Applying Extending Structuration Theory: A Study of an IT-enabled Budget Reform in the Context of Interdisciplinary Collaboration

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Abstract
This study considers contemporary budget reforms within the context of e-government due to their broader technological applications and informational content. In recent initiatives of budget reforms, governments have coupled together information systems with budgetary and managerial components. The result is a joint innovation to support the budget reform. This study extended structuration theory to study the adoption of these joint innovations in a contemporary case of budget reform in Mexico. The purpose is to learn about the critical factors that influence the adoption of these initiatives in a context of interdisciplinary collaboration (IC). IC involves interactions among actors with different professional backgrounds, knowledge and expertise in charge of implementing the related systems and tools for the budget reform. The study used an embedded case study design employing 28 semi-structured interviews and analysis of official documents. The results show a broad set of factors of related systems, policy and practices.

1. Introduction

Governments have attempted to transform themselves through continuous experimentation of technologies and tools in budget reforms [1, 2]. This experimentation corresponds to a large community of professionals from various disciplines collaborating together. By observing budget reforms and their derivative instruments, there is evidence of an uneven level of adoption among participants due to their different backgrounds, knowledge and expertise [2, 3]. Some are quite successful in adopting different components and tools of the budget reform into their organizational routines, while others do not even comply with its basic formal requirements [2]. Many have developed some theoretical frameworks to capture the complexity of budget reforms [4-7]. Most of these studies focus on dominant actors or organizations (reformers) and the analysis prevails over budgetary and managerial components of budget reforms. Today, those who attempt to adopt these initiatives require more than just budgetary and managerial understanding. They also need to be aware of on various informational and technological components of the initiative or at least collaborate with those who have the knowledge and expertise on these components to complement their own understanding [8-10]. For the adoption of any budget reform initiatives, interdisciplinary collaboration (IC) among different professionals becomes necessary. This study developed an extension of structuration theory (ST) to answer two research questions: What factors influence the adoption of budget reforms? How does IC play a role in the adoption of budget reforms? The structure of the paper contains six sections including these introductory comments. The second section presents the ST framework, its applications in the fields of information systems and budgeting, and the extended model for budget reforms. The third section details research methods. The fourth section discusses the study case background and the application of the extended ST model for our case of budget reform in Mexico. Finally, the fifth section draws some conclusions.

2. Structuration theory (ST) framework

For the extension of the ST to study budget reforms, this section discusses the basic premises of ST framework, some applications of Giddens ideas in the fields of information systems and budgeting, and the extension of the ST framework for budget reforms.

1 This paper presents results for interdisciplinary collaboration as the interaction among actors with different professional backgrounds, knowledge and expertise. A previous study of this research uses the same extended ST framework, but to study cross-boundary collaboration that involves the coordination between “reformer” and “implementer” agencies that interact with each other for the adoption of the budget reform initiative. This study will be presented at the 5th International Conference on Theory and Practice of Electronic Governance (ICEGOV2011).
2.1. Premises of ST

Among the main premises of the original ST framework commonly used and shared in social research, this study focuses on five [11]: practices or routines, properties, modalities, outcomes, and discursive consciousness. ST characterizes social systems as both constituted by human agency through daily practices or routines, and yet at the same time these practices are the medium of this constitution [12]. This is what is meant by duality of structure. Giddens explicitly denies the idea that social systems appear as something external to human action. On the contrary, a social system is a set of properties that human agents adopt in the form of rules and resources into their daily practice in three modalities: signification, domination and legitimation [12]. Practices of signification are adopted through interpretive schemes that exercise communication of common categories, assumptions, and interpretations among human agents. Practices of domination are adopted through facilities that include commands or controls over people, resources, and technology. Practices of legitimation are enacted through norms including codes of conduct, set of values, ideals and rights to hold others accountable.

Human agents reproduce the properties of social systems only in social interaction with others [13]. This interaction among human agents produces outcomes that eventually change or last the existing properties of the social system in three dimensions: communication, power, and sanction [12]. Outcomes of communication are the results in communication of meanings. Outcomes of power are the results in controls over people and resources. Outcomes of sanction are the results in the evaluative judgment of conduct or sanction of human agents.

ST concentrates its process at the individual level of human action by considering the stratification model [14]. The stratification model has three types of human action: rationalization, reflexive monitoring, and motivation. Rationalization is the way a human agent articulates reasons for action by considering the ongoing properties and outcomes. Reflexive monitoring represents the human agent’s knowledge of what he or she is doing as well as the environment and others actions. Rationalization and reflexive monitoring conforms what Giddens called discursive consciousness. Motivation is conscious and represents desires and needs of actors which are difficult to observe in the real world. For this reason, motivation is usually excluded in the analysis.

2.2. ST in information systems and budgeting

ST is a general theory of social organization rather than a specific theory to any particular discipline [11, 14]. Giddens makes no specific foundation of his theoretical proposal for information systems, budgeting or any other field [11, 15]. In spite of its generalization, ST has been used to reconstitute the fields of management accounting and budgeting [16, 17], the sociology of information systems [15], and inter-organizational studies [18]. Each of them has contributed with ST framework from their own scholarship and tradition. In information systems, Jones and Karsten [11] identified two important variants of ST ideas applied for the study of information systems: duality of technology by Orlikowski [15] and adaptive structuration theory (AST) by DeSanctis and Poole [19]. In budgeting, there are several applications developed during the 1990s that basically applied ST framework by using the concept of duality of structures and properties to study the adoption of new accounting systems [16, 17, 20-22]. Recently, Van Reeth applied ST to study the evolutionary aspect of the adoption of budget reforms [2].

A complete discussion of the ST frameworks in the fields of information systems and budgeting exceeds the purpose of this paper, although I summarize main trends. In general, the applications in these fields commonly emulate the concepts of: the duality of structure; the characterization of human agents as knowledgeable and competent with reflexive capabilities; the notion of routines or practices as a chronic feature of day-to-day constitution of social systems; properties of signification, domination, and legitimation in the form of rules and resources; and the overlapping structures situated within technology, within budgetary techniques, and within embedded complex settings. However, there are some aspects of ST that varied across models between fields. While Orlikowski acknowledges the concepts of knowledge, reflexivity, and consciousness, she does not consider them in her model. On the contrary, AST includes knowledge, experience and the perception of others’ knowledge as part of the group’s internal system. In budgeting, these concepts are assumed as only pertaining to powerful or dominant agents. The application of embody or enactment also varies within each field. Both fields generally conceptualize social structure as “embodied” in technology or “embodied” in budget techniques. Not long, Orlikowski reconsidered her view of structures as enacted in practice by human agents as in the original ST framework [23]. There
are also discussions of the differences in terms of methodological orientations between these models that also exceed the purpose of this study, but for more reference revise Jones and Karsten [11].

This study contributes with the application of ST in three ways. First, it considers complex phenomena like budget reforms as a process of adoption of a joint innovation that requires an interdisciplinary perspective. Today budget reforms include more than just new budgetary techniques. They involve overlapping informational, technological, managerial and budgetary structures that participants unevenly adopt into their daily practice. Second, budget reforms also imply a process of adoption across multiple actors in interdisciplinary collaboration. For the purpose of this paper, interdisciplinary collaboration (IC) involves the coordination among actors with different professional backgrounds, knowledge and expertise that interact with each other for the adoption of the budget reform. Third, the extension of the ST for budget reforms incorporates the stratification model usually neglected in the existing ST models by including the concepts of reflexive monitoring and rationalization in the process of adoption.

2.3. Extending ST for budget reforms

This research supports the idea that an extension of ST is useful to understand the process of change or preservation of formal and informal structures of budget reforms from an interdisciplinary framework. For this extension, this study makes two considerations. First, practices or routines will be analytically bracketed in two types according to the original ST framework: (1) formal or “official” practices and (2) informal practices. Formal practices are prescribed by reformers of the budget reform initiative at the level of collectivities. Informal practices are adopted by reformers and implementers into their daily life at the level of face-to-face interaction among participants of the budget reform. Second, ST does not specify any operationalization of the concepts of properties and outcomes. By reviewing common critical factors and measurements of success in the literature in the fields of information systems and budgeting, this study enriched the concepts of practices or routines. Table 1 shows the taxonomy of common critical factors found in the literature classified for analytical purposes in six domains: contextual, organizational, budgeting, information systems, collaboration and individual. Each domain represents properties within human action such as collaboration and individual factors, within information systems and budgeting, and within contextual and organizational structures. According to Giddens ideas, every property (or critical factor-in-practice) is analyzed by modality (signification, domination or legitimation). The properties in each system are enacted in interaction with other actors in the budget reform producing or reproducing certain outcomes (communication, power or sanction). Table 2 shows the taxonomy of common measurements of success as outcomes. For analytical purposes, the concepts of discursive consciousness (rationalization and reflexive monitoring) were related respectively to the concepts of knowledge and trust due to the individual level of human action of these concepts. Table 3 shows the taxonomy of common factors for each of the concepts of the discursive consciousness.

### Table 1. Taxonomy of properties

<table>
<thead>
<tr>
<th>Domains/Properties</th>
<th>Common critical factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contextual</td>
<td>Social, economic, political and institutional factors [2, 5, 7, 24-28]</td>
</tr>
<tr>
<td>Organizational</td>
<td>From organizational culture, characteristics and jurisdiction [2, 5, 24, 27, 29-31] to the level of standard setting and strategic alignment [2, 26, 27, 31, 33]</td>
</tr>
<tr>
<td>Budgeting</td>
<td>Reform strategies, format, procedures and functions [2, 34]</td>
</tr>
<tr>
<td>Information Systems</td>
<td>Characteristics of information architecture, data integration and interoperability [33, 35, 36]</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Authority, leadership, governance and resource sharing [2, 5, 24, 29, 32, 33-36]</td>
</tr>
<tr>
<td>Individual</td>
<td>Knowledge [2, 5, 6, 25, 26, 34, 40-43] and trust [5, 33, 34, 44]</td>
</tr>
</tbody>
</table>

### Table 2. Taxonomy of outcomes

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Common measurements of success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Communication and information access with stakeholders [24, 45, 46]</td>
</tr>
<tr>
<td>Power</td>
<td>Efficiency and cost savings [2, 24, 27, 30, 47, 48]; public service improvement [24, 27]; and internal management benefits for agencies [2, 27, 31, 49]</td>
</tr>
<tr>
<td>Sanction</td>
<td>Strengthening accountability [2, 5, 27, 45]</td>
</tr>
</tbody>
</table>

### Table 3. Taxonomy of discursive consciousness

<table>
<thead>
<tr>
<th>Domains/Properties</th>
<th>Common critical factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationalization</td>
<td>Knowledge [2, 5, 6, 24-26, 34, 41-43]</td>
</tr>
<tr>
<td>Reflexive monitoring</td>
<td>Trust [5, 33, 34, 44]</td>
</tr>
</tbody>
</table>
Figure 2 shows a visualization of the extension of the ST model for budget reforms. In this model, reformers prescribed formal practices based on different properties designed for the budget reform initiative. Each participant reflexively monitors these properties prescribed by reformers and other participants’ actions based on trust. Each participant verbalizes properties as a way to rationalize their relationship with the social system of the budget reform and their interactions with others during the adoption of the initiative. Properties of the budget reform are practices prescribed by reformers expected to be recurring and often regularized routines of using rules and resources among participants. Participants enact these properties into their everyday practice in three modes: signification, domination and legitimation. This reproduction happens in interaction with other professionals resulting in outcomes of communication, power or sanction. This study proposes that this structuration process is unevenly adopted at the context of interdisciplinary collaboration in which each professional enacts differently the properties of the budget reform prescribed by reformers.

Figure 2. Extended ST model for budget reforms

3. Research methods

Budget reforms are complex phenomena that are recurrently enacted in the context of multiple actors and organizations [2]. Researchers have the challenge to understand a multiple set of embedded units, levels of analysis, and pieces of evidence dispersed across different organizations and actors engaged in the initiative. In order to cope with this complexity, this study adopted the embedded case study (ECS) proposed by Scholz and Tietje [50]. This design offered the necessary flexibility to draw upon a variety of complementary and converging data from multiple sources of evidence [51]. In particular, this study adopted 28 semi-structured interviews conducted during October and November 2009 and a document analysis of 27 official sources including laws, manuals, presentations, training material and memos. The case selected for this study is the initiative known PbR-SED for its Spanish abbreviation of “Budgeting based on Results - Performance Evaluation System” implemented by the federal government in Mexico. This initiative was recently designed and enacted in May 8, 2008 and still ongoing in various agencies. The PbR-SED offers a convenient and contemporary case of adoption of a budget reform and condensed various concepts of the taxonomies referred in Tables 1, 2 and 3.

The ECS requires architecture to organize different components of this research by ensemble the concepts of the extended ST model with the qualitative methods used to collect data in three levels: (1) case level, (2) synthesis level, and (3) subproject level [50]. The case level describes background, features, context, and process. The synthesis level examines the concepts of the taxonomies in Tables 1, 2 and 3 that requires a more detailed level of inquiry. The subproject level represents a lower data-level of research work of collecting, organizing and coding different sources of data through the taxonomy of concepts. The case and synthesis levels are developed in further sections while the subproject level was only used for data collection and coding.

Data analysis involved triangulation between semi-structured interviews and official documents in order to compare separate results and draw final conclusions. The document analysis reflects the examination of formal practices prescribed by reformers for the PbR-SED initiative while semi-structured interviews provide evidence of the informal practices adopted by the members of different staffs. The coding was conducted by using the taxonomies of concepts identified in the literature for properties (see Table 1), outcomes (see Table 2), and the concepts of discursive consciousness (see Table 3). In specific, data was coded according to type of domain and modality. By reviewing official documents, it was possible to code a set of formal practices prescribed by reformers for the PbR-SED initiative across each concept of the taxonomies.
Similarly, every question of the interview protocol also maps each domain and category in the taxonomies. Afterward, for every concept of property a modality of signification, domination and legitimation was coded based on actions related to communication, authority and set of values respectively. In the same way, for every concept of outcome a modality of communication, power and sanction was assigned. Only one type of modality was coded for each property or outcome. In order to make this study and its findings more defensible and solid, techniques of participants’ feedback over results were used to improve its soundness as qualitative research [52].

4. Results

4.1. Case level: background of budget reforms in Mexico

In Mexico, the budgetary system has been subject of experimentation through various reforms towards the inclusion of performance information and information systems. In 1988, the Ministry of Finance (SHCP) established a conceptual framework for performance evaluation and applied mainframe technology to collect data across ministries. The result was the Executive Information System (SIE) that included information about budget allocation and monitoring of public expenditure. The SIE evolved into the Integral Information System (SII), a more integral and comprehensive information system to assist executive decision making for expenditure control and analysis. In 1996, the SHCP started to integrate separate components of performance evaluation into one project called the Budget System Reform (RSP) supported by a Web-enabled system called System of Integral Process of Programming and Budgeting (Sistema del Proceso Integral de Programación y Presupuesto-PIPP). In March 2007, the current president administration presented to the Congress the Performance Evaluation System (SED) initiative elaborated by the SHCP. The initiative is known as the PbR-SED. The proposal was finally enacted as a constitutional reform in May 8, 2008 making the PbR-SED mandatory government-wide. Along with this mandate, the reformer agencies such as the SHCP, the Comptroller’s Office (SFP) and the National Council of Evaluation (CONEVAL) started to design different tools, techniques and information systems for the PbR-SED initiative. The SHCP has served as the responsible of the budgetary process, the SFP as the public management auditor and evaluator of budgetary programs, and the CONEVAL as the evaluator of social programs. These three organizations have been engaged in an obligated collaborative relationship around this initiative. As in past reforms, the PbR-SED reform also has the purpose to associate performance information with the existing budget. In addition, the official repository of performance information is a newly designed Web portal of the SHCP that serves for collecting and integrating budgeting and performance information across ministries and agencies at the federal, state, and local levels of governments. The PbR-SED reform has motivated a renovated interest as well as a vitriolic skepticism about its adoption and benefits in the actual budget practice across ministries, agencies and practitioners. As a constant of all these efforts, many professionals in different levels of government have collaborated to couple innovations as e-government projects to collect and report performance information.

4.2. Synthesis level: adoption at the context of interdisciplinary collaboration

The following sections cover the level of adoption of formal practices prescribed by reformers and uncover some new informal practices enacted by different professionals: budgeters, IS staff, program managers, planers and evaluators.

4.2.1. Adoption of formal practices. From a total of 19 formal practices found in the document analysis, only one practice was directly adopted as prescribed by reformers and 5 were unevenly adopted across different professionals. Table 4 details the adoption of these practices. Format methodology was the only official practice directly adopted across different professionals as prescribed by reformers. Format methodology consists in the adoption of the logic model for the definition of performance indicators and goals. In particular, budgeters, program managers and IS staff did not have variations in enacting the way reformers prescribe this methodology into their routines. This study found 5 formal practices unevenly adopted in two modalities: signification and domination. The practices of the structure of information (budgeting practice) and executive support (leadership practice) prescribed by reformers were unevenly adopted among professionals in different ways. For example, budgeters usually followed the official structure the information while IS staff and program managers enacted several modifications or additions into the formal structure of data due to their consolidation and operation needs. The difficulty mainly derived from the
incompatibility between the structures of performance and budgetary information. In terms of executive support, there were also uneven adoptions among professionals. In general, the leadership of the PbR-SED was granted by top executive to interdisciplinary teams, but in other organizations the leaderships was deposited to budgeters or planers. I found a more solid association between a successful adoption of the PbR-SED project to interdisciplinary teams than to solely budgeters or planers. Based on different professionals' contribution, teams embrace coordination, communication and knowledge sharing issues easier than individual professionals or areas.

Table 4. Formal practices

<table>
<thead>
<tr>
<th>Formal Practice</th>
<th>Mode**</th>
<th>I</th>
<th>B</th>
<th>M</th>
<th>E</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format methodology (budgeting practice)</td>
<td>S</td>
<td></td>
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<tr>
<td>Structure of the information of the format (budgeting practice)</td>
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<tr>
<td>Executive support (collaboration practice)</td>
<td>S</td>
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<tr>
<td>Responsibilities in the flow of information (budgeting practice)</td>
<td>D</td>
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<tr>
<td>Authority over definition of formats / methodology (budgeting practice)</td>
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<td></td>
</tr>
<tr>
<td>Authority over information architecture and system management (IS practice)</td>
<td>D</td>
<td></td>
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</tbody>
</table>

* Types of professionals: I (IS staff); B (budgeters); M (managers); E (evaluators); P (planers).
** Types of modalities: S (signification); D (domination); and L (Legitimation).

At the domination modality, budgeting practices such as responsibilities in the flow of information and authority over the definition of formats and methodology were unevenly adopted across professionals. In many organizations these practices were exclusively deposited to budgeters, but in reality this conflicted with other professionals. Budgeters perceive these budgeting practices as part of their functions and responsibilities within the official calendar of the budget cycle. Program managers considered them as part of the actual operation needs of public programs with more open schedules. Evaluators and auditors also had different perception about adopting these practices from their own job´s standpoints. For example, budgeters follow strict deadlines of the budget process while program managers, planners and evaluators constantly require various adjustments in the information, formats and methodologies. Another example was to find planers, program manager and evaluators complaining about having no access to revise performance information before budgeters approve it. Instead, budgeters indicate confusion about their role and responsibilities in authorizing information based on their poor knowledge in other areas. Finally, the authority over the designated information architecture and IS management was commonly centralized and mainly managed by IS staff, but in some organizations this authority was teamed among IS staff and professionals from different areas. The data shows that types of “teamed” and “shared” authority were positively associated with high levels of technological advance in platforms, capacities and skills in the agency.

4.2.2. Adoption of informal practices. This study found 13 new practices informally enacted across professionals in two modalities: signification and domination. No informal practices were found at the legitimation modality. Table 5 shows these 13 new practices. At the signification modality, there are practices in the domains of budgeting, IS, knowledge and trust. As a budgeting practice various professionals enacted homogeneity of vocabulary. The evidence shows that due to the different professional background of participants, it was needed a common language of terms and concepts. At the IS domain, different professionals enacted the practices of sharing databases, catalogs and tables as well as data integration. This informal practice helped participants to communicate feedback and to explore ways of sharing information. These feedbacks were made through brainstorms, meetings and informal training sessions in which different professionals had the opportunity to exchange and share their expertise. Not free from obstacles, there is evidence that previous turf or conflict between staffs reduced the willingness of sharing mainly between budget, IS and program management staffs. There were other conflicts among staffs, but in general if the core set of professionals achieve teamwork, the chance for a successful adoption of the PbR-SED was greater for all groups.

There is also evidence of informal practices for knowledge and trust more as internal mechanism of action than embodied properties of the PbR-SED initiative prescribed by reformers. Previous knowledge obtained in similar projects and interdisciplinary contributions were informally adopted across professionals. In general, a single professional expertise was not sufficient for the adoption of the initiative. This study found evidence that participants usually searched for “expert” help.
inside and outside the agency in order to build a more complete understanding of the adoption of the PbR-SED. Examples of this “experts” are participants who gained expertise in similar projects in the past. Other professionals enacted the practice of exchanging information, knowledge and expertise with each other in order to contribute with their understanding of the project. This informal practice enriched participating professionals with useful and specialized knowledge, such as: how to collect performance information; how to define goals and indicators; how to implement and use information systems; and how to implement the project inside the organization.

**Types of modalities:** S (signification); D (domination); M (managers); E (evaluators); P (planners).

**Types of professionals:** I (IS staff); B (budgeters); M (managers); E (evaluators); P (planners).

For trust, previous experiences working in similar initiatives and with other staffs increased trust among participants and consequently a successful adoption of the PbR-SED. A positive previous experience working in previous projects or with other staff creates certainty about the results of the initiative in the agency. In terms of professional affinity, there is evidence that if actors from different professions shared a common disciplinary interest on, e.g. new technology applications, they have better chances for a common understanding of the project and eventually a better adoption of the initiative.

At the domination modality, this study found 5 new informal practices in the IS, collaboration and individual domains. Different professionals collaborated using written agreements, formats or internal contracts in order to set concurrence around decisions concerning information architecture. These boundary objects served to build consensus among participating professionals about the roles, responsibilities and mechanisms of interactions among professionals to define, implement and evaluate databases, system features, and changes of the information architecture. The informal practices of definition of authority and building informal interdisciplinary liaisons were also very common across professionals. Different staffs informally adopted the practice of building interdisciplinary liaisons with members in other staffs. These informal liaisons were built upon existing or previous relationships between executives from different staffs or areas. These liaisons provided a baseline for teamwork. In spite that the SHCP has the authority over the PbR-SED initiative, many found opportunistic to re-define this authority at the interior of their agencies. This redefined authority obeyed different and complex organizational settings. In some organizational contexts, this authority was centralized between budgeters or IS staffs. In other contexts it was shared or team-worked. This study also found informal training sessions between various professions as a manner to share their knowledge or expertise about certain components of the PbR-SED initiative. In terms of trust, it was found that a low level of trust is closely associated with lack of knowledge or expertise about critical aspects of the PbR-SED, such as: building performance indicators, strategic planning, budgeting legal framework, the official information system, and others issues.

4.2.3. Outcomes. The adoption of every formal and informal practice derives into some expected outcomes prescribed by reformers and some unexpected outcomes resulted from the interaction across different professionals. Table 6 shows 4

### Table 5. Informal practices

<table>
<thead>
<tr>
<th>Informal Practice</th>
<th>Mode**</th>
<th>I</th>
<th>B</th>
<th>M</th>
<th>E</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homogeneity of vocabulary (budgetary practice)</td>
<td>S</td>
<td></td>
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<tr>
<td>Sharing databases, catalogs and tables (IS practice)</td>
<td>S</td>
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<tr>
<td>Data integration (IS practice)</td>
<td>S</td>
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<tr>
<td>Previous knowledge working in similar projects (IS practice)</td>
<td>S</td>
<td></td>
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<tr>
<td>Interdisciplinary contributions (knowledge practice)</td>
<td>S</td>
<td></td>
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<tr>
<td>Previous experience working in similar projects (trust practice)</td>
<td>S</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Previous experience working with other professionals (trust practice)</td>
<td>S</td>
<td></td>
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<tr>
<td>Professional affinity (trust practice)</td>
<td>S</td>
<td></td>
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<tr>
<td>Characteristics of information architecture (IS practice)</td>
<td>D</td>
<td></td>
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<tr>
<td>Building informal liaisons (authority practice)</td>
<td>D</td>
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<tr>
<td>Authority of the PbR-SED initiative (authority practice)</td>
<td>D</td>
<td></td>
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</tr>
<tr>
<td>IC for training (knowledge practice)</td>
<td>D</td>
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<tr>
<td>Distrust caused by lack of knowledge (trust practice)</td>
<td>D</td>
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</tbody>
</table>

* Types of professionals: I (IS staff); B (budgeters); M (managers); E (evaluators); P (planners).

** Types of modalities: S (signification); D (domination); and L (Legitimation).
outcomes across professional groups found in the study. Based on document analysis, reformers expected several outcomes of interdisciplinary collaboration (IC) as a communication result. In general, professionals recognize a better collaboration among professional groups. Unfortunately, there are professionals indicating the lack of mechanisms to cope coordination, turf and conflict in interdisciplinary groups.

Table 6. Expected and unexpected outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Professionals</th>
<th>Mode**</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC (Expected outcome)</td>
<td>I B M E P</td>
<td>C</td>
</tr>
<tr>
<td>Homogeneity of vocabulary (Unexpected outcome)</td>
<td>I B M E P</td>
<td>C</td>
</tr>
<tr>
<td>Integration of budgetary and non-budgetary information (Unexpected outcome)</td>
<td>I B M E P</td>
<td>P</td>
</tr>
<tr>
<td>Strengthened accountability (Unexpected outcome)</td>
<td>I B M E P</td>
<td>S</td>
</tr>
</tbody>
</table>

* Types of professionals: I (IS staff); B (budgeters); M (managers); E (evaluators); P (planers).
** Types of outcomes: C (communication); P (power); and S (sanction).

There are 3 unexpected outcomes, one for each modality of communication, power and sanction. For communication, the adoption of this initiative derived into homogeneity of vocabulary of terms and concepts for the PbR-SED as a way to converge in a common language and understanding among groups. In terms of outcomes of power, the adoption of the PbR-SED initiative resulted in a better collaboration among professionals (teamed or shared authority) to develop new budgeting techniques with applications of IS in order to collect, analyze and integrate performance information and comply with the official information requirements. For outcomes of sanction, the adoption of this reform originated in a strengthened accountability. The data shows how accountability was generally exercised across different staffs at the interior of the organization. Performance information was not only used to evaluate organization’s performance, but to evaluate other professionals or areas’ performance.

5. Conclusions

This study extended ST to study a contemporary case of a budget reform in Mexico (PbR-SED) by considering the multiple social systems and actors involved in interdisciplinary collaboration. By adopting the concepts of critical factors and measurements of success from the literature in the fields of information systems and budgeting, the extension of the ST framework was possible and enriched. The model was developed to answer two research questions: What critical factors influence the adoption of budget reforms? How and to what extent interdisciplinary collaboration plays a role in the adoption of budget reforms?

For the first question, the extended ST model was useful to understand the multiple and overlapping structures involved in the PbR-SED initiative. Tables 4 and 5 show how different professionals unevenly adopt the multiple properties of the PbR-SED in various modalities of signification, domination and legitimation. The social system of PbR-SED was enacted through various formal and informal practices from the information systems, budgeting, collaboration and individual structures. No contextual or organizational practices were identified. Similar to previous ST models and findings in the literature, the extended ST model also grounded the presence of social systems within budgeting as well as within technology and within other structures like collaboration and individual [2, 15-23]. For the second question, this study found several practices of information systems and budgeting to be critical for the adoption of the PbR-SED initiative. However, many collaboration properties and outcomes were identified as influential for a successful adoption of the PbR-SED initiative. Executive support was an important formal practice and authority of the project in agencies and building informal liaisons served as critical informal practices for a successful adoption of the PbR-SED. In terms of the discursive consciousness, previous experience, professional affinity and lack of knowledge characterize the reflexive monitoring among professionals. Previous knowledge, interdisciplinary contributions and IC in training were enacted as the rationalization components of the discursive consciousness. Finally, several outcomes were also identified in Table 6.

From the theoretical standpoint, the analytical bracketing between formal and informal practices was useful to describe what Orlikowski recognizes as a time-space discontinuity between design and use of technology. Here this bracketing helped to analyze formal practices prescribed by reformers and informal practices adopted by professionals into their routines. This bracketing also helped to analyze the uneven adoption since only a small subset of formal practices was directly adopted as prescribed by reformers and new informal practices were enacted across professionals. This study also found relevant
to consider other critical actors in the adoption of budget reforms more than the “traditional” or “dominant” figures that prevailed in the literature. There are also some methodological implications. There is a difficulty to code data in modalities or modes. In strictly Giddens’ sense, these modalities coexist in every human action, but for analytical purpose the researcher has to separate them. Therefore, the researcher becomes the main research instrument in which the ST concepts and data come through. This implies an important limitation that brings along important risks. Finally, this study contributed with the idea that ST was useful to study budget reforms as a process of adoption of joint innovations across multiple actors in interdisciplinary collaboration. Future research may redefine, test and refine the extended ST model grounded in this study.

7. References


[34] Schick, A. Getting Performance Budgeting to Perform. In Proceedings of the Conferencia Internacional de Presupuesto por Resultados (México, Junio 8 y 9, 2008, 2008), [insert City of Publication], [insert 2008 of Publication].


