STRUCTURING E-DELIBERATIVE PROCESS WITH ONLINE SURVEYS: METHODOLOGY AND EVALUATION

Cristiano Maciel[1], Licinio Roque[2] and Ana Cristina Bicharra Garcia[1]

Abstract: Citizen participation in governmental affairs can make democracy a reality, since it generates a continuous flow of information between citizen and government while assisting in their decision-making. Nonetheless, for democracy to truly exist, citizens must articulate discourses, pitch in suggestions and proposals, deal with them, and indicate their choices by diffusing them to the public. Through e-democracy, these consultative and deliberative processes are granted visibility and are consolidated. For the purpose of to render the integration of these processes viable, the Government-Citizen Interactive Model is used and sorted into phases. In order to diagnose the effectiveness of citizen participation in processes with e-democratic ends, the Maturity in Decision-Making method (MTD) is discussed. The main purpose of this paper is to discuss the implications of using online surveys by stages in deliberative processes, based on previously established hypothesis. Finally, the MDM is verified, using online surveys.

1 Introduction

E-participation represents the use of Information and Communication Technology (ICT) in supporting the information, consultation and participation of citizens [13]. Within the assorted strategies employed to make e-participation feasible, the following can be included:

- Community development. Virtual communities allow the engagement of interested citizens in specific themes, which in turn allow the creation of subgroups, for example, by subject.
- Public counseling and debate. With this strategy, it is possible to obtain individual and group opinions about matters of public interest which render the debate possible.
- Voting. With regards to decision-making, citizens can vote individually, selecting their choice according to predefined options (pulls), preferably already discussed and duly informed of the matter.
- Deliberation. This strategy represents the finalization of a decision-making process, where individual opinions are considered and a group consensus is reached on a certain theme.

A wide range of applications, software and tools are available to support the implementation of e-democratic processes [2][6]. However, the use of ICTs in Internet is still far from being fully realized. Grönlund [1] affirms that "e-democratic IT tools are so far mainly quite simple mainstream systems…" and that "…more advanced IT tools have to be employed to support the participation".

The involvement of citizens in the deliberative decision-making process is crucial and measuring participation in this process allows for assessment of the effectiveness of participation. Measuring the maturity of this decision, i.e. assessment of individual participation and its consequent reflection on the group's decision, can be accomplished through the Maturity of Decision-Making (MDM) method, briefly discussed in this paper [5]. This method constitutes a set of indicators that monitor the use and, consequently, mediate citizen behavior, providing the latter displays interest in participating in the deliberative

---

[1] *Instituto de Computação, Universidade Federal Fluminense, Rua Passos da Pátria, 156 sl 326 Niterói, RJ, Brazil* {cmaciel, bicharra@ic.uff.br}

[2] *Departamento de Engenharia Informática, Universidade de Coimbra, Polo II. Pinhal de Marrocos. Coimbra, Portugal* {lir@dei.uc.pt

process, registering, participating in discussions, casting votes, and consulting a library of information. Finally, the citizens' decision-making is classified as immature, poorly mature, sufficiently mature or mature [4].

In our research, online surveys were built and tested in stages, structured according to the Government-Citizen Interactive Model [3] in a way that supports the MDM. In our propose, the discussion have a distinct structure, supporting the decision-making processes. This way, one must ask: Is it possible to provide a satisfactory level of information structuring and participation in a deliberative process using online surveys applied in stages? Is the MDM efficient and/or effective in measuring e-participation?

In the general scope of this research, two distinct proposals are verified for the realization of a structured deliberative process, with consulting and voting, with the intention of measuring the maturity of the decisions taken through the application of online surveys by stages, and the use of a virtual community. The use of surveys is the focus of this article, since the web application will be implemented afterwards.

As a hypothesis of this research the following points will be investigated:

H1: It is possible to satisfactorily measure the Maturity Level using online surveys.

H2: The use of structured surveys induces the volunteering participant to filling out even without interest.

H3: Users prefer the secret ballot.

H4: The way in which the demand is registered may impair its discussion.

H5: The information sharing through online surveys is enough for a mature process.

This article is structured as follows. After the introduction, in Section 2, correlated research about the use of online surveys is briefly discussed. The methodology, the case study and the tested hypotheses are presented in Section 4. In Section 5, the MDM is tested using online surveys. Finally, the last section includes discussions and bibliographic references.

2 Online Surveys

An online survey (or Web survey or internet-based survey) is developed on a website which a respondent accesses in order to participate in the survey. The key factors influencing response to the surveys are [10]: quality of survey frame; method of data collection; response load of the questionnaires; follow-up; legal obligations; experience, ability of collection and follow-up staff; communication strategy and relationship management; and track record on protection of confidentiality. Online surveys come with benefits associated with time and cost, and efficiency of completion, but have particular problems in terms of the population that can be reached through the Web and the technical challenges involved in both building and accessing the survey [10]. Penetration refers to the extent to which a technology has been taken up across the general population: in this case, what percentage of the population have access to the Internet and the Web and, also, what kinds of people have access to the Internet and the Web. These topics are of utmost relevance for achieving representative survey samples.

According to Couper [11], Web survey methods, in terms of traditional measures of quality and sources of errors in surveys, require attention to: coverage and sampling error, non-response error and measurement error.

Matsuo *et al.* [9] examine the use of online survey methodologies in the behavioral and social sciences. There are several reasons why social scientists may want to employ internet-based designs. First, certain populations may actually be more accessible via online survey

methodologies than traditional methodologies. Second, online surveys may achieve sample sizes that exceed mail and telephone surveys [12], depending upon the characteristics of target populations. Matsuo *et al.* [9] categorize the methodological issues that need to be addressed when employing internet-based designs into methodological and data analysis considerations. The methodological considerations are: sample representativeness, response and non-response and controlling testing condition. The data analysis can consider the large sample sizes, the use of inferential statistics in nonprobability sampling and the analysis of written comments. The authors emphasize that online surveys are probably the most cost effective means of data collection when the target population is composed of students and employees on a college campus. This research concludes that, although there is some literature on online surveys, there is much need for additional contributions to the body of knowledge in this area.

The behavioral Decision Theory [8] classified the characteristics that influence decision-making, such as: characteristics of the task, characteristics of the information, and characteristics of the decision-maker (self-interest and goal selection). According to the author, as methods for studying decision-making, there are surveys and decision boards. In this way, it is necessary to investigate what types of decision making models are associated with "correct" voting and why.

According to our studies about the use of online surveys in e-deliberative process, there is a lack of methodologies and evaluations that consider all phases in these processes. Then, this research investigates other significant aspects in this field, such as the forms of communication used in ICTs, the participation factors and measures in decision-making and the implication of using online surveys by stages.

3 Methodology and Case study

The methodology suggested to measure a deliberative process according Government-Citizen Interactive Model [3], explores the application of online surveys by stages [5].

As public participation method chosen was the "citizen/public advisory committee" [7], which a small group selected by sponsor to represent views of various groups or communities (may not comprise members of true public).

In this process, users were invited to participate, voluntarily, by email. The first survey available was designed to fill in general information from the interested participants as well as a public consultation on matters to be discussed. This survey has 11 questions. In the second survey, individual opinions were shared and discussed, with 14 questions, mostly open-ended question. Moreover, participants were questioned about having their votes and opinions made available in a secret ballot or not in the next stage. In the third survey, all themes and referred opinions were structured and made available so that this way the participants could take a stance on a form of voting. The participant can to vote favorably, contrary, or neutrally with regards to a certain demand. This stage, separately, included questioning the level of user satisfaction for the survey. The third survey consists of 22 questions. To support this research, three online surveys were developed with the support of an automatic tool. The application of the three surveys was accomplished in 30 days.

3.1 Data Results and Analysis

The sample is composed by doctoral students of computer science of two different universities, the Fluminense Federal University in Niteroi, Brazil, and the University of Coimbra in Coimbra, Portugal. Users were invited and 26 of them volunteered to take the survey. This group was selected due to the fact that education is an important government field. It is also worth emphasizing that, regardless of the target public, the aim was to test the methodology proposed with the use of online surveys and, through this experiment, indicate both positive and negative points.

From the very beginning of the online survey application, it was noted that the group was interested in discussions related to public matters.

Together with the discussions about the process presented below, there were also comments about the hypothesis test. The Table 1 below summarizes our hypothesis results.

Table 1: Hypothesis Results

Hypothesis	Hypotheses supported
H1: It is possible to satisfactorily measure the Maturity Level using online surveys.	No
H2: The use of structured surveys induces the volunteering participant to filling out even without interest.	Yes
H3: Users prefer the secret ballot.	No
H4: The way in which the demand is registered may impair its discussion.	Yes
H5: There is enough information sharing through online surveys.	No

Demographics Data

The average age of the 27 participants who displayed initial interest in the process is 33, a population segment that could reasonably be considered intellectually mature. 51.9% of users are from Brazil, mostly residing in the state of Rio de Janeiro, and the remaining 48.1% from Portugal, mostly residents of Coimbra. Regarding participants' professional activities, 80% are postgraduate students, 16% are professors and 4% are university employees. It must be noted that the emails were extracted from lists of doctoral students of both institutions, and some professors are part of these.

When asked about the intention of discussing themes in distinct areas, the vast majority showed interest in the educational area, since the group was made up of users in this field. On the other hand, only 4 participants showed interest in acting as a moderator, all of which chose education. One of the participants claimed that "*I am not a politically active person, therefore I don't feel qualified to moderate discussions*". Thus we must insist that the moderator's role should be investigated further, since this person should display certain abilities and a certain level of knowledge.

Interest for the Debate

When asked about subject of interest for a collective debate, 7 participants filled in the theme registration and registered their personal opinion about the subjects. All in all, there were 11 subjects presented for discussion, all of which were considered and structured for Stage 2, the discussion phase. In the second stage, 12 out of 27 participants confirmed their interest in participating in the discussion, with the personal opinions of each of the subjects from Stage 1 being registered. The largest evasion occurring from step 1 to 2, attest the hypothesis H2, which states that the survey use induces the participant to participate even if he/she displays no interest. Be it curiosity or momentary motivation, filling out information was only done in the first stage of this research, because from that moment on the users were better acquainted the survey better. In average, there were 10.8% of registrations per subject. Both subjects that

were not from the educational area achieved equal discussion, with an average of 10% of opinion posts. We noted that the vast majority of participants of the debating stage contributed in almost all of the demands. We believe that this is due to the form in which the survey is structured, presenting the questions so that they are answered sequentially. We also noted that the answers were "contaminated", since some demands included reference to the demands previously answered.

The word "demand" was not easily interpreted by some of the participants, although they were instructed on its meaning. The word was chosen because of its use in the public administration milieu but we believe it should not be indicated for use of citizens in general. Then, we suggest the term "topic" for this purpose. 83.3% of participants allowed their opinions to be shared nominally for Stage 3 of the research. The report stating the nominal opinions was sent by email to the participants due to difficulty in including this information in the automated survey, while preserving anonymity of participants who thus requested.

Many factors compel the rebuttal of H5, which assumes that there is sufficient information sharing throughout the online survey. The first factor is the lack of interaction with other participants, since they use a web application to answer the survey but not to communicate amongst themselves; therefore, they are not able to share their opinions as soon as they are registered. This was considered a negative factor for 77% of participants in the user satisfaction survey.

Interest in Voting

Regarding the initial participants, there was a small increase in voting participation, related to the debate, 13 participants having voted for the registered subjects. For reasons of survey administration, the secret ballot was automatically used. Nevertheless, participants expressed their opinion, and as for the ballot being a secret or an open one, 41.7% decided that it should be secret and only the final result should be revealed by subject, and the remaining 58,3% preferred the open ballot. This information refutes hypothesis H3, which assumed that users would prefer the secret ballot, in this experiment. Table 2 shows voting results by demand.

Table 2: Voting by demand

Demands	Favorable vote	Contrary vote	Neutral vote
Education	%	%	%
D1. There are few public financial incentives for funding college education	61.5	7.7	30.8
D2. Migration of professors from public to private universities	38.5	30.8	30.8
D3. Quota system in universities	7.7	69.2	23.1
D4. Improvement of basic education	100	0	0
D5. Quality of college education and student failing rates	69.2	7.7	23.1
D6. Is distance learning a feasible option?	69.2	15.4	15.4
D7. Student acceptance in college without taking an entrance exam	46.2	38.5	15.4
D8. Basing education in lab projects	69.2	0	30.8
D9. The qualification process of doctoral students in Computer Science at the UFF must be changed.	50	8.3	41.7
Transportation			
D10. Autonomous transportation (without a conductor) – would you trust it?	23.1	46.2	30.8
Ecology			
D11. Constant supervision and the imposition of fines for companies that excessively pollute the environment	76.9	0	23.1

Regarding the demands that were voted, it can be noted that some were not able to achieve a degree of discussion that could deliver a definite voters position, such as D2 and D7, since received similar scores for different positions.

Regarding D4, there was absolute consensus among participants that such a demand is necessary, which would lead us to indicate this demand as a priority in terms of government action, in educational field. Demands such as D8 and D11, which did not obtain annulled votes, could also be prioritized for implementation. Those demands in which participants manifested their contrary opinion, such as D3, could be prioritized.

Some demands, on the other hand, by the way in which they were phrased, permit discussion but were too wide-ranged, such as D6 and D10. This type of issue is useful for an initial sample of opinions, for the future selection of specific demands.

Hypothesis H4 assumes that the way in which the demand is registered can impair its discussion. Through email, some participants complained of the lack of clarity that was needed in order for them to understand, discuss and vote on the demands. The fact that the demands were registered by participants must be underpinned, an occasion in which there was an explanation and an example warning about the need of a good demand formulation. We chose not to change the demands in the original form in order for there not to be any misunderstanding on the part of the administrator. An example of a demand deemed problematic by a participant due to lack of clarity would be D5, since it deals with two subjects simultaneously.

When questioned if the form in which the demands were phrased was prejudicial to the process, 84.6% believed that this impaired understanding, 61.5% believed it impaired discussion and 53.3% believed it made voting harder. Then, the H4 hypothesis - the way in which the demand is registered may impair its discussion - is supported. Furthermore, we wish to comment that the opinions registered by participants regarding these demands are very interesting and well-grounded and contain valuable comments.

4 Maturity of Decision-Making Method Analysis

The data was calculated manually, by participants, who were later classified in Groups according to the MDM index [5]. The table 3 presents the number of participants, by groups.

Table 3: DM Survey Participants Classification

Groups	Range	Nr.Part.
Group 1 – immature	1 until 9 points	11
Group 2 – poorly Mature	10 until 18 points	3
Group 3 – sufficiently mature	19 unitl 27 points	8
Group 4 – mature	28 until 36 points	3

In this consultative and deliberative process, 11 participants displayed so-called "*immature*" participation, since they only participated in the first step or in very small degree. The "*sufficiently mature*" group of participation was achieved by 8 of the participants, who participated from the very beginning of the process, registering demands, debating, voting, and evaluating the process as a whole. A disquieting finding was the presence of only 3 users in the category considered "*mature*". Such a feat was acquired from the fact that this person registered more demands than the others, even though his/her participation in the debate and voting process was equal to the others.

Therefore, we believe that the use of MDM for the survey could even be an adequate procedure for measuring the three first groups, as Group 3 and 4 merge into one group. Thus, these two groups will be in a group called as "*mature*". Group 4 was suggested in the method considering that, in a deliberative process, there is interaction between members and it is necessary to measure the confidence generated between members, the forms with which one

socializes with the others, his/her access to documents with information contained in libraries and other sources. It was not possible, by using the survey, to measure such indicators, seen as important in collaborative virtual environments.

If we do not consider the participants who only registered, concentrated in Group 1, the decisions deliberated by the group, generally speaking, can be considered sufficiently mature. The calculation process must be achieved manually, which would be completely unfeasible were there a larger group. In light of these verifications, the hypothesis H1 is not supported, which assumed that it was possible to measure the MDM satisfactorily with the use of online surveys. The MDM can still be measured, but has not presented satisfactory results, aside from the limitations it displays. It is important to note that the methodology used allowed a satisfactory deliberation, however, the use of the MDM method shows limitations.

5 Discussions and Future Works

The main purpose of this paper is to discuss the implications of using online surveys by stages in deliberative processes. Through of the use of online survey in a case study is possible to analyze the MDM method.

In our experiment, realized by stages, online survey usage has generally proven to be satisfactory because it manages the structure of the discussions providing user satisfaction to participants. Some additional advantages of use online surveys are important to take into account: provides good layout, no need for printing, faster data collection, and precision of data compilation, which is realized automatically by the tool.

Some issues with the use of online surveys can interfere in the process realized by stages, such as: the way in which certain demands are written interferes in process; the register of demands must remain close during counseling and the participants may not suggest new subjects for discussions at any moment; the moderator's performance becomes more difficult; the role of the administrator in configuring the survey may be considered in the data analysis and increased sharing of posted information is required. It is also important to consider that, how the discussions are not posted openly, the right to offer a rebuttal becomes restricted and many steps of surveys are necessary in order to sustain a more accentuated discussion. These points deserve further consideration.

Because we are dealing with a different way of undertaking debate and voting, the users were asked to comment on their level of satisfaction in using the automated survey, in the end of the processes. Especially about the survey usability, most users (38.5%) considered it "good", 23,10% considered it "very good" and 30,80% considered it "excellent". One participant, i.e., 7,70%, believed it to be "regular". A total of 93.3% of participants believe that a virtual community would facilitate such consultative and deliberative process. This discovery motivates us for the next stage of this investigation, in which a virtual community modeled for debate and voting of public issues will be implemented - the Democratic Citizenship Community [4]. In this application, the MDM can be calculated automatically.

For measuring the use of online surveys in MDM method it has presented considerable limitations, such as the need to disregard a few indicators, the unfeasibility of demand-based application and the need for manual calculation. In relation to the levels proposed in the MDM, we suggest a new classification, which guarantees better understanding of the method.

In this propose, the citizens' decision-making is classified as immature, somewhat mature, mature, or socially mature.

The experiment was conducted with a small group, of voluntary membership, consisting of representatives with deliberative functions. The popular manifestation was held as a "citizen/public advisory committee". In the future, the methodology can be tested in other forms of popular expression, which will attend a greater number of citizens, such as a "public hearing", in local or national level. To this end, we must seek solutions to the problems presented in this case study. Thus, new considerations on the Government-Citizen Interactive Model proposed, as well as the Maturity of Decision-Making method, can be made.

References

[1] Ake Grönlund. e-Democracy: in search of tools and methods for effective participation, Journal of Multi-Criteria Decision Analysis 12 (2–3). 2003.

[2] Ana Cristina Bicharra Garcia, Cristiano Maciel, Fernando Bicharra Pinto. A Quality Inspection Method to Evaluate e-Government Sites. *In: Proceeding of the International Conference on Electronic Government (EGOV2005),* 4, Copenhagem, Dinamarca. Berlim/Heidelberg: Springer. Lecture Notes in Computer Science, v. 3591, 2005, 198–209.

[3] Cristiano Maciel, Ana Cristina Bicharra Garcia. Modeling of a Democratic Citizenship Community to facilitate the consultative and deliberative process in the Web. Proceedings of the International Conference on Enterprise Information Systems (ICEIS 2007), 9, Funchal, Portugal. Portugal: INSTICC Press, 2007, 387-400.

[4] Cristiano Maciel, Ana Cristina Bicharra Garcia. Design and Metrics of a 'Democratic Citizenship Community' in Support of Deliberative Decision-Making. *In*: *Proceedings of the International Conference on Electronic Government (EGOV 2007)*, 6, Berlim/Heidelberg: Springer. Lecture Notes in Computer Science, v.4656, 2007, 388–400.

[5] Cristiano Maciel, Licinio Roque, Ana Cristina Bicharra Garcia. Measuring the e-participation in decision-making processes through online surveys. *Proceedings of the International Conference on Enterprise Information Systems (ICEIS 2008) 10,* Barcelona, Espanha. Portugal: INSTICC Press, 2008.

[6] Efthimios Tambouris, Naoum Liotas, Konstantinos Tarabanis. A Framework for Assessing eParticipation Projects and Tools. *Proceeding of the 40th Annual Hawaii International Conference on Hawaii International Conference on System Sciences. HICSS 2007*, IEEE: Hawaii, 90. 2007.

[7] Gene Rowe, Lynn J. Frewer. *Public participation methods: a framework for evaluation.* Science, Technology & Human Values, v. 25, Winter, 3-29. 2000.

[8] Herbert Simon. On how to decide what to decide. Bell Journal of Economics, v. 9, 494-507, 1978.

[9] Hisako Matsuo, Kevin P. McIntyre, Terry Tomazic, Barry Katz. The Online Survey: Its Contributions and Potential Problems. Proceedings of the Joint Statistical Meetings of the American Statistical Association, 2005, 3998-4000.

[10] J. Cornish. Response problems in surveys. In Workshop on Selected good practices in the organization and management of statistical systems. Yangon, Myanmar, UNSD, 2002. http://unstats.un.org/unsd/methods/statorg/Workshops/Yangon/Session4_Surveys_Cornish_Slides.pdf

[11] M. Couper. Web Surveys:A Review of Issues and Approaches. Public Opinion Quarterly 64, 464-494. 2000.

[12] R. Kraut, J. Olson, M. Banaji, A. Bruckman, J. Cohen, M. Couper. Psychological research online: Report of board of scientific affairs' advisory group on the conduct of research on the internet. American Psychologist, 59, 105-117. 2004.

[13] Rui Pedro Lourenço, João Paulo Costa. Incorporating citizens' views in local policy decision making processes. Elsevier: Decision Support Systems 43, 4 (Aug. 2007), 1499-1511. 2007.