Exploring the Dialectics Underlying Institutionalization of IT Artifacts

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Abstract:

We examine the relationship between information and communication technology for development (ICT4D) and local historically embedded institutions. We argue that, to understand the process of implementing IT artifacts, one needs to consider not only technical feasibility and economic viability but also institutional permissibility. We present a novel theoretical framework based on dialectics and institutional theory and apply it to a case study that contributes a dialectics-centered framework illustrated with empirical data from the informal sector in Latin America. The analysis demonstrates the institutionalization of IT artifacts as a conflicted and contested process and that historical institutions may enable some forms of institutionalization while resisting others contrary to social norms. We examine the emergence of contradictions, active praxis, and the resulting outcomes before concluding that, for IT artifacts to contribute to development, one must emphasize the embedded institutional arrangements and contestation that historically embedded institutions present. We conclude the paper by discussing the theoretical and practical implications.

Keywords: Institutions, Institutionalization, Dialectics, Development, IT Artifacts, LMIC.

1   Introduction

Researchers generally agree information communication technology (ICT) has a beneficial role in development (e.g., Donner, 2009; Heeks, 2008; Sein & Harindranath, 2004; World Bank, 2012). Heeks (2008) defines ICT for development (ICT4D) as harnessing digital technologies in the service of the world's most challenging development problems. However, senior scholars have identified a high failure rate of ICT4D projects and an enduring "techno-centric" approach that indicates the positive relation between the widespread investment in ICT and economic growth (Avgerou, 2008; Dodson, Sterling, & Bennett, 2012; Fonseca 2010). Literature over the last two decades has emphasized the importance of social and cultural dimensions in enrolling IT artifacts[1] in organizations. Walsham and Sahay (1999) provide one example, which details the problematic implementation of geographical information systems (IS) in India due to the lack of congruence between Western embedded values (e.g., the use of maps) and local understanding. This and other research (e.g., Miscione 2007; Puri & Sahay, 2007) presents ICT4D as problematic and contested and casts doubt on the "techno-centric" deterministic premise that the introduction of ICT will lead inevitably to development.

In recent years a stream of contexualist research has emerged both in mainstream IS (Nielsen, Mathiassen, & Newell, 2014) and ICT4D (Avgerou, 2010; Noir & Walsham, 2007; Rajão & Hayes, 2009) that applies new institutional theory to understand institutionalization[2]. However, with the exception of Rajão and Hayes (2009), few studies have identified the importance of a dialectical lens to understand the role of historically embedded institutions, conflict, and contestation in ICT adoption in low- and middle-income countries (LMIC).

These foundational elements serve as the main motivating force for our paper: we propose a framework based on an institutional and dialectical approach to ICT4D. We draw on Seo and Creed's (2002) dialectical perspective on institutional change to empirically examine the emergence of contradictions that ICT and historically embedded institutions present. By adopting this approach, we can analyze in detail the sources of contradictions and praxis that, when considered together, explain change or persistence.

We conducted an interpretive case study (Walsham, 1995, 2006) of micro and small enterprises (MSEs) in the informal sector that the Mexican Government targeted as part of the millennium development goals (MDG). We analyze how the interplay of the political and technical aspects of IT artifacts shape institutionalization and how understanding this interplay provides rich insight into the dynamics of ICT4D in the context of the informal sector in an LMIC.

We posit two research questions:

RQ1: How does the institutionalization of IT artifacts create contradictions in and between institutions?

RQ2: How, through praxis, are these contradictions resolved?

With this paper, we contribute a novel theoretical framework that allows researchers to examine the dynamics of the institutionalization of IT artifacts and involves the three-stage process of contradiction, praxis, and outcome. We also challenge techno-centric and deterministic assumptions of the institutionalization of IT artifacts and instead offer a complex explanation based on contestation. Finally, we bridge the ICT4D and mainstream IS domains by contributing reverse innovation with the lessons abstracted from the case analysis to offer insights into institutionalization relevant to wider IS research.

The paper proceeds as follows. In Section 2, we outline the paper's theoretical background. In Section 3, we describe the research design and methodology. In Section 4, we apply the theoretical framework that we developed to examine the case through three vignettes. Specifically, we examine 1) the potential use

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[1] Our use of the term "enrolling IT artifacts" aligns with Noir and Walsham (2007) who argue for acknowledgment of the indeterminacy of ICT implementation and for an institutionalist perspective on IS implementation. We draw on Rajão and Hayes' (2009) definition of information technology (IT) artifacts as "bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software" (Orlikowski & Iacono, 2001, p. 121). IT artifacts comprise both material affordances (i.e., design features) and established and envisaged uses or organizing visions (i.e., ideal and actual work practices related to the artifact) (Swanson & Ramiller, 1997; Orlikowski & Barley, 2001).

[2] Institutional theory posits that institutions are social structures such as taken-for-granted norms institutionalized as belief systems transmitted across generations through rites, rituals, routines, and artifacts. Institutionalization denotes the process whereby social activity becomes eventually more or less taken for granted. Actors across an organizational field drive these ongoing processes of institutionalization; however, fields are not static, and participants enter and leave and new agendas emerge with competing beliefs and rationales about how to organize and structure practice including practices related to IT artifacts (Scott, 2001; Neilsen et al., 2013).

of mobile phones to improve efficiency in the ordering process, 2) the outcome when an MSE attempted to develop an Internet-based ordering system, and 3) institutions related to the business utility of using email, digital catalogs, and websites. In Section 5, we discuss our findings, our paper's contributions to theory and practice, and possible areas for future research.

2   Theoretical Grounding

In their review paper, Sein and Harindranath (2004) assert that policymakers and donor agencies have come to recognize ICT as an important contributor to industrial and economic development. They classify ICT's contributions into three main perspectives: modernization, dependency, and human-centeredness (or human development). The modernization perspective argues that developing nations should emulate some of the strategies from developed nations such as using capital and technology as a catalyst to accelerate growth. This perspective, which equates development with modernization, has been discredited because it does not take cultural and local contexts into account. The dependency perspective argues that economic growth in developed countries leads to the underdevelopment of poorer countries (mostly former colonies) that may, as a result, be subject to negative terms of trade and technology and industrial dependency. This view is also discredited because it treats all underdeveloped countries uncritically and puts the onus of development on local government resources rather than the global context. The human development perspective focuses on individuals' capabilities, specifically related to their economic, social, and political development. Prior research in ICT4D has demonstrated the relationship between institutions and human development (Bass, Nicholson, & Subramanian, 2013). We ground our institutional analysis in a development context aligned with a perspective that societies with inclusive institutions foster economic development through the protection of property rights and broad-based political participation (Acemoglu & Robinson, 2012). Inclusive institutions incentivize investments in education, encourage the use of new technologies, and allow individuals to lead the lives they choose. In contrast, extractive institutions tend to allow only a small elite to accumulate benefits while leaving a large segment of society excluded and underdeveloped. In attempting to answer the question of how these processes involve ICT, we identify four main uses of ICT in development:

- To serve as a commodity in itself
- To support development activity
- To drive the economy, and
- To support specific sectors or projects

We can broadly classify research in each of these development discourses and application areas into two main camps: the optimistic camp and the pessimistic camp. The optimistic camp suggests that ICT leads to development, and the pessimistic camp suggests that ICT alone does not unless accompanied by social change.

This paper is aligned with and builds on the human-development perspective and the pessimistic camp, the latter of which draws on institutional theory and has received increasing acceptance as a valuable theoretical framework to understand IS-related processes (e.g., Avgerou, 2000, 2002; King, Gurbaxani, Kraemer, McFarlan, Raman, & Yap, 1994; Noir & Walsham, 2007; Orlikowski & Barley, 2001; Silva & Figueroa, 2002). In brief, institutional analysis enables one to examine how broad social and historical forces that range from explicit laws to implicit cultural understandings affect and are affected by individuals' and organizations' actions (Orlikowski & Barley, 2001, p. 153). Further, institutional analysis considers social and cultural contexts to be as important as the technology itself (Orlikowski & Iacono, 2001; Sein & Harindranath, 2004). Institutional theorists perceive organizations as being suspended in a web of institutions; in effect, organizations inhabit institutions (Barley & Tolbert, 1997), and applying an institutional framework highlights the societal rules and beliefs derived from political or regulatory demands, prescriptions of professional associations and consultants, or mimetic activities (Powell & DiMaggio, 1991).

Moving to the IS literature, King et al. (1994) define an institution as "any standing entity that exerts influence and regulation over other social entities" (p. 141), which emphasizes the regulative aspect of institutions (government authorities, international agencies, trade associations). Because we focus on contested change, we draw on Nielsen, Mathiassen, and Newell (2014) and their identification of salient themes for applying institutional theory to IS research to review the literature in ICT4D.

The first theme focuses on the effect of institutions, and much of this research is at the sectoral or project level. The evolving discourse on the implications of power structures emphasizes how the institutions in developing countries may permit dysfunctional outcomes in ICT projects; for example, Sahay and

Walsham (1996) illustrate how political priorities often override technical recommendations surrounding implementation of projects. As another example, Puri and Sahay (2007) analyze the negative impact that corruption can have within organizations when implementing free and open source software. In the same vein, Diaz-Andrade and Urquhart (2012) found that ICT4D projects that do not consider locally accepted beliefs and embedded power structures are more likely to fail since the current beneficiaries of the existing institutional arrangements may actively resist new IT artifacts that could undermine their power structures. Other researchers in ICT4D have focused on the effect of networks on the use of IT artifacts; for example, Saebo and Sahay (2013) found that enrolment is not only based on individual decision making but also influenced by the organizational field, which demonstrates the role of "distributed agency" (Lawrence, Suddaby & Leca, 2011). In exploring the particular challenges that MSEs face, Beckinsale and Ram (2006) found that peer groups more strongly influenced enrolment behavior than bigger enterprises, which indicates that large firms can act more autonomously but that MSEs require sectoral consensus. This point is relevant to our research because it points to the limitations of a "top-down" approach to ICT4D. Furthermore, weaknesses in institutions at the macro-level (e.g., contract enforcement) may suggest that local institutions have a significant influence on agency. However, to date, little research has examined the role of micro-level institutions on MSEs and specifically how "distributed agency" (Lawrence et al., 2011) builds the necessary consensus for successful institutionalization.

The second theme in Nielsen et al.'s (2014) review explores the interaction between institutions. In doing so, they assume that institutionalization progresses better when congruent with (and that will encounter difficulty when it acts counter to) institutions. Some prior literature has used institutional theory to make sense of contested change and the role of ICT in that process; for example, Rajão and Hayes (2009) propose a dialectical analytical framework to analyze how one may understand IT artifacts as both enablers and constrainers of change. Martin (1984) illustrates divergent outcomes well by describing them as "pull" and "push" forces on ICT enrolment. For Martin, the pull pressure for use emanates from external agents, such as the demands of customers, and push forces occur when organizations develop IT artifacts based on their core competencies before then pushing it to customers or suppliers. Silva and Hirschheim (2007) illustrate the problem in relying on pull pressure from studying the implementation of a strategic IS project in the Ministry of Health in Guatemala. The project, which the central government developed, sought to encourage local hospitals to adopt new technologies. However, local agents met the pull pressure that the central government exerted with suspicion, which ultimately led to fierce resistance. Miscione's (2007) work on the institutionalization of telemedicine in the Amazon region of Brazil further strengthens this finding: the author found that successful enrolment of ICT requires local accountability. The author found that locals in the Amazon region resisted enrolment partially due to a mismatch between macro assumptions of effective healthcare delivery and those of local institutions. Madon (2014) provides further insight into local accountability: from analyzing a health project in India, the author concludes that successful institutionalization requires one to consider how the IT artifact impacts other aspects of social life.

In various ways, the literature outlined here focuses on the interactions between macro and micro agents and suggests that local acceptance requires development projects to develop strong local accountability. This point is relevant to this research because it focuses on how actors in the local context may develop divergent goals from macro agents (e.g., policymakers or consultants). From reviewing data related to the enrolment of IT artifacts in LMICs, Chaudhuri (2012) explains that emotive and utilitarian rationales influence users' to adopt them and that IT artifacts with an emotional impact have the highest usage rates. Chaudhuri (2012) found that users are more likely to adopt mobile phones because of the emotive component of allowing users to contact distant family while they are less likely to other IT artifacts such as computers and access to the Internet due to associating them with a more utilitarian purpose. Chaudhuri's findings indicate that low-income individuals in LMICs are less likely to allocate resources to IT artifacts if they perceive that they have only utilitarian purposes.

The third stream focuses on the institutionalization process of IT artifacts. Sahay, Saebo and Braa (2013) exemplify such research: they analyze case study evidence from India and focus on an IS project's scaling over a 15-year period. They conclude that, in the project, successful institutionalization required an integrative approach of aligning organizational-political actors. Avgerou (2013) highlights the social aspects of institutionalization in a study of e-voting in Brazil. This author notes that building and maintaining legitimacy required active effort from the electoral commission, which demonstrates that institutionalization is both a technical and social process. This example indicates a positive interaction between the micro and macro actors cited as a necessary element for successful ICT4D (Hayes & Westrup, 2012). Furthermore, building the appropriate ICT infrastructure is necessary but not sufficient alone for successful institutionalization. Sahay et al. (2013) provide insights into the differences in IT enrolment between LMIC

and the developed world by indicating that the successful institutionalization process requires additional steps unnecessary in the developed world. Unfortunately, the authors do not clearly prescribe the steps and how projects can incorporate such steps to increase the likelihood of success.

Table 1 summarizes the literature on the institutionalization of IT artifacts by building on Nielsen et al.'s (2014) review of institutional literature in mainstream IS.

Table 1. Institutionalization of IT Artifact Literature

Perspective	Core idea	Representative studies in ICT4D
Institutional effect literature	Examines the effects of institutional pressures on the use of IT artifacts	Local political context impacts success of ICT4D projects (Diaz-Andrade & Urquhart, 2012). Local networks and belief systems impact the enrolment of IT artifacts in the context of health information systems (Saebo & Sahay, 2013).
Institutional interaction literature	Examines the interaction between IT artifacts and institutions	The interaction must include local accountability (Miscione, 2007). Successful enrolment requires positive interaction between micro and macro actors (Hayes & Westrup, 2012). Enrolment is emotive and not transactional (Chaudhuri, 2012) and requires one to consider the impact on other aspects of social life (Madon, 2014).
Institutional process literature	Examines the institutionalization process of IT artifacts	The institutionalization process requires intermediate steps in ICT4D contexts (Sahay et al., 2013).

2.1   The Dialectical Perspective on the Institutionalization of IT Artifacts

We adopt a dialectical framework to capture the dynamic nature of IT artifacts' institutionalization. By using such a framework, we form a view of the social world as being in a state of continual change; this world contains social structures that initially appear firm but prove more tenuous in reality (Benson, 1977). The Greek term "dialectic", derived from "dialogue" between equal partners, implies a unity of opposites. Theories that incorporate dialectical explanations for social change identify forces that both promote and oppose social change (Van de Ven & Poole, 1995; Putnam, Fairhurst, & Banghart, 2016). These theories suit our research because we identify the interplay of these forces. Although ICT4D research mostly neglects this theoretical framework, some literature in mainstream IS does draw on a dialectical account of process (e.g., Robey & Boudreau, 1999; Robey & Holmstrom, 2001), which accounts for a variety of observed outcomes. For these reasons, we adopt a dialectical approach in analyzing the dynamics of IT artifacts' institutionalization.

Seo and Creed (2002) draw on Benson's (1977) framework to understand the process underlying institutional change. This framework assesses the historically embedded nature of institutions, the dynamic contestation involved in building new institutions, and the subsequent (and necessary) deinstitutionalization of existing structures.

2.1.1   Sources of Institutional Contradiction

According to Holm (1995), institutional theory possesses the inherent contradiction of embedded stability and agency. We rely on Benson's (1977) definition of contradiction as the presence of various inconsistencies and tensions in and between existing social structures. In our case, the contradiction surrounds how agents can change institutional arrangements if their actions and worldview reside in the very institutions that they propose to alter. A potential solution to this contradiction lies in focusing on the mechanisms that facilitate institutional change or reinforce institutions.

This concept of contradiction is familiar to institutional theorists, and many concur that contradictions can lead to the development of new institutional arrangements with the new arrangements' being convergent or divergent from previous institutions (Friedland & Alford, 1991; Jepperson, 1991; Powell & DiMaggio, 1991; Scott, 2001).

Seo and Creed (2002) identify four possible sources of contradiction: efficiency, adaptability, conformity, and isomorphism:

1. Efficiency contradictions arise in circumstances when structures that provide legitimacy undermine efficiency (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). A central tenet of institutional theory is the premise that organizational success depends on factors other than technical efficiency and organizations gain legitimacy by becoming isomorphic with their

institutional environments. Institutions that establish and maintain legitimacy may produce persistent structures that undermine organizational performance.

2. Contradictions related to adaptability occur when current organizational adaptability limits future adaptability. Institutional isomorphism that increases legitimacy is an adaptive move for organizational survival, but, once institutionalized, a structure or activity persists and is maintained. Thus, organizations that operate in the same organizational field tend towards isomorphism, and, once structures are institutionalized, further adaptations may encounter resistance. Individuals come to perceive practices as "natural" and, thus, do not question them vis-a-vis alternatives. As a result, individuals' behavior, while consistent with internal norms, becomes unresponsive to changes in the external environment.

3. Contradictions related to conformity present a perspective in which organizations exist in pluralistic environments that have inconsistent prescriptions for action (Friedland & Alford 1991). The major institutions of contemporary Western society (capitalist market, the nuclear family, the bureaucratic state, liberal democracy, and Judeo-Christian religious traditions) have mutually interdependent and yet contradictory sets of material practices and symbolic constructions. These logics may contradict: for instance, capitalist markets may depend on families to minimize the costs of labor supply, but labor market practices may weaken the family system in the work/life balance. Organizations tend to incorporate incompatible practices and procedures in searching for legitimacy and stability, and this source of contradiction moves beyond the organizational field and explores the dynamic societal context, which involves multiple levels and complex elements of interconnectedness.

4. Contradictions related to isomorphism concern conflicts with divergent interests. Proponents of a dialectical perspective see institutional arrangements as the products of political struggles among various participants who have divergent interests and asymmetric power. Isomorphism is likely to reflect the needs of the most powerful interests in the relevant organizational field. Thus, the resulting institutional arrangements tend to satisfy the needs of some individuals more than others. The contradiction lies in misalignment between a particular form of social arrangement and the interests of diverse actors who enact, inhabit, and reproduce that social arrangement who may become conscious of the institutional conditions that leave their needs unmet and take action to change the present order. While institutional change requires a contradiction to emerge, change is neither deterministic nor inevitable, and making sense of the contradictions requires one to explore human praxis.

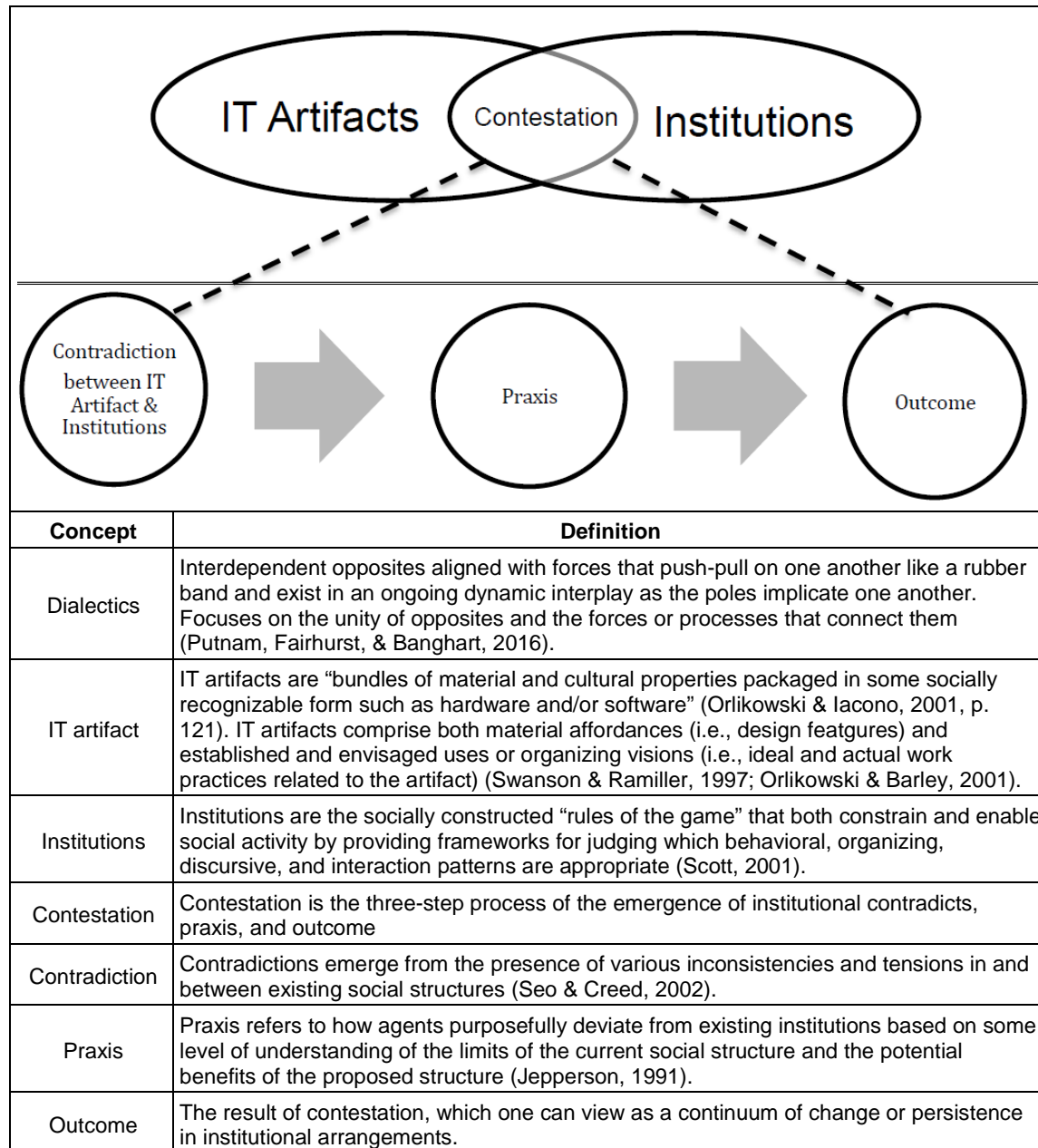### 2.1.2   Praxis as the Core Mediating Mechanism of Institutional Change

Praxis describes the attempt to alter social arrangements by acting in a way contrary to the existing social order. We define contestation in our theoretical framework as the combination of three elements—contradiction, praxis, and outcome—and this process unleashes the forces of opposition to institutionalized structures (Cho, Mathiassen & Robey, 2007).

According to Seo and Creed (2002), institutional change is the outcome of institutional contradictions and human praxis. Further the concept of human praxis is based on the assumption that humans possess a degree of autonomy from the institutions in which they reside (Benson, 1977) consistent with DiMaggio and Powell's (1983) idea of loose coupling. However, a question remains about how praxis takes place or the conditions that cause individuals to take action. Seo and Creed (2002) suggest that the likelihood of praxis increases as an actor's social experience is continually confronted by ever increasing tensions that emerge from contradictions both within and across institutions with the agents transforming from a passive role to a more active one. Praxis requires institutional entrepreneurs (DiMaggio & Powell, 1983) who artfully mobilize different institutional contradictions to actively participate in reconstructing the institution (Friedland & Alford, 1991) in order to serve their own interests. In short, institutional change requires human agency, which, in turn, relies on growing institutional contradictions to trigger such human action.

2.2   Theoretical Framework

Table 2 illustrates the theoretical framework that we use to explore the empirical data. The concentric circles represent the IT artifacts and institutions respectively; the overlap illustrates the areas of contestation. The lower part of the diagram zooms in on what occurs during the contestation, which comprises three distinct stages: the emergence of a contradiction between the IT artifact and the local institutions, the engagement of praxis, and an outcome that reflects how actors resolved the contestation.

Table 2. Theoretical Framework

Concept	Definition
Dialectics	Interdependent opposites aligned with forces that push-pull on one another like a rubber band and exist in an ongoing dynamic interplay as the poles implicate one another. Focuses on the unity of opposites and the forces or processes that connect them (Putnam, Fairhurst, & Banghart, 2016).
IT artifact	IT artifacts are "bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software" (Orlikowski & Iacono, 2001, p. 121). IT artifacts comprise both material affordances (i.e., design featgures) and established and envisaged uses or organizing visions (i.e., ideal and actual work practices related to the artifact) (Swanson & Ramiller, 1997; Orlikowski & Barley, 2001).
Institutions	Institutions are the socially constructed "rules of the game" that both constrain and enable social activity by providing frameworks for judging which behavioral, organizing, discursive, and interaction patterns are appropriate (Scott, 2001).
Contestation	Contestation is the three-step process of the emergence of institutional contradicts, praxis, and outcome
Contradiction	Contradictions emerge from the presence of various inconsistencies and tensions in and between existing social structures (Seo & Creed, 2002).
Praxis	Praxis refers to how agents purposefully deviate from existing institutions based on some level of understanding of the limits of the current social structure and the potential benefits of the proposed structure (Jepperson, 1991).
Outcome	The result of contestation, which one can view as a continuum of change or persistence in institutional arrangements.

3   Methodology

In this section, we present the methodology we used in our research. Specifically, in Section 3.1, we discuss the research design; in Section 3.2, we detail our data-collection methods; and, in Section 3.2, we review the data-analysis techniques that we employed.

3.1   Research Design

We drew on Walsham's (1995, 2006) interpretivist case study methods, which advocate that the perception of reality is a social construct and that individuals form meaning via inter-subjectivity (Klein and Myers, 1999). To conduct our research, we took an inductive approach by using interviews and observational data and reviewing archival evidence to better understand how informants interpreted their context and how that influenced their behavior (Berger & Luckman, 1966).

3.2   Data Collection

We faced the challenge of developing a deep understanding of how and why informants used IT artifacts or not and how they made sense of IT artifacts in their personal and business operations. To collect data, we combined three approaches: semi-structured interviews, observations, and a review of archival data. Table 3 summarizes our data-collection methods. We collected evidence in two phases and interviewed 58 different informants in total. In phase one, we interviewed 34 informants in January, 2010; in phase two, we interviewed 24 informants in July, 2012. We conducted the interviews with insight from Myers and Newman's (2007) guidelines, and we adopted a snowball strategy to select informants, which, according to Bryman and Bell (2007), is an appropriate strategy when sampling requires inside information. Snowball sampling involves identifying informants and asking them to identify other possible informants (Atkinson & Flint, 2001). In doing so, it relies on using existing social networks and, thus, allows researchers to make "warm calls" rather than "cold calls" when recruiting potential research participants. While the snowball strategy runs counter to many traditional assumptions inherent in random sampling, it has clear advantages when researching vulnerable and hard-to-reach populations (Atkinson & Flint, 2001). MSEs operating in the informal sector are typically difficult to identify due to a lack of formal government registration, operations that are commonly located in domestic households, and firms and individuals that tend to move in and out of the sector (Duncombe, 2006); by employing a snowball strategy, we could better overcome some of these challenges. The sampling began with one of the researchers who drew on twenty years of work experience in the sector to identify the initial contacts. The researcher then asked these contacts to identify and introduce him to other MSEs that were "entrepreneurial", designing new products, and not solely relying on pirated designs. Such an approach concurs with the literature, which identifies that institutional entrepreneurs are the agents that develop new social structures (Powell & DiMaggio, 1991). Furthermore, the approach ultimately proved successful in this case: all but one of the MSEs we contacted agreed to participate in the study.

Table 3. Data Collection

What?	How?
Interviews	We conducted a total of 58 semi-structured interviews. We used eight initial open questions to guide the interviews, and the interviews all lasted between 30 and 60 minutes. We conducted the interviews in participants' homes or workshops. We digitally recorded the interviews and had them professionally transcribed and translated. We selected the informants using a snowball strategy. We collected the participants' demographic information in phase one to ensure that the sample represented (in income) the general population.
Observation	After the interviews, we spent two to six hours observing participants' behavior. During the observation phase, we also asked follow-up questions if the behavior we observed required further explanation. Specifically, we observed: 1) the interactions between informants and other members of the MSEs and 2) the interaction between informants and their suppliers/customers. During the observations, we made a note of the context including relevant symbolism and the structure of the interaction.
Review of archival data	After the observation phase, we asked informants who had reported using IT artifacts to provide evidence that they had done so, which included business-related emails, websites, or digital catalogs. The Hawthorne effect proposes that people behave differently when someone observes them and that they may try to please a researcher (Myers, 2013), which can lead to a tendency in informants to provide the answers that they believe the interviewer wants to hear. For example, a number of informants stated that they had websites and digital catalogs or corresponded via email. Mindful of the need not to offend informants, we took care in making subsequent requests for archival data. For example, an informant may have indicated that they had created a digital catalog for their jewelry but, when asked to present the evidence, stated that the computer was not currently working. In such situations, we did not pursue the issue.

The data-collection technique we chose to gather the observational empirical data drew on the techniques of ethnographic field research (Myers, 2013). Fieldwork in qualitative research focuses on gathering data in situ or on creating a natural setting so that researchers become personally immersed in the context in order to gain some a level of understanding of the ongoing social activity they observe (Wolcott, 2005).

We considered how we designed our data collection methods carefully in order to ensure that we adequately examined the historical, political, and economic institutions that frame the social construct, meanings, and shared understandings present in the sector (Klein & Myers, 1999). In addition, by adopting a semi-structured interview format, we successfully elicited rich data from informants in the form of stories. They spoke at length about their ambitions for their MSEs, their struggles in making a living,

and their dreams for a better future for their children, all of which provided deep insights and a rich data set regarding the context and the role of IT artifacts in the business operations. In addition to our observations, we were sometimes invited to help in the workshop making jewelry or to share drinks or eat a meal with the MSE owners and their families. These interactions led to many relevant informal conversations, which we wrote up as notes as soon as possible afterwards.

Our research focuses on handicraft production given its prevalence as a form of income generation activity amongst indigenous communities and its importance to international aid agencies as a mechanism to lift the poorest people out of poverty (Blue, 2006; UNCTAD, 2003). According to the World Bank (2012), some 52 percent of the Mexican population lives below the poverty line, while poverty rates in Guerrero (the location we examined) range from 65-80 percent (US State Department, 2014). We selected the silver handicraft market, which comprises about two thousand MSEs, in order to capitalize on the twenty years of professional experience in the sector of one of the authors. Table 4 applies the Mexican Association of Market Research and Public Opinion's seven-point scale (Asociacion Mexicana de Agencias de Investigacion de Mercados y Opinion Publica, 2007) to categorize income of the MSEs. Based on this scale, we can see that we can categorize 57 out of our 58 informants as either extremely poor or very poor. We deemed a total of 40 (or 69 percent) to be extremely poor because their income placed them at the lowest point on the scale and 17 (or 29 percent) as very poor because their income placed them in the second to lowest point on the scale. One informant declined to answer the question about monthly income. The MSEs averaged 4.2 workers (including family members). While some had as many as ten employees, the typical enterprise comprised a husband, wife, and children. These findings confirm that we captured MSEs at the lowest socio-economic levels in Mexican society and did not inadvertently survey the middlemen and wholesalers in the sector.

Table 4. Categorized Income of Informants

Socio-economic level	Monthly income (USD)	Informants
A/B	Over $5,667	0
C+	$2,334-$5,666	0
C	$744-$2,333	0
D+	$453-$773	0
D	$180-$452	10
E	$0-$179	23
Declined to answer		1

When collecting data, we also explored ownership of ICT tools in the sector. Our participants had nearly universal access to mobile phones: all but one informant owned one. Further, 18 of 34 (53%) had computers at home, while 30 percent of the informants had an email account. Appendix A provides other results from the data-collection exercise.

3.3   Data Analysis

In analyzing the data, we focused on understanding the meaning that informants attached to IT artifacts. We used an iterative process that intertwined the empirical data from both phases of data collection. Consistent with Myers (2013), themes from the preliminary data analysis informed the subsequent data collection; our analytical strategy emerged from the interviews and observations and also involved thematic analysis to ensure we could identify patterns and recurring themes across multiple data sets (Bryman & Bell, 2007).

To develop the themes, we related the data to relevant theory to help explain the phenomena. In this approach to data analysis, the theorization and thematic analysis are closely linked. To perform the thematic analysis, we chose a word or short phrase to summarize the data and placed the data into that emergent theme or silo. This process allowed for flexibility in categorizing and re-categorizing the emergent themes. As we developed themes, we presented our work at conferences to initiate a public discussion and expose the themes to a broader audience to obtain as much feedback as possible. In doing so, we followed Walsham's (2006) suggestion that one should interpret research findings through the minds of others.

For this paper, we re-organized the data into themes, and we constantly compared data from interviews and observations with one another and with literature on Mexican institutions. Subsequently, we re-examined the data using the Seo and Creed (2002) framework concepts of contradiction, praxis, and

outcome to devise vignettes that best illustrated the competing worldviews of IT artifacts. We define a vignette as a focused description of a series of events that represents the case that one studies (Miles, 1990). We used vignettes to effectively illustrate key practices or details relevant to case research (Kotlasky, Scarbrough & Oshri, 2014). After re-examining the data, we identified three suitable vignettes that characterized the institutional dynamics in the case and that illustrated the inherent contradictions and praxis well. The conceptualization we propose in this paper slowly emerged based on these gradually refined theories, feedback from reviewers, and our continual review of the institutional theory literature. This overall approach concurs with other qualitative interpretive case studies in the IS field (e.g., Vaast & Walsham, 2005; Walsham, 1995, 2006).

4   Findings and Analysis

In this section, we describe and analyze the case and, in doing so, examine three vignettes that we analyzed using the theoretical framework in Table 2 to explain IT artifacts' institutionalization. The vignettes focus on: 1) the entropy found in the ordering process, 2) the experiences of a thwarted entrepreneur, and 3) the implications of prevalence of piracy.

We conducted the case study in the Taxco handicraft market in the state of Guerrero, a five-hour drive from the southwest of Mexico City. The Saturday market, which comprised over 2,000 stalls owned and run by the respective MSEs, constituted the primary means for jewelry designers and manufacturers to sell their goods. The market resided around the town's central bus station with stalls set up in school playgrounds, on pavements, in parking lots, and on private property that surrounded the bus station. The market stalls were particularly basic: they each ran side by side and all looked similar (e.g., they comprised tables covered in cloth with the handmade jewelry on top in rows). Some vendors had formed "sindicatos" or commercial trade associations that negotiated with owners of suitable property for weekly tariffs, while others rented their stalls from the municipal government. The poorest sellers did not rent a space in the market and instead walked around trying to find customers while avoiding the local police.

Mexico features significant poverty and according to the World Bank (2012), some 52 percent of the Mexican population lives below the poverty line, and 18 percent live in severe poverty (OECD, 2007). Against this backdrop, the Mexican Government, as part of its MDG commitment, has embarked on an extensive ICT training program known as e-Mexico to reduce the digital divide and lift indigenous communities out of poverty by making markets work better for poorer people (Mexican Ministry of Communications and Transportation, 2012). A key program objective focused on increasing how many MSEs use ICT (Mariscal, Gil-Garcia, & Aldama-Nalda, 2011).

4.1   Vignette One: Entropy in the Ordering Process

Our observations of the transactions that occurred between MSEs and their suppliers revealed that individuals from both groups collectively spent a lot of time waiting—whether waiting to place orders or waiting for orders to be ready. Even though all MSEs possessed IT artifacts (e.g., mobile phones) that offered the means to challenge this apparent inefficiency by streamlining and speeding up the ordering process, the institutionalized rituals of in-person visits by suppliers to clients (accompanied by an inevitable period of waiting) endured. For example, while we were observing informant 35, one of the suppliers arrived. Informant 35 made the supplier wait for 10-15 minutes before speaking with him despite not doing anything to justify such a delay. When informant 35 finally went to the door to meet with the supplier, they spent approximately 30 minutes talking. They exchanged pleasantries, asked about each other's families, and commented on the weather. After about 30 minutes had elapsed, the supplier asked if the informant needed any supplies, and informant 35 then spoke about how slow business was before placing an order for some items necessary to produce jewelry. The supplier left while promising to deliver the order in a couple of days.

When the conversation finished, we asked informant 35 where the supplier was going. The informant responded that the supplier was probably going around town to get more orders. A short while later, the informant left the property and went across town to visit a customer (a retail shop). The ritual repeated itself, but this time informant 35 had to wait in the lobby for 10-15 minutes after which the informant and the customer spoke for some 15-20 minutes about everything except the business transaction. Towards the end of the conversation, informant 35 asked if the customer needed any products. After a short discussion on this matter, the customer placed a small order, which informant 35 promised to deliver in a few days. Informant 35 then went to another store and the ritual once again repeated.

Our findings appear consistent with research that has discovered that business relationships in Mexico often rely on personal friendships (Grosse, 2001). The institution of "confianza" refers to one of mutual trust and is associated with fairness and honesty (Felix-Brasdefer, 2008). Confianza functions as "a psychosocial network" to allow exchanges to occur in the informal sector (Lomitz, 1988, p. 45). Nevertheless, these findings appear to contain a crucial inconsistency. If the informant and supplier described above were friends, why could they not simply use IT artifacts (e.g., their mobile phones) to conduct business? Doing so would allow them to engage in a personal conversation prior to placing an order while still enabling them to develop a more efficient mobile phone-based ordering system in a new social structure. The inability to develop such a new social structure indicates the innate contradictions present in existing institutions. Seo and Creed (2002), in commenting on institutional isomorphism, note that initial adaption increases legitimacy, which the ritualized waiting in the ordering process that focuses on ensuring ensure trust exemplifies. This social structure has subsequently made further adaption less likely because individuals afford legitimacy greater importance than efficiency. It seems apparent that the artisans all possess the necessary IT artifacts to improve the efficiency of the ordering process but cannot adapt their behavior to incorporate them into the ordering process; they remain wedded to the ritualized waiting that pervades the sector. The contradiction involves the institution of confianza and the efficiency potential that IT artifacts offer. The legitimacy-building process contradicts the need to use IT artifacts and personal site visits, and waiting rituals fulfill another, more opaque purpose. When analyzing the institution of confianza in more detail, one can interpret existing social arrangements in which trust is not a constant and individuals need to reaffirm it, which the ritualized process of building enough trust to conduct a single transaction illustrates. By definition, the informal sector operates outside of the formal regulatory system for contract enforcement, and, thus, in the handicraft sector, MSEs use these time-consuming confianza waiting exercises to build trust. Confianza does not describe trust in someone to always do the right thing but instead refers to a level of trust that a supplier will not betray them. Confianza requires a degree of certainty that a supplier will not act opportunistically (e.g., by stealing a deposit or providing low-quality products). However, confianza does not indicate the constant presence of trust; rather, it indicates an absence of distrust, which would serve to disqualify any supplier from involvement in the MSEs' business.

Using this explanation, we can understand the long conversations and waiting that we observed as a process designed to ensure continued confianza. An agent who is anxious to secure an order, illustrated by an unwillingness to wait or engage in small talk, would signal a need for money and, therefore, be assumed to pose a higher risk of theft. Therefore, agents must continually establish and maintain confianza via a willingness to wait and engage in long conversations about personal matters. An agent who has achieved confianza is said to be "muy simpatico" or very sympathetic (Grosse, 2001). In the context of weak regulatory institutions, individuals sanction others who lack confianza by repeatedly refusing to conduct business with them. The long personal conversations we observed serve to mitigate the risk associated with any transactions.

While our findings concur with those of other researchers in that they confirm that Mexicans are more relational in their business dealings (Crouch, 2004; Fox, 2005), our research demonstrates that relationships built up through confianza may only remain valid for one transaction because the process of buying jewelry involves coordinating the purchase through many MSEs. Enrolment of IT artifacts requires a level of trust that does not currently consistently exist in the institution of confianza. It appears that the sectoral adaption to low levels of trust has helped to develop the institution of confianza, which then enables MSEs to conduct business. However, such an adaption hinders the necessary adaptability required for the enrolment of IT artifacts because the institution of confianza has proved resilient to replacing its enduring and more traditional institutionalized trust-building mechanisms.

4.2   Vignette Two: The Thwarted Entrepreneur

This vignette tells the story of informant 58 and how institutional contestation thwarted his attempts to stimulate the enrolment of IT artifacts in the form of online consolidation of orders. This vignette also juxtaposes the institutional logics of the government's neo-liberal assumptions about the benefits of IT artifacts established in "e-Mexico" as part of the mechanism for meeting their MDG, which focus on improving market opportunities for poorer people via IT artifacts (Mariscal et al., 2011). We identified one MSE who attended a training program linked to e-Mexico and subsequently attempted to incorporate this increased knowledge about the use of IT artifacts to help MSEs increase their sales. The ICT training programs for MSEs focused on helping them to improve their revenue (Mexican Ministry of Communications and Transportation, 2012) based on the capitalist logic that individuals seek to optimize their own individual gain. Informant 58 mentioned that the course curriculum had focused on how

participants could increase their income by providing better services to clients by using IT artifacts. Informant 58 had attended one such government ICT training course and subsequently attempted to become a "middleman" or broker between clients and suppliers in the Taxco sector. The informant sought, consistent with the e-Mexico training, to use the Internet to improve the ordering process for customers in New York, USA. To be successful, other MSEs who sold to that customer had to agree to let this MSE act to consolidate and ship the orders to New York on their behalf.

Under the institutions at the time, all MSEs generated their income from what they could sell. Typically, MSEs set up a table at the Saturday market that displayed their products and then waited patiently for customers to arrive to buy their goods. The IT artifact that informant 58 attempted to pilot would have allowed their New York based client to buy from multiple MSEs and reduced their search and travel costs. The artifact also offered a consolidation service to the client that would collect orders from various MSEs in the sector and ship multiple products to New York in one order. The use of this IT artifact would potentially have saved the client both time and money by enabling re-ordering online rather than physically travelling to Mexico as well as economies of scale and reduced transport costs. The MSEs would collectively benefit from the increased frequency of orders likely to result from a decrease in the cost of the ordering process and an increase in the total aggregate of goods ordered. Informant 58's proposed strategy concurs with many of the benefits attributed to online ecommerce. The small size of MSEs means that no individual supplier has enough variety of products to ship separately and thus no artisans were engaging in international shipping. An important part of the arrangement was that in order to take advantage of the on-line ordering the suppliers must group together their products to justify the cost of international shipping.

Initially, the other MSEs agreed to participate in the new structure and supplied their respective products successfully the first time the client placed an order. However, when the client placed a second order, these same MSEs reneged on their agreements. Informant 58 explained:

> *Something inexplicable happened, maybe they're idiosyncratic, sometimes they prefer selling their merchandise to a wholesaler that doesn't treat them as well [as I do] and they left me hanging. I was selling that merchandise but for a strange reason once I started to ask for more they would stop supplying me and I would look bad in front of the client.*

This quote succinctly illustrates what Seo and Creed (2002) identify as adaptation, which undermines future adaptability. We may explain the reneging in this case by the contradiction in enduring institutional arrangements ("caciquismo" and "egoismo") formed by political struggles, divergent interests, and asymmetric power.

Caciquismo describes the local patronage networks that exist in rural Mexico (Villarreal, 2002) as based on over 500 years of elite capture, which has institutionalized a sense of betrayal among the poorest people (Howell et al., 2007). Mexican society deeply embeds notions of the elite's exploiting the lower classes, and various researchers have identified the difficulty of conducting business in the country (Clifton, 2000; Oppenheimer, 1996) due in part to institutionalized elite capture (caciquismo) in which political connections help determine economic success; indeed, betrayal is a common feature of Mexican social life (Foster, 1965). Weak regulatory institutions allow the politically connected to gain economic benefit; Riding (1985) asserts that many Mexicans resent the abuse of power by those in authority but readily admit that they too would take advantage of the benefits of power if they had the opportunity.

Egoismo refers to behavior that has the ultimate purpose of furthering one's self-interest (Shaver, 1999). In Mexican peasant societies, individuals view a belief in self-importance and egoism as a social ill (Aguilar, 1984) because pursuing individual interests runs counter to the institution of "el pueblo". However, the literature on Mexican peasant communities complicates this assumption because research believes individuals to consider the impact of their behavioral decisions on the broader community (Aguilar, 1984; Lewis, 1963). These communities view egoismo extremely negatively, and individuals who brag about their successes are subject to ridicule (Aguilar, 1984). According to Guardino (1996), in the 19th century, acting in response to the loss of socio-economic and political influence in the newly emerging Mexican state, indigenous communities began to develop their own concept of community responsibility, which provided the third institution at play in this vignette: el pueblo. Guardino (1996) describes how the newly independent Mexican nation centralized power at the expense of the semi-autonomy of indigenous communities that was a feature of Spanish rule. These communities responded by developing the concept of el pueblo (literally translated as "the community" or "the Mexican people"). They created this structure to create solidarity against newly established ruling elites, who they believed betrayed the interests of el pueblo for personal gain. The relatively recent introduction of neo-liberal models of development has generated a renewed activism by these indigenous communities since they

once again perceive the state as betraying el pueblo for the benefit of the few (Desmarais, 2010). Mexican identity is embedded with a culture of honor (Najera-Ramirez, 1994), and the institution of el pueblo is a sociocultural construction that represents such honorable behavior towards others in direct contrast to the exploitation implicit in caciquismo, and, thus, this pluralistic institutional environment is imbued with inconsistent prescriptions for action. Several researchers have also highlighted a paradox in Mexican society where individuals do not perceive their own opportunistic behavior as contradictory to their own sense of honor and trustworthiness (Guerrero & Rodriguez-Oreggia, 2008). Thus, we see a contradiction of pluralistic institutional environments imbued with inconsistent prescriptions for action.

The MSEs' refused to participate with informant 58's attempt to introduce a new structure, which we can explain as a deliberate strategy to prevent caciquismo that arises as a result of the IT artifact. We can explain their praxis in the form of reneging behavior as a response to the contradiction caused by the attempted introduction of a new structure that held the potential to alter the relative balance of power of the artisans. The praxis of the MSEs in reneging is based on the misaligned interests of potential change agents, and informant 58's quotation powerfully illustrates his frustration and belief that he was behaving honorably towards el pueblo. We found no evidence that the MSEs actively coordinated their non-compliance; instead, they appeared to do so individually due to their institutional beliefs about informant 58's egoismo.

Informant 58 believed he was piloting a new social structure that was aligned with the institutions of el pueblo and the concomitant requirement to look after the community. We may explain the resulting contradiction as one of misaligned interest because, while the individual concerned believed that his behavior was consistent with the institution of el pueblo, the other MSEs relied on the institutions of caciquismo and egoismo to resist enrolment and believed that the IT artifact formed the basis for negative potential changes in the relative balance of power. Other MSEs perceived informant 58's behavior not as supporting el pueblo but rather as an attempt to become a "caciquista" by gaining power through his role as consolidator. While all MSEs may have desired increased sales, they would not allow any one individual to become a "caqui" via applying egoistic behavior.

Informant 58 was puzzled and frustrated by other MSEs' refusing to support the IT artifact designed as it was in his perspective to help increase sales for all involved. However, despite this other MSEs responded to the second client order by refusing to supply their products. The subsequent reluctance of individual MSEs resided in norms against egoistic behavior. Thus, institutional norms against egoismo and vigilance against caciquismo prevented the informant from enrolling IT artifacts designed to improve organizational performance; instead, they illustrate that capitalist logic contradicted with the multiple institutionalized logics present in the Taxco silver handicraft sector.

4.3   Vignette Three: The Prevalence of Piracy

This vignette highlights how the conformity to the institutions of "fatalismo" impacted the institutionalization of IT artifacts. In Mexico, fatalismo (fatalism) refers to the general acceptance that economic, social, and political advancement is not based on merit but instead relies on a higher force (Pick & Sirkin, 2010). Researchers have long identified fatalismo as a problem that has an impact at all socio-economic levels in Mexican society (Lewis, 1963). Indeed, recent research has confirmed that the power of fatalismo continues to prevail. A general acceptance of "the way things are" becomes an obstacle to autonomous decision making even when the current situation negatively impacts on the individual (Pick & Sirkin, 2010). Paradoxically, other researchers have found that Mexicans readily admit that they too would take advantage of others if the opportunity arose (Riding, 1985), with Paz (1985) and have asserted that fatalismo gives Mexicans only two choices in life: to become the "chingon" (the male that betrays others) or the "la chingada" (the female that is betrayed). The chingon is associated with machismo,and gains power and prestige in Mexican society by "chingando" (betraying) others (Cypess, 1991).

Participants in our research were pessimistic about the role of IT artifacts in relation to piracy, which the following statements illustrate:

> *I do not email [my clients] photos of the designs.* (Informant 50)

> *I do not use technology, I know what they [customers] like and remember my customers [and the products they order].* (Informant 46)

> *If I place my designs [on the Web] they will get copied.* (Informant 38)

> *I am distrustful of uploading my designs on the Internet, I don't upload.* (Informant 44)

The presence and enduring nature of the institution of fatalismo has socialized the artisans in the handicraft sector into believing that success or failure is not in their hands: "Sometimes I sell a lot and other times others sell more" (informant 37). The institution of fatalism stands in contrast to the capitalist logic that individuals have their fate much in their own hands as evidenced by the assumptions contained in the diffusion of innovation theory (Rogers, 1962) in which early adopters and innovators embrace IT artifacts in order to gain competitive advantage. Overall, our research evidences that, overall, Mexicans do not believe that they are in control of their own fate but that fatalismo determines their destiny. In the handicraft sector that we explored, we found widespread pessimistic belief that customers, if given the opportunity, will betray them by finding another MSE to pirate the design in question and make it more cheaply; as a result, the sector contains high levels of opportunism.

In the institution of fatalismo, we identified a further contradiction related to the trust required for individuals to successfully enroll IT artifacts designed to improve organizational performance. The source of this contestation comes from a basic conflict between conformity with the institution of fatalismo and the assumptions embedded in IT artifacts regarding autonomy, which shape patterns of thought about how the development of IT artifacts will benefit the sector. As we discuss above, the Mexican belief in fatalismo assumes that all are doomed to betrayal. The contestation highlights the differences in assumptions related to social interactions result that individuals identifying as both a chingon (betrayer) and chingada (betrayed). Individuals partially form these identities through the institutions of caciquismo, and if they have political connections they are able to secure the best-selling locations from the government. However, fatalismo involves more than elite capture alone: our findings indicate fatalismo it is actually a three-step process that undermines the development of IT artifacts.

In the first step of the process, individuals view their own behavior as honorable, although they do not attribute such a belief to others nor do others reciprocate it as our interview with informant 35 illustrates in which he stated that: "I treat my employees honestly, always, always, always!".

In the second step, individuals often expect others to behave dishonorably (chingon). Once again, our findings indicate that they believe they act reputably: "My prices are just, others have prices that are too low" (Informant 35).

Finally, the conformity with institutions of fatalismo dictates that, as individuals, they must chingar (betray) before they become the chingada (the betrayed). When referring to others who operate in the sector, informants often viewed the behavior of others as unjust and that this perceived injustice legitimized their own behavior: "There are items that everyone has [manufactures] so you defend yourself by offering it cheaper" (informant 48).

Relationships in the supplier support network were clearly adversarial: our findings show that artisans commonly believed that their input suppliers were cheating them:

> [In] the diamond cutting there is a silver loss of .3 grams [per gram] that we lose and the diamond cutter gains. (Informant 50)

> The pendant supplier is ripping me off. (Informant 35)

A consistent feature of the sector is a high level of design piracy, which Stromberg-Pellizi (1993) has also previously noted. A casual observer who strolled through the Taxco handicraft market would invariably notice a multitude of duplicated products. In our two data-collection phases, almost all informants admitted to pirating designs, although they invariably placed the responsibility for piracy on another agent. This adversarial position contributed to the high levels of resistance that individuals expressed toward using any IT artifact for business purposes since they felt that using these tools would risk exposing them to higher levels of piracy from both customers and competitors. As informant 37 said: "Yes, I copy [pirate] designs, sometimes a customer brings me a piece from somewhere else and I make it".

When examining the praxis using the Seo and Creed (2002) framework, we identified that the misaligned interests of potential change agents run counter to deeply embedded beliefs of fatalismo. MSEs had not attempted to adopt IT artifacts because they believed it would enable their customers and suppliers to more easily pirate their designs. While a casual observer can easily see that the sector contained high levels of piracy, informants appeared unwilling to assume any responsibility for the low levels of property rights because they admitted their own role in piracy only after another MSE positioned piracy as something they do, which is consistent with the paradox of Mexican society that MSEs are both a chingon (betrayer) and the chingada (betrayed).

5 Discussion and Conclusion

Our case highlights some of the challenges of institutionalization of IT artifacts. Specifically, we explore the dialectics in and between institutions and understanding the process of how and under which circumstances IT artifacts fail to be institutionalized furthers our understanding of the challenges of using ICT4D as a means to further human development. Our case illustrates the contradictions between assumptions embedded in IT artifacts and their interplay with local institutional structures.

In various ways, the vignettes explain how heterogeneous actors through praxis resolve contradictions. Concurring with Lawrence et al. (2011), our analysis demonstrates the value of abandoning the notion of techno-centric solutions to ICT4D (Avgerou, 2010; Fonseca, 2010) and suggests instead the need to focus on local social structures and the actors that populate them. A failure to institutionalize IT artifacts does not involve technical deficiency or financial viability but institutional permissibility. As such, one needs to examine various actors more closely to fully understand them and the context in which they live.

In this section, we explain the contestation that occurs when IT artifacts are introduced into an organizational field. Specifically, we discuss IT artifacts and local institutions in relation to two themes: how 1) institutional incompatibility and 2) collective agency limit institutionalization.

5.1 Institutional Incompatibility Limits Institutionalization

Dialectics provides a theoretical framework to examine the contested process when new institutional structures are introduced into an organizational field. Our case demonstrates through vignettes one and three how, at times, institutional incompatibility between IT artifact and local institutions limit institutionalization. The use of institutional theory provides a valuable historical context of how local institutions have developed certain practices to ensure organizational legitimacy and survival. Further, the case identifies how institutions endure and unpacks the contradictions with the IT artifacts.

The first vignette focuses on the entropy present in the ordering process through which we identified contradictions between institutions, IT artifacts, and confianza. We found efficiency contradictions in the form of ritualized personal conversations that represent adaptations to build legitimacy: the ordering process has been historically institutionalized as a time-consuming process designed to build rapport and confidence between agents to facilitate a single transaction. This lengthy face-to-face ritual contradicts Neo-liberal assumptions embedded in IT artifacts (e.g., such as by providing MSEs with mobile phones to call suppliers, which would substantially reduce the amount of time they spend travelling around the town to place orders). This dialectic played out in the form of contestation and failure to institutionalize. Institutional conformity embedded in the trust-building institution of confianza in the informal sector contradicted the efficiency logic of IT artifacts. The contradiction between IT artifact and locally embedded belief systems persisted because the situation lacked any potential change agents and the required reflective shifts in how agents perceived the benefits of adopting IT artifacts to the ordering process. As a result, actors did not mobilize for institutional change but collectively mobilized against it and the enrolment of IT artifacts.

The third vignette shows the prevalence of piracy and demonstrates the contradiction between institutions; namely, the promise of improved efficiency embedded in the IT artifact and conformity with the institution of fatalismo. For, while IT artifacts in LMIC are introduced to help individuals based on the premise that they provide data-storage, communication, and other benefits the benefits gained from efficiencies in data storage and communications inter alia the prevalence of piracy results in minimal effort from artisans in the implementation of such IT artifacts. MSEs cynically believe that adopting IT artifacts, such as emailing digital images to clients, will not improve their income but will instead enable their customers to use these images to find other artisans who will undertake similar work for less money. This cynicism pervades IT artifacts, which MSEs do not welcome as institutions that will improve their human development but, on the contrary, that will further erode their meager incomes.

Our findings challenge Chaudhuri's (2012) contention that emotive factors have a more generalized role in enrollment of IT artifacts than utilitarian factors. Instead, we provide a perspective of institutionalization involving the interplay between multiple contradictions in which the ensuing contestation does not predetermine outcome. Thus, we avoid any deterministic claim of any one institutional feature's taking precedence when IT artifacts are introduced.

5.2   Collective Agency Limits Institutionalization

The e-Mexico initiative has had only limited success in convincing MSEs in the informal sector to enroll IT artifacts (Mariscal et al., 2011). In the second vignette of the thwarted entrepreneur, we discern contradictions between the capitalist logic of the e-Mexico training and the institution of el pueblo. We identify how plans to implement consolidated ordering gave MSEs the possibility to economically develop the Taxco handicraft market by increasing the frequency of orders. However, the contradictions with local institutions that assume exploitation from external agents inhibited enrolment of the IT artifact. While the thwarted entrepreneur pursued the capitalist logic in introducing the IT artifact, other actors did not interpret these efforts as praxis designed for the benefit of el pueblo but as self-serving behavior (egoism). From this, we can identify a complex interplay of contradictions from various actors as to what it means to adhere to the institution of el pueblo. When examining the materials produced as part of the government-training program, we identified various assumptions embedded in the curriculum, which included a focus on the need for entrepreneurs to take the lead on implementation. Consistent with the critique of the "hero narrative" of institutional entrepreneurship (Dorado, 2005), our analysis indicates that the thwarted entrepreneur could not single-handedly implement IT artifacts in the organizational field. While we found only one example of the rise of a potential change agent, this isolated shift resulted in sectoral mobilization and collective action against the implementation of the IT artifact. The findings highlight the importance of interactions between actors in the organizational field and move beyond simple assumptions that institutional entrepreneurs will emerge to lead individuals to enroll IT artifacts. This finding concurs with Lawrence et al.'s (2011) assertion about the importance of distributed agency and allows one to understand agency as a complex process that results from different and often contradictory institutional pressures. This approach identifies the challenges that actors in ICT4D face, which the case of the thwarted entrepreneur in particular shows. In this example, other MSEs who operated in the sector viewed the attempted implementation of the IT artifact as yet another example of caciquismo (external agent of exploitation).

5.3   Conclusion

In this paper, we analyze the contestation between IT artifacts and local institutions in depth. Through our analysis, we identify how the institutionalization of IT artifacts conflicts with institutional structures by drawing on Seo and Creed's (2002) dialectical framework. In doing so, we identify the sources of contestation and examine how, through praxis, individuals resolve these issues. By using an institutional framework, we explain the importance of historically institutionalized structures. Our findings indicate that the institutionalization of IT artifacts is a conflicted process in which new institutions attempt to impose new social structures. Through our analysis, we illustrate how actors make sense of these new IT artifacts and respond collectively to prevent institutionalization. We argue how these actors do so contributes to the human-centered perspective of development (Sein & Harindranath, 2004), which researchers often associate with Amartya Sen's capability approach (2001). We ground our institutional analysis in a development context aligned with Acemoglu and Robinson's (2013) macro "view from above" of the role of extractive and inclusive institutions on development. Zooming out on this macro level of analysis presents the role of extractive institutions in the vignettes—in particular the lack of legal enforcement of contracts and property rights in Mexico. In our dialectical analysis, we go further by unpacking the "rules of engagement" in the interplay between institutions and IT artifacts. Zooming in provides a "view from below" as the three vignettes show and highlights in detail the nature and effect of Mexican extractive institutions on ICT4D. This "view from below" contributes to human-centered approaches to development that ICT4D research and practice have embraced due to their emphasis on realizing individual potential with people at the center of the development process whether economically, environmentally, socially, or politically (Bass et al., 2013). When considering an operationalization of this perspective, our dialectical analysis provides a framework for examining the multiple perspectives of "what IT represents" for intended beneficiaries, illustrates how the structures interplay with agency, and the praxis that influences development outcomes.

This research makes two key theoretical contributions. Firstly, senior scholars have previously identified prominent gaps in theorizing the context of ICT4D (Avgerou, 2010; Walsham, 2013). In response, we contribute a novel dialectical theoretical framework to the literature that considers the institutionalization of IT artifacts in the informal sector. We do so by extending Seo and Creed's (2002) framework into the ICT4D research discourse. The combination of dialectics and institutional theory in Seo and Creed's analytical frame is pertinent to making sense of the effects of competing interpretations of IT artifacts and offers a framework to practically unpack "what ICT represents" (Sein & Harindranath, 2004, p.19) and the resultant contradictions and praxis.

Secondly, we build on the institutional discourse literature by building on Abrahamson (1996), which Diaz-Andrade and Urquhart (2012) further developed into the concept of a "modernity bias". Embedded in IT artifacts are assumptions of modernity, progress, and the rationality of improving efficiency. However, our findings reveal the presence of contradictions and contestation: trust mechanisms may not be simplistically embedded in the IT artifact and, thus, may not replace ritualized institutions (e.g., the "waiting around" seen in in the first vignette), and apparently irrational institutionalized transaction costs endure as a means to both demonstrate and reaffirm trust.

LMIC research has the potential for reverse innovation because the dynamics of failure to institutionalize IT artifacts remain largely absent from mainstream IS literature. The opportunity to examine developing country institutions provides a nuanced understanding of the processes of institutionalization, which may remain invisible to an unreflective practitioner. The institutions found in the informal sector of LMICs (such as Mexico) tend to amplify institutional responses when compared with those of developed countries' institutions, with the contradictions and contestation readily observable. Dodson et al. (2012) report a 70 percent failure rate of ICT4D projects; thus, applying Seo and Creed's (2002) framework as we illustrate in the vignettes has obvious value for mainstream IS research.

Our research makes three practical contributions that will assist both researchers and development practitioners in identifying local solutions. Firstly, researchers and practitioners should expend effort to identify existing institutions to position the IT artifact as consistent with current institutional arrangements. Second, while identifying these existing institutions, development practitioners should also seek to identify "institutional entrepreneurs" (DiMaggio & Powell, 1983) since they should be autonomous enough to act as change agents. Our vignettes provide practical guidance as to how to develop strategies to align actions in institutional structures and to anticipate possible contradictions. We posit that this approach has value for practitioners of the human-centered discourse (e.g., Kleine, 2010) because the theoretical framework in our research functions as a practical toolkit for both practitioners and researchers alike in order to appreciate the contested nature of the process between change agents and those individuals and groups who hold views that may contribute to contestation.

Note that, in this paper, we focus on one informal sector and, in doing so, potentially missed some micro and macro influences on the institutions and institutionalization process. For instance, we do not consider how radical changes such as disruptions to the technological, political or economic context, or other societal shifts (Lyytinen & Rose, 2003) may influence whether individuals adopt IT artifacts. Furthermore, while we used ethnographic techniques in our fieldwork, we may have gained additional insights if we had engaged in a longitudinal study. Our focus on a single sector in Mexico may itself prove limiting because, while single case research design has many precedents (e.g., Eisenhardt & Graebner 2007; Levina & Vaast, 2008), researchers have sometimes criticized it for its potential to generalize. Following Walsham's (1995, 2006) guidance on generalizing interpretive cases, we focused on theoretical development in the form of a combined framework and an illustration of the major concepts from an empirical case that offers rich insight.

Finally, we encourage others to apply this dialectical framework to other contexts. In particular, two areas warrant further investigation. First, further research should examine contestation in different LMIC settings to further explore the role of context. Second, while we identify the mismatch between IT artifacts and local institutions, it would be worthwhile for researchers to continue to explore how to align local institutional structures with IT artifacts in order to identify the sources of contradiction and to build an understanding of the praxis. Thus, we suggest that IS research focus on LMIC as suitable contexts to explore the institutionalization of IT artifacts as sources of reverse innovation.

Acknowledgements

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Appendix

Table A1. Informant Responses

Informant #	How many employees do you have?	Do you have a landline telephone? 1: yes, 2: no	Do you have a cell phone? 1: yes, 2: no	Do you have a fax machine? 1: yes, 2: no	Do you have a computer? 1: yes, 2: no	Do you have email? 1: yes, 2: no	Do you have a Facebook account? 1: yes, 2: no
1	2	2	2	2	2	2	2
2	10	1	1	2	2	2	2
3	3	1	1	1	0	1	1
4	5	1	1	1	1	1	2
5	12	1	1	1	1	1	0
6	8	2	1	1	2	2	1
7	2	1	1	1	1	1	0
8	4	1	1	2	1	1	2
9	6	1	1	2	1	2	2
10	3	2	1	2	2	2	2
11	10	1	1	2	2	1	2
12	2	2	1	2	2	2	2
13	2	2	1	2	2	2	2
14	3	2	1	2	1	2	2
15	3	1	1	2	2	1	2
16	4	2	1	1	2	2	2
17	3	2	1	2	1	2	2
18	3	2	1	2	2	2	2
19	4	2	1	2	1	2	2
20	7	2	1	1	1	2	2
21	3	2	1	2	1	2	2
22	3	2	1	2	1	2	2
23	6	2	1	2	1	2	2
24	3	2	1	2	2	2	2
25	3	1	1	2	1	2	2
26	4	1	1	1	1	2	2
27	2	2	1	2	2	2	2
28	3	2	1	2	2	1	2
29	2	2	1	2	2	2	2
30	1	1	1	2	2	2	2
31	3	2	1	1	1	2	2
32	3	2	1	2	2	2	2
33	4	1	1	1	1	2	1
34	3	2	1	1	1	2	2
Average # of employees	4.1						
Total # of informants with access to the ICT artifact		No: 21 Yes:13	No: 1 Yes: 33	No: 23 Yes: 11	No: 16 Yes: 17	No: 25 Yes: 8	No: 29 Yes: 3

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Brian Nicholson is a Professor of Information Systems at Alliance Manchester Business School, University of Manchester, United Kingdom. Brian's interests are in ICT4D and mainstream IS and he has authored many academic articles in leading MIS, ICT4D and management journals in Europe and the United States including Journal of Information Technology, Information and Organization; MIS Quarterly Executive, Communications of the ACM, Information Technology and International Development; Journal of Global Information Management and Information Technology for Development. Brian has also authored three books, Global IT Outsourcing (Cambridge University Press, 2003), Sustainable Global Outsourcing (Palgrave, 2012) and Socially Responsible Outsourcing Global Sourcing with Social Impact (Palgrave, 2016).