Maquiladoras and Beyond: The Continuing Search for Competitive Labor

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The maquiladora industry, the second largest industry in Mexico, in combination with the North American Free Trade Agreement (NAFTA), has served to encourage direct foreign investment in Mexico. Based on extensive research, this paper provides a general investigation into such issues as productivity, quality, labor availability, sourcing, distribution, logistics, etc., from the perspective of the manufacture of products in Mexico, rather than from the trade perspective. Despite Mexico's proximity to the U.S., fierce competition coming from Asia, and especially China, tends to cloud the manufacturing environment in Mexico by offering more competitive labor. This has many ramifications for manufacturers in other countries as well.

Keywords: Mexican Maquiladoras, Free Trade Agreements, Global Economy, Production Issues, Asia, China

1. Introduction

While the North American Free Trade Agreement (NAFTA) has been extensively analyzed from the perspective of *trade of completed products*, the ramifications for the actual *manufacture of products* are every bit as complex, if not more so. Intertwined with increased opportunities for direct foreign investment, issues such as sourcing, rationalization of production processes, distribution and warehousing, and the strategic issues involving international facility location, take on new meaning. In essence, NAFTA allows for (nearly) borderless production, as well as for free trade, with momentous implications for manufacturers.

One of the goals of this paper is to discuss these many ramifications in the context of maquiladoras, which are foreign owned production facilities located in Mexico. Maquiladoras were originally designed to provide the assembly portion of a manufacturing process and over the years they increasingly have become responsible for more of the production process. Parallel strategies for seeking lower labor costs are also seen in Eastern Europe and the Far East.

This paper is based on extensive research including site visits to several maquiladoras--big and small, border towns and interior, heavy manufacturing and simple assemblies, American owned and non-American owned (including Japanese and

European), with representatives from the auto, high tech, electronics, defense, and apparel industries. Interviews were conducted with the maquiladora plant managers and with the presidents of the maquiladora associations in these locations. In addition, the advanced automation laboratory facilities for manufacturing engineering students--training professionals for Mexico's industrial future--at the Monterrey Institute of Technology were also visited.[1] A forerunner of NAFTA, the maquiladora industry, sanctioned by Mexico as a border industrialization program, flourished and blossomed into an industry with currently over 3000 plants, employing over 1,000,000 workers. They not only provide needed capital and employment opportunities to Mexico, they also provided low cost yet efficient labor to the mostly American, foreign manufacturers.

The increased trade within the NAFTA trading bloc (comprised of over 370 million people) has generated much enthusiasm among many of its participants and, for others, concern, depending on whether they gained or lost jobs. However, Fred J. Quintana, Executive Director, Maquiladora Association of Matamoros, contended that maquiladoras and NAFTA were not, and would not be, taking American jobs--that producers who wished to capitalize on the low labor costs by manufacturing in Mexico were already doing so, even before NAFTA took effect in 1994 [17].

Thus, in the next section the role of Multinational Enterprises (MNEs) in global economics is discussed to more fully understand their inherent domination of international trade and production. Next, after this role is established, maquiladoras, from their inception to the present day, are discussed. Maquiladoras essentially have been the appendages of MNEs, facilitating the implementation of the MNEs' global strategies. The ensuing discussion focuses on the many *production* issues (rather than *trade* issues) coming to the forefront with increased free trade. Because of the authors' specific interest in North America, this paper concentrates on North American free trade implications that are generalizable to other free trade agreements such as the European Union [EU], the Central European Free Trade Agreement [CEFTA], the Association of Southeast Asian Nations [ASEAN], etc.

In context of the above, another goal of this paper is to explore the dynamic path to manufacturing competitiveness as defined and demanded by our highly competitive global economy, in the context of new international free trade agreements. In the latter part of the 20th century, a focus on quality came to the forefront of manufacturing competitiveness worldwide. Because of this increased emphasis on quality, a manufacturer and its competitors, have to provide quality products to even a hope of succeeding in the global market, due to the intense competition. A poorly made product will no longer fly. Strategically speaking, the "quality" of a product is now a "qualifier"

[1]This paper has benefited from feedback received from the faculty and participants in the executive program at the University of Houston and from the Symposium on Emerging Paradigms in Globalizing Technology, Manufacturing, and Service Operations held at Tulane University in New Orleans, Louisiana.

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for most entities to even consider buying from any particular source; whereas "cost" has become an "order winner," meaning that "cost" will actually "win" the customer's order, given the prerequisite quality of the product, as might be suggested by Hill [7]. Thus, considering quality as a qualifier, the rise of Chinese manufacturing, with their low labor costs, continues on unabated. The entities purchasing from Chinese suppliers anticipate "cost" will be their own order winner in turn. It should also be noted that any one firm may have more than one order winner, but cost is likely to be among them. Thus, this paper traces the path to manufacturing competitiveness globally and strategically, which is dynamic and continually evolving.

2. The Role of the Multinational Enterprises (MNEs)

From the earliest of times, man has sought satisfaction of needs, as well as seeking competitive advantage, by trading (bartering) one good for another. It is little different for nations, with each nation ideally trading products which it produces in abundance for those it lacks, based on the nation's relative endowments of the four basic factors of production: capital, labor, land, and management [2]. However, as nations become increasingly protectionist of some industries, free trade of products among nations becomes impeded, with less than optimal results in totality. Thus, NAFTA and other trade agreements are, in effect, a mechanism to reverse the negative, economic consequences of protectionism.

On a higher strategic level, increased attention is now being given to the trading of the *basic factors of production* themselves, in contrast to simply the trade of products. In the context of manufacturing in Mexico, the maquiladora movement in Mexico can be seen as the trading of U.S. capital (facilities, equipment, etc.) for Mexican labor, utilizing each nation's comparative advantage in that Mexico has been blessed with an abundance of available labor, whereas the U.S. has a relative abundance of capital. And this is where the MNEs fit in, for it is the MNEs that are the prime facilitators for factor mobility.

MNEs have the ability to shift production, seeking lower costs (i.e. competitive advantage), with relative freedom among different nations and different economic integration areas. In so doing, their locational choice extends not only to the economic blocs of Europe, the Pacific Rim, and North America, but also to specific nations, regions and even subregions of each nation, within these blocs. The low labor cost of Mexico and Asia in general tends to attract MNEs, with each MNE then deciding on a specific location within these particular domains. And while some suggest that MNEs are exploitative of workers and the environment in these and other regions [3], others argue that MNEs are providing jobs that would not otherwise exist.

Yet lower costs (labor, land, capital, and so forth) are not the only drivers of the MNEs locational choice--other strategic factors enter into the equation as well, such as meeting a competitor in a specific market. These multiple decision variables are all dynamic in nature, with the implication that location decisions continually are subject to revision as required by the ever changing, global competitive forces. In any case, MNEs (such as Ford, AT&T, General Motors, General Electric, Northern Telecom, General Dynamics, Sony, etc.) have vested interests in both the maquiladora industry and in trade agreements.

3. The Genesis and Evolution of the Maquiladora Industry

During World War II, Mexican railroad and agricultural workers were admitted into the U.S., under the bracero program, to help combat labor shortages. The railroad worker proviso was eliminated in 1946, but the U.S. continued to rely on seasonal, Mexican farm workers until forced by labor groups to cancel the program altogether in 1964, resulting in high unemployment in the border areas of Mexico [6].

Then in 1965, in response to this exceedingly high unemployment (70% or more in some regions), Mexico developed the maquiladora program as a means of stimulating job formation and industrialization along its northern border. However, the underlying roots of the maquiladora program actually started with U.S. tariff laws, passed in the 1930s, which were designed to stimulate jobs for Americans. These laws allowed any used product to be sent overseas, transformed, and then returned to the U.S. with only a value-added tariff. And at that time, Mexican law required 51% or more Mexican ownership for plants. Then in 1965, Mexican law changed to allow for 100% foreign ownership for plants that would import items in-bond for exportation. Thus, the combination of these events allowed for the formation of the maquiladoras [14].

Under the maquiladora program, components from an American manufacturer could be shipped into Mexico tariff-free to a sister plant in Mexico for assembly, and then exported back to the U.S. plant for completion or sale, with a tariff applying only to the value-added portion of the production process as provided by Mexican labor, thereby utilizing abundantly available, low cost Mexican labor for the betterment of both countries. The maquiladora program was thus especially attractive to manufacturers of labor intensive products--such as those in which labor accounted for 30% or more of product cost.

As originally conceived, twin plants would be created on both sides of the border; however, as it evolved, American factories sometimes at great distance from the border participated in the program as well. From its inception, the maquiladora industry went through several cycles of expansion and decline, and then in the later part of the 1980s, the maquiladora industry rapidly doubled in size, as American companies aggressively sought lower costs due to increased foreign competition. By the 1990s the maquiladora industry comprised approximately 18 percent or more of Mexico's industrial work force and, as an industry, was second only to the Mexican oil industry in terms of producing foreign exchange revenue [4].

The maquiladora industry continued to expand and evolve, shaped by global forces. Although low cost labor had been the primary competitive weapon offered by Mexico, its additional advantage over the even lower labor cost offered by Asia lies in its proximity to the U.S., enabling Mexico to also offer significantly shorter lead times than can Asia. Significantly, according to one maquiladora manager interviewed in Matamoros, proximity to market has become increasingly important since they built their plant along the border in 1980 [14].

Many decisions are faced by manufacturers which decide to locate in Mexico. For instance, a manufacturer has three different options in setting up a maquiladora: (1) from outright setting up and managing a wholly owned maquiladora (approximately 50% of

the maquiladoras belong to this category); (2) to a shelter operation in which a maquiladora operator provides the plant and labor force to the U.S. firm, charging an hourly rate for the services based on costs, and with the U.S. firm providing production management and quality control; or, with even less control, (3) to a subcontractor, with the subcontractor providing the plant, labor force, supervisors and managers, charging a price per piece [11]. The latter choice leaves the U.S. firm with little control over quality or production.

These different forms of maquiladoras allow for a considerable amount of flexibility in the actual physical facility. For instance, one particular plant in Monterrey that has three different products, with a different maquiladora operation defined for each product. Two of these maquiladoras report to U.S. companies and the third reports to a Japanese company. A variant of the preceding, a Mexican factory is free to use its excess capacity for a maquiladora operation, which is not required to be associated with a foreign company.

And then the decision of where to actually locate within Mexico still commands careful consideration. The maquiladoras in the border towns of Mexico typically draw their workforce from other areas, such as southern Mexico. As a result they experience a higher turnover (averaging 10% per month, but with a wide range) than do those located in the interior of Mexico, such as in Monterrey (averaging 5% per month), which are able to employ local workers. In addition to greater workforce stability, the interior also offers a better environment (schools, roads, cultural activities, better water, sanitary conditions...etc.), with these advantages offset by potentially greater logistics difficulties.

However, even in the border areas, stability of the workforce may still be an achievable goal. Some better managed maquiladoras average only about 1-2% turnover per month, comparable to their U.S. based plants, as based on interviews with their plant managers. Also contrary to the general trend, in one border maquiladora over 60% of the workers had been on the payroll for more than 5 years.

Maquiladora wages vary by states and industry. For instance the state of Sonora--Hermosillo and Nogales-- pay considerably less than the state of Distrito Federal--Mexico City. By industry, heavy manufacturing maquiladoras pay about twice as much as other maquiladoras workers. Overall, average wages for workers in Mexico as of July 2006 were $2.70 per hour [8].

Quality also lies at the forefront of managerial issues, and maquiladoras approach quality in different ways. In some maquiladoras, the achievement of high quality relies on inspection and rework, implicitly counting on the low cost of labor to more than offset the additional cost of inspection and rework. Others practice Total Quality Management (TQM) or other total quality programs, which have the goal of producing the product right the first time. And some maquiladoras either have, or are striving for, ISO 9000 certification, either at the insistence of their customers or to facilitate trade with the EU and Southeast Asia countries.

In spite of the apparent satisfaction and success of many maquiladoras, some U.S. based companies that moved their production processes, or part of their production processes, to Mexico have moved their operations back to the U.S., citing decreased

productivity as a hidden cost factor. Despite the preceding, the maquiladora managers interviewed for this research expressed great satisfaction and pride in both the productivity and quality produced in their plants, comparing them favorably to their U.S. based counterparts and to plants in other foreign locations. The actual number of maquiladoras that have returned their production processes to the U.S. is relatively small, and the actual reasons for their return, complex.

Establishing and operating a business or manufacturing concern in a foreign country by nature requires interacting with a different business environment and many times a totally different culture. Workforce issues (employing local managers, adaptability, expectations of the local workers, etc.), issues involving infrastructure differences, and other considerations specifically dealing with the foreign environment apply. Economic issues, such as tax structures, monetary systems, and inflation rates (trends and stability) must be carefully considered. What works in one country may not work as well in another. Thus, the analysis why many maquiladoras successfully remain in Mexico, while others return to the U.S., is not entirely simplistic.

The maquiladoras and foreign owned, non-maquiladora factories continue to evolve, with movement from simple assembly of products towards increasingly sophisticated manufacturing. Advanced concepts such as JIT, kanban systems, TQM, ISO 9000 certification, workplace ergonomics, as well as product design at the factory are making their impacts felt. Significantly, many maquiladoras are now fully comparable to their counterparts in the U.S., and are no longer assigned just the labor intensive portion of the production process.

Another sign of continuing evolution is seen in how maquiladoras are evaluated. Initially they were evaluated as cost centers, but now some maquiladoras are being evaluated as profit centers, which is of especial significance with the liberalization of the laws regarding the sale of their products in Mexico. Maquiladoras are now permitted to sell a portion of their production directly in Mexico, rather than exporting it all back to the U.S., the actual proportion being dependent on the Mexican content of the product.

Along with the loosening up of Mexico's direct foreign investment laws, many American companies (MNEs) that formerly would have established maquiladoras in Mexico, are now building wholly complete factories. Here products are made for Mexico, U.S., and for other countries. Trade agreements like NAFTA help in accelerating these developments, continually redefining the concept of maquiladoras.

4. The North American Free Trade Agreement

The goals of NAFTA for Canada, the U.S., and Mexico include job creation through increased demand for exported goods, in addition to lower priced, imported goods, to everyone's benefit. For all three countries, NAFTA opens up previously protected industries, thereby creating a more competitive environment, and one that is better prepared to compete against the EU and Asian trading blocs. For the MNEs, NAFTA also facilitates the trading of the four basic factors of production: labor, land, capital, and management, as well as the trade of products. And although NAFTA is more trade-oriented than production-oriented, for American MNEs and manufacturers, it gives greater access to Mexican markets and greater freedom for sourcing, and opens

new opportunities. This in turn impacts both production in the U.S. and production in Mexico by American owned factories.

5. Production Issues under Expanded Free Trade

Although tariffs have decreased significantly since the enactment of NAFTA[1] (with tariff phase-out periods up to 15 years for approximately 10,000 products), the rate of change in the production environment has been comparatively slow. However, with changing rules of origin, and with new investment guidelines, NAFTA presents special challenges to the MNEs who choose to compete in the current environment. Essentially most decision making by market participants tend to be short or medium term in nature, with frequent revisions. Competitor MNEs strive constantly to gain competitive advantage in the newly rearranged marketplace, with the expanded competitive environment placing additional strains on what should be strategic long-range planning.

In spite of the obstacles to long-range planning, strategic issues such as how to gain market share in formerly protected industries (examples: banking, insurance, construction, and telecommunications) are having to be addressed. More elementary, should the MNE even attempt to penetrate the newly opened markets. If so, how? By producing goods (or services) in Mexico? Or perhaps service from another, either new or existing, location? What are the advantages/disadvantages of each, and what are the implications for the production system? Other questions and strategic decisions include how to service a larger market (demand)--and just how large will the newly expanded market be? Should the MNE just hire more low cost Mexican labor? or return to the U.S. and automate? or stay in Mexico and automate? or serve the Mexican market with Asian produced products? When does it pay to do which, i.e., what is the break-even quantity? Similar questions can be asked about any two other countries that have free trade agreements.

What about rationalization of factories? What are the implications for existing facilities in Mexico as well as in the U.S.? Does duplication of production facilities continue to make sense? Would the potential joining of twin plants into one facility most likely take place on the Mexican side of the border so as to continue to realize low labor costs? And for MNEs, how does their portfolio of plants fit together, with the advent of free trade and more opportunities for direct foreign investment in Mexico? Should any plants be closed or downsized, or should any new ones be built? When? Where? The same questions apply to distribution and warehousing.Additional considerations include human resource management issues such as (a) the recruitment of native managers (a distinct advantage); (b) how to successfully address cultural differences; (c) the feasibility of using teams in a traditionally high turnover, production setting; and (d) can the turnover rate be reduced and yet still maintain the low labor cost advantage? Interviews with the maquiladora plant managers and maquiladora association presidents highlighted the

[1]Average tariffs at the time NAFTA was enacted: U.S.--4% tariff on Mexican goods; Mexico--10% on American goods.

importance of the human resource function in Mexican plants as a primary key to success for American companies manufacturing in Mexico.

Most of the above questions are strategic in nature, which ideally should result in long term commitments. These questions mirror those which have to be addressed from time to time by other manufacturers which are not international, but now in the context of NAFTA and internationalism the decision areas are laden with additional unknowns, full of complexity. The above questions are not repetitive, each has to be analyzed and resolved separately and there is no one blue print for guidance. There are no quick answers. In this case, most of the firms have to rely on their past experience, the expertise of their management, and possibly international manufacturing consultants.

6. Supply Chain Management Issues

In contrast to the issues in the previous section, the strategic issues concerning supply chain management are more structured in nature. However, NAFTA was enacted in1994 and at that time the term "supply chain management" was not prevalent in Mexico [10]. The word then was "logistics" and still remains much that way even now. In Mexico, the supply chain management concept only took hold about five or so years ago. This has stimulated two rapidly growing, new service industries – that of third-party supply chain management and of international supply chain management consulting. Many U.S. transnational manufacturers use such services, greatly easing the burden of operating in a foreign environment [10].

These new third-party supply chain management companies deal with many issues surrounding transnational manufacturers. Obviously customers as well as suppliers do change. The supplier base has been inadequate in Mexico in the past, which poses this question: Should the MNE vertically integrate backwards? As the tariffs continue to decrease, location decisions also will be affected—should the MNE locate closer to the customers? or closer to the suppliers? -- to be evaluated in the international context. Decisions based on suppliers will become even more complicated because of the changing tariff structure and changing rules of origin. Other supplier issues have to be addressed: Mexican materials used in production by U.S. manufacturers are no longer subject to U.S. tariffs, but is the quality as good? And are the prospective suppliers reliable? Even more basic, are suppliers even available?

Is the border crossing apparatus conducive to JIT production? To counter possible border crossing problems, high inventories sometimes have been carried in border towns,which diminishes the benefits of JIT. A multitude of distribution and warehousing concerns also appear--issues involving transportation of product via cross border routes, including between Canada and Mexico through the U.S. and on other routes that were previously prohibited. Whose trucks will be used and what about the licensing of the drivers? Language barriers still remain. Even conveniences taken for granted by drivers in some countries, such as frequent rest stop areas and plenty of gas stations, are not necessarily available in another.

Where will the warehouses be located, again in the context of free trade between the U.S. and Mexico Substantial growth of the warehouse industry is predicted--goods

crossing the border no longer have to go to a specific importer in Mexico, but can be distributed from the warehouse as needed by various manufacturers. But can the manufacturing facility get timely delivery from a warehouse located in Mexico? (To facilitate quick delivery to the U.S. home plant and customers, some production facilities ship out each day's production to warehouses for consolidation on the U.S. side of the border.) In an interview, the president of one maquiladora association suggested that one particularly promising area for increased American investment would involve the timely transportation and delivery of goods within Mexico, an area that is not done well in Mexico.

Problems involving infrastructure--such as roads, electrical grid, and communications--have to be resolved. Newer highways, such as the ones between Nuevo Laredo and Monterrey, and between Reynosa and Monterrey, were built by private industry. These toll highways are highly useful and desirable for industry but expensive for the general Mexican public. Some maquiladoras use the U.S. highway infrastructure, given increased production, for shipping from one location in Mexico back to another location in Mexico via the U.S.: for example, shipping from Tijuana to San Diego to Laredo to Monterrey, a long way around but feasible and preferable. These are all supply chain management concerns.

7. Onward to Asia

Some Mexican companies are now facing the same choice that U.S. manufacturers have long faced: either automate thereby decreasing labor costs, or move manufacturing to another location that has lower labor costs, such as to an Asian country. Of course China, the world's most populous country, offers the lowest labor costs. A comparison of hourly wages seems to make the case for moving in the quest for more competitive labor costs. For instance, the average hourly wage for a U.S. manufacturing facility is $21.33; in Hong Kong: $5.83; in Singapore $7.27; Taiwan $5.41, and in China the estimates are from $0.33 to $4.00 per hour [9]. Only China has lower labor costs than Mexico's $2.70 per hour.

8. China's Long Shadow

Because of China's very competitive labor, the entry of Chinese manufacturers to the world market represents a very real threat to other global manufacturers. Certainly the maquiladoras of Mexico feel threatened by this new "dreadful" competitor [1], [13]. In response to this competition, some maquiladoras use the very real threat of either (1) increasing automation, or (2) moving production to China or to another southeast Asian country, to pressure their workers to accept lower wages and fewer benefits. And these are not idle threats. The maquiladora industry expanded from around 1,000,000 workers in the late 1990s to approximately 1,300,000 workers in 2001. Then from 2001 to 2002, it reduced to around a million. This reduction was largely, but not entirely, the result of increasing automation as well as relocating some operations to Asia. Other cost cutting tactics are also being used by manufacturers, such as laying off workers before they have completed the 90 days of employment required for governmental protection [1]. Mexico's historical competitive manufacturing strength of low cost labor is feeling acute stress from its very successful competitor.

China, the maquiladoras' "dreadful" competitor, has already captured "50 percent of the world's cameras, 25 percent of washing machines, 30 percent of air conditioners and televisions, and 25 percent of washing machines" [15]. In addition to the global market, China also has a fast growing domestic market. The demand side is strong, and China's factories are humming.

Even so, it is neither problem free for China. For instance, there are many logistics issues in general for manufacturing in China, such as: a poor infrastructure; regulation; bureaucracy and culture; poor training; information and communication technology; underdeveloped domestic industry; high transport costs; poor warehousing and storage; regional imbalance; and domestic trade barriers [5]. In an effort to spread the economic benefits of production to the less developed areas, China is encouraging companies to locate new factories inland, such as in the central or western regions, rather than in the eastern part of the country. However, the inland locations have even more challenging logistics problems.

While recognizing the threat, the maquiladoras also feel hope due to the "hidden restrictions" associated with manufacturing in China, and take some comfort in China's very distant location from the U.S. [13]. Moreover, Cano Ricaud, who is Chihuahua's Secretary of Industry, contends that Chihuahua's greatest advantage is in its highly skilled labor, and said that companies which relocated to China took production processes which were labor intensive, rather than the highly qualified people that Chihuahua offers [12]. In keeping with Chihuahua's experience, some government officials envision Mexico "moving up the manufacturing food chain... " following the examples set by Singapore and Malaysia [16]. It is clear that Mexico fully recognizes the threat of China's more competitive labor costs and its manufacturers are currently in the process of repositioning their manufacturing strategies to better fit the realities of global competition.

9. Conclusions

In this paper we have seen how the strategic pursuit of low labor costs as an order winner has had an enormous effect on the world economy as MNEs move from one country to another in the pursuit of its strategic mission, tying free trade agreements to production issues. Now, with the industrialized world reorganized into the three major trading blocs: Europe, Asia, and North America, the face of both trading and manufacturing is clearly changing. For their own economic survival, the MNEs continue to play a major role in this accelerating reorganization.

Under NAFTA, the maquiladoras, as currently known, essentially are being redefined because they are now competing more and more on an equal footing with other forms of manufacturing, with no special tariff and duty privileges. The more advanced maquiladoras are fully participating in this phase of their life cycle. Although they will cease to exist as "maquiladoras" as originally defined, they will continue to produce, only following the new challenges and rules of the game.

To remain competitive, the major U.S. manufacturers are being drawn into this scenario, either voluntarily or involuntarily, having to totally re-evaluate their production and trade strategies in keeping with the increased global competition. Not

only do they have new opportunities in Mexico, but Mexican companies also have new opportunities in the U.S.

Although Mexico's proximity to the U.S. gives Mexico a distinct competitive advantage, more competitive, yet good, labor has been an even greater driving force behind the relocation of both American and Mexican manufacturing plants to Asia. Thus, fierce competition coming from Asia, especially from China, tends to cloud the manufacturing environment in Mexico, even after considering the benefits of the free trade agreement between the U.S. and Mexico. It is clear that China is here to stay and will remain a major force in manufacturing. It will perhaps be the "dreadful competitor" feared by Mexico and other countries. Meanwhile, the search for more competitive labor continues. . . . . .

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