

A Comprehensive Approach for E-Government Solutions

Roberto Cortés-Morales
Computer Graduate Department
Instituto Tecnológico de Costa Rica
Cartago, Costa Rica
rcortes@itcr.ac.cr

Abstract— Experiences on developing E-government solutions have given a set of evidences that policy makers can profit in order to avoid poor results or to adopt best practices. Complexities on such solutions involve several considerations that should be managed using multiple variables related to different dimensions including political, economic, social, administrative and technological ones. Integrating theoretical principles from Public Value, Public Policies and Multidimensional Actor Model, could derive on a particular approach for the design of policies where E-government supports a political goal. Some cases are referred for illustrate this approach.

Keywords— *Actors, E-government, Public Value, Public Polices, Actors*

I. INTRODUCTION

E-government is far to be a problem solely related to the Information Technologies (IT) domain. Although IT has a substantial role as a mean, E-government is essentially related to political goals. Entrepreneurial or participatory approaches [1] were conceived to classify solutions that try to fix problems on efficiency, transparency, confidence (and others) into the State, as well the participation of citizens on the political processes of a community or nation. Additionally, proposals related on support decisions for public managers could be found on typologies like G4K (Government for Knowledge) [2] stating the need of processing information for better understanding of public problems.

Consider for example the goal of achieving efficiency on public services using IT. The main goal is not just the use of computers but also transforming the processes involved. Even if it represents benefits for users, it certainly could threaten some interests of actors (public or private) that profit from status quo. In this case questions around political, administrative, social, technological or economic variables shall arise. If the use of IT on public services doesn't impact the way things are currently done, efficiencies and other advantages of IT may be lost.

Consequently, an immediate question can arise: how to design policies that enable valuable transformations on Public Administration by using IT?

For answering such question important references can be used. Some theoretical principles coming from Public Value concept [3] [4], Public Policies [5] and the Model of Actors in

Multidimensional Context [6] [7] could be integrated in order to propose an approach for E-government solutions. To observe what those theories propose, they may contribute on defining an approach intended to identify variables from good and bad experiences in E-government development. The goal is to bring some knowledge for future successful projects in this field.

Section II will discuss some characteristics of referenced theories. Section III describes the proposed approach illustrated by cases on Latin America. Some conclusions are pointed at the end of this article.

II. TYPOLOGIES AND THEORIES ON E-GOVERNMENT AND PUBLIC SOLUTIONS

A. General E-government background

Different authors have presented some typologies for identify E-government solutions. From Fountain [8] first classifications were specified depending on “users”. Thus such solutions could be classified on categories like Government to Citizens (G2C, specifying developments for citizens), Government to Business (G2B, indicating that solutions are focused on productive sector) or Government to Government (G2G, solutions that integrate or coordinate actions and information among public agencies).

Additionally, Laynee and Lee [9] contributed with a classification based on the “levels of services” developed for users. Such levels include Information (basic and static information describing the service), Interaction (capabilities of receiving and sending information on line from and to service's users), Transaction (services permit the completion of users' requirements on line frequently involving the payment) and Integration (several public agencies coordinate electronically their information and users of services have a single entry point for their requirements).

Although those typologies have helped on E-government characterization and evaluations like those performed by United Nations [10]; more complex challenges need to be assessed in order to achieve political goals involved. Tolbert and Mossberger [1] describe political objectives related on E-government like efficiency and transparency of services, that could enhance the confidence on Public Administration, as well as the civil participation using IT. Such goals are

intended to be some of the political effects that could be achieved with E-government solutions.

Since these generalities and principles look for improve performance or correct issues in the public administration, the political system and the society, they shall be analyzed using broader perspectives. The following subsections describe some theoretical approaches that could help in this regard.

B. Public Value Principles

Public Value is a concept developed by Moore [4]. It was conceived to differentiate the goals of Business Administration and Public Administration while look to set managerial similarities on both.

One key contribution of this concept is to state that the value produced by the public sector is far more complex to measure than the one produced by enterprises. In the profit value concept (at least in a basic way to understand it, since some complexities are also stated by Moore) customers' decisions (real or projected) to purchase (or not) goods or services in a competitive market establish the value of a firm, viewed as the "return of the investment". The expectations of the value of enterprises can serve to decision-makers in order to fund the investments needed for the current or future production.

On the other hand, the services or products of public sector have some particular complexities. If analogies can be drawn, the citizens or tax contributors are the "shareholders" of Public Administration. They elect their representatives who become the political and administrative managers. Discussions on how to invest taxes and reach goals to satisfy contributors (beneficiaries) are the results on decisions of public actions and policies.

Moreover, the actions that Public Administration adopts as services or products may be not directly related to all beneficiaries. For example, if a political community tries to reduce poverty in order to avoid social and criminal violence, a sector of tax contributors may not be aware of how that policy could benefit them. In this particular action, there are social program beneficiaries that directly (contrary to other citizens) receive monetary transferences that support their day-by-day living. Additionally, the results expected of these actions may not be seen until many years later. Thus to sustain policies is risky due to political changes and other factors. Overall, differently from business goals, in public sector there are no short term results that can be expected in some (if not) most cases.

An immediate lesson of this approach is fundamental: it is always important to set a political goal that is valuable for most of citizens or contributors: this is the public value. Security, peace, social cohesion, national competitiveness, transparence, environment responsibility, among others can be examples of such goals. How different kind of administrative or political arrangements are needed to reach these goals (and the way to evaluate them) is complementary challenge that this approach also proposes.

Moore develops two other components of the concept related to public value: *legitimation and support* and *operational capabilities*. These three components (including public value) are what authors call "*strategic triangle*" [3].

Public value as it was discussed, is the expected value that some public organization should produce. Such value ideally should come from a shared vision of citizens. On the other hand, legitimation and support is how political representatives agree on how public organizations would achieve the public value stated, by allocating resources needed (resources that often come from taxpayers). Operational capabilities are the resources that a public manager could organize to achieve the public value required. To summarize this approach as authors did, the concept of **public value** and its components rely in this sentence: "*imagine and articulate a vision of public value that can command legitimacy and support, and it is operationally doable for the domain you have responsibility*" [3, p. 9].

One limitation that could be found on this approach is that is limited to a managerial vision of organizations. Public sector and more general, the State, include much more complexities than organizational issues. Even if deals with some political aspects; this concept is not enough to comprehend the constraints and considerations where public solutions are immersed.

However, it is important to keep two characteristics of this approach in order to design a public solution: on one side always state a public value goal coming from a shared vision. The means used, including economic measures or the use of IT, among others, are just means. If citizens agree with the public value defined, it would be easier to gain support and legitimacy. On the other hand, public solutions are far to have immediate results. Thus to have business-like expectations would not be correct. Many actions to obtain the public value desired, need to be subsidized and could trespass the time limits of one (or various) administration periods.

Specifically, for E-government policies it is important to notice that solely state a public value based on IT would be no good enough. It should be presented as a more cohesive goal like "State modernization", "efficiency on services", "public rights on information", "participation" and "efficient services", among others. Consequently, it is immediate to note that the problem should not be legitimated and managed mainly as an IT issue. Thus, a main political authority should lead it by setting an important goal valuable for society or community. To "legitimate and to support" and to have "operational capabilities" as the strategic triangle points, it is needed to integrate other dimensions on E-government solutions.

C. Public Policies approach

Public policies deal with the study and prescription of public solutions directly implemented by government or other actors [11]. A public policy is not a random-based action. It requires some criteria from decision makers in order to

improve or correct a situation on the public space.

In order to analyze them, authors like Subirats and others [5] propose to divide the process of public policies on phases. It permits to identify some particular issues related to particularities in each one of them.

Usually a policy includes *problem identification*, *formulation of the solution*, *decision* alternatives on the solution, *implementation* and finally, *evaluation* of the solution.

For real problems, the division on phases it is not necessarily sequential and may neglect some of them. However, it is expected that policies that are well constructed should be composed using elements that could be associated to such phases. Any of them present specific challenges.

1) *Problem identification*

The *problem identification* phase deals with the recognition that some problem is important for a political community or a particular interest. Sometimes it may be necessary to adopt pressure measures by stakeholders, groups or in some cases to have “lobbyist staff” to gain such recognition. Media can also play an important role in this process by publishing studies or news on some particular issue. The result is that the problem can gain visibility and can be include within an official agenda. Thus it could be subjected for resource allocation in later phases of the policy process.

Here it is possible to observe some resemblances to Public Value approach. The “value” of the solution has to be set in this phase. But beyond on just state it, it could be noticed that a political game is played. The interests could be diverse and resources are usually scarce for government in order to address any problem. Which of those could gain space in the agenda is the result on how interested actors have power for the recognition of their problems.

For E-government solutions one of the main challenges it is to develop a sense of awareness that IT may help on a variety of State services improvements such as decision making support, efficiency, enhance confidence and transparency perception on citizens and users, among others objectives. This is not just the use of IT but how IT could help on such objectives.

To gain space on official agenda facing other problems like security, poverty reduction, tax evasion, public finances to name a few ones, could be very difficult. It is important then to point how IT and E-government solutions can help to correct some of those problems: efficiencies, improvement on citizens’ quality of life, transparency, information for planning and monitoring public programs, etc. as the result of the use of IT in E-government solutions, can eventually match several important objectives.

2) *Formulation of solution*

Once a problem is recognized and it is included on public and official agenda, how the solution will be shaped is a strategic task to perform. Here again political games (actors

defending their interests) will affect the result of this phase. Factors dealing with funding, institutional arrangements (if any), effects expected and others have to be considered. For example, it is needed a new law for the e-procurement solution? How it will be funded? The government has enough budget or it is required a loan from an international agency? What is the worst scenario if new law is not approved? What resistances from specific actors could be identified? Etc.

The intention is to draw a roadmap for decision-makers and to the implementation phase. Here too, some similarities with Public Value could be pointed. As a part of the strategic triangle, Legitimacy and Support shall be constructed in order to achieve the public value defined. The formulation phase deals with these challenges by proposing the creation of the public space (using current or new institutions) and defining the possible resources that could be used.

For E-government policies it is necessary to consider the impacts of IT on existing mechanisms for delivering public products and services in order to transform them on more efficient ones. Consequently, it is highly possible that institutions and organizations should suffer some changes in order to make possible the gains of using IT. Institutional impact can be as simple as issuing a decree or as complex as voting a new law. Since institutions define the legal public space, such analysis becomes strategic for E-government solutions.

As well other resources shall be defined: how to train users, what kind of technology is suitable for solutions, who will be the different leaders of the policy process, what sources of funding are available for the projects and the maintenance of solutions.

3) *Decision phase*

Decision-makers shall adopt a decision on how the public solution will be developed. The complexity of the decision mostly would depend on the quantity of actors involved with their particular interests and the space of the solution (meaning if the policy can be solved in few institutions as a government problem, or on the contrary, is a problem involving complex scenario as the Congress or there is a political crisis questioning and confronting the institutions). Hence, actors could come from formal institutions (Executive, Legislative or Justice), or from social or productive sectors that could try to influence the decision.

If the solution requires a new law, the result of formulation may change significantly because the influence of legislators and the interests they represent. If the previous phase (formulation) has reached high consensus, the decision could be taken easily with no significant changes. Moreover, if the decision is in the space of a single State power (for example, the Executive) with a well-recognized leader (for example, the President), the policy process may be simplified at this phase.

Thus, it is important for E-government solutions to maximize the use of current conditions or find the simpler decision space. If not, intensive work for reaching consensus

should be achieved in the previous phases.

Both for private or public sectors IT solutions are complex not only because of IT issues. Consequently, it is important to show to decision-makers how the proposed solution could fix important political problems, as well as good results for previous analogous experiences (either national or international ones) in order to gain support.

Again it can be found here similarities with Public Value. As is required in that concept, legitimation and support are the result (in some extent) of the decision phase.

4) *Implementation phase*

A policy should be implemented with the resources allocated for it. Here the administrative challenges are more important. How to train, how to lead, how to develop, how to organize, etc. are the issues to which actors coming from management and political spheres will deal with. Political resistances may come, for example, from bureaucracy and other actors that could find in this phase more convenient space to strike back against the solution adopted (if some interests were affected). Consequently, the political process, both in the previous phases and in this one, should be managed and resolved for better results at this point.

To achieve good performance on projects as well as some rapid and good results, the use of media to show the advances of the policy, are factors to be taken into account in this phase.

For E-government projects factors like risk control, IT architecture planning for the digital services, the protection of public and personal information, the strategy of implementation using parallel and pilot approaches, the scalability of solution, the training for providers and users of services claim for a strategic perspective of IT Management.

The Public Value concept finds here similarities on its strategic triangle concerning to the operational capabilities. Managers' deal with specific resources allocated for policy implementation. It is expected that the solution can create the expected value as the Public Value concept proposes.

5) *Evaluation phase*

Policies must give evidences of the advances and how they are close (or not) of proposed goals. Some public actors are intended to evaluate the use of public resources in general (like the General Comptroller) as well to exercise political control (like the legislators). Policies shall be designed to facilitate these evaluations by setting information sources and key performance indicators related to the solution. For E-government, typologies described previously could be help on it: how many services are being developed for citizens, business or other agencies, how many of them show accurate information, how many are interactive or transactional, how they are used, etc. Moreover, to show how they impact on transparency, efficiency, user satisfaction and other indicators, could be performed by studies and researches that need to be designed and budgeted.

In summary it may be said that the Public Policies approach contains and extends the Public Value concept. It deepens on some complexities to which the political process affect on

solutions adopted. Challenges for E-government solutions can be identified on every phase that composes a public policy. It would be a good practice to analyze every one of such phases in order to achieve a well-designed policy in this field.

However more precise factors may be identified for the definition of policies for E-government as it is shown next.

D. *Multidimensional actors' approach*

This approach defines and integrates two directions of analysis for policies. On one hand it focuses on dimensions that should be taken into account for public solutions. Specifically, for E-government the factors belong to political, economic, social, administrative and technological dimensions. Questions regarding those dimensions may direct the study or the definition of a policy as well as important findings regarding actors. The second driver of the analysis in this approach (the actors) will be described next.

1) *Characteristics of actors*

The importance of actors has been described by many authors [5] [12] [13] [14] on different political contexts like governability, institutional changes, public policies or policy networks. Using Subirats's definition [5], an actor is any individual or group that defends a particular and unique interest in a policy. Actors are classified as public (responsible of policies) or private, which are beneficiaries or objectives (affected by the policy).

In the Multidimensional Actors Approach [7], actors involved have two specific characteristics: the veto power of an actor and the support given to a policy. Veto power is defined as the resources one actor has in a given moment and the relative importance of such resource. Resources are *institutional*, *economic*, *public recognition* and *media* ones.

Institutional deals with formal resources granted to an actor: what a law, a decree, a contract or normative permits to a specific actor to do in a public context.

Economic resources are those that can be represented by any financial-like instrument (money, credit access, properties, etc.).

Public recognition in contrast with institutional resources, tries to focus on no formal aspects. It deals on how an actor is recognized as a leader, as an authority or expert in a specific subject or others characteristics that are important to some policy (such as, what is the level of approval of the President?).

Media resources are intended to assess the capacity of an actor to access media in order to communicate their positions.

Support as the second actor's characteristic, tries to measure how actor mobilizes its resources in order to support a given policy. Two variables are defined on it: public declarations and actions. First ones are what actors declare publicly on a specific topic regarding a policy. Second ones are how actors do with their resources to back policies.

In this model both actors' characteristics are quantified with values moving from 0 to 1 by weighting the variables involved. Any of those have relative importance depending

on the phase of the policy and other factors. For example, if it is situated on the problem definition phase, declarations for the support characteristic may be more important than actions. For veto power as well, in the same phase could imply that public recognition and media access are more important resources than institutional and economic ones. Table 1 illustrates some guidelines to determine the weight of the institutional resource depending on the phase of a public policy. Similar guidelines are elaborated for the other resources involved.

TABLE 1: EXAMPLE OF VALUE FOR WEIGHTING THE INSTITUTIONAL RESOURCE IN THE PUBLIC POLICY PROCESS

Phase	Resource status	Possible value
Problem definition	The identified problem can be managed within existing institutions	0
	Current institutions deal in part with the problem	0.5
	No current institutions can deal with the problem	1
Formulation	The solution can be formulated using existent institutions with few actors that share common vision	0
	The solution has to create new institutions into the boundaries of a particular branch of State powers	0.5
	Complex institutions (as a new law) have to be created including diverse actors with different interests	1
Decision	Decision concerning the solution falls into few actors using existing institutions	0
	Decision involves an important number of actors but is located into a specific branch of State power	0.5
	Decisions are taken in a complex institution (as the Congress) involving negotiations with different actors	1
Implementation	Existent institutions permit the implementation of the solution	0
	Institution context constraint the implementation of the solution needing them to negotiate for required resources	0.5
	Institutional context does not permit to implement the solution	1
Evaluation	Actors have a institutional context that permits easily the evaluation of the solution	0
	Institutional context is not clear for the evaluation and requires additional efforts by actor for bringing and obtain evidences of the advances of the solution	0.5
	No institutional context exist for evaluation	1

In general, as it can be notice in Table 1, the more the resource is present less is the value of the weight. The formal definition for the Veto Power of an actor comes from the following formula [7]:

$$V(t) = \frac{\sum_{i=1}^N r(t)_i w(t)_i}{\sum_{i=1}^N w(t)_i}$$

For each resource $r(t)_i$ of an actor a value between 0 and 1 is computed. Description on how values for resources are set can be find in [6]. Notice that Veto Power is weighted average based on the weights of resources in a period of time. The Support characteristic is analyzed analogously and is described in [7]. Depending on support and power, actors can be classified as Fig. 1 shows.

		Veto power	
		Low	High
Support	High	UPHOLDER	SPONSOR
	Low	INDIFFERENT	BLOCKER

Fig 1: Actors' basic typology [15]

An immediate hypothesis of this model is that a policy would be more feasible if more “sponsor” actors can be found. Contrary it would be less feasible if more blocker actors were found. Illustrations of those concepts can be drawn for better comprehension.

Imagine that circles represent actors. For each circle, the diameter represents the veto power of each one. In Fig. 2, Actor Y and Actor X have different power represented by y and x values, where x has a greater value than y . It says that in a specific context, Actor X is more powerful than Y.

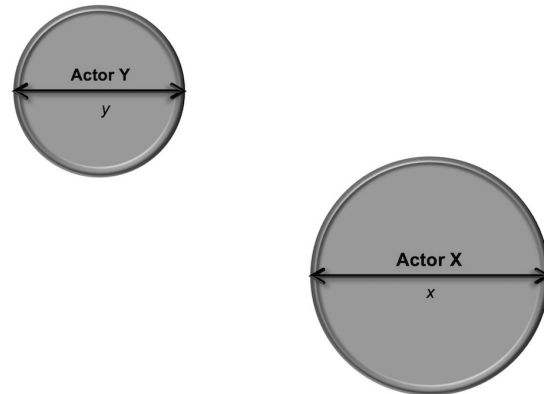


Fig. 2: Veto Power representation of an Actor

If every actor identified in a specific moment for a policy is placed in a “balance” representing the support, feasibility can be represented as a measure depending on actors’ power. Fig. 3 illustrates it.

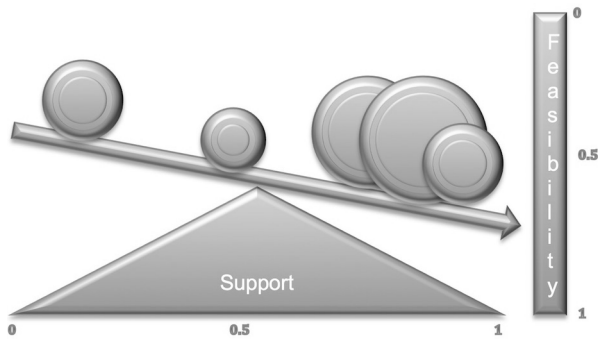


Fig. 3: Feasibility depending on actors' support

Notice that powerful actors are determinant on feasibility behavior. In the example of Fig. 3 the support given by few of powerful actors inclines the balance towards an important value of feasibility. Contrary if they are placed to the left side of support, value shifts close to 0. The formal definition for feasibility is given by the following formula [7]:

$$F(t) = \frac{\sum_{i=1}^N S(t)_i V(t)_i^{o(t)}}{\sum_{i=1}^N V(t)_i}$$

For each actor i its support $S(t)_i$ and veto power $V(t)_i$ were calculated. Feasibility for a policy in a moment t is a weighted average on the veto power. The value $o(t)$ is the number of independent options for solutions that actors defend. If $o(t)$ is greater than 1, more powerful actors are less affected but in overall the value of feasibility decreases.

The ability to identify and gain support of powerful actors is a key factor for any policy. Ideally a consensus situation would place most actors on the right side of the balance of Fig. 3, reaching a value near to 1 for feasibility.

Notice that the model can be used for explaining experiences of policies developed or can be used as well for policies to be designed.

If policy designers could assess characteristics of existent actors or actors needed, they could find out what is the support required to have an important value of feasibility.

It is important to point that, although the model deals with actors this is not an individualistic model. By defining dimensions of analysis that are mapped to actors' characteristics, the model takes into account more global considerations regarding the policies.

2) Using multiple dimensions for public policies on E-government

This approach proposes that multiple dimensions need to be used in order to analyze or define public policies for E-government.

Political dimension considers a set of variables related on the institutional structure (as Constitution, laws, decrees, etc.), the actors involved, the policies defined, the identified public problems and others.

Economic dimension deals with variables related on budget, public finances problems, capacity for funding policies, international loans, as well the IT solutions that could help productive sector among other variables.

Administrative dimension considers variables related on managerial capacities and problems such as leadership, project organization, IT strategic planning, process design for digital services, outsourcing management and others.

Social dimension address variables related with problems that affect society that E-government might help to solve (criminality, corruption, etc.), including the digital divide, the training for users and others.

Finally, *technological* dimension includes variables like architecture definition for IT components (networks, public infrastructure. databases, application software, hardware, mobile apps, etc.), and the research and development on such technologies.

The analysis in each dimension could help on retrieving important information that could be used either for the retrospective study or to set the requirements of a new public policy for E-government.

Table 2 shows examples of such kind of information sources and how they could potentially be mapped to a specific component of the actor's characteristics.

TABLE 2: EXAMPLES OF INFORMATION SOURCES FOR EACH DIMENSION MAPPED TO MODEL'S CONCEPTS

Dimension	Example of information source	Concept related to the model
Political	Policies for the use of IT in public services	Identification of public actors, institutional resources for actors
	Laws, decrees, contracts or others institutions related to E-government	Identification of public and private actors, support actions, institutional resource, economic resource
	Declarations of actors in media regarding E-government initiatives	Support declarations of actors, media resource
Economic	Budget allocation for digital services	Economic resources; support actions of actors
	Evaluations of cost and savings from the use solutions implemented	Economic resource, identification of actors, public recognition resource
Administrative	Strategic plan for development E-government solutions	Identification of actors; institutional, economic, public recognition and media resources; support actions of actors
	Documentation of redefinition of processes for digital public services	Identification of actors, support actions of actors.
Social	Assessment of adoption of solutions on users	Identification of actors, public recognition resource, support of actions and declarations
Technological	Components of IT architecture developed to hold public digital services	Support actions, economic resource

The use of dimensions may be also applied to specific phases of the public policies. Table III shows an example for the case of *economic dimension*.

TABLE 3: EXAMPLE OF QUESTIONS FOR THE ECONOMIC DIMENSION IN DIFFERENT PHASES OF THE POLICY

Phase of the policy	Examples of questions for the economic dimension
Problem identification	How the specific economic context favors or impedes the development of the solution? What specific economic problems could be solved by using E-government solutions? What potential public value worth to subsidize?
Formulation	What instruments of economic policy have to be used or created to fund the development of the solution? What portion of tax incomes can be allocated to fund service operation? What funding sources (in partnership with private sector or international loans) can be accessed to support the projects for implement the digital service?
Decision	What instruments for funding the solution are adopted? What social, economic or political issues will be fixed by the proposed solution? What parameters of performance both financial and public value are defined for policy evaluation?
Implementation	How financial resources will be managed and executed to achieve the implementation of the solution? What information sources need to be defined during the implementation phase to monitor the advances of the solution?
Evaluation	Are the financial resources executed on time and efficiently? It is any saving achieved from the use of the digital service?

This approach enhances the one described for Public Policies. Its contribution aims to guide both academics and policy designers on characterizing such policies by using sources of information related to specific dimensions. Moreover, by analyzing the information it might be mapped to characterize actors and obtain some indicators on how the policy may be (or not) feasible.

The model can help to analyze best practices of E-government development of known cases and identify key factors related to dimensions and actors' characterization. It may help also to determine what problems can be found on specific phases of the policy (for example, it might exist a good formulation but poor decisions). Finally, one can design policies by defining actors that are necessary depending on requirements of resources on each dimension applied to specific phases.

III. A COMPREHENSIVE APPROACH FOR DEVELOPING E-GOVERNMENT SOLUTIONS

Previous sections describe and discuss the main characteristics of different approaches developed for management of issues concerning the public sector. Specifically, for E-government such approaches can be important in order to have successful developments. Next paragraphs will propose important aspects that should be managed to produce a good solution. It will be illustrated using some examples of cases.

It is important to note that those cases were analyzed using the case studies approach comparing some services developed under a E-government strategy in two different countries. Methodology had focused on analyzing a variety of documents applying the multidimensional model previously described. In general, conclusions of the cases point the need of answering two prospective questions: how to raise the priority of E-government solutions and, how to manage them adequately. By abstracting some lessons learned by applying the models and theories described, the approach proposed may be a response to such questions.

A. Set Public Value of E-government solution

As discussed previously, no important value could be set to citizens and government users solely by emphasizing IT advantages. They should be mapped to more valuable goals like transparency, efficiency, cost reductions, citizen participation and others. Two successful experiences in Chile and Panamá have set valuable goals as starting point.

Chile E-procurement service (named ChileCompra) which is a world reference of good practices, have indicated that this solution would help on reducing inefficiencies of public purchasing, as well to increase transparency of the processes involved. Savings on procurement can be translated to fund other important State programs [16].

Panamá's Public Sector Cloud come from the promise of President Martinelli on deliver better and improved public services to population, as well as to be responsible with the environment by the reduction of use of paper and to increase the security of public information managed by the Panamá's State [17].

On the contrary Costa Rica's case of State Procurement have been focused on a debate involving two solutions, where main arguments are related to technological characteristics of the computer systems. No valuable goals appear on the discussion and to date, no solution has been implemented after 15 years of efforts and expenses near to USD 20 million [6]. Just in the last year, some effort in Public Procurement law at this country has identified the use of a technological platform as a "transparency" goal on the public sector purchases [18].

By setting the Public Value of the solution it might be possible to create a shared view among actors using "political and public vocabulary", not the eccentricities of IT characteristics. As Chile and Panamá did, initiatives have to be promoted by important and powerful actors like the President of the Republic. He or she could be supported by other actors (national or foreigners) that are well recognized on the specific field of solutions related to E-government. Colombia's case shows how the role of the Minister of Information Technologies was important on the progress of E-government development [18]. In this country, IT policies are oriented to improve citizens' life quality.

B. Divide the problem referencing specific dimensions

To have a broad vision of variables that could affect the E-

government solutions, it is necessary to assess them on specific dimensions.

For example, when ChileCompra started its formulation in 1997 [6], the requirement of a new law was identified. Such **political** problem had been critical along the construction of the policy, but it was known that no good solution could be possible without such law (political dimension). Also it was identified the reduction of the State agency of procurement, setting at the same time **administrative** (administrative dimension) challenges for the implementation. **Funding** problem (economic dimension) was arranged by the use of a credit of the Interamerican Development Bank (IDB) solving economic issues for the solution. **Social** impacts had been identified from savings and the use of them to fund social programs as well to promote the participation of Small Enterprises on the process of selling to the State (social dimension). The **technological** aspect of the solution at the beginning was supported by an enterprise, which had developed the earlier IT platform for ChileCompra (technological dimension).

Even if ChileCompra faced at first some difficulties, the comprehension of all sources of problems and how to fix them helped to reach at some moment important validation to be adopted as a solution of a specific circumstance of the political life in Chile.

Panama's Cloud solution had set its **political** goals (political dimension) as it is pointed previously (efficiencies on services, savings on IT and environment responsibility). It was **funded** as well using a credit from IDB (economic dimension). For the maintenance of the platform, all the public agencies contribute with their budgets since they don't need to purchase IT equipment due of the existence of the Public **Cloud** (administrative and technological dimensions).

Successful Costa Rica's electronic platform for Drivers License and Passport document transaction had considered most dimensions [6]. One can identify **political** support and agreements between Government agencies and a local Bank to **fund** and to install points of services along the whole territory. Impacts on **society** mainly are that Costa Rica nationals have no longer to travel to capital city from regions to obtain their documents. **Administrative** arrangements to develop the project were managed by the political leadership of the Vice-President and the technical support of an expert on IT projects.

To neglect important aspects on any dimension may result on poor results. Even if Chile had shown important progress on E-government from 2002 to 2005 placing it as a leader country, some projects failed in an important manner. That was the case of International Trade Platform where no strong political leadership was conceived (political dimension). Complexities on managing 18 different agencies required more than just an IT leader implying severe difficulties to finish the solution after many years of efforts [6].

C. Manage phases with specific dimension problems

Since policies have a cycle of life divided into different

phases it would be a good practice to manage them. Public Policies Approach discussed earlier pointed on specific issues that each phase deals with.

Complementary, multidimensional approach tries to enhance phase analysis by including particular aspects that have to be considered. Particular questions can be addressed on specific phases of the policy in order to avoid potential errors.

Let's take Costa Rica's State Procurement case. Actions have been taken by two agencies (the Minister of Treasury and the Digital Government Secretariat). Both agencies have tried to promote their solutions. Both have advanced in problem identification, formulation and implementation phases. But the absence of a good decision phase affected in two ways. On one hand they exist two complex and expensive solutions competing for the same goals. No superior authority has been capable or willing to adopt and legitimate one of them. On the other hand, institutional context was not sufficient for reaching goals on savings and transparency because none solution has a mandatory use in the Costa Rica's public sector. Note in this case that decision phase is crucial and it has been poorly managed in its political dimension. Additionally, using correctly the economic and technological dimensions could warn decision-makers on the misuse of important resources implementing two competitive solutions.

Sometimes institutional structure may permit to develop actions more easily. In the case of Panama's Cloud, an Executive Order from the Minister of State Modernization was enough to avoid public agencies on purchasing IT equipment. In this case a powerful actor adopted political decision. Even if political dimension is less complex in this case, it was managed effectively.

Policy designers have to be aware on such issues for each phase. To set specific objectives using properly the multidimensional analysis, can help to avoid neglecting important considerations.

D. Identify appropriate actors and define their resources

Any policy relies on the performance of actors in different levels and roles (political, administrative and technical). Hence, it is strategic to select, to profile and to empower appropriately such actors.

The actors' model was applied on some cases in Chile and Costa Rica [7]. The application reveals some correspondence of feasibility with the results of good and poor experiences on both countries.

In any case the model aims to clarify decisions on how global aspects of the policy could be mapped to specific resources of actors. What is the ideal institutional resource for him or her? What are the economic resources needed for each actor? How to achieve or to hire someone with sufficient public recognition in order to legitimate the policy? How the actor could access media to communicate important advances of the policy?

Note from previous discussion that the importance of actors' resources could be relative to specific phases. Additionally,

analyses performed into dimensions could be mapped to specific actors' characteristics on veto power and support.

Thus actors' characterization could synthesize at the end many of the information coming from different dimensions and phases analyses.

Agencies, academics, entrepreneurs or groups interested on E-government development need to identify strategic actors that could adopt and sponsor such initiatives. Good experiences in Chile, Panamá or Colombia give evidences on such commitment from powerful actors. The case of Costa Rica is less clear and no evidence from current political environment seems to be favorable for E-government development [19]. In general, many of these factors can be found on qualitative evaluations made by agencies as the World Economic Forum. For example, some countries (Chile, Panamá and Uruguay) were evaluated as excelling in the development of E-government in the Latin American region [21]. One can identify in this report many of variables that were important for such success: political definition, political commitment with the E-government goals, adequate funding, social orientation of solutions, actor able to lead the policies and projects, etc. At large, to comprehend and integrate the public value, the policy phases, the pertinent dimensions and the appropriate actors would contribute on the success of E-government development.

IV. CONCLUSIONS

The approach developed here is the result of an extensive but synthetic discussion of some of the main approaches intended to develop solutions on public spaces and how they could be applied for the specific case of E-government solutions. Each approach contributes in an important way to consider special issues for any policy.

Specifically, E-government solutions should avoid IT objectives looking for more valuable political goals. Once this is set, the use of dimensions could help on defining important variables for policy phases and for actors' characterization.

The experiences observed here illustrate some characteristics of E-government policies that could explain failures or successes on them. Nevertheless (as any applied research) it is important beyond the knowledge contribution described here, that E-government solutions require some practical approaches that may help to minimize the risks often related to such kind of projects. The integration of some important theories and principles may result in an accurate approach that consider multiple dimensions of analysis, using different phases of public policies, stating valuable goals for E-government initiatives. Unfortunately, no room for controlled experiments could be performed, and the only way to learn is to observe past experiences in order to abstract important lessons for future projects. Obviously, approaches like the proposed here is subject of improvement. Ultimately the effort of this kind of contributions is to reduce the uncertainties in the integration of IT in the Public Sector.

Learning in a consistent way from successful and failed past

experiences permit the identification of particular elements that policy-makers can use. Because complexities and large expenditures of E-government development and maintenance, it is valuable to guide future policies assessing particular issues that are only present on specific contexts. The potential gains on using IT for State modernization, cost reductions, transparent and efficient services among other objectives worth to consider general and specific aspects for the solution as this paper has tried to show.

REFERENCES

- [1] C. J. Tolbert y K. Mossberger, «The Effects of E-Government on Trust and Confidence in Government,» *Public Administration Review*, pp. 354-369, May-June 2006.
- [2] UNPAN, «E-Government Survey 2010,» 2010. [En línea]. Available: <http://unpan3.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2010>. [Last access: July 15th 2014].
- [3] M. Moore y K. Sanjeev, «"On creating public value: what business might learn from Government about Strategic Management". Corporate Social Responsibility Initiative, Working Paper #3,» John F. Kennedy School of Government, Harvard University, Cambridge, MA.
- [4] M. H. Moore, «Public value as the focus of strategy,» *Australian Journal of Public Administration*, vol. 53, n° 3, pp. 296-303, 1994.
- [5] J. Subirats, P. Knoepfel, C. Larrue y F. Varonne, *Análisis y Gestión de Políticas Públicas*, Barcelona: Ariel, 2008.
- [6] R. Cortés Morales, «Análisis comparado de las de políticas públicas de gobierno digital en Chile y Costa entre 2002 y 2010,» SEP, San José, Costa Rica, 2013.
- [7] R. Cortés-Morales, «Assessing the influence of actors on e-government policies: evidences from Chile and Costa Rica experiences,» de *Strategic Information Technology Governance and Organizational Politics in Modern Business*, T. Iyamu, Ed., Hershey, PA: IGI-Global Publishing, 2015, pp. 153-170.
- [8] J. Fountain, «The Virtual State: Transforming American Government?,» *National Civic Review*, vol. 90, no. 3, pp. 241-251, 2001b.
- [9] K. Layne y J. Lee, «Developing fully functional E-government: A four stage model,» *Government Information Quarterly*, vol. 18, n° 2, pp. 122-136, 2001.
- [10] United Nations, «E-Government Survey 2014: E-Government for the Future We Want,» United Nations, New York, 2014.
- [11] F. Pallares, «Las políticas públicas: el sistema político en acción,» *Revista de Estudios Políticos (Nueva Época)*, n° 62, pp. 141-162, Octubre-Diciembre 1988.
- [12] J. Prats, «Gobernabilidad democrática para el desarrollo humano. Marco conceptual y analítico,» *Revista Instituciones y Desarrollo*, pp. 103-148, 2001.
- [13] E. Klijn, «Redes de Políticas Públicas: una visión general,» de *Managing Complex Networks*, London, Sage, 1998.
- [14] G. Tsebelis, *Veto Players: How Political Institutions Work*, Princenton, NJ: Princeton University Press, 2001.
- [15] R. Cortés Morales y G. Marín Raventós, «Analyzing E-government policies: the actor's perspective,» de *WWW/Internet 2013*, Fort Worth, TX, 2013.
- [16] Chile, Ministerio de Hacienda, «Plan estratégico 2002-2005: Sistema de Compras Públicas,» Chile Compra, Santiago de Chile, 2002.
- [17] A. Gutiérrez, L. Murillo and Á. Zúñiga, «Propuesta de una nube computacional para el gobierno de Costa Rica: estudio de caso comparativo con la solución del Gobierno de Panamá,» Maestría en Computación Instituto Tecnológico de Costa Rica, San José, Costa Rica, 2015.
- [18] Costa Rica, Asamblea Legislativa, «Sistema Costarricense de Información Jurídica,» 31 August 2016. [En línea]. [Último acceso: 15 March 2017].

- [19] G. Mestre, «Public Policy on Information Technology in Colombia,» de *CLEI 2014*, Montevideo, 2014.
- [20] R. Cortés-Morales, “Considerations in multiple dimensions for Costa Rica E-government strategy,” in *Computing Conference (CLEI) 2014 XL, Latin America*, Montevideo, Uruguay, 2014.
- [21] M. Porrúa, «World Economic Forum,» 2013. [En línea]. Available:

http://www3.weforum.org/docs/GITR/2013/GITR_Chapter2.3_2013.pdf.
[Last access: April 10 2017].