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Collective Learning in Global Diffusion: Spreading Quality Standards in a Developing Country Cluster

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This research analyzes how foreign organizational practices diffuse among indigenous enterprises in a developing economy. It highlights the collective knowledge-building process as central for understanding diffusion. Based on a longitudinal case study of a cluster of dairy producers in Nicaragua, a representative low-income country, it looks at cross-border diffusion in conditions that differ significantly from advanced economies. The current literature that highlights institutional pressures driving global spread of practices has limits for capturing a significant dynamic caused by increased integration of markets and production. By focusing on production organization and practices in a late developing context, this paper explains the intertwined process of spreading new standards and changing existing local practices by elaborating the relationship among building collective capabilities, learning, and standards diffusion. This study enriches current views on institutional effects and adds to the practice-based literature, as well as to the work on developing economy firms in organizational research.

Key words: international diffusion; organizational practice; collective learning; knowledge building; developing economies; quality standards
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Introduction

With globalization and increasing cross-border integration, the international transfer of practices has grown significantly. A substantial organizational literature highlights institutional mechanisms that cause the diffusion of practices from one context to another. The most prevalent view focuses on the coercive, imitative, and normative pressures (DiMaggio and Powell 1991, Mizruchi and Fein 1999) helping to spread them internationally (Brune et al. 2004, Corbett 2006, Delmas 2002, Guler et al. 2002, Meyer et al. 1997, Polillo and Guillen 2005, Simmons et al. 2006). A related research line examines persistent cross-national variation, instead of convergence, showing that differences in local institutional contexts shape the extent and speed at which a practice diffuses at the adopting end (Cole 1985, 1989; Djelic 1998; Dobbin 1994; Guillen 1994; Westney 1987). Other bodies of institutional literature analyze the diffusing idea or practice as it undergoes local adaptation and transformation, referred to as translation, when the idea circulates across organizations and borders (Czarniawska and Sevon 1996, Frenkel 2005, Zeitlin and Herrigel 2000, Zilber 2006). Studies that seek to understand the underlying processes at the level of those adopting the practices in the context of developing economies are limited. Most research has focused on experiences in advanced countries.

Existing organizational research on international diffusion has limitations for capturing mechanisms related to the spread of foreign practices among enterprises in developing economies. This study takes as a starting point the substantial research showing that firms in late-developing economies compete in globalized markets with two sets of differences from advanced country firms. First, they do not initially have the superior technology, know-how and skills that firms in developed economies enjoy, so they face significant knowledge and resource disadvantages (Amsden 1989, Chittoor et al. 2009, Hobday 1995). Therefore, late-developing firms improve their productive capacities through learning, that is, by building new knowledge and skills to improve products and production processes so they are at the level of established international competitors (Amsden 1989, Amsden and Wan-wen 2003, Lall 2000, Sabel 1994, Saxenian 2006, Zhao et al. 2004). Second, late-developing firms operate in a low-income environment characterized by significant coordination problems (Rodrik 1996); such problems are associated with a lack of supporting infrastructure, government assistance, and technical services, among other things (Hoskisson et al. 2000, Porter 2000), and therefore face the challenge of making simultaneous and complementary changes involving many actors to improve their competitiveness. The further the enterprises are from the technological frontier and its supporting infrastructure, the larger the gaps are. These differences create challenges for developing country enterprises in acquiring and building knowledge to survive and compete in increasingly integrated markets. Existing analyses of international diffusion overlook these differences; however, they are central to understanding the cross-border spread of practices.

With integrated markets and production, late-developing enterprises face new opportunities along with greater pressures to close initial gaps. How does diffusion of foreign practices happen in this context? How does the knowledge building necessary to improve their products, processes, and skills occur? This paper shows that collective learning is central for understanding the diffusion of foreign practices in the developing world. Collective learning is defined here as new knowledge that a group of enterprises develops that changes existing production practices (Amin and Cohendet 2004, Miner and Anderson 1999). Practices are the way production and work are done (Brown and Duguid 1991). Knowledge is recognized as a core element in the production process, whether to produce new products or new processes or to develop new capabilities (Amin and Cohendet 2004, Nelson and Winter 1982). Knowledge forms and flows through social interaction in shared productive activity; therefore, its formation and circulation have a collective dimension (Brown and Duguid 2001, Gherardi and Nicolini 2000, Tsoukas 2009). Hence, the organizational literature emphasizes the crucial role of networks in facilitating the collective learning implicated in knowledge building (Beckman and Haunschild 2002, Powell et al. 1996), affecting the firm's ability to survive (Uzzi 1996) and innovate (Piore and Sabel 1984, Saxenian 2006). Furthermore, knowledge is not the individual possession of data and facts transferred and received. Rather, it is enacted, situated, and knowing in practice (Gherardi 2006, Orlikowski 2002). It is developing the competence to perform new ways of working by engaging in new practices (Lave and Wenger 1991).

This study explains the cross-border spread of practices as part of the knowledge-building process in which late-developing firms engage to build their productive capabilities. Diffusion may be seen as a process of developing the capacity of many enterprises to perform new practices. Collective learning occurs in the changing of existing practices, and new practices spread as people experiment with and learn new ways of producing. Existing institutional approaches to studying international diffusion tend to focus on what is transferred, highlighting the differences or similarities with the original practice or context. As well, they emphasize imitative and coercive mechanisms behind the spread. The empirical example and perspective discussed in this paper suggest these views are problematic for capturing the central role of learning in the spread of foreign practices that contribute to the creation of collective capabilities among groups and clusters of enterprises. The argument developed here expands existing understanding of international diffusion and adds to current practice-based perspectives on organizational research.

An example of an organizational practice diffusing worldwide is the case of quality standards, which are defining organizational changes, global competition, and innovation dynamics in the context of increasing integration of markets and production (Brunsson 2000, Cole 1999, MacDuffie 2000, Winter 2000). In general, standards are understood as constituting explicit conventions, rules, norms, shared expectations, agreements, and regulations that show certain regularity, eventually becoming institutions (Biggart and Beamish 2003, Storper and Salais 1997). A standard concerns production practices, and different rules or expectations that govern production affect how the production is done (Piore 2003, Storper and Salais 1997). The concept of a quality standard refers to product characteristics and production methods designed to meet certain expectations (Brunsson and Jacobsson 2000). It can refer to final product requirements (i.e., safe for human consumption) as well as to the process used for producing the product (i.e., elimination of hazards). Standards are ubiquitous and represent an important dimension in technological development, innovation, public policy, interfirm relationships, and trade relations (Brunsson and Jacobsson 2000, Casper and Hancke 1999, Hawkins et al. 1995, Leblebici et al. 1991, MacDuffie 2000, Winter 2000). Different types of standards are emerging to address a variety of issues, such as quality, environment, labor, and technical compatibility (Dolan and Humphrey 2000, Hawkins et al. 1995). Quality standards can be generic (i.e., ISO 9000) (Casper and Hancke 1999) or sector specific (i.e., Hazard Analysis of Critical Control Points [HACCP] in the food industry) (Ansell and Vogel 2006). The diffusion of standards refers to a process in which norms and the related practices that are new or that differ from prevailing ones replace the established ones (Rogers 2003).

The prevalent view in the organization literature relies on institutional isomorphism to explain the adoption of quality standards worldwide, including both advanced industrial economies and those in the developing world (Guler et al. 2002). For example, multinationals and the state are the source of coercive pressures for diffusing international quality standards to the extent that adopters depend on these strong actors for resources. Trade relations exert isomorphic pressures as organizations imitate others in the same network (Albuquerque et al. 2007). Most of this research has focused on the aggregate multicountry level to show the widespread adoption of quality certification. These efforts, however, have not given attention to the process and activities involved in spreading a new quality standard in the context where it is adopted. This is important because the spread of new quality norms can entail profound changes in the existing production processes and the building of new institutional arrangements (Cole 1999, Czarniawska and Sevon 2005, Lazaric and Denis 2005, MacDuffie 2000, Nadvi 1999). The pressures for organizational change are higher where the gap is wider between the existing and the new quality standard (Winter 2000).

Extending explanations of the quality standards-diffusion phenomena in advanced economies to the developing world presents two significant puzzles. First, the emphasis of the institutional view is that firms imitate others. If simply imitating the norms of advanced countries could bring the developing world to the same level, then emerging firms would quickly meet international market pressures. Adopting them in practice proves difficult, because adoption depends on putting the norms together with complementary inputs, such as skilled labor and institutions (North 1990). Standards encompass technological knowledge with significant tacit aspects (Jacobsson 2000), which involve specific actions in production (Brunsson and Jacobsson 2000, Leblebici et al. 1991). Technical dimensions play an important part in the adoption of quality standards (Casper and Hancke 1999, MacDuffie 2000, Winter 2000). The organizational literature has explained the difficulty of imitating and diffusing skills and know-how from one context to another, given the practical dimensions of knowledge formation and circulation (Brown and Duguid 2001, Kogut and Zander 1992, Nelson and Winter 1982, Winter 2000). This makes mimicking mechanisms problematic in the developing world.

Because international standards involve ideas and practices developed in advanced countries and reflect their production systems, they are not easily applied in developing countries, given the differences in productive conditions and technological development among firms (Piore 2003). Adoption of standards in developing countries occurs in a context that is far from the technological frontier (Amsden 1989, Lall 2000). Diverse studies demonstrate the challenges when developing country firms attempt to adopt international practices that differ significantly from their traditional local customs (Amsden 1989, Chittoor et al. 2009, Nadvi 1999, Perez-Aleman 2005, Reardon et al. 2001). Where practices vary considerably, a quality norm may fail to diffuse through simple imitation in developing countries, as practical and localized knowledge dimensions complicate diffusion.

A second puzzle emerges when coercive mechanisms, via state or multinationals, are used to explain the diffusion of quality standards in the developing world. In this scenario, multinationals require that their suppliers meet a given standard to be part of the supply network. Coercion clearly contributes to spread standards, but it is also problematic. Coordination problems that exist in firm activities (Kogut and Zander 1996) and in supply chains (Gulati et al. 2005, Helper et al. 2000) are significant in the context of low-income countries. Coordination failures are common in the low-income environment of developing countries, given low skills, lower technological development, and poor infrastructure (Hoff and Stiglitz 2001, Rodrik 1996). Low levels of development require simultaneous and complementary changes to support a catching-up process (Hoff and Stiglitz 2001). Coordination failure, or the inability to bring together simultaneous changes, leads to continued underdevelopment (Hoff 2000). Because adopting international standards requires new skills, production routines, and investments, these simultaneous changes by multiple actors and organizations may fail to occur, even in the face of coercive pressures.

Even where multinational presence is high, as in Brazil, quality standards fail to diffuse among low-income producers because of the organizational and technological changes required to meet foreign norms (Farina 2002, Reardon et al. 2001). Private and public infrastructure, substantial changes in production practices, new knowledge, and costly investments are just a few of the challenges involved in closing the gap between existing domestic and international standards. The coercive mechanism does not explain how and why—given the conditions of developing country enterprises—collective changes involved in spreading quality standards occur. In this scenario, coercion may be insufficient for explaining the diffusion process, which requires that many enterprises adopt the new practice.

From the context of late-developing enterprises, how do we explain the cross-border diffusion of quality standards? The argument advanced in this paper is that the diffusion of quality standards in the developing world is related to a significant collective learning process and coordination of changes in practices among interdependent actors in their efforts to compete. Diffusion involves putting new quality standards into practice, which is intertwined with knowledge flows to a large number of enterprises that contribute to building the collective capacity to improve products and production methods so they reach the level of established international competitors. This study describes the case of a cluster of dairy entrepreneurs in Nicaragua who adopted new quality standards. It shows how local enterprises in developing economies strategize to survive and grow in a globalized world, and how the process of creating local collective capabilities leads to the spread of foreign quality norms. Besides adding to current research on global diffusion of organizational practices, the discussion also contributes to existing work on knowing and learning in organizations.

International Diffusion of Quality Standards and Developing Countries

One of the institutional approaches to global diffusion of international quality standards follows neo-institutional theory (Guler et al. 2002), explaining that coercive, normative, and mimetic forces lead to diffusion that produces isomorphism (DiMaggio and Powell 1991). For example, multinationals are a coercion source, as they increasingly rely on global supply chains and thus operate with quality standards that all suppliers must meet (Guler et al. 2002). ISO 9000 spread within Europe and

then to other world regions as European companies pressured foreign suppliers to obtain certification (Casper and Hancke 1999, Corbett 2006). The state is another important coercive actor through its role in setting standards through regulations and sanctions related to health, safety, and the environment, among other areas.

The emergence of new regulation at industry and international levels has influenced the adoption of numerous standards at firm and country levels (Bernauer and Caduff 2006). For instance, regulation in the European Union and the United States mandates adoption of quality standards before exporting to these markets (Dolan and Humphrey 2000, Nadvi 1999). Increasing trade ties and foreign investment correlates with the international diffusion of standards, as firms in countries with strong trade relations imitate each other (Albuquerque et al. 2007, Christmann and Taylor 2001). In general, the discussion remains at an aggregate multicountry level, relying on the large number of certificates adopted to show the widespread reproduction of quality standards. The sense from this institutional view is that imitation and coercion mechanisms are straightforward. The local dynamics and the different speeds at which a practice diffuses are addressed by others.

Another set of organizational studies shows that the presence of an institutional infrastructure on the receiving end supports the spread of new quality practices (Cole 1999). For example, public and private organizational networks in automotive, semiconductor, and manufacturing settings constituted an infrastructure that helped U.S. managers adopt quality practices and diffused quality management (Cole 1999). Likewise, quality circles diffused more rapidly in Japan than in Sweden and in Sweden more rapidly than in the United States, because the different government agencies, trade associations, and unions created varying degrees of supportive conditions, which led to different patterns of diffusion (Cole 1989). Existing studies, however, focus on advanced countries with similar levels of socioeconomic development. In these contexts, the public and private infrastructure develops close to know-how sources, abundant capital for investments, and a critical mass of skilled labor. These studies say little, however, about how such infrastructure develops when these elements are missing, or how late diffusion may occur in the absence of such pre-existing conditions.

A different institutional research line develops the notion of translation to explain the global spread of an idea or practice (Czarniawska and Sevon 1996, 2005). Instead of interpreting diffusion as reproduction of an unchanged practice, these studies point to the adaptation and construction that occurs as the practice spreads in space and time, as local actors transform it to fit their specific setting, locally combining new and old (Frenkel 2005, Zeitlin and Herrigel 2000) or adopting activities that differ from the original idea (Solli et al. 2005). Thus, a quality practice expresses itself locally in heterogeneous ways. For example, the introduction of quality assurance in Sweden's health sector became an audit when applied to health care as a whole, a lab accreditation when implemented at a clinical laboratory, or patient-oriented services in clinics (Erlingsdottír and Lindberg 2005). By accounting for the local transformation involved in adopting a new practice and the resulting heterogeneity, this literature adds valuable understanding of cross-border transfer processes. Moreover, it shows the organizational changes that the diffusing idea provokes where it is adopted, in contrast to other institutional views that emphasize ceremonial adoption. Still, this literature emphasizes imitation to follow fashion and to conform (Czarniawska and Sevon 2005). Yet if we look at the literature on late-developing enterprises, other reasons may affect the adoption of foreign practices.

Taking a closer look at the context of developing countries, existing research shows that indigenous firms face numerous strategic challenges to become competitive, given their late entry into markets with established competitors. Late-developing firms thus engage in a search to achieve higher-quality products, increase the value added, raise productivity, and build skills to be competitive (Amsden 1989, Amsden and Wanwen 2003, Lall 2000). They typically start with disadvantages, such as being far away from the sources of leading-edge technology, and the infrastructure that could support improvements in their productive activity (Chittoor et al. 2009, Hoskisson et al. 2000, Mesquita and Lazzarini 2008, Saxenian 2006). To overcome these limitations, they compete in globalized markets by upgrading, that is, by shifting from lower- to higher-value economic activities, and building local capacities to make improvements in production processes, products, and functions (Gereffi 1999, Giuliani et al. 2005, McDermott 2007, Perez-Aleman 2005, Saxenian 2006).

Improving or creating new products and processes involves the acquisition of new knowledge, which the organizational literature shows entails a learning process to build know-how (Brown and Duguid 2001). Beyond buying machinery or equipment, there is the issue of the tacit dimension of knowledge that is not easily codified or put into a blueprint, or held by an individual, which relates to how to organize the production process, the building of new skills, and collective knowledge (Amin and Cohendet 2004, Brown and Duguid 1991, Kogut and Zander 1992, Nelson and Winter 1982, Nonaka and von Krogh 2009, Zhao et al. 2004). This distinction raised in the organizational literature underlies the challenges observed when firms from developing countries adopt foreign practices that differ from their typical ways of producing (Amsden 1989). This knowledge building is collective as firms interact in productive activity (Amin and Cohendet 2004, Miner and Anderson 1999)

and frequently occurs in interfirm networks and clusters that support the collective improvements (Giuliani et al. 2005, McDermott 2007, Mesquita and Lazzarini 2008, Perez-Aleman 2005, Saxenian 2006). Transforming existing resources, creating new products, training in new areas, and producing in new ways all imply coordination and interdependence among groups of firms and other organizations.

Accounting for the differences between firms in developing and advanced economies and the complex bundles of simultaneous actions tied to adopting foreign production methods suggests that current institutional explanations may not be capturing key mechanisms involved in global standards diffusion in developing countries. The implication is that the diffusion of quality standards may be linked to knowledge building, which current institutional explanations have not addressed. Some organizational studies have noted that learning to build know-how is connected to the spread of new information technology (Attewell 1992). The existing literature, however, has not explored how quality standards, learning, and diffusion interact, particularly among late-adopters. The next section presents a field study of how developing country producers adopted taken-for-granted international quality standards, viewed through the lens of what was happening at the level of local enterprises.

Methods and Setting

This study was designed to explore how enterprises from developing countries improve their capabilities and competitiveness in the face of increasingly integrated markets. The research began with questions on whether and how these enterprises were upgrading their products and production methods, and if so, what processes contributed. This inquiry was conceptually tied to how knowledge building occurred in this context. From the first field visit, the issue of quality standards was prominent as a crucial aspect linked to upgrading that was affecting the way entrepreneurs conducted productive activities. As a result, the study focused on understanding the process of spreading foreign quality standards among local entrepreneurs. These questions required a close look at production organization and practices. To explore these issues empirically, the study centered on a cluster, which is characterized by the geographic concentration of production in the same industry and enterprises located in proximity in related productive activity (Porter 2000). The cluster level of analysis followed studies showing that processes of development and upgrading of local enterprises often occurs in clusters (Giuliani et al. 2005, McDermott 2007, Perez-Aleman 2005, Saxenian 2006). This cluster-level approach facilitated focused attention on the producers and the organizations interacting in the related industry, and its concentration within one geographic region of the country provided an ideal size for pursuing a qualitative research approach.

To gain a close understanding of local enterprise learning and capability building in the cluster, this investigation used a longitudinal case study strategy, an approach commonly used to gain insight on the "how" questions about processes that have not been studied (Burgelman 1983, Eisenhardt 1989, Leonard-Barton 1990, Yin 2003) and how production organization is changing and evolving (Barley 1990, Pettigrew 1990). The simultaneous exploration of a cluster of enterprises and of concrete production practices required building data on entrepreneurs, organizations, and production methods and procedures, their interactions, and the changes occurring in this setting. To get a rich description (Geertz 1973, Mintzberg 2005) of these requires in-depth data collection on a highly dynamic and interactive phenomenon: a qualitative research approach can provide this empirically (Marshall and Rossman 1989, Patton 1990). As is typical of case studies, this work combined diverse data collection methods, including interviews and observations. Organization studies show this combination of ethnography, interviews, and documentation is essential for gathering direct data on concrete production or work practices that are processual, contextual, and historical (Barley 1990, Bechky 2003, Feldman 2000, Gherardi 2006, Johnson et al. 2007, Pettigrew 1990, Piore 1979).

Nicaragua was an ideal location for this study. It is a representative low-income country, with a per capita GDP in 2005 of $910 (World Bank 2006): that is among the poorest in the Western hemisphere. It shares important similarities with other poor Latin American, African, and Asian countries: it has weak national institutional infrastructures and limited government capacity, and it has undergone a political transition common to many developing countries, especially in Latin America, moving from dictatorship to democracy. In addition, Nicaragua has experienced market liberalization since the 1990s, removing trade barriers and increasing cross-border integration through regional and bilateral trade agreements. These changes created new international trade regulatory and market pressures for its local firms, affecting the dimensions that are the focus of this study.

The selected Nueva Guinea cluster site is representative of typical socioeconomic conditions with a predominantly rural population, where 70%–80% are categorized as poor (RUTA 2007). This cluster of 250 individually owned small and microdairy enterprises is located in southeastern Nicaragua, about 270 kilometers east of Managua, the capital city, or eight hours by vehicle over mostly poor roads. Seventy percent of the total raw milk volume produced in Nicaragua comes from producers located in this area and two adjacent regions, Boaco and Chontales (PRODEGA 2003). Overall, small producers (1–20 head of cattle) account for 80% of the raw milk produced in Nicaragua (Hollmann 2001); 73%

of Nueva Guinea producers are small, with 6–12 head of cattle (Bourgondien 2000, Hollmann 2001). The case was deliberately selected because the Nueva Guinea producers had recently become suppliers to a foreign multinational. This visible event facilitated the study of local and global interactions as well as how local production was changing. The collection of data began shortly after this event, from those actors directly involved. It was a case where the changes in progress were transparent (Pettigrew 1990).

Several aspects make this case particularly relevant for understanding the diffusion of international quality standards. First, the local-global interactions examined refer to local enterprises adopting foreign quality standards taken for granted in advanced countries. Second, it includes two phenomena associated with globalization: the growth of foreign investment flows into developing countries and global supply chains. Third, the issue of quality standards is the point of reference for current discussions on diffusion related to globalization that involves standardized quality management practices that in principle are easily mobile across borders. Finally, the agrofood processing industry is one in which global quality standards are at the center of current competitive strategies and international trade. Food safety standards have been among the most globalized and regulated, making it a paradigmatic case for studying organizational practices related to quality (Ansell and Vogel 2006, Reardon et al. 2001). Changing food safety awareness, product differentiation, traceability, certification, and increasing decentralization of the value chain places quality standards at the center of the discussion.

This research required extensive field work. Data collection took place over a four-year period, from June 2002 until August 2006. Interviews and site visits were conducted during four separate one-month visits to Nicaragua in 2002, 2003, 2004, and 2006. Multiple sources of evidence were used, mainly interviews, observations, and documents. First, 40 open-ended interviews were conducted with a variety of key informants, including dairy producers, foreign subsidiary managers, international development project managers, government officials, and association leaders (Table 1). The interviews lasted between 90 minutes and 3 hours each, guided by open questions tailored to the type of informants. Producers were interviewed once and were selected from 8 of the 14 localities in the cluster. They all had from 12 to 20 years experience in dairy business. All interviews were private and conducted face to face in Spanish, the native language. Responses were recorded and handwritten notes taken during the interviews. Tape recording was not an option in this cultural context, as interviewees often feel intimidated, fearful, or reticent to be recorded. Each of the 40 interviews was given a number, date, time, and place.

The individual, in-person interviews with the dairy entrepreneurs were conducted at their production site, typically a rural farm including dairy cows, open fields for grazing, and a milking shed and corral; most interviewees had their residence adjoining. These interviews contained several parts. One part included questions on each producer's history and the historical changes in markets, products, production methods, and organization. Another part asked comparative questions to contrast what and how they produce currently and previously. Another set of questions focused on the quality standards and how they changed and affected the production process, products, and markets and the factors behind their evolution, as well as the challenges of their implementation. Finally, another part targeted the historical and current relations with other local producers, the cooperative and its formation, and the foreign multinational and other organizations (government and international aid).

The interviews with the managers of the multinational firm were conducted at the company's main office and processing plant. A section of these interviews gathered information on the foreign firm's strategy and the

Table 1 Characteristics of Interviewees and Research Sites

	Nueva Guinea dairy cluster producers	Non-Nueva Guinea producers	Multinational company	International development project	Government	Association of dairy producers
Number of informants	25	3	4	3	2	3
Location of interviews	Nueva Guinea	Boaco	Managua	Managua Nueva Guinea	Managua Nueva Guinea	Managua Nueva Guinea
Years in activity	12–20	15–20	3–6	5	3	20
Number of production sites visited for direct observation	20	2	1	N/A (Office)	N/A (Office)	N/A (Office)
Times the informant interviewed over 4 fieldwork periods	1	1	2	1–3	1	1
Selected interviews (#) cited in text	7, 8, 10, 11, 12, 14, 15, 23, 27	25, 26	17, 18, 21, 22, 29	3, 23	28	—

changes in markets, products, and production organization after the local acquisition. Another set of questions focused on its supply chain, particularly its relations with local suppliers, and the management and implementation of quality standards. Collectively, these interviews provided historical and current descriptions of production organization and practices, as well as key events occurring over the last decade that helped anchor the discussion to important transitions and changes in the local cluster, providing rich longitudinal and triangulated information.

Second, direct observations of the different production activities and procedures were conducted. The sites in the Nueva Guinea region were visited for direct observation of the work being done at the dairy farms, local procurement centers, the cooperative-owned labs, and the local processing plant. This included observations of procedures related to animal husbandry, milking, quality testing, transportation, laboratory sampling and analysis, collection and cooling centers, local installations for processing milk locally, veterinary and technical services, and producers' meetings. In Managua, the multinational subsidiary's main industrial processing plant and quality control center were visited. These observations provided insightful and concrete information on how dairy production work is done today and captured the differences between the traditional and new practices in terms of procedures, materials, technology, equipment, personnel, setting, reporting, monitoring, and organizational interactions. These observations raised questions on what was being observed and engendered explanations of activities and procedures through informal conversations, allowing the author to interpret changes narrated in the formal interviews. In addition, archival documents were used, including internal reports from the multinational and the producer's organization, local newspaper articles, international development project reports, and published secondary sources.

Based on these varied sources, data triangulation (Patton 1990, Yin 2003) was possible with interviews with many people actively involved at the same time in the same process and events, checking one interviewee's view against that of others, and where possible against the written record of the particular event they were describing. Combined with direct observations, this produced rich details from multiple perspectives on the same local process of changing production practices. Moreover, the numerous periods of field involvement allowed the author to combine intense episodes of data gathering with others focused on processing what the author gathered in each visit. This repeated involvement method created the opportunity to review results with the producers and other active participants during data interpretation. Barley (1990) notes the usefulness of longitudinal field research for triangulation by allowing repeated observations, increasing understanding of the setting and patterns and further probing of what one is discovering.

The analysis and explaining followed an inductive approach through the discovery of patterns, stories, relations, and chronologies from the raw data (Langley 1999, Mintzberg 2005). The data analysis first focused on reading and extracting from interviews the changes in local production organization and the shift in quality norms experienced over the last 10 years, while also identifying critical junctures and moments to build a collective story by grouping responses together. Descriptive notes of the findings included information on the producers' histories and on the interactions between their products, markets, technology, production organization, quality norms and procedures, events, problems, and the nature of the changes in each of these dimensions, extracting what people described about their experiences.

The next analytical step involved organizing the data findings according to relevant periods to define corresponding transformations and phases to present the case in a way that showed the movement over time of the transition from local to international standards. In subsequent steps, the collective story emerging from the fieldwork was evaluated against existing views in the literature on the global diffusion of quality standards, looking at how different organization theories might explain or capture what was uncovered here. This movement between data and theory continued through the writing and completion of this paper.

Diffusing Foreign Quality Standards in a Cluster of Dairy Producers

Defining and Observing the Shift in Quality Standards

"Quality standard" refers to norms and production methods related to food safety in the production of milk products, including procurement and processing. In general, concerns with safety prompted quality management systems in food production, such as HACCP, in the United States and the European Union and other developed countries (Bernauer and Caduff 2006). Advanced countries set the international standards as their own production systems evolved, and their food quality standards are connected with public health regulation. The United States, for example, developed quality standards for milk at the turn of the 20th century, after several studies demonstrated milk's role in major disease outbreaks (USFDA 2001). These concerns led to the initiation of milk sanitation programs by federal health and food authorities to control disease by improving the safety of milk and dairy products and by establishing a grading system to classify milk quality. United States standards emphasize sanitary conditions at every stage

of the process: raw milk production, handling, pasteurization, and distribution of milk products. More recently, a key component of international practice is the evaluation of on-farm practices and raw milk handling prior to pasteurization as part of the HACCP certification process. The international standard, based on total quality management principles, includes dimensions such as minimum temperature levels, maximum bacterial limits, and the absence of residues from drugs, chemicals, or animal diseases (USFDA 2001). Its focus on safety includes sanitary operating procedures and good hygiene practices.

International quality standards are fundamentally different from those traditionally existing in a developing country such as Nicaragua, which has not included sanitation and food safety mandates or product differentiation by grade. For example, a key measure of quality is the quantity of bacteria per liter of milk. Simply stated, lower bacterial content equals higher quality, and conversely. The international standard sets the maximum bacterial count at 100,000/ml (USFDA 2001). In traditional Nicaraguan dairying, milk products with bacterial count close to 1,000,000/ml are the norm—10 times higher than the allowable international standard (Hollmann 2001).

Producing milk in Nueva Guinea until recently followed typical Nicaraguan practices, which lack observance of health and food safety norms, resulting in products with high bacterial contamination levels. The science of bacterial or chemical contamination is poorly understood. Visits to dairy farms in rural Nicaragua illustrate that traditional practices include milking on unhygienic dirt floors and muddy open corrals, instead of on sanitary milking sheds. Milk collection and storage is in plastic, instead of stainless steel, containers. Disinfectants are not used to clean milk storage containers. Instead, briefly rinsed plastic buckets are reused. Manual milking is not preceded by hand washing. There is no testing or controlling for cattle diseases (including mastitis, tuberculosis, and brucellosis), which are widespread in rural Nicaragua. Instead, the norm is to add unhealthy chemicals in the milk, such as formalin, to slow bacterial growth. Moreover, small producers usually have no access to refrigeration centers to cool milk prior to processing. In 1996, 90% of the milk produced in Nicaragua did not go through pasteurization and was sold in local markets (Artola and Parrilli 2006).

A major shift occurred in the productive practices among Nueva Guinea producers. In contrast to their historical norms, producers now observe international industry standards, such as the differentiation of milk quality by grades and the inclusion of measures of bacterial content, to produce safe dairy products, similar to those in the United States and Europe. Today, Nueva Guinea producers abide by stringent hygienic methods during the milk collection phase. For example, new norms are now common and have led to the use of covered cement-floor corrals for milking, chlorine and detergent solutions to clean and disinfect newly introduced metal milk containers, and hand washing by workers. Producers also conduct weekly and monthly tests and control for cattle diseases; they also implement programs to eliminate them in the herd. Milk refrigeration centers are used to store raw milk. This production process upgrading contributed to improve the collective performance of these enterprises. By 2004, 96% of Nueva Guinea producers' daily milk production achieved "A" milk quality level, the highest rank (Cooproleche 2004).

Besides the shift in production standards, there is also a new economic organization, including a local collective production network and new market channels. Historically, Nueva Guinea producers sold their milk individually to local traders, who controlled the regional market. Industrial processing plants did not procure milk from these small producers, relying instead on large dairy producers located in the Pacific region, who owned milk cooling tanks and had electricity and paved road access to the plants. Today, the Nueva Guinea cluster producer brings the individual milk output to a small joint refrigerated collection center (or pericenter), from where it is later transported to a central storage plant; both are owned by the producers' new cooperative. They jointly process cheese for export as well as supply milk to a foreign multinational. In 1999, all the multinational's raw milk supply came from the Pacific region; by 2003, the company procured 60% of its milk from the interior regions of Nueva Guinea, Boaco, Chontales, and Matagalpa (Interview #17, 2003).

The transition from old to international standards did not happen all at once, but over a period from the mid-1990s to 2004. The change was not straightforward, or simple; it was ridden with political divisions, resistance to adoption of new methods, lack of local understanding, and unexpected turns of events. The retrospective account of the dramatic shift presents a highly dynamic and uncertain process, from the point of starting to change local production practices until today.

Search for New Markets and Emergence of a Local Network

The search for new markets for their milk product, along with the introduction of new technology, triggered changes in the way producers organized production in the Nueva Guinea cluster. Under the traditional system of selling milk individually to local cheese traders, dairy producers were vulnerable to seasonal price fluctuations and unreliable payments. Their reliance on natural pastures for feeding led to abundant production in the rainy season. Lacking refrigeration storage tanks, milk had to be sold quickly, as it was decomposing, a disadvantage for negotiating price when supply increased and given their isolated location. Dairy producers also faced

constant income insecurity from uncertain and delayed payments, as traders paid only after selling their cheese product on consignment. Facing these conditions, Nueva Guinea producers searched for different ways of commercializing their milk that would bypass traders.

When they initially looked for alternatives in the mid-1990s, several coops in neighboring regions became a reference point for Nueva Guinea entrepreneurs, but there was a reluctance to imitate this organizational form. In neighboring Costa Rica, the cooperative Dos Pinos, the largest dairy processor in Central America, and in Boaco, a region adjacent to Nueva Guinea, three cooperatives formed in the early 1990s (PRODEGA 2003). They successfully procured the raw milk, using collective refrigeration tanks, and then processed it into cheese for direct sale in domestic and export markets (Artola and Parrilli 2006). Fresh in the Nueva Guinea producers' memory, however, was the 1980s civil war between the "contras" and the Sandinista government, which locally divided them into opposing camps. Located in one of the epicenters of the conflict, cooperatives formed in the 1980s by the Sandinistas became either targets of contra attacks or military defense units, or both. Rebounding from this civil war, they were far from being a cohesive group, as they had major political divisions. This collective memory meant that when confronted with examples of successful dairy cooperatives from adjacent regions, Nueva Guinea entrepreneurs did not like, trust, or embrace that model.

Local producers began to interact more closely, however, with the installation of milk cooling tanks in 1997. That started a local organizing process. Decentralized community groups began to form throughout Nueva Guinea with the creation of refrigerated centers, establishing the base for the development of a dairy producers' network. As part of a Nicaraguan government program, a European international development aid project financed the purchase of 14 mini-cooling tanks in 1997. These were installed in collection centers, or pericenters, in 14 localities or "comarcas," the smallest unit within a municipality (Interview #12, 2003). Installing tanks near the remote farms made it possible to deliver milk faster to cooling stations, to prevent product deterioration. Each pericenter tank had the capacity to store 1,600 liters daily. As well, the international project provided financing for the purchase of a central reception tank, with a capacity of approximately 20,000 liters, to receive and hold the consolidated milk from each of the 14 localities.

The producers formed committees to operate each of the pericenters in their respective communities. Each comarca unit set up its own directive board with producers from the respective locality. In addition, two producers from each pericenter became representatives in a regionwide board encompassing all 14 centers. Joint collection centers intended to provide them with a way to significantly break with traditional traders. This effort met with the difficulty of building producer commitment for a new procurement system without offering another market outlet for their product to replace the low-volume trader-led option. The lack of alternative buyers meant they continued to rely on immediate individual sale to traders who collected milk door to door. During the first years, the collection tanks functioned at low-volume capacity, with only 60 producers sending a total of 600 liters daily (Interview #23, 2004). Nonetheless, the introduction of shared refrigeration tanks offered a space for building new connections among producers within the region, bringing them together to explore a new way of producing.

Interactions with Global Practice Bring Awareness of Different Quality Standards

While searching for alternative markets, a new foreign government regulation and the presence of a multinational company led producers to focus on quality control practices. First, a change in trade regulations limited their market access. In 1998, El Salvador passed a new consumer protection law, which established that all imported dairy products must be pasteurized. This neighboring country had become the main destination of Nicaraguan cheese exports, accounting for 75% of Nicaragua's dairy exports in 1995–2001 (Dobson 2003). At the time, Nueva Guinea producers did not follow hygienic milk collection procedures, or pasteurize their raw material, so they were prohibited from selling to El Salvador.

The Salvadorian regulation was the first time the Nueva Guinea producers had encountered regulatory pressures related to milk hygiene. There was no regulation of milk safety quality in Nicaragua (Interview #21, 2004). This is not exceptional in Latin America; for example, only in 2001 did Brazil begin formulating new legislation to regulate the safety of milk products (Farina 2002). The dairy producers directed efforts at lobbying the Nicaraguan government to put political pressure on the Salvadoran government to relax legislation through bilateral negotiations, but nothing materialized. El Salvador followed norms of advanced countries, as it was trying to increase its international commercial links with the United States. But it was hard at this point for Nicaraguan producers to understand the logic behind the legislation, or what was being asked of them. Continuing to seek market alternatives, Nueva Guinea producers turned to selling domestically.

Coincidentally, a new market opportunity opened with the entry of a foreign multinational, which in 1998 acquired La Perfecta, a Nicaraguan-owned dairy firm, and the largest fluid milk processor in the country. The foreign company saw Nicaragua as a platform for exporting dairy products throughout the Central American region, Mexico, and the Latin consumers in North America (Interview #17, 2003). It sought U.S. FDA approval,

a rating contingent on the existence of an HACCP quality monitoring system and quality control department, neither of which La Perfecta had (Interview #22, 2004). With a larger market in mind, the multinational immediately set out to increase the existing production capacity; it quadrupled plant production, from 50 to 200 tons per day (Interview #18, 2003). As important, but more challenging, the subsidiary set a goal to increase procurement of raw milk of adequate quality by more than 300%, from the historical 16 million liters per month purchased by the acquired Nicaraguan company to 50 million liters per month (Interview #18, 2003). The multinational was totally dependent on raw milk input from local suppliers to achieve its export goals.

Though the idea of becoming suppliers to the multinational was attractive to Nueva Guinea producers, they confronted a major challenge because quality was a crucial issue as the company sought raw milk of grade A standard, essential for HACCP certification. The company's pricing policy reflected its demand for hygienic raw milk and its quality focus by offering better and stable year-round prices. The price paid to suppliers was three times the local rate—12 Córdobas per gallon compared to 4. The higher price was for A grade milk. In addition, the multinational offered price stability by setting a yearly price, regardless of seasonal supply fluctuations.

It was a mystery to Nueva Guineans why their milk was seen as inadequate. In their view, their milk was good and their practices did not have to change. The notion that their milk was "dirty" and contaminated with bacteria was a foreign concept, and they did not understand why their farm-level practices were part of the problem. As one producer expressed, "We thought all we needed to do was to refrigerate the 'dirty' milk" (Interview #8, 2002). Others thought the pasteurization process would eliminate bacterial contamination from the milk, and some even proposed buying small pasteurization plants. They did not understand that higher levels of bacterial contamination require a longer pasteurization process, which in turn deteriorates milk quality, making it less useful for industrial processing. Moreover, pasteurization could not correct for raw milk with bacterial counts higher than 500,000/ml (Hollmann 2001).

The majority of producers rejected the idea that their on-farm practices were creating the problem. Their lack of knowledge about what was behind the A grade milk made it difficult to understand the international quality standards. Nonetheless, they could see advantages to becoming suppliers to the multinational by calculating the lost income if they continued to produce low-grade milk (Interview #27, 2005). Their attempt to connect to the multinational supply chain opened their exploration about the problems with their low-grade milk, sparking new local actions.

Understanding and Coordinating New Quality Standards

Aligning the local production to the requirements of global markets entailed collectively closing two gaps in production: producing high-quality milk and in larger volumes. Achieving a critical mass was necessary to convince the multinational to invest in a 14 hour round-trip from Managua, the capital city, to collect product from their Nueva Guinea location. In 1999, their central reception plant was only receiving 3,670 liters daily, though the plant had a daily capacity of 20,000 liters (Interview #23, 2004). Finding a way that hundreds of small producers could change their established production practices was crucial. A common feeling was that changing their production process "seemed too complicated and very difficult" (Interview #7, 2002). New activities and projects began to foster knowledge flows to build know-how in the local cluster and to support producing milk in a different way.

One important step was the introduction of milk-testing procedures to monitor its condition at the first reception point, the pericenters. This effort supported understanding on how to avoid farm-level contamination. The new testing system involved an initial pH level test at the pericenter, a check for milk adulteration, and a temperature test to determine its adequacy for later pasteurization. Milk that did not meet acceptable levels for these three attributes was rejected at this point. The producer was immediately notified, a local board member visited to explain the problem, and the milk was not accepted until it improved. The pericenter evaluation prevented commingling of substandard milk with the collective product, and also allowed faster identification and response to production problems. As well, the tests made explicit why a specific milking or delivery practice was important, reinforcing its adoption. For example, the temperature test fostered prompt delivery during early hours of the day to avoid product damage from the heat from the sun, which promotes bacterial growth. This had not been a consideration in the past.

As important, the construction of a new lab for conducting microbiological tests on the milk samples from each producer nurtured a higher level of understanding and promoted knowledge flows among producers. The international development project funded the installation of a modern milk quality test laboratory in the central processing plant located in Nueva Guinea. Having a lab to test for milk quality helped increase local understanding of bacterial content as a dimension of quality, as well as the links between their actions and the resulting milk quality. This in turn allowed the definition of clearer guidelines and the ability to get immediate feedback on how farm and handling procedures were affecting milk quality. The lab provided a written report of the bacterial content for each sample taken from individual producers (i.e., what quantity of bacteria per milliliter) (Interview #3, 2002). The microbiological tests were a major

revelation that challenged the producers' prior assumptions. As one revealed, "Those tests made me understand there was a problem. The milk and cheese I produced before were contaminated, but I did not know it" (Interview #11, 2002). Another said, "Now I know that milk quality depends on what happens before it is refrigerated" (Interview #15, 2002).

With lab test reports that could immediately reveal problems, identify the source, and make it easier to locate bottlenecks, a transparent and explicit evaluation process could be implemented. Tests helped monitor whether all producers were doing their part to achieve the collective goal. Producers that did not deliver A quality milk received notice that they needed to improve. A pericenter board member visited to check everything on site (workers, milk cans, mastitis) (Interview #14, 2002). Another important step was the establishment of training programs to identify and control for key cattle diseases. As one producer stated, "Before, I would guess blindly what the disease was and what to do about the problem. With the training, the control becomes more explicit. We learn to identify the problem and how to respond. In addition, the daily lab test results give us immediate information, and we can take care of the problem right away" (Interview #10, 2002).

In 2000, the Nueva Guinea producers moved to create a formal cooperative enterprise for the procurement and processing of their milk product, starting with 180 members (Interview #3, 2002). By 2003, the cooperative had grown to 250 producers (Interview #23, 2004). By 2004, they collectively achieved maximum total daily volumes of 20,000 liters (Cooproleche 2004). In the process of shifting to the international quality standard, new rules emerged that reflected their new production organization as well as their collective sense of mutual expectations. They created agreements in four areas: (1) commitment to make necessary production process improvements, (2) price and profit paid to producer, (3) monitoring, and (4) sanctions (Interview #14, 2002).

New health and safety norms were developed, including a commitment to maintain a healthy herd by controlling for diseases (absence of brucellosis, mastitis, and TB) and to ensure hygienic milking and handling of milk on the farm and during delivery to the pericenter; as well as improving overall farm infrastructure (Interview #14, 2002). Producers also developed a pricing arrangement whereby the cooperative differentiated price based on product quality of A, B, or C grade, with A getting the highest price (Interview #16, 2002). In the past, there was only one price, as quality was not a concern. When quality goes down, the association further lowers the price of C quality milk, until producers respond. For B or C quality milk, the producer receives only the coop established price per liter, but for A quality the producer not only gets the highest price but also a profit (i.e., the difference between the association's price and what the multinational pays). These norms made explicit the definition of quality, specified with information on how to meet the desired standard. Combined with the lab and multiple testing procedures, advice, training, and constant interactions, local producers developed trust in the new way of working. This also created a sense that it was possible to work together.

In 2004, the Nueva Guinea producers began to create infrastructure in their central plant to produce specialty cheese with their own processed milk. With financing from the government, the European Union, and the multinational, as well as the resources pooled by the 250 cooperative members, they built an industrial cheese plant in 2005 (Interview #30, 2006). In 2006, this new plant began to process 10,000 liters daily to produce a variety of cheeses. They continued to sell the remaining milk (10,000 liters per day) to the multinational. Their goal was to export to the United States, targeting the Latin immigrant market, as well as to other Central American countries.

In 2007, the Salvadoran government opened its market to the Nueva Guinea cooperative's cheese products; the coop now exports 100,000 kilos of cheese monthly to El Salvador (Duarte 2007). Contract negotiations were in place with committees from Guatemala and the United States to seek approval to enter these markets. With the new Central America Free Trade Agreement, and their ability to meet the food safety quality standards of the United States, the producers hope to expand their production further and increase export sales (Duarte 2007). Initially, local producers made use of the multinational's strategy to reduce their vulnerability to low prices and income instability. Now, local producers diversify and expand alternatives, leading to more choices of local and international customers.

The Nueva Guinea producers have gone beyond organizing their own production to begin regional and nationwide connections and collaboration to improve conditions for rural producers. They created working committees with government agencies, such as the Technical Assistance Institute, the Ministry of Agriculture, and the Ministry of Public Works, to work with policymakers in defining strategies to overcome obstacles to further growth (Interview #23, 2004). A new university campus was established in Nueva Guinea to expand opportunities for local youth to train in technical fields related to dairy production (veterinary science, animal nutrition, lab technicians). By 2004, 70% of the students had done work practice on the local farms (Interview #23, 2004). There have been new electrification projects as a result of regionwide mobilization to improve local infrastructure. They also created a veterinary lab and a new transportation cooperative.

Discussion

The above evidence suggests that the spread of new quality standards, which minimize bacterial and chemical contamination, involves increasing knowledge flows

and coordinating joint actions, leading to a new way of producing milk. It illustrates how the collective learning processes affect the ability of local enterprises to adopt new practices, as well as the need to coordinate actions that bring about diffusion. New interactions and procedures fostered understanding and knowledge circulation that enabled the building of capabilities for meeting the new standards. Without collective learning, the new quality standards would not have spread, even with isomorphic pressures or a desire to imitate.

The Challenge to Institutional Theory

The bulk of the existing literature has invoked isomorphism as an explanation of the international diffusion of practices. From this framework, the emphasis would be on the role of the multinational and of global regulation as coercive mechanisms. As the practices being adopted are taken for granted internationally, this would point to imitation. Indeed, some of these elements are part of the dynamic observed. This framework, however, has limits for capturing what happens at the local level when (and if) the foreign practice spreads. Looking back, the relationship with the multinational began when entrepreneurs were searching for market alternatives. When the foreign subsidiary arrived, it created an opportunity as a potential customer, though not the only one.

Imitating a different practice is not straightforward. For example, local entrepreneurs resisted forming a cooperative and instead only shared refrigeration tanks. In addition, when they identified the multinational's demand for milk, they began adopting new standards only when they saw the benefits of earning higher income with year-round price stability. The new standards were not taken for granted locally. The ties to the multinational were not automatic, as local producers had to surmount knowledge gaps, coordinate large volumes collectively, and achieve clusterwide diffusion of new practices. Even more, the network ties typically used to explain imitative mechanisms did not exist and developed as the shift in practices occurred. Explanations based on coercive and mimetic mechanisms do not capture these aspects.

The literature on translation addresses some of the limitations of isomorphism (Czarniawska and Sevon 2005, Zilber 2006), in particular the local processes tied to diffusion. This framework highlights the adaptation of the original practice, the transformation that occurs as local norms interact with the global ones, and a new local production system emerges. It captures how the implementation is done differently. In this case, it is not the government or the multinational doing the enforcing, but the local producers actively creating ways to meet the global standards by devising their own organization and local rules in response to an international standard. This literature, however, relies heavily on fashion following, and it focuses mainly on explaining heterogeneous outcomes as the diffusing practice and the local context change. It is an incomplete way of understanding what is going on in this developing country context, as it does not address the issue of knowledge building, which is central to the diffusion of new practices and the local changes observed. The adoption of global norms involves producers gaining access to knowledge they did not have before and establishing connections to local and international actors in ways that allow them to gain new competence as dairy entrepreneurs.

Standards, Knowledge Flows, and Networks

This case study indicates that local entrepreneurs increasingly engaged in collaborative efforts that involved redefining both what product to produce and how. These efforts were by no means predictable and started in a region that was highly divided because of historical civil war conflicts, with established old ways of producing. Through concrete activities, the cluster of producers developed novel ways of organizing, noticeably building new connections among themselves.

The concept of "community of practice" (Brown and Duguid 1991, Lave and Wenger 1991) captures some of the process as it highlights such groups that collectively develop a shared understanding among those engaged in the same economic activity. With the introduction of new cooling tanks, quality standards, lab tests, and meetings, producers engaged in different interactions and joint activities that fostered new relationships and trust where it did not exist before. At the same time, the ability to become suppliers to the multinational company required a collective commitment to make changes together to produce large volumes. Just as important, Nueva Guinea producers began to establish relations with foreign communities, like the multinational enterprise and development organizations that connected them with foreign practices. They became part of networks of local and global communities, gaining access to knowledge that did not exist before locally.

This study demonstrates that Nicaraguan dairy production evolved in different ways than in the United States and Europe. The foreign multinational, rooted in the European context, could easily grasp the global HACCP quality practices. The differences between Nicaraguan and international quality practices created global communication barriers that are well described in the communities of practice literature (Brown and Duguid 2001). Though in the same industry, Nueva Guinea producers had not been part of communities or networks where they could share the knowledge emerging in other parts of the world, crucial to being competitive in integrated global markets. This barrier prevented understanding of the new regulatory requirements regarding food safety and explained why norms taken for granted in the United States or Europe had not spread in this marginalized region of Nicaragua.

The challenge to upgrade their products and production, according to international quality standards, required linking to the knowledge formed in different global communities to develop new local ways of producing. At the simplest level, the global standard could be easily imitated. The underlying knowledge behind the standard (knowing why) and the organizational and technological component to meet new requirements (know-how) is more complex. For example, adoption entailed building a common understanding of knowing why to use different and hygienic milk containers and careful hand washing; building skills to know how to detect and control for cattle diseases; establishing new routines to control for temperature, bacterial, and chemical risks; and making investments to improve infrastructure, among others. However, this meant completely disrupting the normal way of doing things.

The organizational literature has shown that building such know-how involves getting at the tacit dimensions of knowledge through shared practice and situated activity (Bechky 2003, Brown and Duguid 2001, Lave and Wenger 1991). This learning occurs through conversations and interactions between people (Tsoukas 2009). Extensive sharing of activities leads to extensive shared know-how, which in turn allows knowledge flow. Orlikowski (2002) makes the point that knowledge and practice are not separable, rather reciprocally constitutive. Tacit knowledge is a form of knowing that develops by engaging in the activities comprising the practice. Standards should not be seen as mere formal certification, but rather as facilitating knowledge circulation when producers attempt to put them into practice as they engage in new joint activities. Although the standard has codified dimensions, understanding and putting them to use depends on the practical dimensions that are central to know-how. By engaging in the new procedures associated with global norms, they build their collective ability to upgrade milk products.

To overcome isolation, the global quality standard becomes one of the ways by which local producers connect with and gain access to knowledge from other communities in different countries. The standard guides the local collective process of discovering and sharing new practical experiences to build know-how. It helps local producers set a collective direction for new skill acquisition, training, infrastructure investments, and production that supports their discovery of new ways of producing. For example, monitoring through microbiological lab tests fosters know-how sharing, as it becomes an occasion to face problems revealed by new testing procedures, get feedback, and learn from other producers' experiences, enhancing producers' understanding of causal links between their actions and the quality of their products (Bechky 2003, Carlile 2002). The decentralized boards responsible for operating each pericenter contribute to frequent interaction in small group meetings. These lateral communications among producers when there was trouble fostered knowledge building and circulation by creating a space for productive dialogue, discussing consequences, making changes, and creating new local knowledge (Carlile 2002, Tsoukas 2009). By sharing individual experiences and comparing their performance to their neighbors, there was increased understanding of what each could do differently to achieve the new quality standard (Bechky 2003). The group-managed cooling centers, the creation of a local lab for performing quality tests, the provision of training, and the development of new local norms all contributed to sharing ideas that helped coordinate changes in dairy production practice and spread new knowledge.

This study demonstrates that knowledge flow involved in the adoption and diffusion of foreign quality standards could be thought of as a collective learning process. Local-level interactions to foster understanding, interpretation, and implementation of the changes facilitate the shift from local practices to international ones. For example, entrepreneurs and committee representatives engage in visits and discussion to identify problems. Suggestions on how to take corrective actions are developed together. Prevention training and problem solving occurs in groups. Moreover, a critical mass has to achieve simultaneous common understanding for widespread adoption of the new norms. There had to be a collective effort to achieve sufficient A quality volume collectively. This increased interdependence between dairy producers, as they all had to forsake old production practices to move away from the old norm. The collective learning observed in the Nicaraguan case is similar to that highlighted in the organizational literature, where social interaction creates a context within which producers can acquire and share knowledge (Amin and Cohendet 2004, Brown and Duguid 2001, Gherardi and Nicolini 2000, Lave and Wenger 1991). It is collective as it occurs at the field level in the cluster, involving collective action and highly interactive dynamics (Miner and Anderson 1999).

Similarly, the phenomenon described indicates that quality standards diffusing in the Nicaraguan setting may be seen as intermediaries that represent practical knowledge initiated elsewhere, which can be passed along (Gherardi and Nicolini 2000). As the Nicaraguan producers face the gap between their current and foreign practice, they engage in interpretation and translation of knowledge to implement and achieve the new norms. They build joint competence in the new production system through collective learning that occurs by engaging in concrete production activities. The practice-based view of knowledge describes the process not as one of fact transfer, but as one of developing capabilities through performing real actions, experimentation, and participation (Bechky 2003, Gherardi 2006, Orlikowski 2002). By doing activities and using objects tied to the

new norms, such as reading lab test results, identifying animal diseases, hand washing, controlling for temperature, using stainless steel containers, collecting milk jointly in cooling centers, grading milk, and adopting new pricing schemes, Nicaraguan producers begin to know how to coordinate their dairy production efforts to produce new global products. In this way, local producers connect with practical knowledge tied to the notion of safe milk, which is taken for granted elsewhere (Gherardi 2006). As they engage with the unfamiliar procedures, new standards are locally constructed and validated. Collective learning is central to the diffusion process, and it is through engagement with actual practices embedded in the foreign standard that joint local knowledge building occurs.

The observed interdependence did not already exist, but emerged in the process of adopting the new practices and of joining both local and global production networks. Connections increased among entrepreneurs and between other organizations as the producers performed the new practices to produce safe milk. The institutional literature on diffusion usually highlights the role of pre-existing ties in facilitating the transmission of a practice, assuming a stable set of relations. In this case, the local network developed as new activities related to foreign norms were implemented. Specifically, the use of new milk production procedures for testing, collecting, processing, evaluating, and troubleshooting spread as the producers increasingly interacted within and outside the cluster with other organizations. By conducting concrete activities, the network emerges, consolidates, and expands as the local practices develop in response to the gap between local and global norms. This observed dynamic is similar to the view offered in recent work drawing on actor-network theory (Latour 2007), in which actors create and alter networks when attempting to combine tacit and explicit knowledge (Gendron et al. 2007, Gherardi 2006, Gherardi and Nicolini 2000). The new collective competence develops alongside new connections and emergent networks. Moreover, this case illustrates that local producers keep building new associations, such as recent ones with universities and government agencies, as an ongoing dynamic.

Conclusion

Existing organizational research highlights institutional factors related to isomorphic pressures to explain the international spread of quality practices. This study suggests an additional explanation. Collective learning processes play a central role in global diffusion, particularly among firms in developing economies. Moreover, local actions to upgrade drive the diffusion of quality standards across borders. Building knowledge, improving products and processes, and acquiring new skills are intricately linked with the global diffusion of organizational practices as late-developing enterprises strategize to survive and compete in the world economy.

This research adds to the work on communities of practice by showing how both local and global connections interact to support knowledge building. The findings show that knowledge and community are built through interaction with distant foreign ideas. The knowledge building that underlies enterprise upgrading depends not only on what is available within the community, but also on knowledge flows across communities that global standards facilitate. Although this literature has emphasized learning within communities, some have analyzed the interactions between different ones within the same organization (Bechky 2003). This study shows the importance of creating links with knowledge outside the community, where local and global practices differ significantly, as in the context of developing economies. Global standards serve to signal another practice, to initiate communication of different knowledge, and to coordinate changes in another local context across organizations. Diffusion of that knowledge, however, depends on collective learning, which challenges traditional assumptions, disrupts old ways of working, and helps develop new routines and strategies through increased interactions and shared experience among groups of enterprises.

This investigation also contributes to current organizational studies on the building of collective competence (Nicolini et al. 2003, Orlikowski 2002). This study shows that quality standards contribute significantly to cross-border organizational learning, an important phenomenon of globalization. Foreign standards may be seen as intermediaries that contribute to spreading knowledge and to spark changes in established practices when indigenous enterprises engage in active efforts to build their collective capabilities. Adoption of the foreign standard is not a given, as bringing about the changes necessary to adopt new practices is a difficult process involving active participation in new procedures, developing understanding, and coordinating among local actors.

The focus on learning contributes to enrich institutional explanations. Recent work highlights that institutionalism has given scant attention to organizational and interorganizational learning, yet it can help to explain dramatic institutional changes (Haunschild and Chandler 2008). Most of the institutional literature explains change within the confines of institutional theory. Yet learning (organizational, interorganizational, and population or industry) is intertwined with change processes (Beckman and Haunschild 2002, Gherardi 2006, Gherardi and Nicolini 2000, Miner and Anderson 1999). This study illustrates the ways in which research with a learning perspective can capture important dimensions of institutional change processes, like the diffusion of foreign practices. Moreover, collective learning can help build a view of institutions that emphasizes their ongoing changes and flexibility and the multiple sources and processes of transformation (Feldman and Pentland 2003).

One issue is the ability to generalize these findings. The spread of safety norms around the world across many products suggests that they are generally applicable to quality management of many industries characterized by supply chains, including food processing (Lazaric and Denis 2005). There is also indication that collective learning and coordination have relevance in supply chains and networks (Beckman and Haunschild 2002, Helper et al. 2000, Kogut and Zander 1996). Moreover, the diffusion dynamics observed might be common to other norms, such as environment, labor, and health, which increasingly confront firms involved with trade and investment activity in the developing world, and a broad range of organizations and industries (Sahlin and Wedlin 2008). Recent studies indicate that issues of safety in production and organizations are at the center of managerial and scientific interest, given the increasing emphasis on making firms more socially and environmentally responsible (Gherardi 2006). Traditional approaches emphasize new regulations and pressure, but research indicates that these norms are not extraneous to work practices (Gherardi and Nicolini 2000) and involve knowledge building and change (Lazaric and Denis 2005). Regulatory dimensions are certainly relevant, yet this study's findings also show there is a serious shortcoming when they are understood as separate from practice. It provides useful insights on the challenges of spreading new norms across widely different contexts.

An additional contribution is an explanation of diffusion grounded in what enterprises are doing. Although previous studies relied on macro-level analysis, based on large quantitative databases to look at patterns across a large number of countries, these have only been able to use the number of certificates as indicators of diffusion. Such an approach does not provide information on the actual diffusion process where the practice is being implemented. More process studies will enable further development of the theoretical and empirical insights presented here. There is a growing interest in strategy and organization research for more studies of the interactive and contextual dynamics of firms and markets and a closer focus on concrete practices (Johnson et al. 2007).

This research also expands understanding on how resource-poor and technologically backward enterprises from developing economies transform themselves to compete in the global economy. This is a central phenomenon as recent decades have witnessed a globalization of supply chains, cross-border production networks, increased investment and trade with developing countries, and a growing role for developing economy firms. This study therefore has important practical implications for public and private organizations, as they address the complex challenges of improving and spreading quality, social, and environmental practices in the developing world. It will depend significantly on coordinating growing interdependence, organizing and creating new local institutions, and collective learning.

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