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A Framework for Evaluating the Impact of E-Participation Experiences

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Abstract. Over the past decade, the inclusion of citizens in political decision-making through electronic participation (e-participation) has received much attention. Many projects have been, and are continued to be executed at different levels of government. E-participation projects aim at providing a facilitating online environment, where citizens and other relevant actors can be involved in the processes of public decision-making. Up to now, the evaluation of the success and impact of such projects has not been addressed widely in research. This paper studies existing evaluation approaches and details the EF³-framework, which was developed to assess effectiveness, efficacy and efficiency of e-participation experiences. The EF³-framework has been reviewed, revised and applied to the e-cognocracy real-life experience of the municipality of Cadrete (Zaragoza) to provide a proof of concept for assessing impact of e-participation via the EF³-framework. Also, the EF³ framework has been validated by international experts, who also assigned weights to individual indicators for each of the three criteria. The revised model with details of indicators, the proof of concept of Cadrete, and the results of expert reviews and assignments of weights to criteria are summarised in this paper.

Keywords. E-participation, e-cognocracy, evaluation, effectiveness, efficacy, efficiency

Introduction

A decade ago, the OECD stated in a report that a major challenge was "evaluating e-participation: making sense of what has, or has not, been achieved; understanding how to assess the benefits and the impacts of applying technology to the democratic decision-making processes" [1]. Since then, and as the academic literature on e-participation is growing, a number of papers that discuss methodological frameworks for the evaluation of e-participation experiences have emerged (e.g. [2],[3],[4],[5]). Yet so far, these evaluation approaches are restricted to project-related aspects or are not yet rigorous enough to assess the wider impact of an e-participation endeavour.

Especially when an e-participation experience or project is financed by public funds, evaluation and in particular wider impact assessment should be mandatory. Nevertheless, although the importance of rigorous evaluation of e-participation projects is recognised, there is little evidence of the use of evaluation methodologies also in practice.

In April 2010, Moreno-Jiménez proposed the EF³-approach, which was developed for the e-cognocracy evaluation, based on a real-life experience in Spain, through the use

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of the Structural Equation Models (SEM) method. The result of that work was a theoretical framework identifying the relevant aspects that determine effectiveness, efficacy and efficiency (EF³) of an e-cognocracy experience [6]. This paper extends that framework to any e-participation experience, details the approach and presents its validation by a group of international experts. The experts also assigned weights to the attributes considered relevant for the revised framework. The paper is structured as follows: Section 1 presents the EF³-approach proposed for e-cognocracy and its adaptation to any e-participation experience; Section 2 applies the revised framework to the Cadrete (Zaragoza, Spain) experience within the context of e-cognocracy; Section 3 includes the experts' validation of the revised framework and the assignment of weights to attributes and indicators. Finally, Section 4 highlights the most relevant conclusions and future work.

1. EF³-approach for evaluating e-participation experiences

Moreno-Jiménez argues that the following three areas are commonly used when evaluating the behaviour of enterprises: strategic, tactical and operational planning [7]. The EF³ framework as introduced in [6] integrates these ideas by contemplating three main criteria for success and impact as follows:

a) Effectiveness, which is associated with strategic planning or long-term behaviour and which investigates aspects relevant to the resolution of a problem (doing what is right);
b) Efficacy, which is associated with tactical planning or medium-term behaviour and is related to measuring how well the goals that are settled are achieved;
c) Efficiency, which is associated with operational planning or short-term behaviour and is measuring best possible allocation of public resources (doing things correctly).

In the next two subsections, we outline the theoretical framework of EF³ as introduced in [6] and detail the attributes and indicators for evaluating each of the criteria.

1.1. Theoretical framework

Figure 1 shows the theoretical EF³-framework as presented in [6], which identifies relevant aspects required for evaluating e-cognocracy based on the real-life experience (Cadrete, Spain). As shown, the framework integrates effectiveness (doing what is right), efficacy (achieving goals) and efficiency (doing things correctly) and can be considered an extension of the technology acceptance model (TAM) [8] and the Delone & McLean [9] approach: the perceptions and behaviour of citizens are used to evaluate the processes of citizen participation and the adoption of technology, as employed in the case of e-cognocracy ([10],[7],[11]). Cognitive democracy (e-cognocracy) is a concept of citizen participation that combines liberal or representative democracy and direct or participative democracy to cognitive ends. It seeks the creation and social diffusion of knowledge and the construction of a more open, transparent, cultured, educated and freer society; a society that is more cohesive and connected, more participative, egalitarian and cooperative. The e-cognocracy system uses multi-criteria decisions as its methodological support, the internet as its communication support and the democratic system as a catalyst for learning [10].

This theoretical framework was first evaluated through a survey implemented in the real-life experience of Cadrete using SEM, or Covariance Structure Analysis approach ([12-15]), which was chosen as it allows the researcher to formulate and evaluate the existence of latent variables from the reflected indicators [13], that is to say, variables that are not susceptible to direct observation. The software used was EQS 6.1 [15].

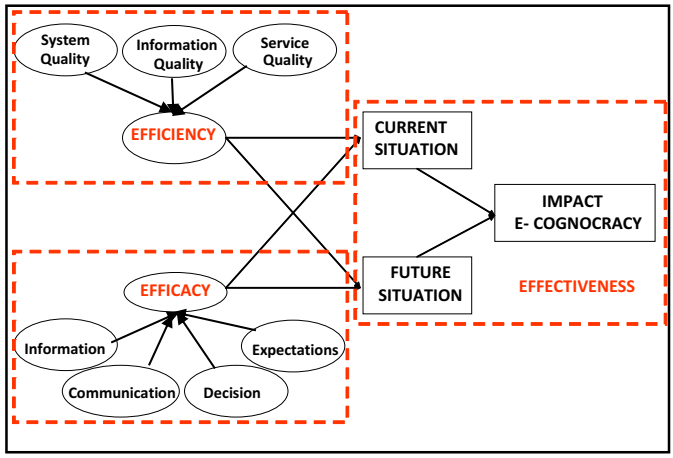

Figure 1. Theoretical EF[3] framework for the evaluation of e-cognocracy as suggested in [6]

Due to the limited number of responses, it was not possible to validate a general framework for the conjoint evaluation of all the aspects outlined in the theoretical EF[3] framework. Nevertheless, results obtained from the 20 valid responses identified a series of relationships that contributed to the formulation of a general framework [6]. The small sample size means that the evaluation and selection of the models is governed by goodness of fit (GFI) indicators that do not directly depend on the number of observations [12]: SRMR (Standardised Root Mean square Residual), GFI Goodness-of-Fit Index) and CFI (Comparative-Fit Index) (cf. [16] for explanations on determining model fit in SEM). For all the measured and/or structural models, the estimated parameters were presented in their completely standardised version, norm 0-1, and, in addition, all the equations were given their corresponding coefficients of explained variance. The assessment of the construct is based on the methodology proposed by Bagozzi [17] for the validation of multidimensional constructs and the covariance structure analysis of observed variables (McDonald's omega coefficient [18] and Fornell and Larcher's coefficient, C-FL [19]. The stability of the parameters of the models was estimated and evaluated sequentially.

The relevant aspects determining efficiency as outlined in Figure 1 are based on the three constructs contemplated by the model of Delone & McLean [9]: the In-formation Technology application (System Quality), the information that is obtained (Information Quality) and the human resources support (Service Quality).

Four constructs are considered for the evaluation of efficacy: Information, Communication, Decision and Participation Expectation. Information can be considered as a unidirectional flow of interaction (usually from the administration to the citizens). Communication is understood as two-way interaction: debate and discussion. In addition to the bi-directional flow of information, Decision includes the production of a co-decision between the Administration and Citizens. Finally, Participation Expectation

refers to the identification of the characteristics that participation experiences should have in the future.

Effectiveness is through the analysis of two scenarios as latent intermediate variables: the current situation and the ideal, and an endogenous variable that captures the idea of the creation of a better society.

A simplified analysis of the EF^3-framework with the three criteria (Effectiveness, Efficacy and Efficiency) was carried out in a particular experience and with a limited number of responses (20 valid) [6]. It has not let us get significant statistical conclusions. However, it has allowed us to obtain ideas for revising the existing EF^3-framework and, together with studying the existing literature, to extend the frame-work to any e-participation experience.

1.2. Revised EF^3-framework for e-participation experiences

After identifying the relevant aspects from evaluating the theoretical EF^3-framework of e-cognocracy, and with the aim of extending the framework to any e-participation experience, the next step was to revise the framework for each criteria (effectiveness, efficacy and efficiency). This included identifying a set of attributes, indicators and weights for evaluating e-participation experiences, which we describe next.

Table 1. Attributes and indicators for the evaluation of effectiveness

CRITERIA: EFFECTIVENESS			
	ATTRIBUTES	**DESCRIPTION**	**INDICATORS**
PEOPLE	**CONTROL (CO-DECISION)**	The % of the citizens in the decision making process and the possibility of putting forward specific situations that are conjointly resolved and validate the politicians that are in power (motions of confidence in decisions).	% assigned to citizens to decide a policy/decision
	PARTICIPATION (CO-CREATION)	Participation has been evaluated in many ways; in this case, the people that follow the discussions that create content and those that vote will be measured, along with the number of arguments that can be extracted from the discussion and decision processes	Clear track from participatory endeavour to the political decisions and the policy implementation
			People who contributed to improve the participation
			How many topics were proposed for implementing the participation process
			% of participation of population contributing to the polls
			% of participation of population contributing to the discussion; number of messages
			Number of political representatives engaging, including meetings with the citizens
	LEARNING (FORMATION)	The changes in and impacts of individual preferences between the two voting rounds and the discussion stage. The opinions of the others participants have influenced their final decisions.	I think the discussions in the forum influenced my decision (question of a survey)
	FREEDOM (TOLERANCE)	The % of vetoed messages; the % of ideologically intransigent messages; the % of individuals with a change in the preference structure.	% censored messages; % ideological intransigent messages
SOCIETY	**SUBSISTENCE**	The selection of the best individuals for the management of the systems	Under the current system, representatives defend my interests (question of a survey)
	COHESION	Qualified consensus (clear majorities) and limited veto. The number of groups that can be identified among individuals must be determined in the final decision.	Homogenity of opinions, preferences and norms
	EQUITY	Equal opportunity for all. There should be no digital, economic, social or cultural divides.	The Administration informs society about the decisions made and the existing mechanisms for citizen participation (question of a survey)
	SOCIAL WISDOM	The creation of a cultural resource of ethical values. The leaders should become a point of reference for society and, by example, engender ethical values (the social rejection of corruption, dishonest behaviour etc.).	The e-participation experience contributes to a better society (question of a survey)

Effectiveness, as associated with analysing "doing what is right" and evaluating "current situation", "future situation" and "impact of e-cognocracy" [6], is now extended to incorporate relevant attributes and indicators for the evaluation of effectiveness. An initial set of attributes evaluating effectiveness was proposed in [20]. This set is now refined and grouped into attributes related to the individual perception as well as attributes related to the impact on whole society. The attributes and indicators are shown in Table 1.

Efficacy, assessing the achievement of goals [7], considers four attributes as indicated in Figure 1 and described above. The revision of the framework incorporates the associated indicators for each attribute as shown in Table 2. The extension refers therefore to the inclusion of the attributes to evaluate each indicator as already contained in the original theoretical EF^3-framework.

Table 2. Attributes and indicators for the evaluation of efficacy

CRITERIA: EFFICACY		
ATTRIBUTES	**DESCRIPTION**	**INDICATORS**
INFORMATION	Existence of an unequivocal Administration-Citizen relationship	Government informs society about the mechanisms of citizen participation and the decisions taken
COMMUNICATION	Existence of feedback	Government takes the opinions of the citizens into account in their decisions
DECISION	A higher level of the relationship, that is to say, implication in the result or final selection	Citizens influence the making of public decisions
EXPECTATIONS	Active participation and conjoint decision	Citizenry and their representatives should jointly participate and decide on the design of public polices

Efficiency, being associated with assessing "doing things correctly" [7], also embarks on the three attributes the original framework proposes but details these by also adding indicators as shown in Table 3.

Table 3. Attributes and indicators for the evaluation of efficiency

CRITERIA EFFICIENCY		
ATTRIBUTES	**DESCRIPTION**	**INDICATORS**
System Quality	Information Technology application should consider items like: Convenience, Navigation, Interactivity, Response time, Access	The tools used in the experience were appropiate, easy to use, navigate etc.
Information Quality	The obtained information should contemplate items like: Precision, Relevance, Reliability, Ease of Understanding, Usefulness, Conciseness	The information was easy to understand, appropriate, without mistakes…
Service Quality	The human resources support should contemplate items like: Interpersonal quality, Empathy, Responsiveness, Flexibility	Level of help from the support staff when participating in the experience

In the next section, we exemplify the application of the framework to the Cadrete case to provide a proof of concept, before we outline the results from validating this revised framework of EF^3 through international experts in section 3.

2. Application to a real-life experience

In April 2010, the Cadrete Municipal Council, in collaboration with Zaragoza Multicriteria Decision Making Group (GDMZ), implemented a citizen participation project (https://participa.cadrete.es) that aimed at giving the residents of the municipality a voice in public policy decisions. The issue in question was the design of cultural and sporting policies. The GDMZ's objective was to validate the methodological and technological tools. The City Council had two main objectives as follows: (i) decisions on the budget assigned to the aforementioned policies would be conjointly made by the politicians and the citizenry; (ii) citizens would be encouraged to involve themselves in the debate and take part in the decision making process, and more specifically, that the arguments that supported the decisions would be publicly disseminated.

Participation was encouraged by the incorporation of a new group of actors: the neighbourhoods association. Therefore, three groups of actors were involved that were given different weightings: (i) the politicians, with a weighting of 40%; (ii) the citizens with 44%; (iii) the local associations with 16%. The participants were local residents (on the electoral register) of over 18 years of age (politicians, citizens and representatives of the local associations). Two voting options were provided: (i) National Identity Card or (ii) username and password. In accordance with e-cognocracy, two voting rounds were interspersed by a forum discussion, which emitted 61 messages, of which 37 were related to cultural polices and 24 to sport.

After finishing the project, participants were asked to complete an online questionnaire to evaluate the attributes. The measurement scale of the questionnaire was from 0 to 10 (0 = total disagreement, 10 = total agreement). 51 questions were grouped into 7 sections: (i) The System of Citizen Participation; (ii) The Creation of a Better Society; (iii) Motivation; (iv) Evaluation of the Technological Support and Applications; (v) Evaluation of the Information; (vi) Evaluation of the Support Personnel and (vii) Overall Evaluation. 24 residents responded and 4 of the replies were invalid. Questionnaires were considered as invalid if: (i) less than 80% of the questions were answered; and (ii) if there was zero variability with regards to the total number of questions [11].

The subsequent tables outline the application of the revised EF^3 framework to evaluate effectiveness, efficacy and efficiency of the e-participation experience in Cadrete, which was also presented to the international experts for review (cf. section 3.1).

Table 4 shows the indicators and the value obtained in order to evaluate each attribute of effectiveness in the real-life experience. Some of the indicators selected are questions from the survey (they are the average (mean value) of the scores given by the citizens of Cadrete in the survey). Table 5 shows the indicators and the value obtained in order to evaluate each attribute of the efficacy. The indicators selected are questions from the survey. The "Cadrete's values" are the average (arithmetic mean) of the scores given in the questionnaire by the citizens of Cadrete. Table 6 shows the indicators and the values obtained to evaluate each attribute of efficiency. The indicators selected are questions from the survey. The "Cadrete's values" are the averages (= mean value) of the scores given by the citizens of Cadrete in the questionnaire.

In this section, we have shown the application of the framework to the Cadrete case to provide a proof of concept of the EF^3 framework. In the next section, we present the results from validating the revised framework by international experts.

Table 4. Indicators and value obtained for the effectiveness evaluation of the Cadrete experience

CRITERIA: EFFECTIVENESS			
	ATTRIBUTES	**CADRETE'S INDICATORS**	**CADRETE'S VALUE**
PEOPLE	**CONTROL (CO-DECISION)**	% assigned to citizens to decide a policy/decision	Politicians: 40%; Citizens: 44%; Associations: 16%
	PARTICIPATION (CO- CREACCION)	Clear track from participatory endeavour to political decisions and policy implementation	100%
		People who contributed to enhance the participation	Team research
		How many topics were proposed for implementing the participation process	One topic (Culture activities and sports activities)
		% of participation of population contributing to the polls	1st Round: 14.96%; 2nd Round: 17.60%
		% of participation of population contributing to the discussion; number of messages	Cultural messages: 61% (37); sport messages: 39% (24); Cultural Comments: 58% (114); Sports comments: 42% (81)
		Number of political representatives engaging, including meetings with the citizens	7 meetings
	LEARNING (FORMATION)	I think the discussions in the forum influenced my decision (a question of the survey)	Average: 2.30 (1-10)
	FREEDOM (TOLERANCE)	% censored messages; % ideological intransigent messages	0%
SOCIETY	**SUBSISTENCE**	Under the current system of PC, representatives defend my interests (a question of the survey)	Average: 5.45 (1-10)
	COHESION	Homogenity of opinions, preferences and norms	_
	EQUITY	The Administration informs the society about the decisions made and the existing mechanisms for citizen participation (a question of the survey)	Average: 5.45 (1-10)
	SOCIAL WISDOM	The e-participation experience contributes to a better society (a question of the survey)	Average: 7.73 (1-10)

Table 5. Indicators and value obtained for the efficacy evaluation of the Cadrete experience

CRITERIA: EFFICACY		
ATTRIBUTES	**CADRETE'S INDICATORS**	**CADRETE'S VALUE**
INFORMATION	The Administration informs society about the mechanisms of citizen participation	**Average: 5 (0-10)**
	The Administration informs society about the decisions taken	**Average: 4.7 (0-10)**
COMMUNICATION	The public authorities consider the opinions of the citizens in the design of public policies	**Average: 5 (0-10)**
DECISION	Citizen has influence on the political decisions that are taken	**Average: 4.85 (0-10)**
EXPECTATIONS	The citizenry should participate in the design of public policies	**Average: 7.5 (0-10)**
	The citizenry and their representatives should jointly decide on the design of public policies	**Average: 7.15 (0-10)**

Table 6. Indicators and values obtained for the efficiency evaluation of the Cadrete experience

CRITERIA: EFFICIENCY		
ATTRIBUTES	**CADRETE'S INDICATORS**	**CADRETE'S VALUE**
System Quality	The computers were appropriate	Average: 6.7 (0-10)
	The presentation structure of the software was simple and understandable	Average: 5.1 (0-10)
	It was easy and convenient to move from screen to screen (navigate)	Average: 5.75 (0-10)
	The voting system was easy to use	Average: 5.8 (0-10)
	The discussion system allowed me to incorporate arguments was adequate	Average: 5.05 (0-10)
	The discussion system has allowed me to know other people's views and share my own views	Average: 5.2 (0-10)
	I believe that my anonymity was assured throughout the process	Average: 6.4 (0-10)
	Overall, I liked the design of the software application	Average: 5.8 (0-10)
	Overall, I am satisfied with the application used	Average: 5.95 (0-10)
ATTRIBUTES	**CADRETE'S INDICATORS**	**CADRETE'S VALUE**
Information Quality	It has been easy to understand	Average: 6.9 (0-10)
	It has been appropiate	Average: 6.85 (0-10)
	It was received on time	Average: 6.35 (0-10)
	Basically, it didn't present mistakes	Average: 5.9 (0-10)
	In general, I am satisfied with the proportionate information	Average: 6.9 (0-10)
ATTRIBUTES	**CADRETE'S INDICATORS**	**CADRETE'S VALUE**
Service Quality	Support staff helped in the development of citizen participation process	Average: 8.45 (0-10)
	Support staff provided additional information	Average: 8.15 (0-10)
	Without the support staff, I would not have been able to participate	Average: 5.85 (0-10)
	Overall, I am satisfied with the help of support staff	Average: 8.5 (0-10)

3. Validating the framework through international experts

The revised EF³ framework as put forward in section 1.2 was validated by a group of experts through a questionnaire. In this section, we outline the methodical validation context and describe the contributions of the experts including suggestions for revision and the assignment of weights to attributes and indicators of the three criteria.

3.1. Methodical context of expert validation

The revised EF³ framework was reviewed and validated by international experts that were selected from the contacts of the authors and from scanning literature on e-participation evaluation. Nine experts agreed and filled in the questionnaire. They have the following backgrounds (names and locations omitted for anonymity purposes):

- Four professors with academic backgrounds in: economics & operations res., e-government, political sciences, public administration & law & statistics
- Five senior experts with competencies in: citizen participation, e-participation, political science, public administration, public law.

The validation of the revised EF³ framework was performed through a written questionnaire. Experts responded with their views and weights. The questionnaire was structured in three parts: (1) The revised EF³ framework was introduced. Experts were asked to validate the framework by commenting the criteria and respective sets of attributes and indicators as explained in section 1. Experts could also suggest amendments or revisions. (2) Experts were asked to assign weights to each attribute of a criterion based on the expert's perceived importance of respective attributes. (3) The application of the revised framework to the real-life experience in Cadrete was presented. Experts could provide suggestions and changes or comments to the exemplification of the evaluation framework.

3.2. Feedback of the group of experts on the framework

Overall, experts agreed with the need for fine-tuning indicators to make e-participation experiences clearly measurable by establishing qualitative or quantitative measurements thereby being specific. Almost all experts advised that more details on the indicators would make it easier to understand the meaning of each one.

With respect to Effectiveness, it was suggested that the attribute "social wisdom or collective intelligence" be renamed into "civic intelligence" as e.g. put forward in [21]. Likewise, experts suggested that the attribute named "subsistence" might be better called "significance", as this concept would better indicate the selection of the individuals who can contribute more.

With respect to Efficacy, most experts agreed with the need for explaining better the differences between the indicator of "communication" and "decision". Some experts advised to take into account the term accountability, especially when "in-formation" and "communication" are referred to. Others suggested that Efficacy is just an attribute called "engagement" with four or three levels and they think that "expectations" should not be contemplated as an attribute of Efficacy.

With respect to Efficiency, most experts agreed with this term being an economic concept confirming the need to analyse the effort and result in relation to resources expended. Others suggested including another attribute: "quality of participation". Some

of them commented that the human resources support could influence in the final decisions of the citizen, accordingly confirming the attribute "service quality".

3.3. Assigned weights

The arithmetic mean of the weights assigned to attributes given by each expert individually is shown in Table 7. Some experts did not assign weights to the attributes because they consider that all indicators should have the same importance without discrimination among them.

Table 7. Assigned weights to each attribute of the three criteria

EFFECTIVENESS			
ATTRIBUTES		WEIGHT	
PEOPLE	Control (Co-Decision)	27%	56,0%
	Participation (Co-creation)	46%	
	Learning (Formation)	15%	
	Freedom (Tolerance)	12%	
SOCIETY	Subsistence	19%	44,0%
	Cohesion	18%	
	Equity	33%	
	Social Wisdom	30%	

EFFICACY	
ATTRIBUTES	WEIGHT
Information	21,00%
Communication	25,00%
Decision	26,00%
Expectatives	28,00%

EFFICIENCY	
ATTRIBUTES	WEIGHT
System Quality	30,00%
Information Quality	42,00%
Service Quality	28,00%

Most experts agree with the values being difficult to interpret. They argue that more descriptions are needed as to what questions were asked that give these indicator values. They advise a better match between the questions asked in the questionnaire and the mapping thereof to each criterion of the EF^3. Besides, they suggest that the framework should be tested in further e-participation endeavours.

4. Conclusions and future work

This paper presented the attributes and indicators of the revised EF^3 framework (efficiency, efficacy, effectiveness) to evaluate the success and impact of e-participation experiences. Furthermore, results of a survey among a group of international experts who validated the framework and assigned weights to the attributes per evaluation criterion were presented. Finally, the revised framework was applied to a real-life experience of Cadrete, Spain, based on e-cognocracy.

It is important to mention that the obtained results are conditioned by the real-life experience that previously was performed in Cadrete (2010). This pilot experience does not only constrain the results but also some of the attributes included in the current framework. In the next revision of the framework, the authors will include the experts' suggestions and their own ideas in the final framework. It is planned to develop an integral evaluation of the three criteria (effectiveness, efficacy and efficiency) using

multi-criteria technique. Finally, the framework will be applied to others e-participation experiences to enrich the evidence base of evaluation.

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