Mexican maquiladoras: helping or hurting the US/Mexico cross-border supply chain?

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Abstract

Purpose – This study aims to report on the current issues facing the maquiladora industry in Mexico and the cross-border supply chain and to present suggestions for improving the situation in the future.

Design/methodology/approach – Phenomenological interviews were conducted with managers overseeing various aspects of the cross-border supply chain. The resulting data were analyzed using a grounded theory methodology to uncover theoretical linkages.

Findings – The results of this study show that maquiladoras experience many of the same problems as other companies in terms of managing the cross-border supply chain. Key factors such as distance, comparative advantage, and integration of the workforce cause problems everyday for the managers involved.

Research limitations/implications – This was an exploratory investigation of the issues with a small number of informants and future research needs to be done to gain additional insights. As North American Free Trade Agreement enters its second decade, and the focus on global supply chain efficiency becomes primary for all manufacturers, solving the problems discussed in this paper becomes even more paramount.

Practical implications – In addition to low-cost manufacturing, distance and integration are critical issues for companies to understand in their pursuit of a low-cost strategy for competitive advantage.

Originality/value – The major contribution of this paper has been an improved understanding of the impediments to success in the Mexican maquiladoras. Many of the issues discussed in this paper would also apply to other global supply chains and numerous other countries.

Keywords Maquiladora production, Supply chain management, Free trade, Mexico, United States of America

Paper type Research paper

Introduction

The stability and success of the Mexican manufacturing sector is critically important for US interests for a variety of reasons. From an economic standpoint, this sector is important as a source of low-cost goods for US consumers, a revenue stream for US corporations, and a tax base for the US Government. These benefits are derived since many of the companies operating in the sector are subsidiaries of US companies operating as maquiladoras. These plants transform primarily US-made components and raw materials into finished goods – 82 percent of manufacturing materials come from the USA (Whalen, 2001; Gonzalez *et al.*, 2007). Perhaps more importantly, the industry is responsible for a burgeoning Mexican middle class, hungry for US products, and it acts as a bridge to markets in Latin America, which represent

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"major market opportunities" for US products (Bowersox and Calantone, 1998). From a governmental standpoint, maquiladoras promote stabilization of the US southern border and economic growth along both sides of that border. For example, maquiladoras accounted for 25 percent of Mexico's gross domestic product (GDP) and 17 percent of Mexican employment in the late 1990s (INEGI, 1997; GAO Reports, 2003). Meanwhile, economic vitality in border towns is fueled by workers eager to purchase the American lifestyle and US maquila managers moving to the area (Lindquist, 2001; Salas, 2002; Thomas, 2001).

The last several years have been hard on the maquiladora industry, which posted negative growth of nearly 10 percent in 2001 – a loss of 253 plants with corresponding declines in employment and profitability (CNIME, 2002; GAO Reports, 2003). Orrenius and Berman (2002) reported that as of January 2002, nearly a quarter of a million maquiladora workers had lost their jobs in the previous year. This figure represented a loss of 19 percent of total maquiladora employment in just one year. Several factors account for this loss including a worldwide economic slump and the attractiveness of Asia's lower wage rates, which is prompting many maquiladora owners to move their operations to Asia (GAO Reports, 2003). While these factors are uncontrollable, the industry can reverse the downward trend by recognizing internal problems and implementing effective solutions. This study was designed to investigate this issue.

Given that transportation and logistics costs historically represent some of the highest costs associated with international operations (Bowersox and Calantone, 1998; Robinson and Bookbinder, 2007), this area appears to offer one of the most salient opportunities for the survival of the maquiladoras. This is especially true in the case of Mexico, which had the highest ratio of logistics costs to GDP of any country, based on a 1997 study of both developed and developing nations (Bowersox and Calantone, 1998). In addition, unique features of maquiladora operations might reflect problems and potential solutions to the improve profitability.

The purpose of this study was to uncover current impediments to efficient cross-border supply chain management, with a focus on maquiladora operations through the perspectives of individuals living the maquila experience daily – specifically managers of maquilas, government officials responsible for facilitating maquiladora operations, and third-party providers interfacing between the USA and Mexican logistics systems.

Historical background

The maquiladora industry owes its existence to a combination of government policies and entrepreneurial drive that formed the first maquilas in the 1960s. The first significant event leading to formation of the new industry was the closing of the US borders to Mexican agricultural workers, resulting in numerous unemployed, unskilled laborers along the border. This prompted the Mexican Government to enact a program encouraging US businesses to perform labor-intensive, value-added activities in manufacturing facilities in this border region by eliminating tariffs on re-exported materials and limiting taxation to the added value performed in Mexico. Seeing this, individuals and businesses quickly moved into the region, a move that was facilitated by the rapid growth of contract manufacturing facilities. With the eventual passage of the North American Free Trade Agreement (NAFTA) in 1994, which phased out export restrictions between the USA and Mexico, maquiladoras grew rapidly. NAFTA led to a

170 percent increase in exports to Mexico, much of it representing inputs to the maquiladoras (Whalen, 2001). Between 1994 and 2000, maquila employment grew 110 percent to the point where the industry accounted for a payroll of $63.5 billion through employment of 1.1 million Mexican workers (Gruben, 2001; Lindquist, 2001). Recently, the North American Free Trade Area boasts a total GDP of approximately $11.4 trillion, making it the world's largest free trade area (McKinney, 2004).

The maquiladora industry began its descent in 2001 with the implementation of Article 303 of NAFTA, which required maquiladoras to document the country of origin for all materials crossing into Mexico, even when all materials originated within the NAFTA trading block. This not only increased the costs of supplying maquiladoras by hundreds of thousands of US dollars, but also increased both cycle time and uncertainty associated with international sources of supply due to increased inspections of material as it crossed the border (Lindquist, 2001). As a result, maquiladoras had to increase inventory levels to ensure sufficient working materials and customer service became more problematic. Certainly, these issues increased the difficulty of achieving profitability and feasible alternatives must be developed if the industry is to survive. However, with the possible exceptions of the clothing and electrical equipment industries Truett and Truett (2007) suggests that NAFTA had either a negative impact or no effect on the maquiladoras.

Meanwhile, cultural differences between the Mexican workers and their primarily non-Mexican managers began to impede manufacturing efficiencies (Hausman and Haytko, 2003). Cultural differences, for instance, negatively affected employee productivity and turnover. They also complicated the flow of goods across the border in both directions and other important elements of the governmental interface within the organization.

Literature review

In the literature review, we examine the existing knowledge base of supply chain management, specifically as it relates to supply chain optimization and efficiency. While an attempt was made to search for specific articles related to the US/Mexico cross border and Mexican maquiladoras supply chain topics, very few were found and the majority of articles focused more on the broader topic of international or global supply chain management. This lack of existing knowledge highlights a gap in the literature regarding issues specific to the Mexican maquiladoras and supply chain management.

The primary findings of the literature review were in two areas. First, there were several articles relating to the quantitative aspects of supply chain optimization and modeling (Denton *et al.*, 2006; Giacomo and Patrizi, 2006; Dotoli *et al.*, 2005). Second, and more directly related to the qualitative research presented in this paper were five factors that were found to be critically important in optimizing the supply chain. Those factors are:

(1) distance (Bowersox and Calantone, 1998);

(2) comparative advantage (Alguire *et al.*, 1994);

(3) integration (Min, 1994; Bagchi *et al.*, 2005);

(4) mutual trust (Claro and Claro, 2004); and

(5) long-term orientation (Glaro and De Oliveira, 2004).

In terms of distance, not only must organizations manage international exchange in a timely manner, but also absolute distance carries an increasing cost as average distance between links increases (Bowersox and Calantone, 1998). Associated supply chain costs come through increased transportation costs, increased inventory carrying costs, and decreased nimbleness as the time necessary to meet market expectations increases.

Comparative advantage is obtained when firms take advantage of differentials in factor costs across countries (Alguire *et al.*, 1994; Kogut, 1985). Unfortunately, firms locating in countries to take advantage of labor or tax differentials may face diminished returns when compared with relative disadvantages in the flow of goods and information across borders (Bowersox and Calantone, 1998).

Integration between members of the supply chain harnesses cooperation, effective communication, and mutually beneficial goals to improve firm performance. Cross-national supply chains face problems managing diverse cultures, customs, and bureaucracies in attempting to achieve the benefits derived from integration. These issues complicate international sourcing, where supplier selection decisions cannot be optimized due to conflict among the factors influencing these decisions (Min, 1994). Using correlation and multiple regression techniques Bagchi *et al.* (2005) found that supply chain integration affects operational performance and the degree of integration also influences cost and efficiency.

Claro and Claro (2004) found that mutual trust and long-term orientation were enhanced when implemented using a cross-border integrator and were found to support the coordination of the business relationship. When emphasis was placed on coordination overall efficiency of the supply chain was increased through reduction of internal and transaction costs.

Methodology

To develop an understanding of how managers of maquiladoras currently deal with supply chain issues, factors influencing their supply selection decisions, and uncover possible problems affecting supplier optimization, we developed an interview guide centered on cross-nation supply chain issues (see Appendix). Two stages of data collection were completed. In the first stage, phenomenological interviews were conducted with managers overseeing various aspects of the cross-border supply chain, including customs brokers, regional economic development offices, maquiladoras, and contract manufacturing facilities (Thompson, 1997). Thus, informants were selected using purposive sampling to tap the broad range of perspectives (from maquiladora managers, foreign trade zone representatives, economic development agents, and customs brokers), rather than as representatives of the population in a statistical sense (Lincoln and Guba, 1985). Some of the participants were selected through a snowball procedure, whereby one participant would recommend others. All informants signed informed consent release forms and were assured anonymity.

The first round of interviews were conducted by two researchers in person at the participant's place of business, some in the USA others in Mexico. Interviews took place in the offices of the informant and in most cases interviewers were given tours of the facility as part of the interview. Careful field notes, including photographs, made during the interviews allowed access to perspectives in action, which were later compared to the perspectives of action contained in the transcribed interviews (Arnould and Wallendorf, 1994). Along with member checks, this triangulation of methods both increased the richness and improved the trustworthiness of the data (Lincoln and Guba, 1985). The first round of data collection resulted in eight interviews, which were audio taped and transcribed; resulting in approximately 175 single-spaced pages of text (see Table I for respondent information).

The second round of data collection involved interviews conducted by phone by one of the primary researchers. These interviews were completed with the original participants to confirm that we had accurately conveyed their thoughts and feelings (known as member-checking, see Lincoln and Guba, 1985). In addition, four more participants were contacted on the Mexican side of the border to broaden the sample from the Mexican perspective. This second round of data collection resulted in four new interviews and 76 pages of transcribed text.

As recommended by Thompson (1997), the interviews were guided by the perspectives of the informants and additional perspectives gave voice to alternative perspectives until saturation was achieved. Prior to the interview, the participants were told the general purpose of the study; to examine the cross-border supply chain issues. The primary aim of this type of qualitative investigation is to understand experience as closely as possible as its participants feel or perceive it. The depth-interview method offered the opportunity to gain insight into the participants' subjective experience of their day-to-day supply chain management issues. As a result, the course of the interview dialogue was set largely by the participant and the issues question guide used as a backup to be sure that everything was discussed at some point in the interview. In several cases, multiple informants were employed to ensure adequate representation of the experiences typical within the firm.

The resulting data were analyzed using a grounded theory methodology to uncover theoretical linkages, rather than to test existing theory (Glaser and Strauss, 1967; Strauss and Corbin, 1994). Two researchers analyzed all of the transcripts utilizing an iterative reading strategy following the general procedures set forth by Corbin and Strauss (1990). Subsequently, researchers sought elements of similarity and divergence across informants using marginal notes, coding, and summary sheets (Huberman and Miles, 1994). These first-order concepts were built into second-order concepts to explain the emerging pattern of relationships (Van Maanen, 1988). The first stage of coding, termed open coding, sought to identify discrete ideas. Data that appeared to

Pseudonym	Title	Industry	Nationality
George	Export manager	US electronics	USA
Miguel	Export manager	Japanese chemicals	Mexican
Thomas	Owner	Customs broker	USA
Peter	Owner	Customs broker	USA
Juan	Customs agent	Customs dept. – Mexico	Mexican
Jesus	Customs agent	Customs dept. – Mexico	Mexican
Susan	Manager	Econ. development office	USA
Jose	Manager	Foreign trade zone	Mexican American
Manuel	Manager	Mexican trucking company	Mexican
Diego	General manager	Mexican agricultural products	Mexican
Joel	Former manager	US agricultural products	USA
Richard	General manager	US telecommunications	USA

Table I. Characteristics of informants pertain to similar ideas were clustered into categories and subcategories. Connections between categories were identified through axial coding, the second type of coding. Open and axial coding were not conducted in linear fashion, but instead the researchers moved back and forth between them to refine the categories. The final type of coding, selective coding, was used to identify the experiential story that emerged from the data. Thus, the evolving theory is both a more explicit conceptualization of the theories in use and a closer approximation of the socially constructed reality of informants. Such theories are conceptually dense (Strauss and Corbin, 1994).

Results

In this section, we focus on three of the five key factors described in the literature review as important in implementing cross-border supply chain relationships: distance, comparative advantage, and integration. Through the detailed process of data analysis, these three factors emerged as important to the majority of the respondents. The other two factors, trust and long-term orientation were not mentioned separately in the transcripts. Trust (or more often the lack thereof) is inherent throughout the interview and thus, not a separate issue for these participants. Long-term orientation was not mentioned in that most of the individuals dealt with day-to-day, hour-by-hour issues and did not seem to think in terms of future interaction. Each of the three factors we did find is detailed with respect to how it manifested itself in the interview data. While these problems surfaced for nearly everyone, solutions do exist. The solutions are presented in the evaluation section.

Distance/time issues

While distance should be an advantage for the Mexican maquiladoras compared to other global suppliers, the time to cross the US/Mexico border is frequently an issue in both the north and south bound directions. Many of our respondents described serious problems relating to the transport of goods effectively and efficiently between countries. The majority of these problems were a function of having multiple jurisdictions, which caused significant delays in the time it took to transport goods across national borders. For example:

> [Slowdowns] are usually on the Mexican side. See, on the Mexican side, at least southbound traffic, usually encounters several different things. One is that the documentation process is pretty good. It's just when it gets to Mexico, the inspections. Over in Mexico, if we have one piece over what's documented on the invoice, it's considered contraband. They automatically fine you; they pull you into a secondary storage area or parking area and want you to unload everything. That can take hours or days. It can be days if they don't want to let it go. If you don't want to work with them, and give them a little bonus on the side, then, you're out of luck. You can be there maybe a week, depending on what it is [the violation] and what company you are. The bigger manufacturing companies have more pull, they've been more established, and they are already well known (Jose).

As this example shows, governmental regulations can impose significant slowdowns on products being shipped across the border. Although the process has improved significantly with increased utilization of technologies such as electronic documentation, it is still cumbersome. Part of the problem is due to efforts of both governments to stop the flow of contraband, especially recreational drugs and illegal immigrants. Southbound traffic also faces problems resulting from friction between the nations. For instance, recent problems over US subsidies of agricultural products led Mexican customs officials to reject sugar trucks headed for Mexican candy-making operations for several days until an equitable solution was found (Putnam, 2004). In a related incident, Mexican farmers blocked one of the main bridges for several days in protest of US agriculture practices they considered unfair (Putnam, 2004). The refusal of US officials to allow access to Mexican trucks as dictated by NAFTA has also created an atmosphere of retaliation between the nations leading to border crossing problems (Putnam, 2004). A final reason for slowdowns along the border is Mexico's desire to keep out competing products from other countries. According to George, Mexico sees these countries as "competitors for their industries and resources" so they check trucks coming into Mexico to ensure they do not contain any products from outside the NAFTA trading block that are not listed on the manifest.

We spoke to two Mexican customs officials and asked them about the detailed checking of trucks for contraband. This is what Jesus had to say:

> Of course, we check manifest for each truck. We are well aware of the negative things American companies say about Mexican officials, so we take pride in making sure that they meet all of our requirements. We are sick of hearing that things are so much more easy in Mexico. It's important to us to make them understand that we care about finding illegal shipments just as much as they do. We have laws too! (Jesus).

Juan added that the American customs officials are just as likely as the Mexican officials to send a truck over to the parking pad and make them unload. He said that the American customs officials are more likely to examine the individual trucks for violations with respect to the vehicles themselves rather than the content of the shipments.

Whatever the nature or cause, these slowdowns can diminish any labor or other comparative advantage a firm sought to capitalize on when locating to Mexico. This is especially true for small businesses that lack the power to influence Mexican officials. For instance, George, who is a Manager at one of the major maquiladoras, told us he had negotiated special crossing times for his trucks to minimize crossing difficulties. Only one of our informants said that she saw no problems with border crossing for trucks from either country. Susan, who manages the economic development office on the US side of the border, was very positive about everything we discussed in her interview. She said that education is not "such a big deal" in Mexico. She also believes that the end result of NAFTA was not the loss of jobs to Mexico but instead an increase in skills and wages for the Mexican workforce. The majority of our informants disagreed with her comments and described numerous problems with border crossings, customs and government requirements.

In addition to government regulatory problems, there are issues with Mexican unions that affect border crossings. Several of our participants talked about the strength of union leaders in certain parts of Mexico as the following example explains:

> The trucks here in [US border city] I can say, actually have been pretty good compared to Laredo. In Laredo, they can take forever to get your trucks across. One thing over here is that we don't have drivers charged to take your trucks across or actually across the border. Whereas in Laredo, you have to have a Mexican union truck come across, pick it up at the U.S. side warehouse, they charge you eighty dollars for that, and they take it back. And then they transfer it over to one of our trucks, which takes it to its destination in Mexico. So, they have that down to where every crossing is eighty dollars. And it varies, I've seen as high as

> ninety-five dollars, and sometimes as low as sixty dollars They won't let you cross a truck unless that thing is hooked up to union trucks. You try it, and good luck, you're not going to cross it. It's not going anywhere ... The drivers over there, the union has their representative over there ... They won't cross there. That's not a picket line, but it's kind of like a mafia, really. You go over there, and there's really nothing you can do about it (Peter).

> We've had some labor issues. It's been very good. To answer your question, I think it's been very, very good. We've had some real good leadership here locally. We don't have the agapito, who's ninety-some years old, sitting down there in Matamoros. Mata-moros is almost twice our wage rate here in Reynosa. They are also on a forty hour work week, and we're on a forty-five here ... it's like a local union they've had a lot of strike issues over the years down in Matamoros. The whole labor thing has been – there's been a lot of unrest over the years. And agapito is just one of those strong –. He's still around, this guy is still kicking, still president of the union down there. I think he's ninety-something years old ... and he controls everything (Richard).

As these examples show, government regulations, customs issues, and even union issues on the Mexican side of the border seriously impact the border crossing times and experience that companies involved in cross-border shipments deal with on a daily basis. Managers deal with these problems by realizing that they are a cost of doing business and cannot be helped or changed until the rules change. The issues of kickbacks and the corruption of government officials in Mexico also affect border crossings (Hausman and Haytko, 2003). Few of these participants believe that any rule changes are coming soon.

A second distance/time issue had to do with the duplication of resources, rather than the efficient utilization of resources, across borders. The decision to operate a maquiladora plant in Mexico is driven by a number of factors, not just the availability of inexpensive labor. Initially, the idea was to have "twin plants," a component production facility in the USA and an assembly plant in Mexico. However, this reality rarely occurred. Instead, many companies chose to relocate both facilities to Mexico and limit their US operations to headquarters and warehousing facilities. However, some companies tried to manage facilities on both sides, with limited success, as the following example illustrates:

> Having a warehouse over here for someone who had a kind of medium amount of business, it becomes a tar-baby (a sticky situation that is hard to get out of). You can't have just one guy, because what if he's sick? What if he's on vacation? What if you only had one forklift, because what if it breaks down? It would make it tough. So, you end up with all this stuff over here and it becomes a big cost thing with them (Thomas).

This example shows the challenges multi-nationals face when implementing a cross-border strategy. In a sense, the decisions are the classic "make" or "buy" decisions faced by all organizations. However, the requirements of maintaining facilities on both sides of the border lead to inefficient use of resources and ultimately negate the cost savings achieved by locating in a less expensive labor market.

A final distance/time issue has to do with the rigidity of local logistics, both in terms of providers and participants in the process. This manifested itself through an engrained cultural belief, as the following example shows:

> You still can't get Mexicans from Monterrey to go anywhere but to Laredo. They won't change, even though it costs more money and takes more time. It's the Camino real – the

> royal road, from Mexico City to San Antonio. They've been doing it for five hundred years and they're not about to change just because it makes more sense, is faster, and costs less (Peter).

This participant explains the "royal road," which is the one large highway system traversed by many of the Mexican truck drivers. There is a lot more to this quote than the fact that the participant believes that the Mexicans he works with are resistant to change. Much of the problem lies in the social structure of Hispanic cultures. These drivers are familiar with the route and who works on the route. They know exactly what they face when dealing with Mexican customs and any other officials they may meet along the way. As such, they do not wish to deviate from the familiar, leading to less efficient transport of goods for the client company.

We specifically asked Manual, who owns a Mexican trucking company, about the "royal road." Here is what he said:

> I love the way the Americans come up with these terms to describe OUR business! We have our own ways and we follow our own ideas. Just because we don't take what they think is the fastest way or the best way, that doesn't mean that we aren't doing our jobs. Our way can be the best way because we know the routes, we know the problems, we know the side tracks. I wish they would just let us do our jobs! (Manual).

This same form of ethnocentricism exists when dealing with local transportation providers. Some may call this corruption, others will view it as normal operating requirements, as can be seen in the following example:

> I had my own fleet of trucks when I was up in Michigan. Down here, I didn't have a fleet of trucks. I had to get a local carrier. Come to find out, one guy was running the whole place, he had this whole city. Like, you couldn't talk to anybody without going through them. Every time you went out to quote, as soon as you got the quote back, you could just tell those guys were in collusion. They're all deadbeats (George).

Understanding the cultural issues, such as business customs and ethics, and also the great emphasis on family and friendships, would help the manufacturer accept this experience as a cost of doing business in Mexico. While the manufacturer would prefer to bid out transportation, he must face the fact that there is only one option and learn to adapt to this situation.

The net result of supply chain problems is that managers carry larger inventories in their maquiladora plants than in comparable US plants. For instance, George told us his plant maintains about two weeks of material to ensure a constant flow for production to fill the anticipated 17-18 semi-trucks per day. Because material must cross one of a handful of bridges to get from the plant to its international customers, heavy traffic or bridges closed to traffic limits the flexibility of maquila plants relative to their US counterparts.

Comparative advantage issues

As Porter (1990) claimed, global sourcing enables a company to capture local advantages. Kogut (1985) asserts that, since factor costs vary from one country to the next, firms could take advantage of these differences by locating the activities comprising its value chain in countries that possess a comparative advantage in the factors that a given activity used intensively. Porter was adamant that there is no excuse for accepting basic factor disadvantages and that a firm must view its production system in global terms and disper se particular activities in the value chain to whatever country enjoys advantages. While these ideas make intuitive sense, implementing them is sometimes quite difficult, as is seen in the following example:

> It's about economies of scale, moving an operation over there. Big volume and your wage rates are so huge. Like here, were General Motors pays $18-$27 an hour for factory workers. They move down there, and everything is considerably less, with the same technology. That's what it takes, because of all the costs of moving down there, administrative costs, all that stuff going up over there. The only thing that is cheaper is the actual in-line labor (Joel).

What this example illustrates is that trading comparative advantage in labor factor with equivalent costs for other resources – only works when labor is the major factor cost. Thus, the costs to the entire value chain have increased and the labor cost advantage has been lost.

Another example shows a similar problem with trading one cost function for another without regard to the entire systems' costs:

> I think a typical US wage, on the hourly basis, is probably in the vicinity of nineteen and twenty bucks and hour. And you can almost double that for benefits. In the Mexican arena, right now, we are probably in the range of about two dollars and hour. And you can almost double that, too, from a benefits standpoint, to four dollars. Of course, what you gain in terms of labor [costs], you usually end up paying logistics, and the infrastructure and you run into power [electricity] problems (Richard).

In this example, the company traded off the comparative advantage in the labor factor with higher logistics and infrastructure costs. Richard also commented on the higher power and administrative costs encountered in Mexico compared to his experiences with similar US plants. Without viewing the entire value chain, a company misses the uneven balance in the total cost structure by focusing solely on the labor factor.

The type of product also determines the nature of the comparative advantage that can be obtained through logistics activities. Diego, who owns a Mexican agricultural company, explains what he sees as his firms' advantage:

> In my industry, word is that the Americans are looking for less expensive produce and are starting to ship from South America and as far away as China because the labor rates are so low. What they seem to be forgetting is that we have the best quality product around and that getting to the U.S. while its still fresh and edible is much easier from here in Mexico than from half way around the world in China. Also, we inspect all of our produce in the ways the Americans like, following their rules, while who knows what you get from other countries. This is our advantage. We provide a great product, quickly, before it has the chance to go bad. So what if it costs us a bit more to pick, it costs less in the long run since it stays fresher for much longer (Diego).

A third example illustrates something all multi-national firms face; communication barriers. Many of our participants complained about the number of different governmental and non-governmental agencies that have power over their ability to do business. It seems many of the agencies are unaware of other agencies requirements and thus, manufacturers attempting to comply with all rules and regulations encounter numerous problems in meeting these requirements:

> It's very hard to get information. You go to customs, "How do you do this?" And they tell you to do whatever. Then you find out they didn't tell you everything. You're supposed to register

> with Treasury, you're supposed to register with customs, and you're supposed to register with their equivalent to OSHA. And then you take their equivalent to OSHA, and then there's another outfit completely different that's responsible for administering OSHA. They both have power over you and then the state can come in and inspect you for the same thing. So, you have three or four different inspectors coming in, all looking at the same stuff and using their own set of rules. It gets to be a never-ending cycle of correcting this and correcting that, finding out this and finding out that (Joel).

This example shows that this company traded off the benefits of reduced labor costs with poor information flows. As such, they are often unable to meet requirements for doing business in Mexico. The only way management saw to address these problems was to hire a "compliance officer" to oversee all of the various agencies to which the company was responsible. This represented another significant cost of doing business that offset the comparative advantage of lower wage rates in Mexico.

Integration issues

Another key problem described by our participants was the difficulty in integrating the supply chain due to the challenges inherent in managing a multi-national workforce and developing ways to train and integrate the workforce to achieve maximum efficiencies. The logistical problems encountered by goods at the border are also encountered by workers who must migrate from one country to the other daily, as the following example shows:

> The fastest I've been able to cross [the border] is about 20 or 30 minutes. An hour is about average, which is why it starts to really affect the companies on both sides and the workers, as well. The upper management is always on this side. Usually, they have to cut out about 3:30, just to deal with the traffic ... That's pretty much the biggest complaint, dealing with the Mexican traffic, not only on the bridge, but in general. People say, "God, it's crazy, I'd much rather drive in L.A. than in Mexico." ... As soon as they cross the border, they have a feeling of insecurity. They just don't feel comfortable knowing that they're in another country. They're in Mexico and, I guess, they feel there's no law. You're considered guilty before (Jose).

This informant, who works for the foreign trade zone working with a number of maquiladoras, points to additional stressors on US managers, especially the sense of alienation they feel. A manager whose firm relocated to the US side of the border after an unsuccessful venture in Mexico echoed this sentiment. His comments provided support and a rationale for similar administrative wages on both sides of the border, but suggest that maquilas may be hampered by problems hiring and retaining qualified management skill. Joel, who worked on the Mexican side of the border in the past, had this to say:

> If I was approached and they said, "OK. I'll pay you a $100,000 to run a plant in [Mexican city]. I would think twice. I really would. It [the salary] would be a big jump for me, but I'll probably be dead in five years, just from the hassles and nerves, it's a tough job. I have a neighbor who leaves at 6:30 in the morning and he's home by 6:30 every night (Joel).

To alleviate some of the problems associated with using US-based managers, many of the maquiladoras have attempted to hire and train Mexican managers to run their companies. Most have experienced a small degree of success in these efforts; with several of our informants reporting that approximately 50 percent of their managers are Mexicans. Miguel, a Mexican-born import manager working for a Japanese chemical company, told us that his education was in the USA. He said that his employer specifically sought Mexican nationals for management positions. Corporate executives felt they could gain a stronger foothold in Mexico by employing Mexican managers. Their biggest mistake, according to Miguel, was expecting Japanese management principles to work well in Mexico. He reported that the company had exercise sessions each morning that he was required to attend. As more and more people complained, the Japanese managers had to drop this program and other similar ones.

With respect to Mexican managers, they tend to be found more frequently in the middle management ranks and not in the highest echelons of the firms. This process, however, progresses discontinuously, as suggested by the following:

> It's kind of a catch 22 for us over time. It seems like, just when we get that high potential individual, we have to put him through his Masters, given them various work experiences and the Maquiladoras next door steals him . . . It's a very competitive market, that skill set, those types of people, are not readily available. They're just not out there. You can go find some for a premium (George).

Supporting this is the statement of one of our informants:

> There's a lot of transitory-type people that are coming up here. They want to make a little bit of money, and they're going to go back home. Their families are back there. There's kids coming up here, I think there is a group or at least a segment that want to hook into a Maquila, get their college degrees, and go back home (Richard).

These two examples illustrate the problems with hiring and training Mexican managers. Nearly everyone with whom we spoke had experienced these problems. Given that domestic talent is heavily sought, those who are well trained are in high demand and willing to jump to another maquila for a significant increase in pay and/or benefits. An important aspect of the second quote is the use of the word "kids." The maquila workers are indeed kids, as the average age is approximately 18 in many of the plants. These workers join the maquilas to gain an education and to support their families at home in the interior portions of Mexico. Once they have reached their goals, they leave. These employee problems add up to a significant cost to the Maquila to hire and train good workers. Turnover is a major concern. Because of this, there is another tradeoff between inexpensive labor and costs of professional development.

Evaluation

The results of this study show that maquiladoras experience many of the same problems as other companies in terms of managing the cross-border supply chain. Key factors such as distance, comparative advantage, and integration of the workforce cause problems everyday for the managers involved. These problems, along with rising relative labor costs, have contributed to the recent decline in the industry. While the problems may be similar to those encountered in other contexts, there are a couple of unique solutions that offer hope for the lagging industry. These solutions make a managerially-relevant contribution to the literature. An additional contribution comes from the similarity between the maquiladoras and emerging situations in Europe. Increasingly, European manufacturers find their neighbors in Romania, Hungary, and surrounding nations offer attractive labor markets and are moving production to these countries. As they do this they are likely to encounter problems like those described here and may find the solutions offered present viable options for their operations.

First, the owners of the maquilas need to embrace the value chain concept and realize that bottom line costs are not only affected by inexpensive labor rates, but also by other production and logistics costs. Several of our participants said that the owners of the maquilas were beginning to look to China and other Latin American countries as more cost effective alternatives and moving their operations to these countries. For instance, labor rates in China are more attractive than those in Mexico, resulting in a booming maquiladora type industry in China. To the extent that products manufactured in China will be consumed in the region, this trade-off makes financial sense. However, it makes less sense to trade the 12 week delivery time needed to ship products to Western markets for much lower wage rates. As our examples show, this trade off can be detrimental to the bottom line if it leads to increased costs, reduced flexibility, and strained customer relationships, as a result increased variance in deliveries. In fact, difficulties achieving success in Asian manufacturing operations have led a number of firms to re-open their more cost effective maquiladora operations effective (Berton, 2004).

It is important that management uses a least total cost strategy when planning and implementing multi-national endeavors. As Porter (1990) suggests, firms must capitalize on advantages in each part of the value chain in the countries that offer those advantages. Maquiladora plants could further capitalize on existing competitive advantages by increasing the number of domestic suppliers.

While labor rates for maquila workers are important, it is also important to implement growth and retention programs for domestic managerial talent. These managers help navigate the political and cultural roadblocks necessary for efficient and successful operations. As our participants explained, there are currently few managers of Mexican decent. Those that do take advantage of educational opportunities are often lost across the border, to the USA, or recruited by other maquiladoras. Management development programs could be developed within the Mexican Maquiladora Association or by each individual firm. Pooling resources within the association may be the best way to grow native Mexican managerial talent. An informant who is an automotive maquila manager said that his firm is working hard to develop this type of managerial training program, utilizing a rotational training program that exposes trainees to business at the corporate headquarters in Michigan as well as the warehousing and maquila manufacturing facilities in Mexico. Many more of the maquilas need to implement these types of programs.

Second, although not a solution for all the logistics problems facing the maquiladoras, domestic sourcing (in this case from Mexico) appears to offer promise for improving supply chain performance, thereby improving firm profitability and survival. Ramirez (2003) reported that the maquiladoras sell very little of their output in Mexico and buy no more than 3 percent of their materials, parts, and components from Mexican suppliers. This is a problem that could be solved. Domestic sourcing reduces the distance over which materials must be shipped to meet the manufacturing demands of the maquiladora industry and reduces time delays caused by border crossing. Reduced distance reduces transportation costs while increasing flexibility achieved through more rapid transit.

Domestic sourcing also exponentially increases the comparative advantage achieved through differential wages in the labor factor. Currently, with 82 percent of process materials emanating from the USA the impact of wage differentials is limited to those experienced in the assembly of these materials. If domestic sources were utilized, the wage differential experienced in the manufacture of process materials arguably reduces acquisition costs of these materials – thereby reducing manufacturing costs of maquiladora products.

Establishing domestic sources has been problematic for the maquiladora industry, a problem our informants attributed to poor reliability of domestic suppliers in terms of meeting delivery schedules. Several of the informants said they hired an individual whose primary responsibility was to procure materials from Mexican sources. Again, utilizing Mexican managers in these roles might alleviate some of the difficulties, as they would share a cultural lens that might increase cooperation among the firms. Developing Mexican sources should be viewed as a long-term goal of the maquiladora and not a tactical goal. Adopting this strategic view of Mexican sourcing might alleviate some of the current frustration, while providing for future improvements.

Finally, for the maquilas to regenerate and begin to grow again, efforts must be made within the NAFTA trading bloc to further eliminate barriers between the countries. As our study shows, transportation across borders is a time consuming and sometimes very expensive proposition for both goods and workers. USA-Mexico trade has nearly tripled under NAFTA, growing from US$81 billion in 1993 to 235 billion in 2003. Trucking is a vital aspect of the trade partnership because trucks move approximately 80 percent of the value of bilateral trade (Schulz, 2004). Many of the border crossing problems described by our participants related to the fact that neither nation's trucks are allowed beyond 20 miles of the border, requiring the switching of drivers and loads sometimes several times during the border crossing process. On June 7, 2004, the supreme court issued a unanimous decision to open the border to Mexican trucks. Trucks were supposed to have complete access in both nations by the year 2000, but unions, environmentalists, and lobbyists had blocked access. Two logistics suppliers say the decision could cut between 30 minutes and four hours off cross-border shipping times (Kachadourian, 2004). In part, this openness has been facilitated by technological improvements along the border that allow vehicles to be X-rayed for contraband as they cross, which reduces the need for costly and time consuming manual inspections. It is unclear when the change will be fully implemented. When it is, USA-Mexico shipments will be free to travel in the same truck and trailer and with the same driver. When this paper was being written, there were renewed attempts in the US Government to implement a trial program for Mexican motor carriers in the USA and vice-versa.

While the supreme court decision should alleviate some of the problems faced by our participants, it will not eliminate the customs related problems. However, a new proposal for creation of a full-blown customs union among the three members of NAFTA has attracted attention from candidates for the presidencies of Mexico and Canada as well as the USA according to Robert Pastor of American University (Pastor, 2004). The development and implementation of such a union is believed to be the best action to take to create uniform border crossing requirements across the entire North American trading block and a way to lessen the corruption that exists among Mexican customs officers.

Conclusion

We have used grounded theory developed through depth interviews to highlight some of the fundamental issues facing the maqiladoras and the economic development of cities on both sides of the USA-Mexico border. The major contribution of this research is that it provides an understanding of the impediments to success in the maquila industry. Many of the issues described in this paper would apply to other supply chains, involving numerous other countries. It is important to note that this was an exploratory investigation of the issues with a small number of informants and future research needs to be done to gain additional insights. As NAFTA enters its second decade, and the focus on global supply chain efficiency becomes primary focus for manufacturers, solving the problems identified in this paper becomes paramount. From a managerial perspective, in addition to low-cost manufacturing, distance and integration are critical issues for managers to understand in their pursuit of a low-cost strategy for competitive advantage.

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Appendix. Interview guide

- Differences between managing a cross-national supply chain versus a purely domestic one.
- Benefits and problems associated with cross-national supply chain management.
- Logistics issues: what opportunities/problems exist and how do they affect the quality of the relationships?
- Tactics for managing constraints by several governments, both local and national.
- Security issues: how have the borders changed?
- Future challenges and plans for adapting to change.
- Future opportunities and plans to capitalize on them.

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