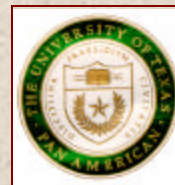


Charter Evolution in Maquiladoras: A Case Study of Reynosa, Tamaulipas



John Sargent
The University of Texas-Pan American

**Working Paper #2003-16
January 2003**



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Abstract: For the first time in its 35 plus years history, beginning in November, 2000 Mexico's Maquiladoras have suffered significant job losses. Factors such as the US recession, a strong national currency, rising wage rates, steep tax increases, NAFTA article 303, and modifications in various international agreements have all contributed to the loss of over a quarter of a million Maquiladora jobs. Given the upward shift in total costs and increased competition from exporters located in lower wage countries, Maquiladoras must now face the challenge of transitioning into a business model that combines moderately priced labor with higher value added production. Relying on interviews at 40 maquilas in Reynosa, we investigate the dynamics associated with this shift. Central to our study is the concept of a subsidiary's charter-defined as the business, or elements of the business, in which the subsidiary participates and for which it is recognized to have responsibility within the larger firm. We find that maquila auto part suppliers have been able to renew and at times even extend their charter. However, charter erosion and/or charter loss is common in another major maquila segments. Although there are clear winners and losers, our results suggest that the most attractive maquila segments can successfully transition into a higher value added model.

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The maquiladora program (often shortened to maquiladoras or simply maquilas) has created significant economic benefits for both Mexico and the United States (US). Among other things, the industry has provided jobs in the formal economy for large numbers of Mexican operators, technicians, and managerial employees. By being able to tap into a readily available low wage, developing country workforce and to ship goods by land, many firms serving the US market (the destination for more than 95 percent of maquila exports) have found Mexico and especially its northern border to be an ideal manufacturing and assembly location. With these advantages, it should come as no surprise that the maquiladora industry has enjoyed near continuous year to year growth in output and employment since the program's inception in 1965. To give just one measure of the program's success, the total number of maquila jobs jumped from 113,897 at the start of 1980 to an all time high of 1,338,970 by October 2000 (INEGI, 2002).

Past accomplishments, however, are not always the best predictor of current or future performance. Starting in November 2000, a combination of factors have contributed to an unprecedented loss of dynamism in the industry (Sargent and Matthews, 2003). The recession in the US has reduced the demand for maquiladora products. A strong, some would say overvalued Mexican peso and rising direct and indirect wages for Mexican employees has significantly increased the costs incurred by maquiladora operators. In addition, the Mexican government has shifted from a regulatory philosophy of treating the maquilas as a program designed to create jobs to an industrial sector that should pay its so-called "fair share" of taxes. Various developments in the international trading environment, such as the implementation of Article 303 of the North American Free Trade Agreement (NAFTA), China joining the World Trade Organization, the Caribbean Basin Trade Partnership Act of 2000, and the rapidly

approaching expiration of the Multi-Fiber Agreement in 2005 have all increased the benefits associated with producing goods and services for export to the US in developing countries other than Mexico. In response to these changes, numerous multinational corporations (MNCs) have significantly reduced and in many cases even closed their Mexican production facilities (Calbreath and Lindquist, 2002; Johnson, 2002; Malkin, 2002; Smith, 2002). When compared to the employment levels reached in October 2000, by August 2002 over a quarter of a million maquiladora jobs have been lost (see Table One). In Cd. Juárez and Tijuana alone, maquila job losses total over 114,000.

Table One: *Changes in Maquila Employment by City and Sector*

	01/1994	10/2000	08/2002	Job Losses
City				
Cd. Juárez	129,991	262,805	197,378	65,427
Tijuana	80,506	198,776	149,593	49,183
Reynosa	34,874	67,275	67,609	<334>
Matamoros	39,126	69,989	56,435	13,554
Mexicali	19,495	63,562	50,627	12,935
Cd. Chihuahua	28,336	52,631	40,669	11,962
Sector				
Electronic	190,940	465,742	322,132	143,610
Auto Parts	126,061	248,488	232,180	16,308
Apparel	67,269	289,401	237,982	51,419
Industry Total	546,433	1,338,970	1,085,154	253,816

Source: INEGI, *Banco de Información Económico, Industria Maquiladora de Exportación*

Unless something truly dramatic occurs (such as a major peso devaluation), the current downturn suggests that there has been a semi-permanent or perhaps even permanent shift in the overall attractiveness of Mexico as a production location for MNCs serving the US market. In this paper, we investigate the efforts of Reynosa based maquiladoras to maintain their

competitiveness when faced with this new business environment. Located along the South Texas-Tamaulipas border, Reynosa represents an especially interesting site to examine the industry's search for a viable competitive model. Of the six largest maquiladora concentrations, Reynosa is the only city that has not experienced significant aggregate job losses over the November, 2000 to August, 2002 period. Another strength of the current study is that as a source of data we rely on in-depth interviews with top maquiladora managers. These individuals are acutely aware of the threats inherent in the new competitive environment and many have significantly altered what they and the operations they lead are trying to accomplish along the US-Mexican border.

In addition to new insights into maquiladora strategy and competitiveness, we believe our study has clear implications for policy makers in Mexico as well as in other locations in the developing world. Placed in this broader context, maquiladoras are just one component of what has been called the global export processing zone (EPZ) industry (Grunwald and Flamm, 1985; ILO, 1998). Historically, EPZs have represented an especially controversial form of foreign direct investment. In these zones, firms typically import the great majority of their raw and intermediate materials, process those inputs utilizing a low wage, developing country workforce, and then export the final product to industrialized country markets. When a zone is first established, participating firms tend to specialize in low value added assembly activities. While some EPZs never evolve beyond this initial stage, once the local workforce gains sufficient skill and experience MNCs will ideally begin to transfer more complex assembly and manufacturing operations to the zone. At the same time that the local skill base is improving and essential infrastructure is being built, lead MNCs can serve to attract a variety of specialized service providers such as tool and die makers, metal stampers, plastic injection molders, and others.

Eventually, this collection of lead firms and key suppliers supported by specialized infrastructure may coalesce into a highly productive cluster that is no longer dependent on low wages and tax breaks for its survival. The experience of countries such as South Korea, Singapore, and Taiwan provide concrete examples of how EPZs can serve to facilitate cluster formation and advanced industrialization (Galhardi, 1997). Mexico's maquiladoras are perhaps the most visible contemporary test case to determine if the Asian Tigers' experience with EPZs can be recreated in the Americas. Through systematically capturing the viewpoint of Reynosa maquila managers regarding the ability of their plants to prosper in a higher cost environment, our study is designed to provide policy makers and interested scholars a well informed lens regarding the evolutionary potential of these firms to continue down the path leading to advanced industrialization.

MAQUILADORAS AND MAQUILA STRATEGY

As alluded to in the prior section, there is no guarantee that EPZ firms will evolve into higher valued added activities. A long academic tradition has shown that MNCs tend to perform core functions such as research and development, product design, and the manufacture of new, innovate, and difficult to make products in the industrialized world. Vernon's (1966) well-known product life cycle proposes that only after an item has transitioned into a standardized product and cost competition has become intense will MNCs relocate production to a low cost, developing country location. With standardized products, all of the competing firms are aware of the most efficient way to manufacture the item, year to year design modifications tend to be minimal, and competition revolves around which firm can access the lowest wage labor force and the transportation costs of delivering the final good to the end user. Since MNCs typically

do not have access to a highly skilled workforce in these low cost locations, there is a tendency towards dividing the assembly and/or manufacture of standardized products into very simple, discrete steps. By doing this, an unskilled factory worker with minimal training can rapidly master his or her job and the expense associated with training a developing country workforce prone to high rates of turnover is minimized.

Given the costs now associated with Mexican production, it is unlikely that firms pursuing this traditional EPZ model will continue to find the country an attractive location. It is also clear that the Mexican government no longer wants to play host to this type of specialized activity. The current Mexican president Vicente Fox has stated that in his view the prior maquila model based on low wages and low value added production has reached a certain degree of “*agotamiento*” (exhaustion) and export oriented firms (especially those located on the northern border) must transition into a higher value added, more complex manufacturing paradigm where technology and knowledge workers represent the industry’s core competitive advantage (Diaz Mendez, 2002). The rapid increase in income and payroll taxes imposed by the central government over the last several years (Schatan, 2002) as well as policies that have resulted in a strong Mexican peso provide ample evidence that the Mexican government has no intention of artificially supporting EPZ firms whose primary competitive advantage is based on accessing a low wage workforce.

As a result of these changes as well as increased export competition from developing countries where wages are significantly lower (especially China), MNCs are faced with the challenge of identifying a higher value added competitive logic for their Mexican EPZ facilities or exiting the country. In both the popular press (cf. Johnson, 2002; Malkin, 2002) and the academic literature (Galhardi, 1997; Cañas and Coronado, 2002; Sargent and Matthews, 2003),

at least two seemingly viable models have been identified. In what we label the high complexity model and consistent with the wishes of the Mexican government, maquilas may evolve into performing higher valued added, more complex, technology intensive assembly and manufacturing functions. Given the demands of this model and its reliance on highly skilled operators, technicians, and managers, as long as maquilas enjoy a lower total cost structure than their competitors (often located in high wage, industrialized countries) MNCs have a clear reason to utilize and even expand their Mexican operations. A considerable body of research over the last decade has found that a significant number of maquilas are shifting away from traditional EPZ activities towards something beginning to resemble the high complexity model (Shaiken, 1990; Carrillo, 1991; Wilson, 1992; Carrillo and Hualde, 1998; Lara, 2001; Hualde, 2001, 2002).

Based on the nature of certain products and consumer markets, what we label the proximity model represents another fundamentally sound approach for some producers. Maquiladoras adopting this strategy take advantage of the fact that the US and Mexico share a 2,000 mile long land border. As an illustration of the benefits that flow from the proximity model, consider a firm that requires a low to medium cost labor force to produce a part that is then sold to a final assembler in North America. If the firm decides to establish a plant in China, if shipped by sea it will take roughly six weeks for that part to go from the loading dock in Asia to the time it is delivered to the final assembler. In contrast, plants in Mexico can in many cases produce an item on a Monday and that same week have their output in the hands of their North American customer. For those serious about following a just-in-time (JIT) system, the shorter supply chains made possible by relying on Mexican rather than Asian suppliers often represents a key competitive advantage. For example, if a final customer in North America identifies a defect with a supplier's part from a Mexican plant, that quality problem can be corrected with

minimal losses. However, if that same part came from a plant in China, that may mean that there are six weeks of defective products in the supply chain en route across the Pacific Ocean that may need to be scrapped.

Taking our example one step further, suppose the same MNC also manufactures a product that is sold directly to a North American retail consumer. If US customers suddenly start purchasing more of a particular type of product (say red shirts versus blue ones, or large shirts rather than mediums), a firm in Mexico can respond to these demand shifts quickly. A company relying on Asian production, on the other hand, may be stuck with a six week long production run of medium sized blue shirts that no one wants to buy. Under either of these two scenarios (conforming to the demands of a JIT system or adjusting rapidly to the fickle demands of North American consumers), as long as total operating costs are less in Mexico than in other North American production locations companies have a clear reason to stay in Mexico.

In addition to the high complexity and proximity models, another option for maquiladoras is a bit more non-traditional and less often discussed in the literature. Within the larger MNC, maquiladoras have often been considered as simple factories. Other value creation activities, such as logistics support, purchasing, applications and design engineering, distribution, customer support, and divisional/regional top management activities have often been performed elsewhere. The functions performed by many of today's maquiladoras, however, is not consistent with this stereotypical EPZ model and many Mexican plants have captured additional linkages within the total value added chain. Since they no longer function as just factories but more as centers of knowledge based, value creation activities, companies adhering to what we call a full business model appear to be better positioned than traditional EPZ firms to withstand the upward shift in costs facing maquiladoras.

In reviewing the recent maquila literature, there are relatively few studies that directly address the question of whether or not the industry can successfully move en masse into one or more of the newer business models. There is also relatively little data to suggest which of the models might become dominant. On a plant by plant basis, in this study we attempt to measure the direction taken by Reynosa based maquilas. We utilize two primary measures to gauge the industry's evolution. First, it would seem logical that with the upward shift in costs maquiladoras following a low value added, traditional EPZ model will fail at above average rates but that others more closely aligned with the new environmental context will move in to take their place. To better understand this Darwinist perspective of the industry, for the Reynosa maquila cluster we present information on firms that have entered and exited the area from June, 1998 to September, 2002. Second, existing firms may choose to reshuffle their portfolio of activities and reemerge as more competitive operations. In the international business literature, in order to better understand the process of how the various components of a MNC network change over time Birkinshaw and Hood (1998) have utilized the concept of a subsidiary's charter. A charter is defined as the business, or elements of the business, in which the subsidiary participates and for which it is recognized to have responsibility within the larger firm. We utilize various measures of charter evolution to gauge the success of the existing industrial base in Reynosa to evolve into a high complexity, proximity, and/or full business model.

RESEARCH METHODS

Sample

As mentioned, Reynosa is an especially interesting location in which to conduct a study on recent maquiladora dynamics. While little research have examined the operation of EPZ firms along this section of the US-Mexico border, as of August 2002 Reynosa (67,609) ranked

behind only Cd. Juárez (197,378) and Tijuana (149,593) as the Mexican city with the largest number of maquila employees. Reynosa is also the only major Mexican EPZ center that over the October 2000 to August 2002 period has not experienced a significant drop in employment. Reynosa based maquilas are well diversified in the major maquila segments (especially electronic, automotive, and a variety of “other” industries) and are controlled by a mixture of both large and small corporations from the US, Europe, and Asia.

In order to identify EPZ companies that have entered and/or exited the Reynosa area in the recent past, we used several editions of a directory prepared by a local economic development agency (versions dated June, 1998, January 2000, July 2001, and September 2002). These directories contain information on the products made by a particular company, the number of people employed, and other relevant information. With a goal of collecting information on the business strategies and the evolution of established firms, beginning in July 2002 and continuing into November 2002 we contacted plant managers at maquilas with 100 or more employees located in the six major industrial parks in Reynosa. Managers at 40 of these firms agreed to be interviewed. Our sample maquilas (several with multi-plant operations) at the time of our interviews employed over 38,000 people (see Table Two). As a general rule, we interviewed plant managers or, in a limited number of cases, someone else on the top management team (plant controller, director of operations, etc.) on-site at their place of employment. The interviews ranged anywhere from one half to two hours (average length of 50 minutes) and in several cases were followed by a tour of the manufacturing facility.

Table Two: *Sample Characteristics*

	<u><i>Industry Sector</i></u>			<u><i>Parent Nationality</i></u>		
	<u><i>Electronic</i></u>	<u><i>Auto</i></u>	<u><i>Other</i></u>	<u><i>US</i></u>	<u><i>Asia</i></u>	<u><i>Europe</i></u>
Number of firms	16	9	15	32	3	5
Total employment	14,591	17,508	6,203	33,100	2,286	2,916

Grand Total

Number of firms	40
Total employment	38,302

Measures

In order to identify the current maquiladora charter, the plant's strategy, and how the local operation was evolving over time we asked our interviewees a variety of questions (see Appendix One). In exchange for their cooperation, we promised all participants that the information collected would remain confidential and anonymous. In the examples where we do report the names of specific companies, this information is readily available from published sources or, in the case of plant shutdowns, would be apparent to a knowledgeable observer driving through the major Reynosa industrial parks. Based on responses to several key questions (trends in total employment, whether or not the parent company or competing firms had comparable plants in China or other developing country locations, if the upward shift in costs had changed what the parent company's goals for the plant are, etc.), we classified each of the firms in our sample into one of four categories:

1. Maquilas undergoing charter renewal and extension - Plants in this category appear to be fundamentally healthy. They are successfully building up the capabilities of their local workforce as well as evolving in one or more of the following areas; 1) adding additional product lines, 2) making more complex products, 3) adding additional capital

intensive equipment, and 4) performing additional value added functions such as engineering support, customer service, logistics, etc.

2. Maquilas that show signs of charter erosion - This category includes operations that by some indications appear viable but have lost, or are threatened with the loss, of key parts of their charter. Indications of charter erosion include laying off a significant number of employees, the closing of some production lines with the parent company replacing those items with goods from China, major customers closing North American production facilities, and plant managers stating that the parent company had slowed down or stopped transferring additional production lines to Mexico due to perceived negative characteristics of the local environment.
3. Maquilas that face charter loss - These are firms that face such significant problems that their very survival is in doubt. Plants in this category include those that have recently shut down the majority of their production lines (often transferring the work to facilities in China), multi-plant maquilas where the parent company is regularly closing Mexican factories performing more or less the same operations as those in Reynosa, and other plants that have undergone a fundamental, potentially fatal shift in strategy in the recent past.
4. Maquilas fitting a traditional model - This category includes plants that are performing low value added, low skilled assembly activities and show few if any signs of evolving into a higher valued added business model. What distinguishes these firms from those in categories two or three is that maquila management stated that these plants are making money for the parent company, they are not facing any critical competitive threats, and there are no short or medium term plans to alter their current business strategy.

Given the complexity of the issues we are addressing, the classification of some of our sample firms is admittedly somewhat arbitrary. Therefore, in the results section we have included detailed firm profiles of companies falling into the major categories.

RESULTS

Plant Start Ups versus Plant Closures

In Table Three, we present information on the number of firms listed as having at least 60 employees entering and/or exiting the Reynosa cluster from June 1998 to September 2002. In total, 37 plants started operations during this period and were still operating as of September, 2002. Twenty two companies closed down over this same period. Of these, nine both started up and shut down during this roughly four year period. There is a net addition of plants during the first two periods but a net loss from July, 2001 to September, 2002 of 7 (5 start-ups versus 12 closures).

Table Three: *Plant Start-Ups and Plant Closures in Reynosa: June, 1998 to September, 2002*

Date	06/98	Per Month	01/00	Per Month	07/01	Per Month	09/02
Start-Ups	0		14		32		37
Additions		14		18		5	
Per Month		.74		1.0		.36	
Closures	22		17		12		0
Subtractions		5		5		12	
Per Month		.26		.28		.86	
Additions/Subtractions		+9		+13		-7	
Per Month		.47		.72		-.50	
Total Employment	51,338		63,531		67,139		67,609

The change in the composition of firms in the Reynosa maquila cluster does show some positive signs. Especially prominent start-ups include Black and Decker, Maytag, Symbol Technologies, and Kohler. A fair number of plastic injection molders, metal stampers, mold makers, and others that provide goods and services to the existing maquila base are also on the start-up list. In contrast, maquilas that have recently shut down include Converse (the athletic shoe company), a phone repair facility initially established by Lucent Technologies, and a host of less well-known companies such as IEC Electronics (a contract manufacturer), *Empresas Principe* (a provider of powder coating painting services as well as sports equipment manufacturer), Fox Supply (a local business that sewed bags used to store and transport fruits and vegetables), and Wexford Electronics (a plant controlled by an Irish company that assembled wiring harnesses for products such as fork lifts). In addition, a limited number of firms publicly announced that they intended to establish Reynosa production facilities but then withdrew before beginning full production. Examples in this category include a Nokia division that planned to produce high resolution computer monitors in Reynosa as well as a division of Johnson Controls that built a new, very large facility with the intention of producing seat assemblies. These two MNCs backed away from these ventures before entered the production stage.

To summarize, in our view there is some, but not overwhelming, evidence suggesting that the firms moving into Reynosa are performing higher value added activities when compared to those that are leaving. On the positive side, it is certainly encouraging that companies such as Symbol Technologies and Black and Decker still view the Reynosa area and the maquiladora program to be attractive enough to warrant large investments. As would be expected, the record also clearly shows that a number of maquilas performing what would appear to be low value

added activities are leaving. What is troubling, however, is that a limited number of firms engaged in higher value added activities are also exiting the area.

Evolution of Existing Plants

In Table Four, we present our findings regarding the charter evolution of our full 40 firm sample. In total, 20 maquilas (50 percent) were undergoing charter renewal and extension, 9 (23 percent) showed at least some signs of charter erosion, 8 (20 percent) could be characterized as facing competitive challenges that could potentially result in charter loss, and 3 firms (7 percent) fell within the traditional (but successful) maquila category.

Table Four: Reynosa Maquilas Experiencing Charter Extension and Renewal, Charter Erosion, Possible Charter Loss, or Following a Traditional Model

	Electronic	Auto	Other	Total
Charter Renewal and Extension				
Number of firms	6	6	8	20
Total employment	6,700	16,623	3,982	27,305
Charter Erosion				
Number of firms	5	1	3	9
Total employment	4,865	415	735	6,015
Possible Charter Loss				
Number of firms	4	1	3	8
Total employment	2,783	155	1,366	4,304
Traditional Maquila Model				
Number of firms	1	1	1	3
Total employment	243	315	120	678
Total Sample				
Number of firms	16	9	15	40
Total employment	14,591	17,508	6,203	38,302

Summarizing based on employment rather than number of firms, 71 percent of sample employees work for firms undergoing charter renewal and extension, 16 percent charter erosion,

11 percent possible charter loss, and 2 percent in firms conforming to a traditional model. An analysis by industry sector also reveals important trends. Fully 95 percent of those employed by auto parts suppliers are at plants undergoing charter extension and renewal. The percentage in electronic and in “other” industries is 46 and 64 percent respectively.

In Tables Five through Seven, we present profiles of maquilas falling into the three major categories. Starting with Table Five, for maquilas experiencing charter renewal and extension our interviewees frequently stated that they were following a strategy consistent with the proximity model. By all accounts, the major North American automobile assemblers continue to require that their suppliers deliver on a JIT basis. As a result, none of our interviewees from the larger auto part suppliers indicated that they faced direct competition from companies sourcing out of China. The other primary component of the proximity model, i.e. responding to the fickle demands of North American consumers, was also frequently mentioned. For example, a plant manager stated that their customers were always calling up and changing their order quantities and delivery dates to better reflect sales.

There was also substantial evidence that many maquilas in this category were gradually moving into a limited version of the full business model. For example, one manager emphasized that they had been doing their own engineering and development work for years. Another discussed at great length how local management was championing new innovations with their distribution and purchasing systems. At another plant our interviewee stated they were moving towards assuming full purchasing responsibility and could foresee their customer service function being shifted to Reynosa in the near or medium term. An operations manager with multi-plant responsibility indicated that they now had full control over their manufacturing

engineering function as well as what he termed “resident engineering” (engineering teams that investigate product failures occurring anywhere in the world).

Table Five: Firm Profiles - Charter Renewal and Extension

1. **Large, auto parts** - This plant had reduced headcount by 500 over the last two years. However, due to an internal reorganization that had increased efficiency and customer focus total output was up 20 percent. The plant manager stated that he was not aware of anyone that was sourcing out of China in this industry segment due to the need to supply assemblers on a JIT basis. Even though the product continues to become more complex, he also stated that had not put a lot of high tech equipment into the plant given the goal of leveraging lower priced labor.
2. **Medium, “other”** - After experiencing significant layoffs in 2001, the parent company, with active lobbying from the top management team in Reynosa, decided to close a plant in the US and relocate that work to Reynosa. They had been sourcing some items from China; however, due to long supply lines, inventory buildup, and quality issues they had decided to make some of these items locally. Local plant management was lobbying to get another product line in the short or medium term.
3. **Large, electronics** - Although they had reduced head count by 200 employees in the last year, the plant was producing the same volume of products due to strong gains in productivity resulting from lean manufacturing and six sigma programs. In addition, they had evolved from focusing on low margin, low cost items to more complex, late model products. A goal was to reduce the capital intensity of the plant (due to low utilization of some equipment) and to increase flexibility (people rather than machines can change over to different products more rapidly). Plant management now in charge of distribution functions previously done elsewhere. Redeployment of engineering teams had increased the number of new products the plant could introduce each year. Supplying both US and Latin American markets. Looking to utilize more temporary workers in order to increase flexibility.
4. **Medium, “other”** - The plant had moved from assembling a very simple component to producing several complete products over the last five years. They are buying a considerable portion of their inputs locally with plans to add additional support functions in the future.
5. **Medium, “other”** - Company had gone from one start-up facility to plans for two additional plants in the last year. This is the parent’s first major production facility outside of the US; they sell large, bulky items in a premium market segment.
6. **Large, auto parts** - In the past, this plant had only been assigned to produce items that the plant manager described as the “leakers and bleeders.” However, the Reynosa operation is now assuming the role as the only North American production site for a high volume product line within the parent company system. Major customers pursuing a regional strategy (relying on the lowest cost producer in Asia, Europe, and North America to supply plants in those regions). Production from China not currently a threat. No trend toward increased capital intensity, plant manager stated that “We are staying as far away from robotics as we can.” Plant now in control of purchasing, more direct contact with customers, and more involvement in product design.
7. **Large, electronic** - Parent company has plants in China, Poland, India, and other developing countries. In addition to freight charges, one of the primary dynamics keeping the work in Reynosa is that North American customers frequently change their order quantities and delivery dates to better reflect their sales. Major plant expansion planned in the near future.

8. **Large, “other”** - Plant had added 200 employees over the last two years. Strong commitment to upgrading on the shop floor, technologically oriented plant manager stated that “We are doing everything up to and including robotics.” Labor only two percent of total costs. Buying the majority of their inputs from Mexican suppliers, moving into redesigning their logistics system and eliminating the need for a warehouse on the US side. Currently shipping directly to any place in the world, unofficially doing design engineering as well as some marketing activities. In general, “getting corporate out of the loop,” plans to move out of standard items and into customized products “with all the gizmos.” “The only way to compete is to build to order” and “We will be doing the stuff that China can’t or doesn’t want to do.” Actively lobbying cabinet level officials in the Mexican government (one had recently toured the plant) in order to get a critical input from China into the plant duty free.

At an auto parts supplier, local management was now controlling purchasing as well as having more contact with customers, more involvement with design engineering, and through increased use of teleconferencing and the internet becoming more involved in the entire value added process. For the first time, an electronics maquila was in the process of getting a product testing lab. One multi-plant auto part producer had located their regional headquarters in Reynosa with responsibilities for not only local operations but also a large plant on the outskirts of Mexico City. Another multi-plant operation had established a 30 person supplier development group with the mandate of increasing purchases from local companies on both sides of the border. On the not so positive side, we found only one sample firm that had assumed significant research and development duties and relatively few were seriously involved in design engineering.

When asked whether their maquila was moving towards a high complexity model, our interviewees provided mixed responses. Almost all were in agreement that there was a trend towards producing more complex products. However, this did not always translate into additional investments in capital intensive equipment or hiring additional engineers. For example, at a large auto parts manufacturer the plant manager stated “We are staying as far away from robotics (and other forms of advanced automation) as we can.” At a large electronics maquila, the controller emphasized that one of their strategies to increase profitability was to

reduce capital investment (due to low utilization of expensive equipment) and to increase flexibility through the use of more manual labor. These two plants, as well as several other sample firms, were experiencing major gains in productivity. The controller stated that compared to two years ago they were now producing the same numerical volume but of a greater variety of more complex products utilizing 200 fewer employees. Another manager reported that they had reduced headcount by 500 over the last two years but that output was up by 20 percent. Our interviewees generally credited their six sigma and lean manufacturing initiatives for these types of productivity gains.

Tables Six and Seven includes profiles of the majority of our sample firms undergoing charter erosion and possible charter loss. One of the factors that emerges from these profiles is that several maquilas were attempting to maintain their charters through pursuing a proximity model strategy. An especially interesting version of this is the “dual tooled” approach employed by the maquila discussed in Example Eight of Table Six. Another factor that is clearly evident is that the Chinese competitive threat is very real. A number of our sample firms had lost production lines and reduced headcount due to Chinese competition. With small, easy to ship standardized products the Chinese cost advantage was often so great that Reynosa managers typically saw little if any hope of directly competing in these segments. In addition, a number of our interviewees stated that the quality of competing products from China is good and rapidly getting better and that the Chinese government (as well as other Asian governments) are providing significant incentives for MNCs to enter high-tech, high complexity industries.

Table Six: Firms Profiles - Charter Erosion

1. **Medium, auto parts** - Had laid off a significant number of employees over the last two years. Supplying North American consumers that at times require regional suppliers. However, parent company had just established a plant in China. Plant manager stated that they would still be here in 5 years but maybe not in 15.
2. **Medium, "other"** - Supplier to maquilas and other industrial firms in Northern Mexico. Relatively new plant, located on the border because "the customers were moving this way." Plant manager stated that he had lost 4 to 5 million dollars in business this year because clients had relocated to China. Also indicated that it might have been a better idea to locate the plant on the US side due to significantly lower rent and utility charges, fewer bureaucratic hassles.
3. **Medium, auto parts** - Producing a wide variety of products with low volume. The plant had just lost one product line to China and total employment had fallen by 50 over the last year. The parent company is saving a half million dollars by buying from China rather than producing in Reynosa and is increasingly adopting a strategy of focusing on distribution rather than manufacturing. Highly automated lines still located in the US with no plans to transfer that work to the border. Another division in the parent company has been renting space within the plant but rather than grow the business in Mexico they had set up a plant in China.
4. **Medium, "other"** - On the positive side, this was the only plant in a very large parent company that made their product line. However, a number of major customers had moved to China from Mexico and they had suffered a small reduction in headcount. While they still sell to some of their former Mexican customers, they have to send people from Reynosa to China in order to provide customer service. The current plant manager had been able to convince corporate to re-locate marketing and product development activities to Reynosa. However, he seemed to have second thoughts about this stating "We're challenged technically here. It's hard to develop new products" and "These plants should be pure labor."
5. **Small, "other"** - While the plant manager considering this only a temporary setback, they had recently lost two major customers and laid off two thirds of their workforce. Plant manager stated that Mexico is not a low cost site, "Companies just end of spending their money in a different way. There are a lot of hidden costs that you wouldn't have in the US."
6. **Large, electronic** - Employment at the plant had dropped by 700 over the last two years. Plant manager stated that if items were big and heavy it still makes sense to produce them in Mexico. The original plan was to bring in several other products but the Reynosa facility was losing out in the parent company's "total cost models" to facilities in China, Korea, and even West Africa. The plant manager stated that; "There would have been much more work transferred here if Mexico was more competitive."
7. **Large, electronic** - Well established plant with an extensive engineering group including a large design team. They have been gradually laying off employees and were currently operating only three of five production lines. Due to severe competitive pressure, they were not longer selling to US retailers and were instead focusing on the US wholesale market as well as attempting to increase sales in less competitive and more profitable Latin American markets.
8. **Large, electronic** - The parent company is following a "dual tooled" strategy. In other words, for some production lines plants in China and in Reynosa manufacture the same product. China, however, produces the majority of the items and Reynosa is used to cover sudden spikes in demand from customers that want their products in a hurry. Plant manager stated that "Our biggest strategy (to stay cost competitive) is supply base development" but that the Chinese cost

advantage “rests not only in low cost labor but all the way through their supply base.” Plant manager trying to convince corporate VP that the manufacture of high complexity, high margin items should stay in the US, items that are fairly complex and/or seasonal should be done in Mexico, and commodity goods should be done in China. The plant has lost several product lines to China once those items became commodity products in a very short, three year product life cycle.

Table Seven: Firm Profiles - Possible Charter Loss

1. **Small, electronics** - Relatively new plant, the company had come here with the idea of producing high volume standardized goods. To survive, they are now specializing in products that the customer needs with a 24 to 72 hour lead time that cannot be supplied through inventory. They deal with non-standard items; in fact a particular customer might buy only one. They had recently lost one product line to another parent company facility in Baja California. Part of the work they were now performing was from another parent company facility that had been shut down in the Mexican interior. According to their initial plan, they should be expanding by adding another building in 2002. Instead, their current facility was at best half full. Plant manager stated that “The market is taking us to China.” This person had strong disagreements with how the Mexican government was regulating the industry, but stated that “maquilas might have died a natural death anyway given what is happening in Asia.”
2. **Medium, “other”** - Parent company had closed a plant in Mexico over each of the last three years and was quickly shifting production to Central America and Asia. The plant was focusing on rapidly supplying US customers and on new products, but the constant introduction of new product lines and the shifting of plant managers from one facility to another had caused significant drops in quality and productivity .
3. **Large, electronic** - Plant established and operated by a well-known, high-tech MNC. While plant management would never confirm it, it had been rumored that they would eventually transfer from Asia to Reynosa significant manufacturing operations. Parent company recently sold the entire facility to a contract manufacturer; plant manager stated “We didn’t have enough work to fill the plant.”
4. **Medium, electronic** - Relatively new, very capital intensive plant that in the recent past had over 1,000 employees. In the last six months the parent company had transferred four of the plant’s five production lines to China. Trying to clear millions in inventory through increasing Mexican sales.
5. **Small, “other”** - While the final decision had not been made, the parent company was seriously considering closing the Reynosa facility and buying all of their products from a Chinese manufacturer. Over the last year, the Reynosa facility had shifted from focusing on manufacturing to primarily serving as a warehouse/distribution facility for Chinese goods.
6. **Small, auto parts** - Headcount at the plant had dropped by 50 people in the last two years. Plant manager stated that it was a poorly kept secret at headquarters that there are plans to close the Reynosa facility and open a plant in China. Plant manager had tried to utilize spare capacity by bidding on contract manufacturing work but had been told by the parent company to get out of that line of business.
7. **Small, electronic** - Headcount had dropped by half over the last two years. The strategy for the plant as recently as a year ago was to serve as a volume producer of standardized products.

However, they found that they could buy from China several of their products for 40 to 60 percent less than they could produce them in Reynosa. The current strategy is to buy from China those high volume standardized goods where they can develop an accurate six month sales forecast; Reynosa will be used for products that are still “morphing”, and for “mosaic type products”, to assemble products from components sourced from China for items with unstable demand, and to serve as a distribution center. Plant manager stated that they want to get away from manufacturing.

DO REYNOSA MAQUILAS HAVE A SUSTAINABLE COMPETITIVE MODEL?

In this paper our primary goal has been to determine how maquiladoras located in the border city of Reynosa, Tamaulipas have been altering their business strategy given the significant increase in total costs now associated with producing in Mexico. This study has clear limitations. It is an extended case study of the only major maquila center that has not suffered significant job losses over the 2000 - 2001 period and so our results may not generalize to other maquila clusters.¹ Even with this limitation (and consistent with much of the macro-economic data), we find that the current competitive environment is resulting in clear winners and losers. Large maquila auto parts suppliers, shielded from Asian competition due to the need to supply North American assemblers on a JIT basis, appear to be largely unaffected by the upward shift in costs. The relative success of this sector also suggests that the high complexity, proximity, and full business models are not mutually exclusive options. While still lacking charter responsibility for research and development and at times design engineering, the competitive profile of the large auto part maquilas includes components of each of the three newer strategies.

There is a stark contrast between the competitiveness of the auto part suppliers and the continuing struggles of many of our sample firms in the electronic and the “other” industrial sectors. Several MNCs that had intended to utilize Mexico as an export platform for high volume standardized goods have been forced to find an alternative strategy for their Reynosa facilities. At the time of our interviews, proximity to the US market appeared to be the key

factor keeping a number of these operations afloat. However, even this strategy is somewhat vulnerable to competitive threats. If the cost differential continues to widen, MNCs may increasingly turn to EPZs in Central America and the Caribbean. At a maquila where the parent company has production facilities in Mexico, Central America, and China, our interviewee stated that the total turn-around time (measured from the time an order is placed to the time it is delivered to the final customer in the US) from their Honduran plants is only a week longer than from their border maquilas. Even certain low-tech automotive maquilas working on a JIT basis may find Central America to be an attractive production location. When asked about producing elsewhere, the plant manager for a large auto part supplier stated that “If somebody was willing to put the infrastructure into a place like Costa Rica, they could be a big threat” and “Mexico should be worried.” In fact, somebody already has. The Packard Electric division of Delphi Automotive is rumored to have started assembling automotive wiring harnesses (an activity traditionally concentrated in Mexico) in Honduras.

In addition to adopting strategies dependent on proximity advantages, our results suggest that sample firms undergoing charter renewal and extension and in some cases charter erosion are making slow but steady progress towards a modified version of a high complexity model. For example, parent company firms are transferring more complex products to their Reynosa production facilities. This change, however, is not always accompanied by additional investments in capital intensive equipment or a significant increase in the size of local engineering staffs. On average, these same firms are also steadily capturing additional value added functions within the larger parent company system such as full control of purchasing, customer service, distribution, and some engineering applications. We see little evidence, however, of a

true paradigm shift towards high-tech, knowledge intensive production within either the existing industrial base or with the newer firms coming into the Reynosa area.

When asked, our interviewees gave numerous reasons (such as a shortage of highly skilled professionals, deficient infrastructure, government corruption, excessive bureaucracy, etc.) for why their parent companies had not located more high complexity, high-tech investment on the border. In addition, top managers at two relatively high complexity maquilas provided especially powerful examples of how the Mexico government lacks a clear vision of how to grow its high-tech sector. At one high profile electronics maquila, the plant manager (who had worked in China before coming to Reynosa) stated that when his parent company is planning to add high-tech jobs in Asia they will go to the various governments in the region looking for the most attractive incentive package. For example, if they are adding 125 new employees they might request that the host country government pay the salaries (as a “training wage”) of these new employees for the first year. For certain types of investments, Asian governments are willing to offer these types of incentives. In contrast, Mexico has a “one size fits all” approach to maquila investment and makes available few if any special benefits for high-tech, knowledge intensive firms.

In addition to the absence of entry incentives, high-tech MNCs appear to receive little if any special treatment once they are operating in Mexico. At a high-tech, high capital intensity maquila controlled by a rapidly growing MNC, the parent company had been in a dispute with the Mexican government for several years over their transfer pricing policies. Even though they were already realizing an above average markup on imported materials, the courts had ruled in favor of the government and the Mexican taxing authority was requiring that the company restate their earnings going back several years. For the earlier time periods, the company was not

eligible to receive a foreign tax credit from the US government to offset the additional Mexican taxes now due. In effect, the MNC was being required to pay taxes on the income generated by their Reynosa operation to both the Mexican and the US governments (a combined tax rate of roughly 70 percent). Our interviewee stated that there was no flexibility on the Mexican side to resolve this issue in a way that would avoid this substantial (reaching into the hundreds of thousands of dollars) double taxation penalty. Rather than matching the actions taken by Asian countries to encourage high-tech investment, in practice the Mexican government appears to view high complexity maquilas as just another generic source of tax revenue. In fact, if high-tech firms are especially profitable they may become the favored targets of Mexican tax collectors. With this policy, it is hard to imagine that Mexico will be able to attract substantial new investment in high-tech sectors.

To conclude, our interviews with plant managers from Reynosa maquiladoras suggests that MNCs competing in North American markets selling non-standardized, time sensitive products continue to view Mexico as an attractive production location. Given the widespread use of JIT practices, the maquila auto part sector also appears to be fundamentally healthy and to be evolving in very positive ways. On the not so positive side, our case study relying on plant manager interviews confirms many of the reports from the popular press indicating that MNCs that view Mexico as a site to produce cost sensitive, standardized products are failing at alarming rates. The implications of these dynamics for the future of the maquiladoras can be viewed as positive or negative depending on one's point of view.

If the purpose of EPZs such as the maquiladoras is to facilitate economic development, we believe that the story emerging from this study is overall very encouraging. As mentioned, to facilitate development EPZs should evolve from specializing in low value added assembly tasks

in the early years to higher valued added, higher wage activities once specialized infrastructure and a skilled workforce have been established. Mexico's maquiladora program has been in existence since 1965. A drive through the major industrial parks in Reynosa clearly shows that specialized infrastructure is present. Plant tours demonstrate that these firms often perform relatively complex assembly and manufacturing tasks utilizing capital intensive equipment. The great majority of our interviewees have very positive things to say about the work ethic of their operating level employees and the development of their Mexican engineering and managerial staffs. The auto parts sector, which prior research has shown to make the greatest contribution to skill development within the maquila program (Sargent, 1997), remains fundamentally sound and poised for future growth.

Based on these findings, we are cautiously optimistic about the ability of the industry to continue its evolution into a higher value added model. China and other low wage locations will undoubtedly continue to capture low valued added activities as well as some more attractive segments. However, we believe the evidence emerging from the Reynosa cluster suggests that Mexico and the maquiladora industry has accumulated sufficient organizational capabilities and specialized infrastructure to successfully jump to the next step on the ladder the eventually leads to advanced industrialization. During a time when export oriented firms in Mexico were facing unstable demand in their product markets, increased international competition, rising wage and tax rates, an overvalued currency, and what many of our interviewees would describe as a hostile regulatory environment, over 70 percent of the employees in our sample firms were working in maquilas undergoing charter renewal and extension. The various individuals and institutions that have a vested interest in economic development in northern Mexico should recommit themselves to making Reynosa's success story a generalized, rather than a unique, condition.

ENDNOTES

1. At a number of plants, we did ask our interviewees why they thought Reynosa has not suffered significant job losses. We received three primary responses. First, Reynosa has enjoyed above average growth for much of the 1990s which resulted in more “momentum” than other maquiladora areas. New infrastructure projects have undoubtedly added to this momentum. In particular, the Hunt Development Corporation has invested significant sums in new warehousing and distribution facilities as well as a large housing development specifically designed for the maquiladora industry. Second, during the 1990s the local economic development agency in charge of bringing manufacturing firms to this part of the border deliberately targeted a diverse range of higher valued added industries. Firms that did not fit this profile were not encouraged to establish operations in the area. Third, manufacturing wages are lower on this part of the border when compared to other cities such as Saltillo, Matamoros, and Cd. Juárez.

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Appendix One : *Maquila Evolution Survey*

1. What role does this facility play in the overall strategy of the parent company?
2. Does the parent company have facilities similar to this one in other developing countries? If so, why would they choose to produce in Mexico versus in that other plant?
3. Does this company compete against other firms making the same product that have production facilities in China or in other developing country locations? If so, how is the parent company strategy affected by this competitive threat?
4. Has the parent company goals for this facility changed over time? If so, how?
5. I have a list of various measure of plant evolution. On a one to five scale with one indicating no trend, three indicating a moderate trend, and five indicating a strong trend, please respond to the following questions:
 - a) Is there a trend at this plant to assembly or manufacture more complex products?
 - b) Is there a trend at this plant towards utilizing more capital intensive equipment?
 - c) Is there a trend at this plant to employ additional engineers?
 - d) Is there a trend at this plant to perform additional value added functions such as dealing directly with customers, other marketing activities, purchasing, supplier development, etc.?
 - e) So, to summarize, on a one to five scale with one meaning parent driven and a five indicating that these changes have been initiated by plant management, where would this plant score?
- 6) Given the changes with this facility, what types of activities do you think will be performed here in five years?
- 7) In the academic literature, it is emphasized that firms need to continually improve their organizational capabilities, especially the knowledge, skills, and abilities of their workforce, in order to jump to the next level. In this facility, do you believe this process of continuously adding to the plant's capabilities is progressing as it should?
- 8) I have asked you a fair number of questions about what the parent company goals are for this plant. As plant manager, what are your goals?
- 9) Please talk a little bit about your relationship with the key decision makers at the parent company. For example, do you see them as supporting the goals that you have set for this plant?
- 10) The maquiladora industry has certainly had its fair share of problems recently (such as Article 303 and the changing customs laws, increased taxes, rising wage rates, etc.). Has any of these developments changed what the parent company is planning to do with this plant?
- 11) Considering everything that we have discussed, is there anything else that you believe is important to understand the development of this facility?