote
- The system returns a number also contained on the voting card to indicate that its ballot has been deposited in the electronic ballot box.

¹ Source: <http://ge.ch/vote-electronique/votations-mode-demploi>, consulté le 30 août 2016

In the case of Switzerland, we must mention that e-voting was only concerned with increasing voter turnout in the political life of their country. As a result, electronic voting is only a voting tool in addition to the citizen. In the popular vote of 28 February 2016, the results by voting channel gave the following figures: electronic voting 24.50%, postal voting 70.14%, voting by ballot 5.36%.

This system, which emphasizes the secrecy and reliability of voting, is not currently applicable in Haiti for three reasons: 1) Haiti is not yet familiar with the practice of postal voting; 2) it presupposes that each voter has easy access to a computer, which is not the case in Haiti; 3) the level of control of the computer tool in the population is neither convincing nor generalized enough to allow to consider the establishment of such a voting infrastructure in Haiti right away.

Estonia

Like the Swiss system, Estonian e-voting does not replace voting at the ballot box, which is predominant in the event that the voter has used both alternatives.

To use electronic voting, the Estonian voter needs his electronic identity card, two PIN codes and a computer connected to the Internet. The SIM card of the voter's mobile phone can also serve as an electronic identity card. The voter must connect to the site of the Electoral Commission to deposit its electronic envelope

- The Estonian voter must download an app (app) that allows him to access the site of the Electoral Commission
- The voter introduces their electronic identity card
- The voter confirms their identity with the first PIN
- The system presents the list of candidates with their number corresponding to their electoral district
- The voter makes a choice
- The voter confirms with the second PIN which plays the role of electronic signature
- The vote is associated with a random number, the public key and the private key of the voter and then is encrypted before being transferred to the server. The system

returns a unique number to the voter..

Online voting extends over a period of one week. It is suspended 48 hours before the voting day at the ballot box. The voter is allowed to vote multiple times. The system will only remember the last operation. He may cancel his electronic voting by voting at the ballot box on the day of the election.

The Estonian system also uses the double envelope principle which protects the anonymity and secrecy of the vote. The encrypted votes pass from server to server before arriving decrypted in a counting server. But in 2013 Assistant Professor J. Alex Halderman of the University of Michigan recommended to the Estonian authorities to abandon online voting because of several flaws discovered both in the design and in the management of the system.

As with the Swiss system, the Estonian system is a supplemental voting tool that does not rule out manual voting, at least for now. Some of the observations made for the Swiss model can be repeated: 1) it postulates that each voter has easy access to a computer, which is not the case in Haiti; 2) the level of control of the computer tool in the population is neither convincing nor generalized enough to allow the establishment of such a voting infrastructure in Haiti, at least immediately.

Brazil

« The first ballot boxes called "Brazilian ballot boxes" tried to fight the fraud problems identified by the TSE (death vote, multiple vote, etc.) ... The National Democratic Institute, which is an American research organization, Of the organization of elections, the TSE, the supreme electoral court, considered that electronic voting was the most effective way of fighting the "stuffing of ballot boxes"»²

Paradoxically, the Brazilian electoral authorities decided to "eliminate ballot boxes, ballots and electoral cards" to combat fraud and stuffing of ballot boxes. The voter is identified at the time of voting.

The Brazilian model is the most mentioned model in Haiti. It is presented as the most reliable system, designed to withstand ballot box stuffing, with identification of the voter at the time of

²Source: Electronic voting in Brazil

<http://sanzgallo.com/wp-content/uploads/2015/07/Le-vote-electronique-au-Bresil.pdf>, consulté le 31 août 2016

voting. What is the response of the Brazilian system if a Haitian elector decides to vote in two different electoral districts? What is the response to the sequestration of voting cards?

3 Analysis and proposal

3.1 Framework for analysis

In a country like Haiti where unemployment is high, elections are generally a source of income for a large number of unemployed young people. Indeed, more than 50,000 members of the Voting Office, security agents and supervisors are mobilized on voting day, as well as the agents who work for 3 months at the level of the communal and departmental offices.

Electronic voting, although employing technically more qualified staff in information technology and communications, can not be considered a source of job creation. The search for efficiency in electronic voting must be conceived in terms of reliability, speed and reduction in the costs of operations. It can also be seen as an approach to achieving electronic governance.

As a result, we will analyze the effectiveness of electronic voting from two angles:

- The first economic (show how it will cost less to the country, if it happens to set up an electronic voting system);
- The second organizational (show how voting can ease the burden on human resources, logistics, and the electoral machinery).électorale).

3.2 A range of possibilities

There are several ways to do electronic voting. We will present two possible generic models that may have variants in their implementation. The first model is a replication of the phone card charging system, very common in the country. The second model is a more classical approach with presentation of the voter at the polling station.

Option 1: Phone card charging technology

This model is simpler and cheaper. It consists of adapting the technology of charging phone cards to electronic voting. Extremely simple and without major complication for the voter, it

sends an SMS message to a number indicating the voter's choices. He or she can also be guided by the software on their phone.

Table 3-1 : Variants of the card-charge model

Variant	Steps	Advantages	Disadvantages
Vote by telephone with identification card number.	i) The voter from a mobile phone between an access number to the electoral system and the number of his or her National Identification Card (CIN) eg: * 999 * CIN #. ii) The system checks the CIN. iii) If the CIN is validated, the system displays the list of candidates and their number iv) The voter enters his / her candidate's number and v) Send vi) A confirmation by SMS is sent to the voter - Immediate result of the vote	<ul style="list-style-type: none"> - Instant result of the vote - The cost of voting by elector for the Haitian state is comparable to the cost incurred by a telephone company for a recharge of minutes. - Simplicity in the process. - Procedural knowledge already widely diffused throughout the population. 	<ul style="list-style-type: none"> - The system does not know if the person voting is the actual holder of the CIN number. - The system is not transparent. The system can not be controlled by an independent entity. - Possibility of bottleneck at certain times of the day - Possibilities of fraud from the electoral machine exist
Voting by telephone from a secret number.	i) Each voter is registered, with an imprint as a voter for the next elections in an office assigned for that purpose. A card with an encrypted number is given to him; ii) The voter calls an electoral system access number and the secret number, eg: * 999 * Secret #, as for a card recharge. iii) The system checks the secret number. iv) If the number is validated, the system displays the list of candidates and their number v) The voter enters the number of his / her candidate and vi) Send (Send) vii) Confirmation by SMS shall be sent to the voter	<ul style="list-style-type: none"> - Instant result of the vote - The system knows in advance the number of potential voters - The cost of voting by elector for the Haitian state is comparable to the cost incurred by a telephone company for a recharge of minutes. - Simplicity in the process - Procedural knowledge already widely diffused throughout the population. 	<ul style="list-style-type: none"> - The voter is obliged to register to obtain his secret number - The system does not know if the person who votes is the actual holder of the secret number. Voting Trading, Voting Card Market - The system is not transparent. The system can not be controlled by an independent entity. - Possibility of bottleneck at certain times of the day - Possibilities of fraud from the electoral machine exist

In order to guard against irregularities and the possibility of fraud, further organizational improvements can be made to this model. However, true democratic control of the process eludes voters, because nobody knows who actually voted with the phone.

Option 2: The National Identification Card as an interface for electronic voting

The approach of using the National Identification Card as an interface of electronic voting offers as a first advantage the redundancy of the enrollment list. With this approach, the reader of an electoral district can vote in any office in his or her constituency. This freedom to vote in any BV can be extended to the whole country. The voter votes at any point in the national territory, but

has access only to the data of his electoral district. As for the system based on the principle of charging telephone cards, several variants can be envisaged for its deployment.

The electoral map has the advantage of having two digitized pieces of information on the person. The two must correspond with the right person so that they can vote.

The voter introduces his card into a device that reads his card number. The system checks if the card number is in the constituency database. The system also checks the voter's fingerprint. If the data, card number and fingerprint match the voter then has access to an ergonomic system that allows him / her to make his / her choices as easily as possible.

Depending on the level of reliability sought, the system can generate a paper bulletin that can be deposited automatically in the ballot box. An encrypted receipt of the vote can be given to the voter with a randomly generated sequence number, without indication of the voting or card number. Depending on the choice of the solution, the vote can be transferred immediately or at the end of the day to a central or regional server. However, a counting of ballots is also done in the polling station. Voters should be able to verify their vote against the encrypted number of the receipt. Counting of the ballots would be done one by one in the printing of the ballots, with cumulative total per candidate and sum total at the end of the list.

Voters have 3 levels of control to ensure that their votes have been taken into account. The manual counting of the ballots if necessary, the automatic counting with display of the list of votes, at the level of the polling station; And finally, the central count. The 3 counts should correspond to the proceedings taken place without any incident.

Table 3-2: Alternatives to the Electronic Voting Model

Variant	Steps	Advantages	Disadvantages
Direct voting on the CEP website	<ul style="list-style-type: none"> i) The CEP makes the internet voting infrastructure available to voters ii) The voter presents himself / herself to the Voting Office with his voting card, he can do it also from a personal computer iii) He signs with his card (CIN) to have access between a number of the electoral system and the number of his National Identification Card (CIN) ex: * 999 * CIN #. I iv) The system checks the CIN. v) If the CIN is validated, the system displays the list of candidates and their number vi) The voter enters the candidate's number and vii) Click on a button to send its validation message to vote viii) Confirmation by SMS is sent to the voter 	<ul style="list-style-type: none"> - Those without a computer do not need to go to a polling place. - Instant result of the vote - Vote counting is automatic - Voters may request verification of their ballot 	<ul style="list-style-type: none"> - Internet coverage is not guaranteed or reliable - The system does not know if the person voting is the actual holder of the CIN number. - The system is not transparent. The system can not be controlled by an independent entity. - Possibility of bottleneck at certain times of the day - The possibilities of fraud from false cards exist. - The manual system must always be available
Electronic voting without internet access	<ul style="list-style-type: none"> i) The CEP makes the voting infrastructure available to voters ii) The voter shall present himself at the Voting Office with his voting card, iii) signs in with his / her card (CIN) to access the system iv) The system checks the CIN. v) If the CIN is validated, the system displays the list of candidates and their number vi) The voter enters the candidate's number and vii) Click on a button to send the validation message 	<ul style="list-style-type: none"> - Immediate result of voting at the voting center - Vote counting is automatic - Voters may request verification of their ballot 	<ul style="list-style-type: none"> - Effective verification of identity by an agent is neither guaranteed nor reliable - The system does not know if the person voting is the actual holder of the CIN number. - The possibilities of fraud from false cards exist. - E-bulletins must be electronically transferred or sent to collections centers
Double-verification electronic voting with internet support	<ul style="list-style-type: none"> i) The CEP makes the voting infrastructure available to voters ii) The voter shall present himself at the Voting Office with his voting card, iii) signs with his / her card (CIN) to access the system iv) He presents his thumb to the fingerprint reader v) The system checks the CIN and the fingerprint. vi) If the CIN and the fingerprint are validated, the system displays the list of candidates and their number vii) The voter enters the candidate's number viii) Click on a button to send the validation message 	<ul style="list-style-type: none"> - Verification of identity is done by computer and not by an agent - Immediate result of voting at the voting center - Vote counting is automatic - Voters may request verification of their ballot - The count can be done locally at the level of the BV or the voting center - A copy of the ballot count is printed 	<ul style="list-style-type: none"> - Possible fault in the fingerprint reading technology - Slight increase in voting time required by reading the imprint - Increase the cost of the voting machine with additional equipment (fingerprint reader, printer)

3.3 Proposed choice: electronic voting with double verification

The choice we propose, as the most appropriate solution to all the problems that Haiti is experiencing with its elections, is the electronic voting system with double verification. This choice responds to most of the challenges posed to electoral administration.

What is electronic voting with double verification?

Double verification consists of verifying the number of the voter with respect to his fingerprint. Even if the voter can entrust his voter's card to a third person, he can not entrust his fingerprints to him. Thus, the voter is required to provide both information to the machine (computer) before being able to vote. He will only have access to the voting system if he passes the 2 checks.

Infrastructure required for electronic voting with double verification

The infrastructure is to be considered at several levels: Central Office, Communal Electoral Office, Voting Center.

At the Central Office level, the central voter table is broken up into several small tables, one table per electoral district. Each computer in a voting center will have a copy of an excerpt from the central table for voters in the electoral district. This table will contain only the CINs, names and fingerprints of the constituency voters. This approach can be taken up at commune and department level if regional controls are considered.

At the polling station: In each polling station, the voting machine is a set of equipment assembled in order to facilitate logistics. This package will include a computer with a touch screen with a diagonal dimension of 27 inches or more if possible, a magnetic card reader, a fingerprint reader and a receipt printer (33-48 columns) .

How is the voting process conducted? The voter presents himself in front of the computer, introduces his voting card (CIN), presents his thumb to the fingerprint reader. The machine checks both data. If they match, the options are displayed. The voter then chooses his candidate (s) just by pressing the square of his choice. On the ergonomic level, the system is studied to

allow the voter to complete his choice as he does for calls and the sending of messages on his telephone. As soon as he has his vote recorded, an encrypted copy of the vote is printed for the voter. A copy is kept in the printer roll.

Double verification as a solution to process reliability

Double verification eliminates any possibility of sequestration of the voter's card by a political party or a candidate. Some political parties or candidates are in the habit of demanding the electoral support of certain voters with whom they negotiated the cessation of the card.

Because there is only one key-only record available to the voter, this option makes it impossible to clear the ballot boxes and multiple votes. At the constituency level, depending on the level of the polling station's network infrastructure, the system can disable access to a reader's registration from the first vote so that it can no longer access a " try again. A second screening check can be performed to determine if a reader has voted or attempted to vote more than once. All these checks can be done discreetly by the system.

Irregularities, such as: absence of signature, names not on the enrollment list, CIN numbers absent or incorrectly carried over to the control sheets, incorrect summing of votes in the minutes, labels that do not match numbers in numbers, etc., are automatically avoided.

4 Cost-Benefit Analysis

4.1 A brief summary of the methodology to be used

One of the requirements made by Haiti Priorise for the completion of this study is the calculation of the Advantage / Cost ratio. This led to the following methodological approach, consisting of these steps:

- 1) Establishment of a basis of comparison of electoral systems
- 2) Presentation of the alternative model.
- 3) Evaluation of the alternative model compared to the basis of comparison

- 4) Development of indicators to determine the impacts (benefits) of the alternative model
- 5) Calculation of the ratio of benefits to costs

Establishment of a basis of comparison of electoral systems

At the time of writing, our alternative model was already ready. But there was no basis for comparison for calculations. Detailed budgets of the various elections are impossible to find even with the electoral body. Figures giving an overall estimate of the elections are available but without any details on the items of expenditure. Fortunately, the last electoral council, set up at the beginning of 2016, published its detailed budget for the 2016-2017 elections. It is this budget that will be used as a basis for comparison for the proposed model.

Presentation of an alternative model

The alternative model is the one we proposed in Chapter 3 entitled electronic voting with double verification.

Evaluation of the alternative model compared to the baseline 2016 CEP budget

The alternative model would require much more study than what we propose, because the concern for the effectiveness of electronic voting may require a completely different organization compared to what is done in the country. But this perspective is outside the scope of this presentation. As a result, we have decided to carry out a budget-by-item analysis of the budget to determine which expenditure will be affected by the alternative model, and in what direction. We found expenditures that would be eliminated, such as the printing of ballots and the tabulation center. It has been found that logistics expenses will be reduced due to the volume of paper that will be replaced by computers. But other items of expenditure will be maintained. These mainly concern the administration of the process, promotional campaigns and part of the logistics. These costs will give us the total cost of the alternative model.

Development of indicators to determine the impacts (benefits) of the alternative model

The measurement of impact requires the development of different types of indicators. Most indicators are average costs based on values taken in expense items and other values such as the

number of offices, center of voting, voting, used or unused ballots, process steps, and so on. **Table 4-5**, presented in the Appendix, lists the indicators used and their method of definition.

4.2 Comparing the current and proposed systems

For the analysis of the economic benefits, the analyses are made from the budget document of the elections of 2016-2017, as has already been stated. The results of the calculations are presented in **Appendix Table 4.1**. We use the same items of expenditure as those in the election budget. In the first column of the table we find the items coded by the CEP. In the second column are the amounts of all expenses as foreseen by the CEP. The 3rd column presents the amounts of expenses that will be maintained in spite of electronic voting. The fourth column presents the savings to be achieved due to the deletion of certain tasks. The fifth column presents the new expenses that will be caused by the electronic voting. The 6th column, which is the total of retained expenditure and new expenditure, gives the final amount of expenditure for each heading for the proposed alternative model.

The budget for the 2016-2016 elections is estimated at \$US55 million by the CEP. By using electronic voting, without a thorough analysis of the organizational infrastructure, we were able to reduce this budget to \$US36 million, at least in our calculations. Over \$US25 million was rejected through electronic voting. The four major items of these spending cuts are: voting equipment acquisition (\$US13 million), tabulation center (\$4 million), application management (\$US3 million), election staff (\$US2 million). It should be noted that the material and tab center posts account for about 70% of the savings to be realized.

4.3 List of expense items to be removed as part of the proposed solution

Table 4.2.2, presented in the Appendix, provides a list of items that have been totally or partially deleted. Some items of expenditure whose descriptions are too broad have been left as they are, because they do not make it possible to assess their justification from the technical point of view. This suggests that more analysis of the efficiency of the organization of the electoral machine should reduce other items of expenditure.

4.4 List of expense items to be added

Table 4-3 in the Appendix shows the 3 main items of expenditure to be added. By maintaining the distribution of the polling stations as they appear in the 2016-2017 election budget, we will need about 11,000 computers. Each unit (computer, magnetic card reader, fingerprint reader, printer) should cost about \$US1024.00 which will be amortized in 5 years. The amount allocated makes it possible to select robust equipment that can cope with the constraints of the environment, for example: a running time of 10 hours.

The other major item of expenditure is the development of electronic voting processing software. The electronic voting software, as envisaged, must be a software that is simple in terms of its functionality: creation of a database per electoral district, automatic voter identity checking and ballot BV and the transfer of electronic data via the Internet directly to the central office of verification and counting. **The Internet tool will only be used for the transfer of the encrypted data to the central audit and tabulation office.** One of the important factors in electronic voting is the ergonomic aspect, which should enable the voter to use the user easily and easily. For this purpose, tests at 1% of the electorate (60000 voters) should make it possible to judge the ergonomic aspect and the voting procedure. A test with 10% of the electorate (600000 voters) must conclude with the choice of a satisfactory configuration adapted to the Haitian voter. Computer scientists and ergonomists will decide the best way to realize this software.

Electronic voting will require a significant reassignment of staff, workstations will be removed to accommodate other positions required for electronic voting. Training, communication and logistical support positions will be reoriented according to the requirements of electronic voting. In this sense, e-voting will require fewer but better trained staff for setting up networks in voting centers, for emergency interventions, for dealing with contingencies and for assisting voters in difficulty. In the latter case, one will take care to isolate a computer for the training and the demonstration of the process.

Table 4-1 : List of expense items to be added

Heading	Indicated Activities (Expenditure Added)	Total
1.141	Internet service installation	15,450.00
1.041	Depreciation Electronic Voting Management Software	200,000.00
5.012	Depreciation of computer equipment by polling station / 5 years	2,628,000.00
	Total	2,843,450.00

4.5 List of expenditure items maintained

Table 4-4 lists the items of expenditure that will be maintained with electronic voting. Generally, these are posts related to personnel administration, communications campaign, staff training and logistics, while taking into account, however, the reallocations mentioned above.

4.6 Analysis of cost-benefit ratio

Table 4-2 : Comparison of BCRs at different rates

Categories	0	1	2	3	4	5
Cost of Investments	\$17,068,000					
Earnings from Elections		42,392,491				
Profit from Elections Not Recovered			36,539,062			
Profit on second round (50%)					21,196,245.31	
TOTAL COSTS	\$17,068,000					
TOTAL BENEFITS		42,392,491	36,539,062	-	21,196,245	
	3%	5%	12%			
Discounted Costs (Present Value)	\$17,068,000	\$17,068,000	\$17,068,000			
Updated Benefits	\$94,431,918	\$90,954,010	\$80,449,752			
BCR (Profit / Cost Ratio)	5.5	5.3	4.7			

Three elements were selected for the analysis of the BCR. The cost of investments (hardware and software), the expected benefits of elections carried out with e-voting (savings, benefits from reduced deadlines, and confidence in the system, All of these factors have been discounted at different rates shown in **Table 4-7**.

From the point of view of the Advantage / Cost analysis, the e-voting project is far preferable to the current voting system. This is indicated by the 3 ratios (5.5, 5.3, 4.7) shown in **Table 4-7**.

5 Conclusion

5.1 Organizational Factors

The following table summarizes the benefits that an electronic voting system with dual verification can bring to the country:

	Manual voting	Electronic voting with double verification
1)	From the convocation of the people to the proclamation of the last results, the manual electoral system needs more than 4 months to complete the operations. The counting stage is the most time consuming.	Electronic voting allows results to be obtained immediately after the close of business.
2)	Manual counting provides no guarantee of voting reliability, as the minutes may be poorly completed and falsified at all stages, from filling them up to routing to the tabulation and verification center.	Electronic voting allows multiple control points to guarantee the reliability of the vote. Each voter has a receipt of his / her vote, the vote is recorded electronically in the polling station, the vote is transferred to the central server. The list of votes is displayed or printed in the polling station
3)	The time is lengthened by the fact that candidates will challenge the same minutes with different information.	There is no longer any possibility of falsification of the minutes, since the counting can be resumed at various points of the system. The system is redundant.
4)	The electoral machine mobilizes important personnel in the polling stations, electoral agents, agents, observers, security agents	Personnel may be reduced at will to have a limited number of technicians to assist voters, initiate operations and print voting lists in each office.
5)	Whatever the level of participation of the population, manual voting mobilizes the same amounts of human and financial resources. Example: 400 ballot papers for polling stations where less than 20% of the population will vote	Because the ballot is eliminated, electronic equipment in a voting center can be used effectively. The computers are switched on according to the number of voters.
6)	Manual voting requires the voter to appear in the BV designated by the electoral body	With electronic voting, the voter can vote in any polling station in his or her electoral district

5.2 Economic Factors

The election budget (presidential and senatorial) is \$US55,000,000.00 (fifty five million & \$ 0/00 dollars). We have achieved savings in the order of US \$18,460,938.00 (eighteen million

four hundred and sixty thousand nine hundred thirty-eight and \$ 0/00) without the proper organization of the electronic system. This represents a saving of more than 34%.

These savings were achieved by removing the cost items related to the printing of ballots and operations at the Voting Center.

However, new expenses related to the introduction of electronic voting must be taken into account. In these expenses are included: new equipment: computers, fingerprint reader and printer. An equipment investment of \$US1200.00 (one thousand two hundred dollars) per polling station amortized over 5 years. This gives an amount of US \$240.00 (two hundred and forty dollars).

5.3 Political Factors

The most anticipated gain with e-voting would be to see Haitians regain confidence in the country's institutions by demonstrating that they can set up reliable, transparent institutions that respect their will.

6 References

- (1) Droulers M. (2010). FEMMES, VOTE ET POLITIQUE AU BRESIL
- (2) Halderman J and Hursti H., Kitcat J, MacAlpine M., Finkenauer T, Springall1 D. (2014). Security Analysis of the Estonian Internet Voting System. Technical report - May 2014
- (3) Hari K. Prasad, Halderman J., Gonggrijp R (2010). Security Analysis of India's Electronic Voting Machines
- (4) Jazi Zoubeir (2015). Pourquoi le vote électronique n'est-il pas généralisé? francais@rcinet.ca. Consulté en août 2016
- (5) National Electoral Committee (2010). Sous la direction de Ansper A. E-voting concept security:analysis and measures. Tallinn 2010
- (6) Pour ou contre le vote électronique? ENTRETIENS>THIERRY BOUTTE ET MONIQUE BAUS
Publié le mardi 20 mai 2014 à 20h50 - Mis à jour le mercredi 21 mai 2014 à 15h14
- (7) The National Republican Institute for International Affairs (1991).The 1990 Elections in Haiti

- (8) Ulloa F. (2006). Cost of Registration and Elections.http://aceproject.org/ace-en/focus/core/cre/cry_ht, consulté le 14 décembre 2016
- (9) United States General Accounting Office(1996).Haiti: U.S. Assistance for the Electoral Process

Appendix I

Extract from the analysis document of Dr Frédéric Gérald Chéry, October 17, 2016:

"Collective Choices and Individual Rationalities: The Case of Electronic Voting"

It is a matter of comparing the two methods of voting, paper and electronics. With paper, voters choose one of the candidates who are photographed on a sheet of paper. With the electronics, the voter presses a button, perhaps two buttons, to vote his candidate. The voter is supposed to know the candidate for whom he is to vote. The technical options for electronics depend on the degree of transparency and user-friendliness that the national authorities wish to give to the political system and the voters. A favorable bias suggests that the computerized processing of certain electoral operations may contribute to a reduction in election management and lower election costs, while facilitating greater reliability of the results.

We need to compare paper voting and electronic voting from an economic point of view and consider how the country can conduct e-voting. These issues can be discussed to help citizens and decision-makers understand the technical issues involved in voting, as well as the reforms that need to be carried out in order to improve a solution or put in place a new voting system.

In an economic analysis of the vote, its interest lies not only in politics, but also in terms of economy in the short term, during an electoral process. For after the vote, citizens must expect choices of public policies depending on the credibility of the electoral process.

In raising this issue, we need to consider three questions:

1. The way in which political and administrative actors create collective resources to have an electoral system that will advance society. These are the structural conditions of voting;
2. The results of the vote according to the conditions of its conduct, which we shall see with the paper vote;

3. Possibilities to reduce costs that will be created with electronic voting, and also the political conditions that will be generated with a better voting to have legitimate and better elaborated public policies.

On the other hand, due to the ineffectiveness of the policies of the State and especially the weakness of the political debate, the Haitian citizens attach a mixed importance to the elections. Yet citizens see that politics allows elected people to improve their living conditions. And since job prospects in the productive sector are rather scarce, many citizens rely on elections to secure an income, through a political position. One of the few ways to ensure a substantial income is to win in an election, even through fraud.

Since its foundation, citizens have always regarded the state as an opportunity to earn income through a political or administrative post. It is not perceived as an instrument of the general interest.

In this context, individuals who intend to defraud during the elections have the opportunity to exploit certain flaws in the electoral administration, including the poorly maintained voter lists and enrollment lists. This lack of information makes it impossible to punish certain anomalies, including the stuffing of ballot boxes.

1. The weakness of scientific research in Haiti, which is incapable of showing government officials how to improve the current electoral system by drawing lessons from experience;
2. The weakness of the identification system of the National Office of Identification (ONI), and the methods of updating the data on citizens called to vote;
3. The weakness of the control of the electoral vote facilitating ballot boxes and of certain citizens to vote several times speaking of the ballot with irony;
4. The continuing deterioration of the electoral system resulting in the disengagement of the policy by the general public;

5. The provision of budgetary resources as the only strategy to improve the elections, a strategy that brings increasing and exorbitant costs to the elections, despite the doldrums of the Haitian economy.

This administrative and political environment of the electoral system will not lead to a good election. For the CEP can not alone guarantee the administrative and political conditions that other political and administrative actors are not in a position to assume.

When several elections are held at the same time, participation in voting becomes an exhausting exercise for the ordinary citizen who must read at least 68 looks or signs of candidates if he wants to vote for all electoral positions. It was the case for the elections of August 2015 ... To vote in the first three levels, the voter of the 3rd constituency of Port-au-Prince had to read 56 faces of candidates for the presidency, 34 for the senate 41 and signs for the deputation. The most requested voter must read 131 faces of candidate to make his three choices.

After the vote, it is difficult in most of the affected public entities, especially the executive and city councils, to make economic choices. For the conditions of the vote leave a lot of bitterness and mistrust among the citizens. Some remain traumatized. Supporters of elected officials want a return of benefits for actions committed during the electoral process. Voting removes citizens' confidence in the institutions of the state and in their capacity as citizens.

1- With electronic voting, expenses for the design and manufacture of ballots will disappear at item 2 of the budget above. On the other hand, electronics requires software, computers and printers and plain paper during voting, depending on the choice of the CEP to give each voter a written copy of his vote;

2- The number of employees of the center of tabulation will have to decrease in total because the results are calculated automatically. Expenses under item 7 may be used for new IT equipment expenses;

3- The effort will concentrate on the maintenance of electoral lists, in particular at the level of the ONI;

4- Jobs will be concentrated in the voting centers and the preparation of the voters. The preparation of voters can be an outsourced activity, at the expense of town halls, parties and citizens' associations. The workload within the polling station may be reduced, if the secretary does not write on the attendance sheet and if this is done by the voting software;

5- Advisor expenses for item 8 will have to be revised downwards, as expertise will include the design of election management software. However, it is not excluded to have transport expertise to transport computer equipment;

6- The IT infrastructure will be more consistent (software, computers, printers, internet). Here, the technical choices are many, and some more expensive than the others;

7- It will be possible to arrive at a regional deconcentration of the voting system, once the IT organization is robust and effective;

8- Field visits and support for coordination and management of the electoral process should be reduced.

The way in which the ballot is organized can contribute to improving the confidence of citizens in political life and engaging them in collective choices. By reducing the possibility of fraud, politicians will be able to reassure voters about the credibility of the process, bring candidates to make better proposals to voters, and reassure passive citizens, due to the fear of fraud, to interest in political life. These gains do not focus on minimizing election costs, but also on improving the credibility of the process. In the end, citizens will have more confidence in the political system. The CEP will facilitate an improvement of the confidence of the citizens in the political system by increasing the economic importance of the results of the vote.

Appendix II

Table 6-1 : Table of Costs and Benefits

Interventions	Benefits	Costs	BCR	Data Quality
Nombre de machines à voter (ordinateur, lecteur d'empreinte , imprimante)		10,950		
Coût par machine		\$1,240		
Coût des machines à voter		\$13,578,000		
Coût du logiciel de vote		\$1,000,000		
		2,490,000		
A. REDUCED COSTS FOR THE ELECTIONS				
	25,597,968			
1. Structure organisationnelle du CEP renforcée	262,750			
2. Acquisition matériel électoral	13,148,476			
3. Liste électorale mise à jour, imprimée et disponible	570,200			
4. Gestion dépôt de candidature, tirage au sort et accréditation assurée	3,778,980			
5. Centres de vote et personnel électoral disponibles	2,456,887			
6. Campagne d'éducation et d'information renforcée	-			
7. Centre de Tabulation de Vote (CTV) fonctionnel	4,483,675			
8. Assistance technique	897,000			
9. Appui à la Coordination et à la gestion du processus électoral	-			
x. Frais de Gestion	-			
B. TIME SAVED				
	6,545,276			
I- Réduction des délais de production de	1,026,515			
II- Réduction des durées de Livraison	2,461,091			
III- Réduction des délais de Publication	886,200			
IV- Réduction du nombre de contestation	1,677,370			
VI- Réduction des délais dans le processus de vote	494,100			
C. GREATER VOTER PARTICIPATIOIN	10,249,247			
Nombre de votants actuels	1,000,000			
Projection de Votants à cause de e-voting	2,745,000			
Prix marginal de la volonté de voter	6			

Total	42,392,491	\$17,068,000		
PV (5%)	\$17,068,000	\$90,954,010	5.3	

Table 6-2 : Table of comparison between the current model and electronic voting

Rubriques	Budget CEP 2016-2017	Montant Maintenu	Montant Rejeté	Montant Ajouté	Total Nouveau Budget
(1)	(2)	(3)	(4)	(5)	(6) = (3)+(5)
1. Structure organisationnelle du CEP renforcée	2,426,750.00	2,164,000.00	262,750.00	215,450.00	2,379,450.00
2. Acquisition matériel électoral	13,148,476.00		13,148,476.00		-
3. Liste électorale mise à jour, imprimée et disponible	610,280.00	40,080.00	570,200.00		40,080.00
4. Gestion dépôt de candidature, tirage au sort et accréditation assurée	10,614,521.00	9,322,521.00	3,778,980.00		9,322,521.00
5. Centres de vote et personnel électoral disponibles	16,831,134.00	16,180,847.00	2,456,887.00	2,628,000.00	18,808,847.00
6. Campagne d'éducation et d'information renforcée	2,490,000.00	2,490,000.00			2,490,000.00
7. Centre de Tabulation de Vote (CTV) fonctionnel	4,683,675.00	200,000.00	4,483,675.00		200,000.00
8. Assistance technique	897,000.00		897,000.00		-
9. Appui à la Coordination et à la gestion du processus électoral	2,204,960.00	2,204,960.00			2,204,960.00
x. Frais de Gestion	1,093,204.00	1,093,204.00			1,093,204.00
Grand Total	55,000,000.00	33,695,612.00	25,597,968.00	2,843,450.00	36,539,062.00

Table 6-3 : List of expense items maintained or reassigned

Rubriques	Activités indicatives (dépenses maintenues ou réaffectées)	Total
1.02	Consultant en gestion de bases de données – senior	30,000.00
1.03	Consultant en gestion de bases de données – junior	25,200.00
1.06	Techniciens attachés à la DRE	1,117,200.00
1.07	Équipement minimum dans chaque BEC pour techniciens	229,500.00
1.08	Plateforme technologique (Services Microsoft AZURE)	7,200.00
1.1	Imprimantes multifonctionnelles	5,000.00
1.11	Appareil pour reliure	5,000.00
1.12	Spécialistes nationaux attaches aux Bureaux des membres du Conseil Électoral dans les domaines de la gestion du personnel vacataire, planification	600,000.00
1.13	Photocopieuses à grande capacité	15,000.00
1.14	Installation service internet	7,500.00
1.15	Service mensuel int	122,400.00
3.06	Connexion internet dédiée haut débit	10,080.00
3.08	Impression formulaire Requête Changements de CV (contingence)	30,000.00
4.38	Carburant Génératrices BEC (142 génératrices)	454,400.00
4.37	Carburant Motos BEC (142 motos)	362,100.00
4.36	Carburant Génératrices BED (11 génératrices)	93,500.00
4.35	Carburant Voitures BED (22 voitures)	88,000.00
4.01	Impression Guides d'enregistrement des Candidats (BED & BEC)	850.00
4.02	Impression Memento à l'usage des candidats	2,000.00
4.03	Achat d'exemplaires de la Loi Électorale	15,000.00
4.04	Impression Formulaires de dépôt de candidature	4,000.00
4.05	Per diem BED pour convocation au CEP	9,504.00
4.06	Per diem Formateurs BED & BEC – dépôt de candidature	864.00
4.07	Per diem Coordonnateur BED & BEC – dépôt candidature	1,008.00
4.08	Per diem Avocats BCEN – dépôt de candidature	3,024.00
4.09	Per diem Chauffeurs – dépôt de candidature	1,440.00
4.1	Per diem Formateurs – dépôt de candidature	864.00
4.11	Per diem Coordonnateurs – Tirage au sort	3,696.00
4.12	Per diem Chauffeurs – Tirage au sort	768.00
4.13	Per diem Personnel BEC – Tirage au sort	16,614.00
4.34	Appui Logistique electorale - Achat de services	4,800,000.00
4.31	Impression Guides Formation Superviseurs ASE	924.00
4.15	Fonds de roulement BED pendant période électorale (montant fixe par mois)	176,000.00
4.16	Fonds de roulement BEC pendant période électorale (montant fixe par mois)	1,249,600.00
4.3	Impression Guides Formation ASE	36,450.00
4.17	Frais opérationnels (Tirage au sort MBV)	26,400.00
4.18	Location de véhicules (11 départements)	17,600.00

Rubriques	Activités indicatives (dépenses maintenues ou réaffectées)	Total
4.19	Carburant (11 départements / voitures /aller-retour)	4,785.00
4.2	Frais CEP (photocopies, carte cell., copies contrat MBV, etc.)	53,000.00
4.21	Acquisition Uniformes MBV	175,200.00
4.29	Impression Guides Formateur	900.00
4.22	Acquisition Uniformes Superviseurs Centres de Vote	36,000.00
4.23	Acquisition Badges identification Superviseurs Centre de Vote	22,500.00
4.24	Acquisition Uniformes, Matériels & Équipements ASE	435,730.00
4.25	Exécution payroll personnel électoral	940,000.00
4.28	Impression Guides Formation Superviseurs MBV	27,000.00
4.27	Impression Guides Formation MBV	262,800.00
5.09	Frais de formation et per diem/collation contentieux (Avocats et Juges-Magistrats)	250,000.00
5.08	Paiement Frais de formation, Per Diem et Honoraires Avocats et Juges/Magistrats BCEC, BCED, BCEN	650,287.00
5.07	Paiement Honoraire Personnel Centre de Réception PV et de distribution/Frais de collation	266,520.00
5.06	Paiement Honoraires et Frais de securite electorale – ASE	3,931,480.00
5.05	Paiements Honoraires et Perdiem Formateurs (111) et Superviseurs (4500) et Autres	3,628,360.00
5.04	Emolument et Frais accessoires personnel vacataire	5,766,400.00
5.03	Frais de loyer Centres de Vote	225,000.00
5.02	Location tentes pour Centres de Vote	2,800.00
5.01	Location Mobiliers Centres de Vote	1,460,000.00
6.04	Production d'outils de sensibilisation	600,000.00
6.03	Support Audiovisuel (y compris la diffusion)	800,000.00
6.02	Centre Médiatique pour le CEP	90,000.00
6.01	Mobilisation et Sensibilisation	1,000,000.00
7.07	Achat Equipements et Materiels Roulants	200,000.00
9.01	Staff et fonctionnement (location, équipement, entretien, fourniture)	2,204,960.00
ii.	Frais de Gestion	1,093,204.00
	Total	33,695,612.00

Tableau 6-4: List of expenditure items to be removed with electronic voting

Rubrique	Activités Indicatives (dépenses rejetées)	Total
1.01	Complément Matériels & Équipement BED et BEC	75,000.00
1.04	Logiciel Gestion Administrative et Numérisation des Archives	148,000.00
1.05	Formation	12,000.00
1.09	Réaménagement du Centre d'Impression des Listes au CTV	25,000.00
1.16	Coffre-fort BED	2,750.00
2.01	Matériel sensibles et non sensibles	13,148,476.00
3.01	Impression des listes électorales	300,000.00
3.02	Travaux préparatoires	50,000.00
3.03	Operateurs	102,000.00
3.04	Superviseurs	7,200.00
3.05	Frais d'appels entrants	100,000.00
3.07	Frais d'activation	11,000.00
4.341	Appui Logistique electorale - Achat de services	1,200,000.00
4.33	Bureaux Régionaux MINUSTAH/DJESC (animaux, porteurs, etc.)	200,000.00
4.32	Aide-mémoire (transmission, pv dépouillement, pv carence, pv irrégularité, pv incident)	292,000.00
4.271	Impression Guides Formation MBV	65,700.00
4.26	Mission de terrain – Conseillers	400,000.00
4.251	Exécution payroll personnel électoral	235,000.00
4.211	Acquisition Uniformes MBV	43,800.00
4.161	Fonds de roulement BEC pendant période électorale (montant fixe par mois)	942,480.00
4.14	Accréditation observateurs et mandataires partis politiques (badges)	400,000.00
5.081	Paiement Frais de formation, Per Diem et Honoraires Avocats et Juges/Magistrats BCEC, BCED, BCEN	650,287.00
5.041	Emolument et Frais accessoires personnel vacataire	1,441,600.00
5.011	Location Mobiliers Centres de Vote	365,000.00
7.06	Frais de Fonctionnement CTV	700,000.00
7.05	Etude technique pour l'amélioration des conditions de travail au CTV	20,028.00
7.04	Réfection CTV (toiture, faux plafond, aménagement/soutien réseau informatique)	491,602.00
7.03	Paiement Honoraires et Frais accessoires du Personnel CTV:	2,764,045.00
7.02	Systeme de transmission de photographies des procès-verbaux par smartphone	400,000.00
7.01	Frais de Loyer CTV et Entrepôt SONAPI	108,000.00
8.01	Conseillers techniques nationaux et internationaux pour la période électorale	897,000.00
	Total	25,597,968.00

Table 6-5 : Partial list of indicators

Indicateurs utilisés	Méthode de calcul	Valeur actualisée
Appui Logistique (60%)		2,880,000
Nombre de Jours de Livraison de matériels sensibles		55
Appui Logistique / Jour de Livraison		52,364
Prix d'un segment du trajet entre la maison et le BV	10 gourdes/(\$US=1Gourde)	0.16
Nombre total de votants attendus	Nombre total de bureaux de votes * Nombre de votants attendus par BV	5,490,000
Coût moyen par votant	Budget Total des élections / Nombre total des votants attendus	\$12.02
Coût moyen par vote effectif	Budget Total des élections / Nombre de votes exprimés	\$65.81
Coût moyen par bulletin de vote	Budget alloué à la production de Matériels sensibles / Nombre de bulletins produits	\$0.60
Coût moyen par bulletin utilisé	Budget alloué à la production des bulletins / Nombre de bulletins utilisés	\$3.10
Coût moyen par centre de vote	Budget Total des élections / Nombre de Centres de vote	\$43,766.58
Coût moyen par bureau de vote	Budget Total des élections / Nombre de bureaux de vote	\$4,808.74
Coût moyen par Contestation	Budget Contestation / nombre de contestations reçues	\$9,165.95
Coût moyen par procès verbal	Budget Total des élections de 2015-2016 / Nombre de procès verbaux	\$1,202.19
Coût moyen par procès verbal accepté	Budget Total des élections / nombre de procès verbaux acceptés	\$1,584.03

Table 6-6 : Summary table of costs and benefits

COÛTS		
	Nombre de machines de votes (ordinateur + équipement)	10,950
	Coût par machine	\$1,240
	Coût total des ordinateurs	\$13,578,000
	Coût du logiciel	\$1,000,000
	Coût pour la formation du personnel	2,490,000
	Coût total des investissements	\$17,068,000
BENEFICES		
	A. SUPPRESSION DE COÛT SUR LES ÉLECTIONS	25,597,968
	1. Structure organisationnelle du CEP renforcée	262,750
	2. Acquisition matériel électoral	13,148,476
	3. Liste électorale mise à jour, imprimée et disponible	570,200
	4. Gestion dépôt de candidature, tirage au sort et accréditation assurée	3,778,980
	5. Centres de vote et personnel électoral disponibles	2,456,887
	6. Campagne d'éducation et d'information renforcée	-
	7. Centre de Tabulation de Vote (CTV) fonctionnel	4,483,675
	8. Assistance technique	897,000
	9. Appui à la Coordination et à la gestion du processus électoral	-
	x. Frais de Gestion	-
	B. ÉCONOMI DE TEMPS	6,545,276
	I- Réduction des délais de production de	1,026,515
	II- Réduction des durées de Livraison	2,461,091
	III- Réduction des délais de Publication	886,200
	IV- Réduction du nombre de contestation	1,677,370
	VI- Réduction des délais dans le processus de vote	494,100
	C. AUGMENTATION DE LA PARTICIPATION AU VOTE	10,249,247
	Nombre de votants actuels par élection	1,000,000
	Gain en nombre de votants dû au vote électronique	2,745,000
	Prix consenti à payer par vote	6

Appendix III

Steps taken by some countries that have adopted electronic voting

Pays	Etape 1	Etape 2	Etape 3	Etape 4	Étape 5
Suisse	En 1982, à Genève, le Parlement a promulgué une loi sur les droits politiques, laquelle autorisait des essais quant aux méthodes de vote	2000, Lancement du projet de vote électronique par la Confédération. Trois cantons deviennent des cantons pilotes: Genève, Neuchâtel et Zürich	Tests d'ergonomie suivis d'une votation test dans laquelle 16000 élèves du secondaire éprouvent la robustesse du système	2004 Première votation fédérale en ligne de Suisse. Le Conseil de l'Europe utilise le système genevois pour sa consultation sur la «Charte européenne pour une école sans violence».	La disposition constitutionnelle sur le vote électronique est approuvée en votation populaire par 70,2% des votants. Premier scrutin électronique ouvert aux Genevois de l'étranger
Belgique	Le vote électronique a été expérimenté pour la première fois en Belgique en 1991 dans deux cantons électoraux avec deux systèmes différents	En 1994 , une loi définissait le cadre d'utilisation du vote automatisé en Belgique, et c'est plus de 20 % des électeurs qui ont voté au moyen de carte magnétique.	En 2003 eut lieu la troisième expérimentation de la lecture optique à laquelle a été ajoutée une expérimentation de ticketing. Le ticketing consiste à voter avec une carte magnétique mais le choix du votant est imprimé sur un ticket, derrière une vitre et, après validation, le ticket tombe dans une urne présente à côté de l'isoloir	Les deux plus déterminés des opposants au vote électronique tel qu'il est pratiqué en Belgique (Paul Bienbon, un citoyen actif et l'association Pour Eva) continuent à proposer des solutions alternatives pour améliorer la fiabilité de celui-ci, ou alors pour revenir au vote papier	Le 27 novembre dernier, l'association de la Ville et des communes de Bruxelles-Capitale (AVCB) écrivait au gouvernement bruxellois pour lui faire part de son soutien au maintien du vote électronique, estimant que selon ses propres calculs, le vote électronique n'était pas plus cher que le vote papier. <i>"La différence entre les deux systèmes de vote se réduirait à 19 633 €"</i> , explique l'AVCB sur son site Internet. Son calcul a été réalisé sur base d'un leasing du matériel et non plus d'un achat.
Estonie	Le gouvernement a d'abord adopté la loi sur les signatures numériques en 2002, qui	En Estonie, le vote par Internet a été mis en oeuvre aux élections municipales de 2005	L'expérience a été renouvelée en 2007	et en 2009 aux élections parlementaires européennes.	

Pays	Etape 1	Etape 2	Etape 3	Etape 4	Étape 5
	permet aux particuliers d'utiliser une signature numérique approuvée pour confirmer leur identité lors de transactions en ligne, notamment les opérations gouvernementales et le vote				
Brésil³	En 1982, à la fin du régime militaire dictatorial, à l'occasion du premier essai d'informatisation de la totalisation des votes, un évènement connu comme le "Cas Proconsult" se produit. Il s'agissait de la première tentative de fraude par des agents militaires	En 1985, le TSE obtient du Congrès National l'adoption en urgence de la loi 7444/85 qui impose l'unification de la Base de Données des Électeurs par informatique et donne au TSE le pouvoir de réglementer le processus de recensement. Le TSE décide d'éliminer la photo du votant du document d'identité électoral, ce qui provoque un énorme problème de sécurité	En 1995, suite à de nouvelles pressions du TSE sur le Congrès, un projet de loi rédigé six mois auparavant par un groupe de travail interne du TSE est adopté, et deviendra la loi 9100/95, qui permet l'utilisation de machines à voter électroniques et donne au TSE le pouvoir de réglementer leur usage. Il opte aussi pour l'identification du votant sur la machine à voter, créant ainsi un nouveau problème de sécurité concernant le secret du vote	En 1999, le Sénat reçoit un projet de loi : celui-ci oblige les machines à voter à imprimer un bulletin vérifié par Le votant, crée l'audit statistique de 3% des urnes électroniques tirées au sort après l'élection. Les ministres du TSE font à nouveau pression sur le Congrès et obtiennent en 2001, en à peine deux jours, l'adoption de sept révisions du projet de loi qui, entre autres, remet à 2004 l'impression du bulletin vérifié par Le votant, impose d'effectuer le tirage au sort des urnes à recompter avant l'élection	La pression du TSE sur le Congrès contre la transparence du vote électronique continue à se faire sentir en 2003 et, en moins de six mois, il réussit à faire passer une loi qui abandonne le bulletin imprimé vérifié par Le votant et l'audit statistique du dépouillement électronique avant même leur mise en place en 2004.
Inde	The first Indian EVMs were developed in the early 1980s by ECIL. They were used in certain parts of the country, but were never adopted	They were gradually deployed in greater numbers and used nationwide beginning in 2004 [50, p. 1].	In 2006, the manufacturers adopted a third-generation design incorporating additional changes suggested by the Election Commission		

³ Source : Robert Petersen, <http://www.indymedia.be/index.html%3Fq=node%252F5160.html>, publié le 27 octobre 2006, consulté le 31 août 2016

Pays	Etape 1	Etape 2	Etape 3	Etape 4	Étape 5
	nationwide [50, p. 1].				
Philippines	En 1996m le premier test a été réalisé dans la région autonome musulmane de Mindanao				
Venezuela					
Royaume Uni	En 2000, le gouvernement a créé la Commission électorale, une organisation dont le mandat est d'organiser des élections, de mener des recherches et d'envisager des réformes susceptibles d'améliorer le processus électoral britannique	L'adoption de la Representation of the People Act (2002) (<i>la Loi sur la représentation du peuple</i>) a rendu cela possible et a permis au Parlement d'adopter des règlements permettant l'essai de nouvelles méthodes de vote (Barry et coll., 2002)	Les premiers projets pilotes de vote électronique ont eu lieu en mai 2002 . Trente circonscriptions ont pris part au projet, et seize d'entre elles ont testé des méthodes électroniques. Les circonscriptions ont eu recours à un éventail de technologies et de combinaisons, notamment des postes de vote avec écran tactile (dans les bureaux de scrutin et dans les régions éloignées), le vote à distance par Internet, le vote par téléphone, le vote par message texte et le dépouillement électronique.	En mai 2003, la Commission électorale du Royaume-Uni a lancé 59 projets pilotes additionnels dans des circonscriptions locales.	En 2008, le gouvernement a annoncé que le vote électronique n'allait pas être employé pour les élections locales ni européennes de 2009.

Haiti faces some of the most acute social and economic development challenges in the world. Despite an influx of aid in the aftermath of the 2010 earthquake, growth and progress continue to be minimal, at best. With so many actors and the wide breadth of challenges from food security and clean water access to health, education, environmental degradation, and infrastructure, what should the top priorities be for policy makers, international donors, NGOs and businesses? With limited resources and time, it is crucial that focus is informed by what will do the most good for each gourde spent. The *Haiti Priorise* project will work with stakeholders across the country to find, analyze, rank and disseminate the best solutions for the country. We engage Haitians from all parts of society, through readers of newspapers, along with NGOs, decision makers, sector experts and businesses to propose the best solutions. We have commissioned some of the best economists from Haiti and the world to calculate the social, environmental and economic costs and benefits of these proposals. This research will help set priorities for the country through a nationwide conversation about what the smart - and not-so-smart - solutions are for Haiti's future.



Haiti Priorise

Un plan de **développement** alternatif

For more information visit www.HaitiPriorise.com

C O P E N H A G E N C O N S E N S U S C E N T E R

Copenhagen Consensus Center is a think tank that investigates and publishes the best policies and investment opportunities based on social good (measured in dollars, but also incorporating e.g. welfare, health and environmental protection) for every dollar spent. The Copenhagen Consensus was conceived to address a fundamental, but overlooked topic in international development: In a world with limited budgets and attention spans, we need to find effective ways to do the most good for the most people. The Copenhagen Consensus works with 300+ of the world's top economists including 7 Nobel Laureates to prioritize solutions to the world's biggest problems, on the basis of data and cost-benefit analysis.