RESEARCH ARTICLE

Ideologies implicated in IT innovation in government: A critical discourse analysis of Mexico's international trade administration

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Abstract

We develop a perspective of IT innovation in the public sector as a process that involves three complementary areas of ideology and concomitant dispute: first, the widespread view of e-government as a transformative force that leads to major improvements of public sector functions for the benefit of society at large; second, ideologies concerning the substantive policies enacted by public sector organizations; and third, ideology regarding public sector modernization. Our research examines how the objectives of IT projects and their actual effects in government are influenced by such ideologies and contestations that surround them. We develop our theoretical contribution with a critical discourse analysis that traces the ideological underpinnings of two consecutive IT projects for the administration of international trade in Mexico. This analysis associates the objectives of the IT projects with the emergence and ensuing contestation in Mexican politics of two ideologies: the first ideology concerns free international trade as imperative for economic development; the second ideology concerns public sector modernization that sought to overcome historically formed dysfunctionalities of public administration bureaucracies by adopting management practices from the private sector.

The analysis then identifies the effects of the ideologically shaped IT projects on two key values of public administration: efficiency and legality. The insights of this research on the role of ideology in IT innovation complement organizational perspectives of e-government; socio-cognitive perspectives that focus on ideas and meaning, such as technology frames and organizing visions; and perspectives that focus on politics in IT innovation.

1 | INTRODUCTION

It has long been established in information systems (IS) research that information technology (IT) innovation in organizations is influenced by ideas about transformative effects of IT that are shaped in their broader social context (Orlikowski & Gash, 1994; Swanson & Ramiller, 1997). In this paper, we study more specifically the political origin of ideas that form objectives of IT innovation[1] in public sector organizations. We examine the influence of ideology, which we take to mean shared systems of beliefs, values, and norms that contribute to maintaining existing social structures, articulating resistance, or mobilizing action for change (Fairclough, 2003; van Dijk, 1998).

We adopt a nonpejorative view of ideology. We do not consider ideologies as having necessarily negative impact, interfering with technical/rational decisions on IT innovation and limiting the potential of IT to improve the services of public sector organizations. We assume that IT innovation is an intrinsically political process, which involves ideas, decisions, and actions shaped by the diverse interests of multiple actors with different degrees of power. Taking this perspective, our research aims to enhance existing sociotechnical views of IT and public sector reform by identifying the domains of contested ideas that shape objectives of IT innovation in government organizations. Identifying the domains of ideological contestation where objectives of IT innovation are formed is important for explaining observed outcomes and for predicting IT-enabled organizational change. It can also help IS practitioners to better understand the contested ideas that are implicated in the specification of IS requirements and in stakeholders' acceptance or challenge of the systems they strive to construct.

We argue that IT innovation in the public sector involves influences from three domains of ideological contestation: first, ideology about transformative effects of IT in government administration (Elliott & Kraemer, 2008); second, ideologies about substantive public policy areas, that is, ideologies concerning the areas of welfare and development of a society that specific public sector organizations serve, for example, economic growth, health care, and the provision of education; and third, ideology about how the public sector should be reformed to overcome historically developed rigidities of the bureaucratic model of government administration (Baptista, 2005; Cordella & Willcocks, 2010). The ideology about the transformative capacity of IT in government is of global scale, transcending specificities of local contexts. Ideologies that influence the substantive policies that government departments enact often originate in global debates, but they take country-specific forms in the context of national political contestation. For example,

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[1]We use the term "IT innovation" to refer to the introduction of new information technology in organizations and concomitant organizational change. We use the term "IT implementation" to refer, more specifically, to the activities involved in the configuration of the technology and organizational processes. We use interchangeably the terms "IT in the public sector" and "e-government," which, after the advent of the internet in the 1990s, became a common way to refer to IT in government organizations.

options for international trade policy, which is the focus of our study, emerge in global contestations of ideas regarding open markets versus protectionism. But the international trade policy of a government sets a commitment to a specific course of action (such as a focus on international trade restrictions, or regional free trade zones) in the context of national politics. Similarly, public sector reform is influenced by ideological discourses about the organization of the state that emerge globally but take specific form in the context of national politics.

Ideologies are formed and produce effects through discourse and can be studied by examining documents and the talk of individuals (Barrett, Heracleous, & Walsham, 2013; van Dijk, 2006). In this research, we conduct a case study that draws on critical discourse analysis (CDA) to trace connections between IS projects and major discourses of national level ideological disputes. We study the development of an IT innovation for international trade administration in the government of Mexico over an 18-year period. We show how the objectives of this long effort of systems development and organizational change were influenced by debates about free international trade as the route for economic growth and about the modernization of the Mexican public administration. We also trace the effects of these ideological influences on two fundamental values of public administration: efficiency and legality. Efficiency of administration concerns the frugal use of the resources of the state and its citizens; legality concerns the discharge of services in compliance with regulation and is important for the achievement of fairness and equal treatment of citizens by the state (Hood, 1991).

In Section 2, we develop theoretical foundations for the study of IT innovation in the public sector as an ideologically influenced sociotechnical process and in Section 3 we present the CDA approach that we follow in this research. The empirical study, in Section 4, starts with the historical narrative of two consecutive IT projects for the administration of international trade in the Mexican government context. Subsequently, in Section 5, a CDA traces the influence of the ideologies of free international trade, and of public sector modernization on the objectives of the projects and their organizational effects on efficiency and legality. In Section 6, we spell out our theoretical contribution in relation to existing sociotechnical theory on IT innovation, and Section 7, we present arguments for the significance of considering national ideologies in research and practice of IT innovation in the public sector.

2 | IDEOLOGIES IMPLICATED IN IT IN THE PUBLIC SECTOR

In IS theory, recognition of the ideological nature of IT innovation in general came mainly with the conceptualization of the diffusion of IT as "computerization movement" (CM) (Barrett et al., 2013; Elliott & Kraemer, 2008; Hara & Rosenbaum, 2008; Kling & Iacono, 1988; Kling & Iacono, 1995). CMs involve the development of collective understandings about what a technology can do and how it should be used. Such shared meanings of technology, known as technology frames, have been widely studied in the fields of information systems and science and technology studies (STS) (see, for example, Bijker, 1997; Orlikowski & Gash, 1994). Kling and Iacono (1988) emphasized the ideological content of technology frames; in their elaboration of the notion of CM, collective expectations from a technology are instantiations of ideologies manifested in competing discourses that surround the diffusion of technologies (Barrett et al., 2013; Dedrick & West, 2008; Lamb & Poster, 2008). Subsequently, CM studies have shown how certain technologies, such as open source software, were diffused widely as beliefs that they contribute substantial improvements in the world prevailed over views that contested such claims and counter-proposed alternatives (Barrett et al., 2013; Elliott & Kraemer, 2008).

2.1 | E-government as a transformative force

The diffusion of IT innovation in the public sector (and its aliases e-government and digital government) clearly bears characteristics of a CM (Davenport & Horton, 2006; Hara & Rosenbaum, 2008). Ideas about the effects of IT in the public sector have changed over the years from major productivity gains and better planning (Danziger, Dutton, Kling, & Kraemer, 1982) to re-inventing the interaction of citizens with the state. But the expectation that the effects are transformative has remained constant (Brown, Fishended, & Thompson, 2014; Bussel, 2012; Chopra, 2014; Dunleavy, Margetts, Bastow, & Tinkler, 2006; Srivastava, Thompson, & Devaraj, 2016). Transformative effects are more profound in the discourse about IT in the public sector of developing countries. They are associated with

developmental goals such as the inclusion of marginalized poor people in formal state/citizen relationships and the empowerment of citizens to curb abusive behaviour of rent-seeking officers. For example, the World Bank uses an "e-government Web measure index," defined as "the level of sophistication of a government's online presence," as an indicator of a country's development (World Bank, 2009).

In contrast to the discourse of transformative impact, actual effects of IT in the public sector in most countries have been found to be slow and limited (Kraemer & King, 2006; Norris & Reddick, 2012; World Bank, 2016). Studies attempting to explain the mismatch of promised potential and achieved effects tend to highlight resistances, particularly from elites whose positions of power in the public sector may be at risk (Danziger et al., 1982). In developing countries, such resistances are often associated with the persistence of clientelist and patronage-based institutions (World Bank, 2016).

CM analyses explain observed effects of IT innovation by examining the ideas about new "social orders" conveyed by the stakeholders who champion the technology and the alternative social orders counter-proposed by those who oppose them. Such explanation traces the movements and counter-movements that may support or challenge the desirability of the social change associated with an IT innovation. Acceptance or challenge of an IT innovation is often associated with multiple ideological contestations about the intended and nonintended effects of the innovation. For example, the diffusion of electronic identity cards as an infrastructure for effective government services and state security has been stalled in several countries. This is not because their promised impact on services and security was deemed undesirable, but because it has been confronted with counter-discourses from civil societies that advocate privacy as a human right (Whitley & Hosein, 2010).

In this paper, we extend the view of ideological origins of IT innovation in the public sector that has been elaborated in the CM studies of e-government by examining complementary influences on the objectives of e-government projects that stem from two ideologies: concerning the substantive public policies enacted by public sector organizations and concerning the way public administration is conducted.

2.2 | Ideologies concerning substantive public policy areas

The substantive public policy that a public sector organization enacts is influenced by globally contested ideas about the area of welfare and development that the organization is entrusted to serve, but takes the form of specific actions in the context of a country's politics (Le Grand, 2003). For example, at present, a global discourse on climate change sets challenges for the energy policy of most countries of the world. The specific energy policy, however, of a country's government results from contestation of global ideologies by local interest groups, stakeholders, and political parties (Carter, 2018; Taylor, 2007).

Substantive public policy, in turn, affects what public sector organizations set out to achieve with IT. The importance of public policies for IT innovation has received some attention in the IS research stream on health care. For example, in the United Kingdom, adherence to the policy of a nationwide health care service (the NHS) that should be of equal quality across the country justified launching an IT mega-project for a uniform countrywide health IS infrastructure (Currie & Guah, 2007; Davenport & Horton, 2006; Sauer & Willcocks, 2007). Also, explanations of the difficulties faced in the development of effective IT infrastructures in the NHS have pointed to the ambivalence of health care policy. Klecun (2016) argues that problems of IT implementation are partly explained by the controversies about the "Patient-Centred Policy" that England has been pursuing for the modernization of health care. Similarly, Bernardi, Constantinides, and Nandhakumar (2017) show how controversies about health care policy in Kenya generated contradictions in IT innovation. In such research, the ideological nature of public policy tends to be portrayed as an impediment to IT innovation. Ideological controversies surrounding public policy areas, it is argued, create a context of uncertainty which deprives IT innovation of long lasting certainty on requirements for IS projects.

Various government policies other than those concerning the substantive service of a public sector organization may also exert influence on its IT innovation. For example, in Europe, e-government was promoted in relation to the

European Union's aspiration for an "information society" of shared values and practices across nations with different cultures and socio-economic conditions. This European Union vision required the implementation of interoperable technologies (Davenport & Horton, 2006; Grönlund, 2002). An analysis of public discourses in Turkey found that e-government was associated with the aspiration of harmonizing the country's institutions with the European Union (Yildiz & Saylam, 2013).

2.3 | Public sector modernization ideology

Since the 1950s, the implementation of successive generations of IT in government organizations in all countries has taken place amidst widespread concern that the public sector is too large and wasteful, costing too much and performing poorly, particularly in comparison with business organizations (Benington & Moore, 2011; Osborne & Gaebler, 1992). Consequently, there have been multiple efforts to improve public sector performance. Most prominent has been a wave of modernization reforms commonly known as new public management (NPM), which was initiated in the early 1980s in industrialized countries and spread globally (Christensen & Lægreid, 2011; Hood, 1991). Reforms inspired by the NPM ideas introduced business-like practices aiming at cost savings, downsizing and decentralization, outsourcing, privatization, and "customer" orientation (Bozeman, 2007; Christensen & Lægreid, 2011; Dunleavy et al., 2006; Hood, 1991).

Despite the rational justification of such management practices in the public sector as a corrective of dysfunctional bureaucracies, their adoption is widely seen as ideologically driven (Bertelli, 2006; Lavertu, Lewis, & Moynihan, 2013; Louw, 2012). It was noted, for example, that the emergence and specific forms of public management in different countries is associated with their prevailing political economy (West, 2005) and NPM has been more extensive in countries with governments pursuing open market economic policies (Saint-Martin, 2000).

NPM reforms have been controversial and fuelled anxieties about undesirable consequences on the complex role of government organizations in contemporary society (Benington & Moore, 2011; Bozeman, 2007; Christensen & Lægreid, 2011). It is feared that the introduction of efficiency-seeking market-oriented policies and business management practices may undermine the role of government as a provider of public services with principles of justice and impartiality (Cordella, 2007; Fountain, 2001).

IT has been a key component in the transformative visions of the public sector (Dunleavy et al., 2006; Fishenden & Thompson, 2013; Fountain, 2001). The management ethos of a government that "works better and costs less" (Hood & Dixon, 2015) was adopted in e-government projects and led to objectives to save costs, to improve efficiency, timeliness and responsiveness, and to establish a customer focus based on citizens' choices. Practitioner literature too has stressed that e-government should be integrated with the objectives of public administration reforms. The Organization for Economic Cooperation and Development (OECD) stated on its first book of e-government in 2003:

> Reform of the public administration has been on the agendas of most OECD governments well before the advent of the term "e-government." But e-government is an important component of today's reform agendas because it: 1) serves as a tool for reform; 2) renews interest in public management reform; 3) highlights internal inconsistencies; 4) underscores commitment to good governance objectives. (OECD, 2003, p. 41)

IS research has often discussed e-government projects associated with NPM reforms in a critical way, pointing out the prevailing ideological preferences that underpin them (Bloomfield & Hayes, 2009; Cordella & Iannaci, 2010). More recently, advocates of digital government have tried to disassociate IT innovation in the public sector from NPM principles, abandoning also the term e-government that has been closely entangled with their implementation (Brown et al., 2014; Dunleavy et al., 2006; Fishenden & Thompson, 2013). Nevertheless, the digital government discourse continues to borrow ideas about reforming the public sector from the business sector, emphasizing opportunities for new digital business models that restructure the citizen-state relationship.

2.4 | Theoretical framing of our empirical study

Building on the reviewed research, we consider IT innovation in the public sector as a sociotechnical process that unfolds and produces organizational effects under the influence of three ideological discourses: on e-government (and more recently digital government); on the substantive area of policy of a public sector organization; and on public sector modernization. The CM of e-government provides a general rationale for IT adoption in government with the promise of transformative effects on public administration. The general benefits associated with IT innovation in the e-government CM are translated to specific project objectives according to dominant ideologies on substantive public policy areas and on public sector modernization. Our case study concerns these two latter ideologies, focusing our analysis on the way globally contested ideas become specific government policies and come to influence IT innovation in the historically formed political context of a country. It examines the way they contribute to the adjustment of the generic potential transformative effects of IT as projected in the CM of e-government, to specific objectives and consequent organizational effects of IT implementation.

3 | A DISCURSIVE METHODOLOGY TO STUDY IDEOLOGICAL EFFECTS ON IT INNOVATION

Our empirical research is an in-depth study of two consecutive IT projects for international trade administration in Mexico from 1995 until 2012. Data collection and analysis seek to reveal associations between the projects' objectives and effects with ideological influences. Ideologies are formed, reproduced, and diffused through text and talk (van Dijk, 1998). Therefore, an effective way to understand ideologies and their effects is to analyse their discursive manifestations. We do so in a detailed case study with CDA as the central analytical approach. We follow a version of CDA developed by Fairclough and colleagues (Chouliaraki & Fairclough, 1999; Fairclough, 2003; Fairclough, 2010), which considers discourse as linguistic or other semiotic elements of social life, interconnected with cultural, political, and economic practices.

CDA seeks to explain "social processes and events in terms of the causal powers of both structures and human agency and the contingency of their effects" (Fairclough, 2005, p. 924). Methodologically, CDA examines aspects of discourses at three levels: (a) text (textual elements), (b) discourse practice (the production and interpretation of texts), and (c) social practice (the situational, institutional, and/or societal context). Texts include not only written pieces such as policy reports and legal documents but also transcripts of spoken words such as interviews. Discourse practice refers to what people do with texts and how they produce them and interpret them. Social practice refers to the context of organizational and broader social structures, in which discourse in immersed. A fundamental assumption of CDA is that texts are not a mere description of ideas and "facts"—they affect action and make a difference. Discourses represent particular aspects of the world from particular perspectives and inculcate ideologies, thus contributing to "establishing, maintaining and changing social relations of power, domination and exploitation" (Fairclough, 2003, p. 9).

CDA scrutinizes systematically specific texts and seeks to identify the social experiences and practices that produced them, give meaning to them, and are affected by them. Analysis traces links between texts and examines the various discourses they draw upon. In the conceptual language of CDA, analysis investigates the *emergence, hegemony*, and *operationalization* of discourses (Fairclough, 2005). Emergence refers to uncovering how discourses are formed and how they articulate with other reinforcing or competing discourses. Hegemony looks at the ways certain emergent discourses become dominant in organizations. Operationalization follows the ways in which discourses produce effects on the organizational or social reality. The latter requires the analyst to go beyond the level of texts to include fieldwork to assess actual changes (Fairclough, 2005). Our analysis draws on these three categories as we explain in the following sections.

3.1 | Data collection

Our research design included complementary data collection strategies and sources of data. These comprise observations in vivo (meetings, informal conversations, and day-to-day practices of the government), eliciting memories and interpretations via semistructured interviews from 2009 to 2014, and the collection of a broad range of documents from the government (legal texts, internal plans, reports, and presentations) and news articles from local newspapers. The texts we analysed in-depth and other main sources of data are shown on Table 1, together with a description of their role in the analysis.

3.2 | Data analysis

Data analysis comprised three parts that complemented each other. We first constructed a detailed timeline as a visual mapping tool (Langley, 1999) to locate the main episodes and contextual events in the history of the two IT projects, covering the period 1995 to 2012, as shown in Figure 1. We then identified and coded recurring themes

TABLE 1 Summary of data collection and sources and prime role in the analysis

Data sources	Prime Uses in Analysis
Main texts analysed in depth	
The Presidential Decree that establishes the creation of the Mexican Single Window for international trade (January 2011, 5 pages)	CDA (textually oriented analysis)
History of SICEX (1999): an internal document of the first computerization project in the Ministry (35 pages)	
Interviews and meetings: Conducted over a 6-mo fieldwork trip (4 mo in 2009 and 2 mo in 2010); follow-up interviews over the phone until 2014	
45 semistructured interviews, 90 minutes on average, with 37 individuals (high level personnel and leaders of the projects interviewed more than once). All recorded and transcribed	CDA and contextual synthesis
3 meetings with the Single Window team in 2009; early phases of the design; 3 h on average (notes taken and summary written immediately after)	Contextual synthesis
Other texts	
Terms of reference, open public tender for the Single Window (September 2010)	Contextual synthesis
Mexico's National Development Plans (1995-2000, 2001-2006, and 2007-2012)	
Mexico's state of the nation reports (yearly, 1995-2012)	
Mexico's Modernization programmes (1995-2000, 2001-2006, and 2007-2012)	
95 news articles from local newspapers (January 2009 to December 2014)	
The World Trade Organization, Policy review of Mexico (2009)	
Memoirs of "A paperless administration 2000-2006" (an internal document reporting the progress on SICEX from 2000 to 2006)	Contextual synthesis and CDA (mainly for operationalization)
25 internal power-point presentations in electronic format that supports the official strategy and objectives of setting up the Single Window	
15 official presentations and speeches from the leaders of the Single Window that emphasize goals, benefits, plans and results (from 2010 to 2012)	
75 informative sheets downloaded from the Single Window website (Nov 2011 to Dec 2014)	

Abbreviation: CDA, critical discourse analysis.

in the collected texts and in our interviews on national policies, the objectives of the IT projects, and realized objectives. In this initial analysis, we traced the discourse practices that produced the various texts that we collected, noting who produced them and for what purposes; this helped us to differentiate important texts from less important ones. We also traced the discursive links between texts and the narratives of our interviewees, noting the position of interviewees and the texts they referred to in the interviews.

We selected two key texts—the Presidential Decree that established the Single Window and an internal document on the history of SICEX—as starting point of our detailed textual analysis to uncover the underlying ideologies that legitimated the IT projects (Fairclough, 2003). The Presidential Decree of 2011 played the role of an "anchoring" text in our analysis because it succinctly posits the official rationale for the IT projects and because it exerted direct power to trigger actions (Cooren, 2004; Vaara, Sorsa, & Pälli, 2010).

To uncover emergent and hegemonic ideologies, we searched the texts we analysed for explicit or implicit discursive means that conveyed meanings that were taken for granted or that pointed to an unquestioned or unavoidable reality. We paid attention to verbs that suggested what is desirable (for example, *to help*, *to promote*, and *to achieve*). We looked for the explicit or implicit premises that formed the foundation for an argument, and the warrants used to justify what is being called for. We combined insights from the textual examination with data from our interviews to identify alternative meanings, missing voices and competing discourses, and to uncover the way the ideologies were linked to positions on what IT should achieve. In the analysis of operationalization, we drew mainly from interview data and documents from the projects to identify effects on two administrative values associated with the objectives of the projects, namely, efficiency and legality of international trade administration. For our analysis on efficiency, we looked for evidence on the maximization of public service outputs or productivity. To assess the achievement of legality, we searched for data relating to ruled-based procedures, accountability, transparency, and officers' discretion.

In the analysis section of this paper, we trace the emergence of discourses that contributed to launch the IT projects under study. We identify assumptions on what IT can achieve and, more specifically, hegemonic ideological positions that set the objectives that these projects should aspire to achieve, namely, to increase efficiency and safeguard legality of the administration of international trade. We explore competing ideological positions and trace the discourses of contestation by political actors and stakeholders. We then show the operationalization of the dominant discourses in the enactment of two values of administration, efficiency and legality, that the IT projects aspired to accomplish. Overall, in order to craft our contributions, our work involved a reflexive process of observing perceived patterns in our empirical materials and theorizing.

4 | MEXICO'S IT INNOVATION IN INTERNATIONAL TRADE ADMINISTRATION

The two IT projects of our case study have a big significance in Mexico's politics and government. They were conceived as means to make international trade central in the country's economic policy. International trade represented 72% of Mexico's total gross domestic product (GDP) in 2015—a proportion 2.5 times larger than the United States' or Brazil's. In the last three decades, Mexico implemented radical economic and political reforms moving away from its earlier welfare state model and embarking on economic liberalization and political democratization. Liberalization of trade started after the country's debt crisis in 1982 and reached a milestone in 1994, when Mexico, Canada, and the United States launched the North American Free Trade Agreement (NAFTA), creating the world's largest free trade area. The promotion of international trade included a series of economic policies, such as governmental support for the export-oriented manufacturing sector. Academic analysts recognize that the liberalization policies implemented in Mexico contributed to economic stability, low inflation, and a strong presence in global markets (Moreno-Brid, Carpizo, & Ros Bosch, 2009; Moreno-Brid & Ros, 2012).

Economic reform was accompanied by modernization reforms of public administration. Historically, Mexico's national bureaucracy was an instrument of political power (Arellano-Gault & Guerrero, 2003; Gow & Pardo, 1999).

Politicians and other powerful groups used public administration to advance their personal or collective agendas (Arellano-Gault, 2013). In addition to appointing the upper level bureaucrats, politicians could appoint around 60 000 positions in the midlevel of federal public administration. In the last 30 years, several initiatives were taken to change public administration procedures, structures, and work practices, with the aim to reduce red tape and public costs and introduce transparency and merit-based civil service (Cejudo, 2008).

These political and economic reforms have taken place amidst socio-economic challenges, most serious of which is the persistence of inequalities and the pressure to achieve bigger economic growth (Moreno-Brid & Fraga-Castillo, 2014). Despite the big leap in exports, from 1994 to 2015 Mexico's average annual growth of GDP was only 2.6%, and average annual growth of per capita income was 1.2%. Our entry point to the case is the reform of the administration of international trade operations, intended to make the country more competitive and contribute to its economic growth.

4.1 | From SICEX to the Single Window for international trade

International trade entails the movement of goods, capital, or services across borders and involves a variety of regulated procedures that businesses must comply with. These include the collection of customs duties, safety, and security certificates such as sanitary controls for agricultural products and special benefits related to trade policy agreements, such as tax returns, quota restrictions, or preferential access to goods. A typical example of a trade procedure is the certificate of origin, which is a document that an exporter/importer produces and the government certifies attesting that the goods are manufactured or processed in a particular country to benefit from trade agreements.

The two projects we study in this paper constitute a sustained effort to use IT to support the objectives of international trade reforms over 18 years. The phases, main events, and the national political context are summarized in Figure 1. The upper part of this timeline shows government initiatives that influenced the projects, such as the
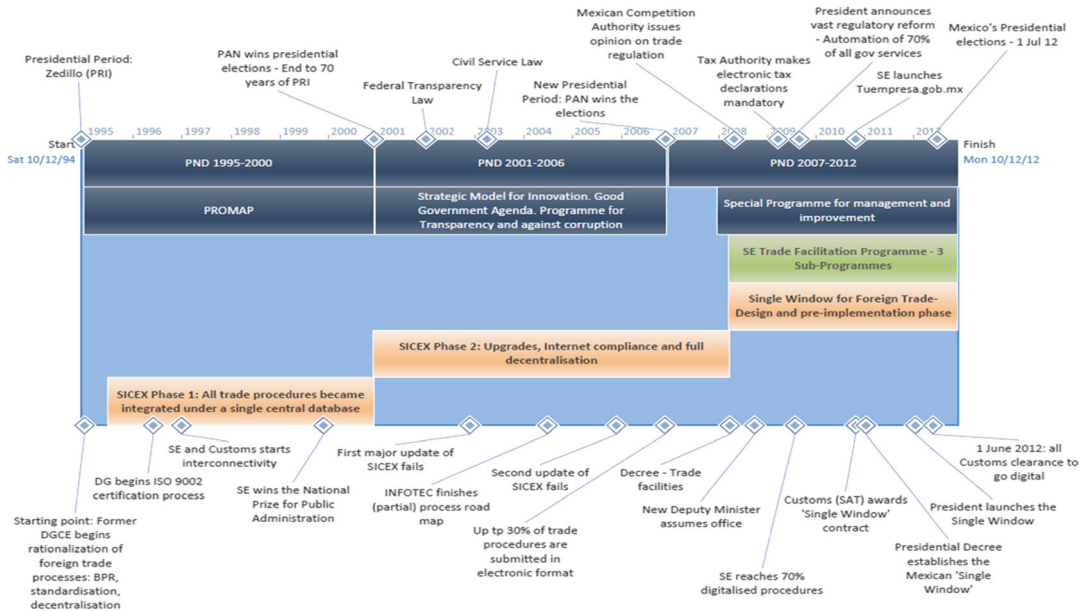

FIGURE 1 Timeline of the case: from SICEX to the Mexican Single Window for International trade (own elaboration). SE stands for Ministry of the Economy; PROMAP, Programme for modernization of the public administration; DGCE for General Directorate of Foreign Trade (the General Directorate [DG] leading both IT projects within the SE). INFOTEC is the name of an IT consultancy firm in Mexico [Colour figure can be viewed at wileyonlinelibrary.com]

National Development Plans (PND) and federal programmes to liberalize trade and reform the public administration. The lower part of the figure shows main episodes and phases of the projects. The entire period is presented in three phases: Phase 1 (1995-2000) covers the design and implementation of the first IS project aiming to support international trade procedures, called SICEX—short for "Integral System for International trade." Phase 2 (2000-2008) covers the main actions to maintain SICEX until 2008, when the government announced its replacement by a more ambitious system called the Mexican Single Window for International trade (hereafter Single Window). Finally, phase 3 (2008-2012) covers the design and preimplementation phase of the Single Window.

Both SICEX and the Single Window were championed and managed by the Ministry of the Economy. The projects involved other government agencies, including Customs, and the Ministries of Finance, Health, Agriculture, Environment, Defence, Energy, and Fine Arts. On their technical side, both IT projects were somehow similar to enterprise systems, in the sense that they entailed the use of hardware and application software to manipulate large bodies of data, to automate and support bureaucratic processes, information flows, and reporting across the central government. SICEX belonged only to one agency, while the Single Window includes a web portal and involves a network of process interdependencies that agencies have to agree upon.

4.1.1 | Phase 1: building SICEX, the first integrated database for international trade procedures

In 1995, international trade procedures and decisions did not follow a consistent set of rules and were conducted with disparate information systems. A request for an import quota, for instance, would get different responses if processed in the offices of Mexico City, Tijuana, or Veracruz. A prime motivation to launch SICEX was the perceived need to apply a set of rules and procedures in a uniform way to eliminate variation in decision making, performance, and outcomes. A former Deputy Minister succinctly stated:

> I'm going to tell you what my problem was [as the General Director of Trade in 1995]. The first thing I notice is that I have to sign 200 matters per day... nobody can review that. Nobody. Thus, we needed to take some actions. First, to generate rules, transparent and published rules ... and we did so, we created clear rules available for all ... then we brought technology in. (Former Deputy Minister, Ministry of the Economy)

In 1996, the Ministry of the Economy launched SICEX as an in-house IS project to redesign processes and develop a database with standardized data across the Ministry. By the end of 2000, 75% of trade procedures were received and processed in federal offices outside Mexico City, contributing to a decentralization process that allocated international trade administration responsibilities to local offices. SICEX also included a degree of automation, such as basic ID data validation. The government estimated SICEX reduced errors related to paper-based administration and decreased response times by about 67% (History of SICEX, 1999). By 2000, it was also possible to start a limited number of trade procedures over the internet through a simple government portal. SICEX was modest in comparison with IT innovation in international trade in other countries at that time, such as the International Trade database in the United States (Fountain, 2001). Yet its implementation represented a milestone for the Mexican public administration and set a precedent for other IS projects in other government agencies of the country.

4.1.2 | Phase 2: working with SICEX (2000-2008) and the failure to scale it up

In 2000, the political party National Action Party (PAN) won the presidential elections after 70 years in office of the Institutional Revolutionary Party (PRI). The change of presidential administration challenged the continuity of ongoing policies and projects, but the team of SICEX in the Ministry of Economy not only remained in place but also won more power with the promotion of some of its members within the Ministry. SICEX entered a phase of

enhancements to develop its internet-based functionality. Two complementary initiatives were pursued: (a) simplification of the regulatory environment and (b) an upgrade of network connectivity to enable SICEX to communicate across the federal offices of the Ministry and with other agencies. The Ministry adopted a mixed strategy of in-house and outsourcing deals to develop the IT infrastructure. However, the technical capabilities of IT service providers were deemed unsatisfactory, and the outsourcing contracts were rescinded. The upgrade of the IS project came to a halt, and the internal efforts mainly concentrated on keeping the system running. In the 2006, presidential elections, the same party (PAN) secured another 6 years in office. It is estimated that, from 2000 to 2006, SICEX achieved an 82% increase in the productivity of procedures per employee, an average reduction of processing times of 65% and savings in the use of paper equivalent to US$ 4 million (Telecom-CIDE, 2007). During that period, however, efforts to upgrade SICEX failed and its infrastructure gradually became obsolete. A system that was very innovative in 2000 remained the same 8 years later.

4.1.3 | Phase 3: from SICEX to the Single Window for international trade (2008-2012)

In March 2008, the government continued to simplify the administration of international trade and announced the development of a digital one-stop shop for international trade. A new Minister was appointed, and a new team of high-ranking staff promoted the project as a necessary development for the country's international competitiveness. Singapore's single window for foreign trade was recalled by many of our interviewees as the inspirational example. Other government actors also contributed to this vision and created strong political incentives for its realization. The Mexican Competition Authority (CFC) stressed Mexico's poor performance in world competitiveness in trade and recommended trade facilitation policies that included IT support for customs clearance (CFC, 2008, pp. 4–5). This position was adopted by high-profile presidential committees as a priority for action. Influential international institutions such as the World Bank, the United Nations Economic Commission for Latin America, and the OECD were also supportive of policies facilitating the simplification of international trade administration using IT.

Later in the same year, the Ministry of the Economy worked out the "Program for Trade Facilitation"—an ambitious trade reform that included a massive reduction in tariffs and the use of IT to support the simplification of trade procedures. In close collaboration with Customs, the Ministry led the process of simplification and initiated the design of a digital service that would become a single entry point for every international trade-related activity. In June 2010, Customs set forth an open tender to outsource the project, which was awarded in October the same year. A contract of 811 million Mexican pesos (US$ 67 million) was initially awarded for 60 months with a possibility of renewal subject to performance. The Single Window follows a public-private partnership (PPP) model—that is, the government steps away from being the direct provider and sole financier of the digital services. The financial risk is shared with the private partner, who charges a fee for the operation of the service. Apart from the design and provision of the IT infrastructure (including the single window portal), the awarded contract included the redesign of trade processes and their simplification, the digitization of 5 years of paper-based procedures, and the provision of IT training for trade regulators. In the meantime, and until the launch of the Single Window, SICEX continued to operate unchanged.

The Single Window portal and its data are owned by the government (Customs) but managed and operated by the IT contractor. Soon after the IT contract was awarded, in January 2011, the project was legally secured with a Presidential Decree. This legal-political milestone, entitled "Decree that establishes the Mexican Digital Single Window for International trade," put firm deadlines and set the ambitious target to launch the Single Window by 2012. From 1 June 2012, all trade operations had to use the Single Window. Only then, SICEX was switched off.

On 1 July 2012, a general election was held in Mexico. The incumbent party lost the elections, and PRI returned to power in December. The new government continued supporting the policies of economic liberalization and facilitation of international trade. The Single Window continued operating, and by December 2015, about 97% of the trade companies were registered as users of the Single Window (Single Window website).

5 | IDEOLOGICAL SHAPING OF THE MEXICAN IT SYSTEMS FOR INTERNATIONAL TRADE

The discourses through which the IT projects for the administration of international trade were shaped are discernible in the Presidential Decree that launched the Single Window project (excerpt below). Articles 3 and 4 of the Decree state a broad range of transformative expectations from IT innovation: more effective and efficient administration of trade regulations, better interaction between trade companies and the government, transparent and equitable services, particularly for small companies, and security for users. Article 1 signals the importance of global competitiveness in a world of open trade, in which countries must compete for investment and growth. It also evokes public administration reforms by referring to the necessity of consolidating and enhancing the "institutional framework." Article 2 is more explicit about required changes in public administration to achieve competitiveness: trade facilitation and simplification of administrative procedures. It also states the objectives of such changes: legality and reduction of transaction costs for traders. Article 5 re-emphasizes simplification and automation as a means for reduction of time and cost of international trade operations.

1 The 2007-2012 National Development Plan indicates that a more competitive national economy will bring better investment conditions and job creation, for which it is indispensable to consolidate and enhance the institutional framework of government;

2 These days, international trade demands measures of facilitation and simplification of trade procedures to provide legal certainty and reduce transaction costs for Mexican enterprises, measures that will increase competitiveness;

3 To support enterprise development in our country, it is necessary that the Federal Public Administration leads the use of information technologies, which can optimize the interaction between private entities and government, create a fundamental tool for the development of trade facilitation and offer a viable opportunity to achieve effective and efficient international trade regulation;

4 In addition to the paragraph above, the use of information technologies in the operation of international trade reduces costs substantially, promotes the incorporation of small and medium enterprises to export activities, offers a transparent and equitable service, and strengthens the security for the users;

5 The authorities of international trade shall coordinate and take actions of simplification, automation and improvement of international trade processes that lead to, among other improvements, the reduction of time and costs of international trade operations;

Excerpt—Presidential Decree that establishes the Mexican Single Window for Foreign Trade (2011).[2]

   Taken together, the articles in the Decree state the Mexican Government's intent to exploit a range of possibilities afforded by IT to achieve two main outcomes: competitiveness of the economy by facilitating international trade, and organizational change of the public sector towards achieving increased productivity and legality. The range of public sector improvements stated in the Decree convey general views on e-government promoted by international agencies, such as the OECD, the World Bank, promoting one-stop shops or single windows for public services (OECD, 2011; World Bank, 2013), and by vendors of such technologies (IBM, 2013). Moreover, the Decree provides a country-specific justification for the importance of these outcomes for Mexico.

   Our analysis in this section uncovers the two ideologies that underpinned this justification and shaped the objectives of the two IT projects under study: free trade for the competitiveness of the national economy and the modernization of the Mexican public sector. We trace their main ideas and controversies as well as the actual effects on efficiency and legality. Although overlaps occur, we address the effects of each ideology separately for analytical purposes and emphasize the primary changes that best link to each ideology. Table 2 summarizes the analysis that follows.

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[2]The excerpt is a direct translation of the original.

TABLE 2 Ideologies, IT objectives, and effects in Mexico—summary of analysis

		Free Trade Ideology	Public Sector Modernization Ideology
Emergence and hegemony	Core idea	Free trade and global competitiveness as path to economic development in the country	Change of old patterns of patrimonial public administration into a professional, impartial, and accountable one Adoption of managerial principles in government
	Objectives to achieve with IT	IT as a tool to reduce costs to traders, bring parsimony and better service IT to facilitate the inclusion of SMEs to trade activity	IT as a tool for productivity for the public administration IT to contribute to transparency and monitoring of decision making processes IT as tool for rule-based decisions, reducing discretion of public servants
Operationalization	Main effects of IT	Efficiency: reduction of transaction costs for trade companies, by simplification of procedures and reduction of response time of customs clearance Legality: IT-based trade administration procedures in compliance with international expectations on the rule of law Also: • No evidence of benefits to groups underrepresented in international trade (SMEs)	Efficiency: streamlining of procedures by government agencies and private sector service providers Legality: substantial increase of legal rules inscribed into software; automated decision making of complex international rules to lessen discretionary decisions of public servants Also: • Restriction of public servants' discretion in the processing of cases • Reduction of IT expertise in the public sector

5.1 | The emergence and hegemony of the free trade ideology

The discourse of free trade stems from the route for economic development that Mexico chose in the early 1980s. The free trade agreement with the United States and Canada, NAFTA, that came into force in 1994 marked a commitment to economic liberalization and an outward looking economy. President Salinas—under whose administration NAFTA was negotiated—said in 1994:

> We decided (…) to embark into a Free Trade Agreement with the United States and Canada. (…) We did it convinced of our ability in the present and assured of the beneficial opportunities of the future. If as a country we needed an efficient link with the world economy, what best way to achieve that than through an effective and reciprocal opening with the biggest economy of the planet. (Carlos Salinas de Gortari, 6to Informe de Gobierno, 1994, p. 7)

The public policy of free international trade and competitiveness was remarkably consistent in the 25 years during which SICEX and the Single Window were developed and was explicitly expressed as the foundation of both IT projects. In 1995, SICEX had been built on a similar motivation to that of the Decree that launched the Single Window:

> The increasing globalization of the economy has created the imperative need for countries to count with more competitive markets, which translates into a growing requirement to achieve efficiency in international trade. (Motivations, History of SICEX, 1999)

The Mexican economy was indeed transformed to one of the most open in the world. Mexico's trade as percentage of the country's GDP doubled in the last two decades. The country's exports increased from about $26 billion in 1990 to $400 billion in 2014—the largest value of exports, after China, in the developing world. The turn towards

free trade in the 1990s was a radical political shift considering that until the mid-1980s, Mexico pursued protectionist policies in government and business. The trade figures show that Mexico's emergent free trade discourse was not just party-political rhetoric but materialized in concrete actions and results. The hegemonic discourse on free trade appeared to wipe away opposing voices, notably those against NAFTA and in favour of protectionism. The free trade ideology remained strong over time, partly because of a coalition of government and big business formed during the NAFTA negotiations and consolidated since then (Thacker, 2012). Competing discourses highlighted the negative consequences of NAFTA for the Mexican small and medium enterprises (SMEs). SMEs account for 99% of the total number of enterprises in Mexico, and 71% of the country's workforce, but only 8% of the SMEs are export-oriented. A former General Director at the Ministry of Economy explained during an interview:

> When you are talking about international trade [in Mexico], you are talking about an elitist material ... they are very big companies ... SMEs do not have the intention, because of the lack of purchasing capacity or the high entry costs in international trade ... so, those who operate in international trade are big corporations ... and these big companies were the ones asking, of course, for more efficiency, but also for less discretion, more legal certainty and transparent rules.

This explains the explicit inclusion of SMEs as a group that would benefit from the Single Window (article 4 of the Decree) as a rhetorical statement to appease concerns that government investment on IT systems would serve the interests of big companies that already benefit from trade.

5.2 | The effects of the free trade ideology

The free trade ideology had direct effects on the way the IT projects were implemented. In terms of *efficiency*, the Single Window redesigned the administrative procedures to reduce the number of steps, data entry points, tasks and activities involved in trade-related regulation, and therefore contributing to reduce the total compliance costs of trading companies. Through the Single Window dedicated web portal, an importer/exporter can submit its trade declarations for processing and approval using a single electronic application. Data are shared simultaneously between Customs and the other government agencies, enabling the approving officers to clear a trade entry in a shorter time frame, or even automatically in some cases. As a result, the Single Window achieved a substantial improvement in average processing times, as shown on Table 3. It eliminated the need to prepare different applications to comply with different authorities and made the use of paper almost obsolete. The government also claimed that it translated in lower transportation costs, as the electronic compliance reduced largely the need to attend local authority offices to process trade declarations. This change was recognized in related international evaluations. The World Bank *Doing Business* report of 2014, for example, highlighted that Mexico made trading across borders easier and speedier with the implementation of the Single Window (World Bank, 2013).

TABLE 3 Aggregated quantification of simplification of trade procedures of the Ministry of Economy (year 2012)

Indicator	Old (SICEX)	New (Single Window)	Change, %
Number of procedures	54	22	−60
Data entry points	770	435	−44
Average waiting time	15-20 d	1-5 d	
Average number of requirements per procedure	104	61	−41
Total number of activities	127	25	−80
Total number of tasks	867	282	−67

Note. Trade regulations represent 55% of all procedures in international trade.

Source: authors' calculation, based on data from the Ministry of Economy.

One of the most important challenges in the achievement of efficiency gains was the redesign of the multiple agency system with jurisdiction in international trade, each with their own interests. Resistance from the interorganizational conflicts of the multiple agencies taking part in the project was overcome by the significance attributed to international trade in the policies of successive governments. It is indicative of this significance that the Single Window was the only IT project in Mexico that had government support in the form of a Presidential Decree. A project leader from Customs explained:

> *The Single Window is more political than technical ... Agencies simply will not respond to me... they need formal instructions ... They [Ministry of Economy] need to convince the President ... without that, without being at that level, this is going nowhere. (Director/Project Leader, Customs, 2009)*

The reduction of administration costs for traders was particularly emphasized in the free trade ideology in relation to SMEs. It was argued that, with standardized and less complex procedures online, SMEs could be incorporated into trade more easily. A government official supported this claim by suggesting that to access the Single Window services, "you only need an internet connection." But the extent to which the move to electronic interaction between traders and the administration has helped SMEs, as stated in the Decree, is disputed. The costs for switching from paper to electronic procedures are considered high for SMEs. A consultant from one of the Big Four global accounting firms mentioned in a news article: "[the Single Window] is going to cost money (...), we foresee that costs may vary in between 7,500 to 75,000 US$," which is a particular high burden for SMEs (Camacho, 2011). An expert from the private sector echoed this claim during one of our interviews in 2012. He suggested that from an operational perspective, the burden to keep pace with compliance changes, including going from paper-base to electronic declarations, is higher for smaller firms operating in trade. New electronic trade systems such as the Single Window actually prove too complex for lower-volume traders. Indicatively, the percentage of SMEs operating in international trade (either by the value of exports or number of companies) did not change since the Single Window started operating.

Both SICEX and the Single Window had the improvement of *legality* as one of their central objectives—manifested in the rhetoric of "legal certainty." Inscribing legal norms and trade regulations into software to automate tasks and offer predictable results from trade applications was frequently highlighted in our interviews with government officials. In SICEX, legality was enacted by first, designing the rules for the administration of trade and then inscribing them into software to meet the expectations of the newly implemented NAFTA. The implementationof the Single Window was a significant milestone towards facilitating trade to realize further the benefits of free trade agreements and to prove that Mexico has "one of the best customs in the world." In part, the automationand simplification of trade processes in the Single Window was a way to signal to global markets an administration that prioritizes clear rules and predictable outcomes instead of whim or discretion. Mexican Customs have historically been known for their opacity, which covered officers' abuses of their role for private gain. In 2009, for example, the federal government hired 1400 foreign trade officers trained in legal aspects, clearance of goods and passengers and procedures for surveillance and control, of which 150 were later prosecuted for suspicion of corruption. In 2010, the General Director of Customs was cited in a news article as follows:

> *We aimed to have the best, most efficient public officials that are at the level of the best customs in the world. We have denounced foreign trade officials ... We have already filed complaints with the Public Ministry (...); they are in judiciary process and we are going over them.*

5.3 | The emergence and hegemony of the public sector modernization ideology

The discourse on free trade and competitiveness was complemented by a public sector reformist discourse. Virtually all National Development Plans since 1995 consistently expressed the need for a more efficient, effective, transparent, and accountable public administration. This discourse is present in the documents of SICEX:

> *In conformity with the objectives of the National Development Plan of 1995-2000, which establish the need to broaden the legal security for the companies ... oriented to improve the [administrative] efficiency ... and to eliminate unnecessary discretionary acts from the authorities and the excess of bureaucratic procedures ... several actions have been put in place, such as the implementation of a novel information system [SICEX]. (Motivations, History of SICEX, 1999, p. 2)*

As this text suggests, SICEX and the Single Window were built in a context of public sector modernization efforts that aimed to achieve a mix of objectives that were incongruent at times: to simplify burdensome procedures, to protect the rule of law with processes based on new regulation, to use public resources more effectively and efficiently, to bring transparency, and to reduce discretion. Historically, the existence of a single ruling party for over 70 years allowed politicians and powerful groups in the Mexican society to use the public administration to advance their interests. The modernization discourse gained momentum when the process of political democratization led to a more diverse composition in Congress and a new party in power in the year 2000. In part, the strategy to change the overpoliticized Mexican public sector drew from the managerial reform ideas. The government celebrated the virtues of incorporating private sector management strategies into public administration. Evidence of business management vocabulary was already visible in the development of SICEX. For example, the government referred to the users of trade procedures as "clients with demands":

> *[in 1994] we were not able to satisfy our clients with efficacy in terms of their demands of services. (Problem justification, History of SICEX, 1999, p. 3)*

From the year 2000 onwards, terms such as "innovation," "optimization," "strategic planning," "total quality," and "re-engineering" were part of the official vocabulary that continued to infuse objectives of IT projects, in conjunction with a view to reduce costs. The Single Window was no exception:

> *For the current Minister, who has worked for the private sector for many years, the use of technology is a constant to increase productivity (...) The Ministry can be compared to a big corporation, but here there is no planning; the duplication [of IT systems] is much worse. There is a need to use strategic planning to solve the IT problems. (IT Advisor to the Minister, 2009)*

The perceived merits of the private sector led to outsourcing an increasing number of the IT functions in government —an acclaimed characteristic of NPM-inspired reforms. Our interviews with project managers of the Single Window pointed to the private sector being widely regarded as a resource that could bring technical and professional expertise to develop better provision of services and to help the government to save money. The managerial discourse, however, created counter-discourses:

> *In public administration, you can only do what you are specifically empowered to do, via a legal instrument, a Law or a Decree. (Former Deputy Minister, Ministry of the Economy)*

> *As a bureaucrat, you got the Sword of Damocles on your head ... you must obey to procedures ... Every bureaucrat wants to be legally protected from the actions taken ... for that reason, you ask for more procedures, to protect yourself ... whether they are an unnecessary burden for the public it's a different matter. (General Director, Ministry of the Economy, 2010)*

Such arguments for the importance of regulation-based procedures conflicted with the significance attributed to a simplification of procedures that was thought all-too-important to facilitate international trade. On one hand, the simplification of procedures was considered paramount for the declared need to increase efficiency of trade administration, to reduce transaction costs, and to increase productivity. On the other hand, the design of and adherence to procedural rules that govern complex foreign trade regulation were important to safeguard the rule of law and a fair

service. It was necessary to implement more formal rules to overcome the legacy of an unaccountable public administration. The solution, as one of the political leaders of the Single Window indicated, was to embed the complex rules of the administration of trade into software:

> We need to do much better. We have a great amount of [trade] programs, and it is really complicated to know under which conditions they were granted or under which rules ... Who knows where that information is ... When you have this information in electronic systems, it becomes much easier to review that everything was done in adequate terms. (A high-ranked official from the Ministry, 2009)

5.4 | The effects of the public sector modernization ideology

The Single Window implementation had effects on the *efficiency* and productivity of the public sector. It pursued an "optimization of human resources" that had a direct contribution towards a higher productivity and reduction of administrative costs for the government. The implementation of the Single Window resulted in a reduction of 21% of personnel—a saving of about US$ 1.25 million for the ministries involved in the project.[3] Naturally, there was resistance to job losses. The need to transform the Mexican public administration, in conjunction with the critical importance attributed to competitiveness manifested in the Presidential Decree, provided crucial support for this change, shifting justifications of job losses away from IT use. Table 3 serves also as an indication of improved trader compliance overall.

The public sector modernization discourse also shaped the way efficiency objectives were enacted through a gradual outsourcing of the IT functions to the private IT services industry. IT contractors were used for the development of SICEX, but they remained under the supervision and control of the Ministry. The Single Window used instead the rhetoric of PPP to carry over the simplification of trade procedures and the deployment of the IT infrastructure. Our discourse analysis reveals that there was an implicit assumption that the outsourcing deal would reduce the inefficiencies of trade compliance, given the financial incentives in place. An Area Director from the Ministry explained the rationale for allowing the IT contractor to charge a fee per procedure completed:

> The contractor is mainly interested in the money ... they do have the interest in making the system work... It's simple ... If [the Single Window] does not work, they do not get paid. (Area Director, Ministry of the Economy, 2010)

The contract set tough penalties for possible system failures. What the quote illustrates is the government's intention to assign the responsibility of potential system breakdowns to the IT firm. However, the financial incentives do not lift the responsibility of the government to safeguard its operations or to resolve how to adapt the system to the issue of new regulation. In effect, while aiming at cost-saving gains, government agencies lost their technical expertise to be in control of their IT infrastructures. The partnership agreement put aside IT workers inside the Ministries who felt excluded. A member of the IT team that was in charge of SICEX and other systems in the Ministry of Economy explained during an interview in 2009:

> We would like that they [authorities] give us more credit, we are people that like to take on board new challenges, and yet, they do not pay attention to us ... or they think that an external one is going to do it better. I do not know why they have to outsource that, when we have the [human] resources here ....

SICEX was judged as a competent and innovative system in 2000 and recognized with government awards, which suggests the government had competent IT skills. By the year 2012, the government IT teams were reduced significantly, because of the Single Window and other outsourcing deals in related areas.

Moving onto the effects on *legality*, adherence to regulation and law-based decisions was one important concern voiced in the public sector modernization ideology; the imperative was to reduce the arbitrary decisions and lack of

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[3]Information provided by the Mexican government.

accountability of public servants that were prevalent in the patrimonial tradition of political patronage. In addition to the effects of the free trade ideology, the modernization discourse aimed to increase the accountability and transparency of procedures and to reveal possible abuses or corruption within the public administration. An Area Director from the Ministry of Economy offered an illustration to this point during a webinar:

> There are lots of advantages in terms of resolutions that you do not see ... but I can assure you that we have set up many internal "locks" [in the software] ... the internal responsibility is much stronger. [The Single Window] gives order to our internal processes, but it also makes them much more efficient. (Area Director, Ministry of the Economy, 2012)

Because the Single Window was designed with no legacy system in place, its implementation was able to automate a larger number of rules for the newly simplified procedures. Table 4 compares trade procedures available on SICEX with the new procedural rules that were inscribed in the Single Window.

The reasons for the automation of international trade regulations differed in the two projects. As we noted earlier, SICEX aimed to provide rule-based trade procedures for public servants to comply with the requirements of the newly adopted NAFTA. SICEX was, however, distrusted and resisted by the local officers who were used to working in a different fashion:

> When you do not have rules, administrators can do whatever they want and nobody will punish them ... Then, to convince administrators that they need to follow rules, that with those rules they will be audited, and if they do not do things according to those rules they will be punished ... well, who's going to like that! (Former Deputy Minister, Ministry of the Economy, 2009)

One way devised to curb the initial resistances was to assign decision-making capabilities to local officers. SICEX facilitated a decentralization of power that assigned a greater role to the 52 local offices in the country to deal with trade applications. Trade regulations are well known for being complex. Therefore, the rationale was that in order to process and approve an import permit declaration in Tijuana, for example, a public official that is next to the trader could verify whether the information provided was accurate faster and more efficiently than someone sitting miles away, in the central offices of the Ministry in Mexico City. In 2009, however, the government justified increased regulations inscribed in the Single Window as a response to lack of control and dubious transparency. The way the tensions over enacting regulation and discretion were resolved in the Single Window entailed a shift of control "back to centre." The move of SICEX to empower local officers in their decision-making processes was reverted with the Single Window. With a centralized IT function, the Single Window automated a larger number of processes and disallowed public servants from taking actions when dealing with special cases of any sort—from SMEs to big companies. The "locks" in place referred in the quote above contributed to faster customs clearance and more efficient use of resources but challenged the level of flexibility required to deal with complex or special cases.

TABLE 4 Change in the number of procedural rules—major procedures of the Ministry of the Economy

Trade Procedure	Number of Rules			
	Old	New	Difference	Change, %
Questionnaire registry	115	120	5	+4
Certificate of origin	28	54	26	+93
Drawback (tax returns)	34	27	−7	−21
Imports and exports quota (worldwide)	34	68	34	+100
Imports and exports quota (regional)	10	68	58	+580
Import and export permits	19	61	42	+221

Source: authors' elaboration, based on data from the Mexican Ministry of the Economy.

6 | DISCUSSION

In the case of the administration of international trade in Mexico, ideology provided and sustained impetus for two successive generations of IT projects. Ideologically triggered objectives for organizational change were to a large extent operationalized in the configuration of technology-supported administration processes. This case study shows how general beliefs about the transformative potential of IT in the public sector—the e-government CM—were translated into specific objectives and led to specific organizational changes under the influence of ideologies concerning two areas of social structure: the economy and public administration. The IT projects we studied were initiated and sustained by the radical turn of the country's political economy from protectionism to free international trade. The ideology of free international trade was combined with an ideology that necessitated the modernization of the public sector to set objectives for the IT projects.

Taking into account the ideological origins of the objectives of IT innovation is important for explaining the course of IT implementation and its effects on public administration outcomes. Because ideologies are contested, the substantive public policies enacted by government organizations are the result of complex discourses about alternative social structures. Hence, objectives of IT innovation tend to accommodate policy adjustments and compromises; they may not be clear cut and free of contradictions, but complex and of contestable legitimacy. In the Mexican administration of international trade, the operationalization of the transformative discourse on IT was possible because the persistent dominance of the free international trade ideology across governments in office since the 1980s secured political support and resources. In many other countries, as well as in other public policy areas, such long-term ideological consistency may be lacking. The risk for derailment of IT projects from change of leadership in government has been repeatedly highlighted in the IS literature (Constantinides & Barrett, 2006; Silva & Hirschheim, 2007).

In this section, we discuss the findings of our case study in relation to existing sociotechnical perspectives of IT innovation and organizational change in the public sector. We highlight our contribution in relation to organizational perspectives of e-government; socio-cognitive perspectives that focus on ideas and meaning, such as technology frames and organizing visions; perspectives that focus on politics in IT innovation; and the literature on the role of ideology in IS research.

6.1 | Extending the organizational perspective of IT innovation in the public sector

Paying attention to ideology requires broadening e-government research to associate IT innovation decisions and actions in government organizations with their national and international socio-political settings. This contribution can be better appreciated in comparison with Fountain's (2001) highly influential theory of technology enactment and interorganizational change in government. In Fountain's analysis, the politics of the implementation of IT in public administration concern the organizational form of a network of agencies involved in the implementation of a substantive public policy. In her case study of the US international trade administration, IT innovation is considered necessary to cope with increases in the volume of foreign trade. The politics shown to have affected the implementation of IT systems concern power dynamics in the formation of new organizational structures that required cooperation of different government agencies. The organizational restructuring objectives of the IT projects are assumed to be rational responses to the historical fact of increased international trade volume following the signing of NAFTA:

> In sum, the argument for fundamental restructuring of international trade data and management is clear; yet the organizational and institutional transformation required to align the state with a digital, global economy is difficult to achieve. (Fountain, 2001, p. 111)

Our analysis of the Mexican international trade case shows that the objectives of the projects were constructed by national level ideologies and political choices. The objectives of efficiency and organizational reform that drove IT innovation in Fountain's case study of the US foreign trade were primary objectives in the Mexican IT projects too. We showed that, in Mexico, these objectives were not just a rational necessity for global supply chains and

increased trade; they originated in the emergence of the ideology of economic liberalization that became a dominant discourse since the mid-1980s.

6.2 | Tracing the source of collective meanings in macrolevel politics

Our research complements the socio-cognitive perspectives that emphasize the formation of collective meanings of IT (Davidson, 2002; Orlikowski & Gash, 1994; Swanson & Ramiller, 1997). It traces the source of collective ideas and interpretations of what IT innovation is for into domains of contestation of desirable social structures in macrolevel politics. In our case study, these were the route to economic growth and the modernization of public administration. This study supports the claim by Barrett et al. (2013) that disagreements over technology options are disagreements over social and economic configurations. While all cases of technology innovation involve ideological positions that concern contested preferences of world orders, the ideological origin of frames of technology meaning are perhaps the clearest in e-government. In addition to the general ideological contestations about potentially transformative effects of IT in the public sector, discourses surrounding IT projects in public sector organizations are directly related with national party-political struggles over contested visions of economics and social structures. We showed how, in our case study, apparently straightforward meanings of IT as enablers of efficiency in government organizations implicated political positions of socio-economic development. Similarly, innocuous IT innovation objectives and effects in other areas of public services, such as improvement of health outcomes (Klecun, 2016) or reducing poverty (Thompson, 2004), are likely to be associated with ideological positions and involve political contestations.

6.3 | The significance of ideology in the politics of IT innovation

Our research builds on and extends theoretical perspectives of politics shaping IT innovation in the public sector (Danziger et al., 1982). It complements the view of politics as power relationships by considering ideologies contested in national politics and associated with the positions and interests of various stakeholders. In the Mexican case study, a cadre of administrators traditionally appointed by the government in office lost their position of patrimonial power as the ideology for the modernization of the public sector became hegemonic in a regime that sought to promote international trade as the route to economic growth. Consequently, opposition to the ideas for IT innovation from bureaucrats was discredited and their counter-discourses weakened.

Thus, taking into account the link between power and ideology challenges the emphasis given to the power held by elites as a source of resistance that dampens down the transformative potential of IT in the public sector. In the political processes of most societies, hegemonic ideologies change in the national and international contestation of preferred social structures. Elites may lose their privileged positions, and subjugated preferences may become hegemonic. The ideology of economic growth by opening national economies to international competition that spurred IT innovation in our case study was a radical change from the protectionist economic policies of previous governments. Interestingly, this ideology of economic growth is now challenged by the protectionist ideologies championed by the current US government and NAFTA-related regulation and the rationale of the Mexican systems we studied may be challenged.

6.4 | On ideology and IT innovation in the public sector

Insights from our research enrich the fledgling IS literature on ideology and IT innovation in several ways: first, by pointing out that ideologies on multiple issues are implicated in specific instances of IT innovation. Generic CM discourses about transformative effects of IT are combined with discourses of other movements—in this case study, discourses on the transformation of the economy and the transformation of the public sector—to form the objectives of IT innovation projects.

Consequently, our case analysis points out the importance of congruence between the ideology underpinning the substantive public policy that government organizations enact and the ideology for public sector modernization to sustain reformist IT initiatives in government. The two ideological influences we studied complemented each other, creating unequivocal directions in the discursive contestation of the objectives of the IT projects and their concomitant organizational change. This is not always the case. In a study of IT implementation in the criminal justice system in England and Wales, Cordella and Iannaci (2010) found that the development of IT systems to facilitate the tasks of prosecution and police investigation was confronted by conflicting policies. Government policy for the separation of police activities, investigations, and prosecutions clashed with public sector reform policy for government agency integration. Their case analysis suggests that such ideological incongruence is likely to create prolonged uncertainty and conflicting organizational change interventions, jeopardizing IT implementation. In our case study, the ideologically dominant economic policy of free international trade was compatible with, and reinforced by, a public sector modernization ideology that aimed to discontinue historically formed features of a patrimonial public administration. One needs to take into account this combination of politico-economic and public sector modernization discourses to explain the specific objectives that SICEX and the Single Window projects sought to achieve. The objectives of efficiency and simplification of the operations of international trade were highly important within the discourses of both ideologies.

Second, our research supports a view of a recursive relationship between ideology and IT innovation. The analysis of the Mexican case shows that IT innovation is not only influenced by ideology but also has an effect on ideology. The findings from the operationalization of discourses in the CDA analysis suggest that once hegemonic discourses are internalized in technology-supported practices, technology enactment further reinforces dominant ideologies. For example, SICEX led to changes of administration procedures and resulted in efficiency gains. Traders could see benefits from the government's free trade policy. This strengthened the discourse on competitiveness with IT as a facilitator of international trade, as expressed in the Presidential Decree. Consequently, the Single Window further increased efficiency by automation, effectively supporting the growth of international trade and reinforcing its significance in the government's economic policy. SICEX, in turn, enabled decentralization achieving higher degrees of transparency and rule-based operations in the government and therefore contributed to reinforce the reformist discourse on the modernization of the Mexican public administration.

Third, in contrast to the IS literature that tends to consider ideology as the source of largely negative influences on IT innovation in public sector organizations, our research supports an agnostic position about the role of ideology. The combination of a wave of positive ideas about the potential of IT in the public sector (the e-government CM) with the economic ideology that required the facilitation of international trade and with the ideology for modernization of the public sector created conditions that spurred and sustained the development of SICEX and the Single Window. Our CDA shows that these projects have to a large extent met the objectives of increased efficiency and improved legality set in the discourses of the three ideologies.

Beyond this observation, the IT projects we studied had a varied impact on multiple aspects of the administration of international trade and defy a general success/failure or positive/negative assessment. The configurations of technology and organizational practices of SICEX and the Single Window are context-specific resolutions of historically developed conditions of Mexico, and their impact needs to be judged accordingly. For example, the Single Window achieved a combination of efficiency and legality by centralizing computerized decisions at the expense of flexibility and human discretion. Applications for international trade licenses are now processed centrally by software that inscribes complex regulation. Decisions were made more efficiently and more legally accurately by following the law in an impersonal manner, restricting the scope for human discretion. From a general public administration theory, the discretion of officers is an important way for sensing and responding to the specific that is not adequately addressed by the universal (Bovens & Zouridis, 2002; Hoggett, 2006). Thus, constraining the role of street-level officers and therefore curtailing the flexibility of administrative decisions may be a negative feature of public administration (Feldman & Khademian, 2001). In Mexico, however, the inflexibility that results from curtailing discretion was a politically feasible compromise in public administration reform that aimed to tackle the now discredited practices of

the patrimonial bureaucratic system. The judgement of the value of this change is itself subject to ideological contestation.

7 | CONCLUSIONS

Our research presents a perspective of IT innovation in the public sector as a process involving influences from three ideologies: about e-government as a transformative force for good; about the substantive public policy options in the area of welfare and development served by a public sector organization; and about reforming the bureaucratic state by adopting organizational principles from private sector management. We argued that at stake in IT innovation are fundamental practices in public sector organizations. We demonstrated our argument by tracing changes of efficiency and legality as indicators of the transformational effects of IT in the administration of international trade in Mexico. Our study suggests that objectives and effects achieved by IT innovation are dependent on ideological contestations at the national level of politics.

The perspective we develop in this paper challenges the rationality of generally beneficial public sector transformation associated with IT innovation. Instead, it uncovers the rationality of IT projects and their effects by studying discourses that reveal contested ideas about change of the state with consequences on different social and economic groups. From this perspective, the course of IT innovation and its effects in the public sector are contingent upon ideologies that are formed and contested over time. Consequently, they may also be ideologically challenged and reversed. Hegemonic ideologies of the political economy of a country and the power of competing ideologies may change, and the durability that IT brings to organizational and interorganizational arrangements may be eroded.

For IS practice, this perspective of IT innovation suggests the need for alertness to shifts in public discourses that may render precarious the legitimacy of IT project objectives or that necessitate adjustments of IT-supported organizational practices to satisfy changing ideological preferences. It challenges the wisdom of strategic planning for IT innovation by technically aligning systems development to public policy. It presents the relationship between IT projects and organizational strategic requirements as contingent on changes of national level ideology. This suggests that IS practitioners cannot fully understand the meanings of the objectives assigned to IT projects by the various stakeholders they strive to satisfy without taking into account what broader social structures are at stake. Identifying the ideologies implicated in IT innovation is important for decisions on IT project investment. This is particularly relevant for developing country contexts, where resources are even scarcer and political instability may jeopardize IT implementation more quickly. There are anecdotes in the public sector about IT teams working out alternative IS development project plans prior to national elections in anticipation of public policy changes that a new government may trigger. The findings of our case study suggest the need for further research to contribute to the development of professional IS capabilities in the public sector to address ideologically caused contingencies.

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