

EMPLOYMENT AND TRAINING
PAPERS

12

Maquiladoras prospects of
regional integration and
globalization

Regina M.A.A. Galhardi

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Foreword

This paper analyses the operations and prospects of export processing industries in Mexico in the context of regional integration and globalization. It draws on papers presented at the International Conference on “Globalization and the Future of Maquiladoras in Mexico” organized by the International Institute for Labour Studies of the ILO and the Colegio de la Frontera Norte (COLEF), held in Tijuana, Mexico, in May 1994. Other sources of information were also used.

The paper covers topical issues such as industrial organization and economic structure; employment, labour relations, working conditions, wages and human resources development. It also compares Maquiladoras with plants in the US, Canada and Asian countries and discusses their role in the “global commodity chains”. An important aspect covered by this working paper is the effects of the North America Free Trade Agreement (NAFTA) in the Maquiladoras and its impact on local and regional economic development.

The paper discusses firstly the economic and political context at the origin of the Maquiladora programme and how it has changed over time. It analyzes the evolution of Maquiladoras in terms of labour conditions, employment and skills. In particular, it discusses the opportunities and risks faced by Maquiladoras to cope with the new trade regime and globalization of production. Some policy options for local development within the framework of globalization and commercial and economic integration promoted by NAFTA are also examined.

The author argues that an industrial transition from assembly operations towards more skilled and technologically advanced activities depends on the Maquiladoras’ participation into international markets and the regional economy, which directly affect labour conditions and skill requirements at the local level.

The study is part of the Work Programme of the Employment and Labour Market Policy Branch on “Employment effects of globalization and regional integration”, and may be helpful in guiding future research on post-NAFTA changes in Mexican manufacturing and trade.

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1. Introduction

Started in 1965, as an emergency measure to combat regional unemployment, the maquiladora programme in Mexico has had an explosive growth. With an annual growth rate of employment of 10 per cent versus the national average of 2 per cent, during the last 25 years, **the maquiladora sector** has become the most dynamic industrial process, experienced not only by the regional economies of the border but also by the Mexican economy as a whole.

The number of maquiladoras in Mexico has grown from 50 small establishments in 1965 to nearly 800 in 1985 and, by 1990, there were roughly 1900 plants employing about 460,000 people. Most of them were in the Mexican-US border regions (Table 1.1). By 1995 the maquilas had grown to over 2,000 establishments with an average employment of 300 persons per establishment. According to forecasts, the employment figure will grow to more than 1300,000 by the end of the century (Alonso, Carrillo and Contreras, 1994, p. 203). The share of maquiladora employment as a percentage of Mexico's total manufacturing employment went up from 4.9 per cent in 1980 to 16.8 per cent in 1993, with a greater impact (26 per cent) in the border states. Maquiladora employment reported an annual average growth of 12.6 per cent from 1980 to 1993.

Table 1.1 Maquiladoras' evolution 1970-1993, selected indicators

	1970	1975	1980	1985	1990	1993
Number of plants	120	454	620	760	1 938	2 172
Border (%)	n.a	n.a	n.a	88.4	76.2	72.5
Interior (%)	n.a	n.a	n.a	11.6	23.8	27.5
Employment*	20.3	67.2	119.5	212.0	460.3	541.0
Border (%)	n.a	n.a	89.2	88.1	76.1	72.7
Interior (%)	n.a	n.a	10.8	11.9	23.9	27.3
Production **	n.a	n.a	n.a.	5 080	14 100	23 190
Average wage***	n.a	0.84	1.08	1.38	1.78	2.51

n.a = not available

* Thousands

**Thousand dollars.

*** Dollars per hour.

Source:- INEGI, Estadísticas de la Industria Maquiladora, SECOFI, México (several years)
- CIEMEX-WEFA, Maquiladora Industry Analysis, Bala Cynwyd, September 1992.

The foreign exchange picture is even brighter, with maquiladora exports generating more foreign exchange than any other sector in Mexico except oil production. Total maquiladora exports soared from almost US\$ 2.5 billion in 1980 to US\$ 10.1 billion in 1988. Imported inputs in 1988 were US\$ 7.8 billion, resulting in a net value-added figure for Mexico of US\$2.3 billion, which corresponds almost entirely to Mexican labour costs. This was equivalent to about one-third of the value-added for all Mexico's manufactured exports (Gereffi, 1994, p.20). Concurrently, commerce and services expanded in the cities that concentrated on maquila operations.

Despite the jobs created and the foreign exchange generated, it is argued that maquiladoras have remained on the fringes of the Mexican economy and have contributed little or nothing to advancing industrialization, technological growth or international competitiveness.

The lack of linkage with local suppliers and local R&D institutions is a limiting factor to

their integration and technological upgrading. It is known that no local suppliers provide more than 2 per cent of raw materials, parts or components. **Why have they been so isolated from the rest of the Mexican economy? Why are they only one or two per cent of all components produced in Mexico?** To answer these questions, we have to understand first the economic and political context at the origin of the maquiladora programme and how it has changed over time. Moreover, it is necessary to study the evolution of the maquiladoras within this changing economic situation. Considering that the biggest change in this programme occurred in 1994 with the passage of North American Free Trade Agreement (NAFTA), **analysing the evolution of maquiladoras in the post-NAFTA economic context is also important.** Significant qualitative changes in the production process of the maquiladora plants have occurred since the early 1980s that reflect changes in the global economy. Maquiladoras grew out of low productivity, labour intensive assembly activities. Worker productivity increased, along with the use of skilled workers and average plant size, the production process became more capital intensive and many maquiladoras began manufacturing, along with assembly. **Will the “new” wave maquiladoras usher in a higher stage of development in Mexico? Will they contribute more to Mexico’s industrial development and to boost its international competitiveness?** A comparison of the experience of Asian export processing zones (EPZs) with maquiladoras in Mexico may tell us about the prospects for maquiladoras’ integration in both the local and international markets. A comparative analysis of EPZs in Asia and maquiladoras in Mexico can help to identify which particular conditions have enabled certain regional economies to follow a kind of “high road” development as opposed to a “low road” strategy. Which factors in the domestic political economy have facilitated following the “high road” approach? What is the role of local policy in creating conditions in which particular industries can be competitive? In particular, we intend to assess changes in working conditions as a result of the technical and organizational “upgrading” of the maquiladoras.

In the next section, some introductory remarks about maquiladoras will be provided on its origin and legal incentives and the evolution of the sector. Changes in production processes, ownership, location, and linkages with local suppliers will be dealt with according to the evidence available. Section 2 will comment on the employment and labour market characteristics of maquiladoras as well as on changes in the working conditions in view of its evolutionary development. In section 3, we will analyse the prospects of maquiladoras in the post-NAFTA context. Empirical evidence will be used to illustrate the opportunities and threats faced by those companies in the new economic context. The fourth section is concerned with the integration of this sector into the global economy by making analogy with the evolution of East Asian export processing plants. In the concluding section, the main issues relate to the possibilities of maquiladoras contributing to industrial development in Mexico as well as strengthening their participation in the global commodity chains will be explored in the post-NAFTA context.

1.1 What are maquiladoras: some clarifications

Maquiladoras are foreign owned, controlled or subcontracted plant operations that process or assemble temporarily duty free imported components in Mexico for foreign consumption, under a special treatment for tariff and fiscal exemption. Maquiladora is not an “industry” but plant operations in many industrial branches. Although they were conceived at the beginning as assembly processes, some are now involved in the more capital and skill- intensive production of electronics and components for cars. They constitute a diverse and heterogenous set of plant operations, technologically segmented within each industry and as a whole. These plants are also known as “maquilas”. Their production is largely exported to the United States.

Initiated in 1965, this industrialization was, however, an “atypical” process in the Mexican

context of industrial development, firstly, because of its geographical coverage. The industrial expansion in Mexico that began in the 1930s took place mainly in the metropolitan areas of Guadalajara, Monterrey and Mexico city. Secondly, the industrialization started in a period in which Mexican industrial policy continued to be firmly established within the model of import substitution industrialization, with a protectionist framework and an internal market orientation.

During the period 1950-1970, the manufacturing industries were the main source of employment growth, mainly in the metropolitan aforementioned areas. At the same time, the border region expanded and created jobs through the growth of the tertiary sector.

Due to the expansion of bi-national commerce and the flow of immigrants from the south, the border regions experienced a demographic growth superior to its ability to create jobs. Between 1940 and 1970 population expanded ten times, and consequently, imposing serious problems of unemployment, housing and urban infrastructure in the border cities. Additionally, the cancellation of the Bracero Program - under which some 500,000 Mexican workers were given seasonal entry visas to work primarily in agriculture - by the US government in 1964 imposed the massive repatriation of workers, many of whom decided to establish themselves in the border regions. With the end of the Bracero programme, a set of rules under which *maquiladoras* could set up in border areas was negotiated with the United States. It was expected that the maquilas would draw primarily from the unskilled labour pool, displaced by the end of the Bracero program. Capital-rich US companies would set up assembly plants in designated areas along the border to provide employment to labour-surplus Mexico. The arrangement would lower manufacturing costs for US companies and provide much-needed employment to Mexican workers. Thus, in its incipient form, *maquiladoras* would serve as a form of international division of labour: low skill work allocated to low wage labour. This idea has appealed to both employers and workers on both sides of the border (Verma, 1994, p. 239). Others (Tamayo and Tamayo, 1994, p. 332) argue that *maquiladoras* were set up in Mexico, because were they not only attracted by the low regional wages, but principally by the absence or weaknesses of environmental regulations and control mechanisms.

It is within this context that the maquiladora programme was established in Mexico in 1965, notwithstanding the strong bias against foreign investment within policy making circles. Its initial purpose was to confront a regional emergency by creating a framework of exception that recreates export processing experiences from other countries, confined within precise temporal and territorial limits. About its temporality, the idea was that within a medium term the industrialization process was going to create regional suppliers' chains that would reintegrate the border economy to the national core. As for its territoriality, the policy of exemption was restricted to the northern border regions¹.

The US government supported the setting up of export assembly operations through items 806.30 and 807.00 of the Tariff Schedule of United States, which assess import duties only on the value added of work done abroad, mainly the (cheap) labour and overhead costs, when US-origin components are sent overseas for assembly and then returned to the United States. The Mexican government also cooperated by permitting duty-free entry of all materials and equipment used in the *maquiladoras*, and it authorized 100 percent foreign ownerships for the enterprise, if the entire output was exported. This was largely a bilateral understanding to fit US and Mexican needs.

¹The cities with the greatest number of maquiladora establishments are Tijuana, Ciudad Juarez, and Mexicali. In Tijuana, there was a total of 447 maquilas employing 57,295 persons with a total investment of US\$61 million. However, there are also growing numbers of maquiladora plants in Mexico's large interior cities such as Monterrey and Guadalajara. These *maquiladoras* located in the central region of the country have expanded from 10 per cent in the 1980s to almost 30 per cent in the mid-1990s (Table 1.1).

In less than three decades, an industrial program conceived as an emergency measure transformed itself into the **dynamic nucleus of the regional economies of the border, and into the most successful industrialization models of the country**. In terms of both employment and value-added, the most important sectors are electronic components, transportation equipment, and electrical machinery. In 1989, the maquiladoras in electronic components employed 105,000 people; transportation equipment, 94,000; and electrical machinery, 67,000. The next largest sector was apparel and textiles, with 42,000 employees.

By the early 1990s, trade had become much more multilateral with growing Japanese, European, and Asian presence in the North American market. Many advanced US and foreign firms such as General Motors, General Electric, Hewlett-Packard, Ford, Chrysler, Samsung, Sony, Thompson and Toshiba, currently have significant maquila operations. Consequently, many original maquila rules were gradually relaxed. Perhaps the single most important event in the evolution was the negotiation of the NAFTA agreement, which came into effect in 1994. NAFTA extends maquila-like privileges to all producers, in stages, regardless of national origin, location within Mexico, and export orientation.

As emphasized by Verma (1994, p.240), the economic context for maquiladoras has changed gradually since they first came into being in 1965. There have been a number of modifications in the original maquila decree. In 1972, interior areas in the country were added to the designated border areas with the exclusion of industrial concentrations around large cities such as Mexico City. In 1989, they further relaxed the export requirement from 80 per cent to 50 per cent. The biggest change occurred in 1994 when NAFTA brought the entire Mexican economy under a phased-in liberalization programme. Subject to the timetable and specific exclusion, NAFTA provisions supersede those of the maquiladora programme.

Other significant changes in the global economy have also modified the context for maquiladoras. In recent years, Mexico has also pursued free trade agreements with some of its neighbours in Central and South America. In May 1994, Mexico, Venezuela and Colombia signed a free trade agreement. These developments altogether **potentially** move Mexico from a supplier to the United States to becoming a manufacturing centre and supplier to markets from Canada to Chile. The strategic question that arises from these developments is whether **Mexico can make the transition from being solely a low wage maquila operation to becoming a manufacturing centre for the western hemisphere**.

1.2 Maquiladoras' evolution: an industrial transition?

Since 1982, important qualitative changes in the production process of maquiladora plants have been observed. In some sectors, these plants no longer were characterized by low productivity, and labour-intensive assembly activities. Worker productivity increased, along with the use of skilled workers and average plant size, the production process became more capital intensive and many maquiladoras began actual manufacturing, along with assembly. In other words, the “**new**” generation of maquiladoras added value to the product by transforming components, not just assembling them.

These changes seem to reflect a transition in global corporate strategy away from simply minimizing labour costs in the mass production of standardized products. Change in the nature of international competition based on labour costs, which had favoured an unskilled and low-paid labour force has been displaced by new market conditions requiring product diversity, design excellence, high quality, and reliability. This requires flexible production systems and, so, the adoption of programmable automated machinery, which allows a variety of products to be produced without expensive retooling or costly downtime. It also requires changes in work

organization and the relationship between firms. Flexible work organization involves rotating each worker undertaking a variety of tasks, usually in a team at a work station, rather than as individuals on an assembly line. It also involves labour in quality circles aimed at diagnosing problems and proposing solutions. Finally, flexible production entails a close relationship with suppliers that, when combined with computer monitoring of materials flows, permit reduced inventories (Wilson, 1994, p.150).

Field studies in Mexico have shown that about 20 per cent of the maquiladoras have adopted some characteristics of flexible production (Carrillo and Ramirez, 1990). Less clear, however, is the pervasiveness of these practices and the extent of their application. In the early 1990s, several studies tried to measure the process of **diffusion of flexible forms of manufacturing**. Using samples not differentiated by the ownership of the plant, several studies found evidence that advanced manufacturing techniques were being used more extensively in most maquiladoras. Wilson (1992) reported that 18 per cent of the 71 establishments surveyed in Tijuana, Juarez, Nuevo Laredo and Monterrey could be considered “flexible”. Pelayo (1992), based on a survey of 18 autoparts plants in Juarez, found that 38 per cent of the plants applied the just-in-time (JIT) technique and 44 per cent quality circles. Carrillo and Ramirez (1990), however, determined that only 18 per cent of the plants in Tijuana, Juarez and Nuevo Laredo could be classified as high technology and flexible, compared with 5 percent obtained in a national survey reported by De la Garza (1992).

Evidence on the technological transformation of the maquiladora sector shows the existence of a “mosaic” of different levels. Brown and Dominguez-Villalobos (1989) found that in some maquiladoras concerned with the production of electronics and autoparts components in Juarez, 60 per cent (twelve out of twenty plants) had an “intermediary” or “high level” of automation in 1988. Reynoso (1992), based on the classification of three technological levels, i.e. no technology (assembly operation), low technology and high technology, argued that 30 per cent of the maquilas in Monterrey were applying “high technology” in 1991. Carrillo and Santibanez (1993) estimated the number of workers per automated unit and concluded that, on average, the maquiladoras in Tijuana had higher technology intensity than those from Monterrey and Ciudad de Juarez. They also found that the maquilas operating in the electronics sector have a higher technological/automation level than those active in the textile and autoparts production. Kamiyama (1994, p. 274) found evidence of increasing automation in the Japanese maquiladoras since 1989.² Besides such automation, his research in 1991 confirmed the introduction of computers to parts and components order, inventory control, outgoing products and the whole process control in these maquiladoras.

Some studies have examined the organizational characteristics of production in the maquiladoras and pointed out the adoption of new forms of work organization, e.g. JIT (just-in-time), TQC (total quality control), team work, etc. These new practices were more diffused principally in those maquiladoras operating in the electronic and textile sectors (Hualde, Mercado, and Zepeda, 1994, p. 109). In a sample of electronics maquiladoras, Carrillo et al. (1993) found that 33 per cent use quality control circles, 39 per cent have multi skilled workers, and 40 per cent use some form of job rotation among operators on the production line. In the case of Japanese-owned maquiladoras, Kenney and Florida (1994, p.39) have analysed the transfer of core elements of the Japanese production system into the Mexican environment and concluded that “*even though the suppliers’ factories are often less than two kilometres from their assembler,..., there is currently no JIT in operation*”.

²One plant raised the automation ratio of the chassis assembly process from 50 per cent to 80 per cent in 1990 and another plant also raised its ratio from 70 per cent to 85 per cent about the same time

Therefore, these studies are not conclusive and their findings cannot be generalized. They are scattered among different sectors, branches, locations and methodological approaches. The results vary according to the sectoral coverage of the sample, ownership of the plant, etc. Nevertheless, they corroborate the existence of, at least, two types of maquiladoras: those involved with (i) labour and low skill-intensive methods of production and (ii) more capital and skill-intensive production practices.

The latter emerged in the early 1980s with growing East Asian investment. The number of Japanese-owned maquilas increased from only eight in 1979 to about 70 by 1990, with an estimated 25,000 Mexican employees. With a total investment of \$1.50 billion at the end of 1989, Japan has become the third largest investor in Mexico, after the United States and Germany³. The increased role of Japanese investment in Mexico is part of “*a larger strategy of increasing investment in North America, in part to bring manufacturing closer and therefore make it more responsive to the US market and, in part, to ward off anticipated protectionist sentiment*” (Shaiken, 1990, p. 93). Japanese companies have started “maquiladora” operations to supplement the operation of their US-based plants. In several cases, however, the Japanese firms ceased US operations and shifted all their production to Mexico.

Japanese direct investment in Mexican manufacturing comprised 61 per cent of the \$1.87 billion total Japanese investment in the early 1990s. The largest investment category by far was **transportation equipment** which accounted for nearly 43 per cent of its total investment and nearly two-third of all Japanese direct investment in manufacturing. The transportation equipment investment is almost entirely the \$1 billion invested by Nissan in an automobile assembly plant and an engine casting facility. The Nissan facility is not, however, a maquila.

Japanese maquila investment has been concentrated primarily in the **electronics and related industries such as video and audio cassette production** (Kenney and Florida, 1994, p. 29). There are smaller numbers of establishments in automotive component parts, industrial machinery and food processing. Electronics dominates Japanese maquila activity with 39 plants or 55.7 per cent of the total number of Japanese maquilas (*ibidem*). Japanese foreign investment in the electronics sector in Mexico comprised 2.1 percent (US\$ 39.7 billion) of the US\$ 1.87 billion total investment. Therefore, the bulk of the Japanese foreign investment in Mexico is not in the maquiladora sector⁴. Moreover, Japanese maquilas comprise a relatively small, 3.6 percent share of over 1900 maquilas operating in Mexico. The vast majority of which are US owned or operated.

Korean investment in Mexico is far smaller and more recent than that of Japan. The number of cases of Korean investment is open to dispute. The Banco Nacional de Comercio Exterior listed 16 investments in 1993. Others have counted 25 investments, particularly concentrated in **the electronics and related industries**. The important exception is the Hyundai factory in Tijuana, which is the largest Korean maquiladora, with approximately 1,200 employees. The total value of all Korean manufacturing investment is approximately US\$97 million, of which nearly US\$80 million was in the maquiladoras and 50 percent of this amount (US\$40 million) in the construction of the Hyundai maquila (Kenney, Romero and Choi, 1994). It seems that these Asian maquiladoras are propelling or stimulating local development through linkages with Mexican companies, at least in the most mature industrialized regions of the country. At the end of 1991, 53 maquiladora plants between the Northern border cities of Tijuana and Mexicali were identified. Of these, 40 were Japanese, and were characterized as being the largest maquiladoras

³ Although Japanese investment in Mexico nearly doubled between 1982 and 1988, it still accounts for less than 6 per cent of total FDI in the country (compared to around 75 per cent for US firms).

⁴ There were 131 Japanese manufacturing plants in Mexico and 70 Japanese maquilas in 1991.

with the largest numbers of employees. During the last few years, the state of Jalisco has emerged as one of the most favoured for industrial location, with 30 maquiladoras in Guadalajara in September 1991. The same process is being repeated in the central cities of Monterrey and Merida, with eighty and 28 maquiladoras respectively, as from September 1991. In these central areas the potential for becoming involved in a dynamic process of subcontracting is also very high due to the existing experience in the production of intermediate components with international quality levels. This suggests that this “new” wave of maquiladoras could help to promote the integration with local companies through the absorption of local inputs and subcontracting. It should be noted, however, that the Asian maquiladoras are only a minor part of the overall maquiladora investment that remains dominated by the US multinationals. Still the vast majority - about 96 per cent- of maquilas operating in Mexico are US-owned and operated.

1.3 Supplier linkages and local content

Mexican industries, propelled by the Mexican government’s local-content regulations, purchase a significant amount of Mexican inputs (parts and raw material). A case study of a major foreign personal computer manufacturer in Mexico found that 30 per cent of the value of the parts used in the production process were sourced in Mexico (Shaiken, 1990, p. 112). Another study places the domestic content of Mexico’s leading computer exports at closer to 10 per cent, although in two computer companies domestic integration levels were 38 per cent and 76 per cent (Unger, 1990). As mentioned by Brannon, James and Lucker (1994), in a sample of 63 of the 100 largest multinationals operating in Mexico, subcontracting went well beyond those industries having local-content requirements. For instance, 3 of 6 plastic material producers subcontracted for 1-10 per cent in two cases and for 11-25 percent of inputs in the other; one pharmaceutical enterprise subcontracted for 50 percent of its needs; six of eight electric and electronic equipment multinationals subcontracted for more than 10 percent and one of them for even more than 50 percent. This evidence suggests that Mexico possesses some internal capacity for producing competitively an array of “intermediate” products, e.g. semiconductors, capacitors, integrated circuits, transistors, disc units, diodes, etc.

In the maquiladora sector, on the contrary, Mexican-supplied material inputs never reached 2 percent of the total inputs purchased during 1980-91. National purchases rose to 2 percent in 1992, but decreased to 1.7 percent through the first quarter of 1993. This evidence in comparison with the level of Mexican industries’ local inputs raises the question about the paucity of local sourcing for assembly manufacturing in the northern border region.

Only about 6 per cent of the value added in Mexico from maquiladora production comes from domestic material inputs and packaging. It was less than 4 per cent in 1987. A recent study conducted by Brannon, James and Lucker (1994) on corporate and plant purchasing arrangements concluded that the contribution of purchased inputs in Mexico to value added is especially low in the border area due to “*a technological vacuum*” (p. 1942), i.e. the lack of an economic and technical environment for firms producing goods with high technical content.

The contribution of Mexican inputs to the maquiladoras located in the interior of the country amount to 17.5 per cent by the late 1980s. Overall, more Mexican inputs tend to be used in locations where supplier industries are already established, such as Guadalajara and Monterrey rather than on the border. This suggests that the low level of local sourcing is aggravated by regional disparities. In the interior of the country, where transportation costs and the technological environment are more conducive to local sourcing, maquiladoras have most Mexican content than do their counterparts along the northern border.

The weakness of the maquilas’ backward linkages to Mexican border cities is accentuated

by the fact that many items requested are produced in the United States or interior of Mexico and are only marketed in the north. Companies in Mexico city and Monterrey, and to a less extent, in Guadalajara, San Luis Potosi and Queretaro, supply nearly all of the Mexican content requiring any degree of technical sophistication. Moreover, under US tariff schedule provision 9802.00.80 (formerly clause 807), enterprises operating in EPZs have an incentive to minimize locally purchased inputs because only US-made components are exempt from import duties when the finished product is shipped back to the United States. These facts, jointed with the isolation of Mexican border cities and the lack of an industrial base have constrained the establishment of meaningful supply linkages between local border producers and maquiladoras.

It is worth mentioning the upsurge of an electronics network of Japanese suppliers manufacturing parts and components in Tijuana. There are three Japanese firms which specialize in different size plastic injection moulded parts and some transplant subsidiaries. The latter supply stamped metal parts, wire harnesses, speakers, coils, transformers, ferrite magnets for speakers, TV deflection yokes, and TV remote controls. At least six Korean suppliers were recently established. One of them provides antenna jacks and control boxes. The others supply plastic injection and moulded parts for televisions.

The supplier networks in the nonelectronics firms are far less clear. Two major exceptions were reported: (i) the Hyundai container facility in Tijuana has four local Korean suppliers and, (ii) the Yazaki Corporation has a nearby subsidiary to do injection moulding and some machine repair for its separate wire harness factories.

A network for the assembly of electronic equipment has clearly emerged in Northwestern Mexico. A relevant consequence of this emerging network are the economic and technological spillovers generated in the form of backward technical-learning linkages extending from purchasing enterprises to subcontracting firms. This could provide an opportunity for upgrading the quality of indigenous suppliers, thus accomplishing the goal of technology transfer.

2. Labour conditions, employment and skills: deterioration or evolution?

Although nobody denies that the maquiladora sector has experienced some important transformations, there is ample debate concerning **their content and nature, and how profound these changes are**. Most research concluded that low wages and limited benefits, boring and repetitive tasks, long workdays, and direct supervisory control characterize labour conditions in the maquilas. Taking into account the emergence of a new wave of “flexible” maquilas, the crucial question is whether this “precarious” situation has been changing, and whether these changes are significant. One of the most contentious issues deals precisely with **the nature and extent of the transformation of labour conditions and the operation of the labour market in the maquiladora**.

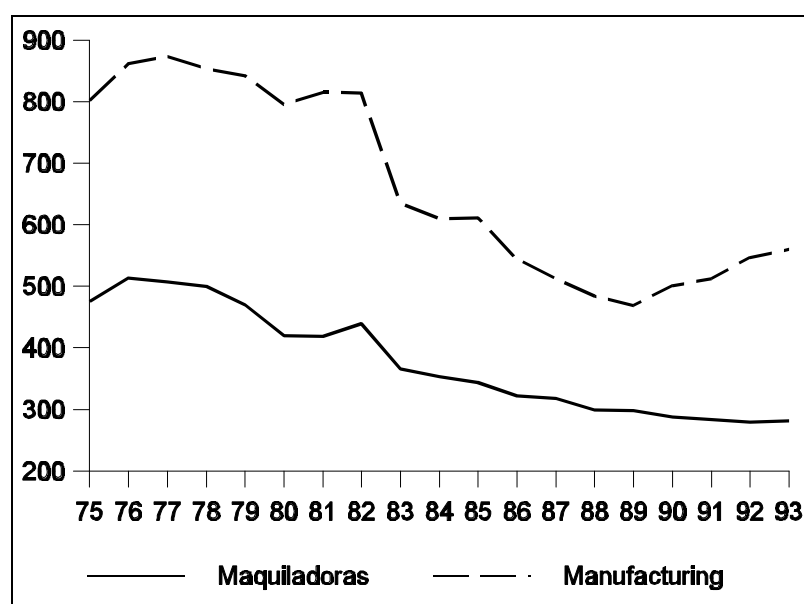
2.1 Wages and benefits

The low wage level is one of the most criticized aspects of the maquiladora programme. In order to understand why the maquiladoras' wages are low, Gambril (1994, p. 212-237) conducted a comparison between the wage structure in the maquiladora sector with the manufacturing sector, during the period 1975-1993. She reported a decrease of 45 per cent in the maquiladora' wage relative to the manufacturing sector between 1977-92. As she emphasised, this decrease had nothing to do with the 1982 devaluation of the peso. On the contrary, the year 1982 was the only exception to the continuous drop of wages. Actually, during that year, there was an increase of 15 per cent in the real wage vis-a-vis the year 1981 (Figure 2.1).

Although wages in the national manufacturing sector also decreased by 45 per cent during this period, the reduction was clearly concentrated during the years 1982-88 (period of the crisis provoked by the devaluation policy). This was the only period where the wage gap between the manufacturing and maquiladora sectors was reduced. After this period, Gambril noted that the maquiladora wages continued to slow while the manufacturing wages increased.

The maquiladora wages declined continuously after and before the devaluation/crisis period. This observation seems to show that the economic situation of the country did not affect the wage fluctuation in the maquiladora sector. The devaluation of the currency has affected principally national enterprises that depend mostly on the local market. As the maquiladoras' production is oriented to the external market, they benefited from the devaluation. If this were the case, how can the reduction of real wages in the maquiladora sector before and after the crisis period be explained?

Figure 2.1
Real wages of low-skilled workers in maquiladoras and manufacturing industry
 1975-1993 (Constant Pesos Dec. 1982)



Source: INEGI, Estadística de la industria Maquiladora de Exportación, 1974-82. 1978-88 y mimeógrafos para 1989-93. INEGI, Estadística Industrial Anual, 1975-82. Encuesta Industrial anual, 1983-86. Encuesta Industrial Mensual 1987-93. Índice de Precios de la Comisión Nacional de Salarios Mínimos hasta 1982 e Índice de Precios al Consumidor del Banco de México de 1983 en adelante.

In order to answer this pertinent question, Gambril examined the evolution of wages during

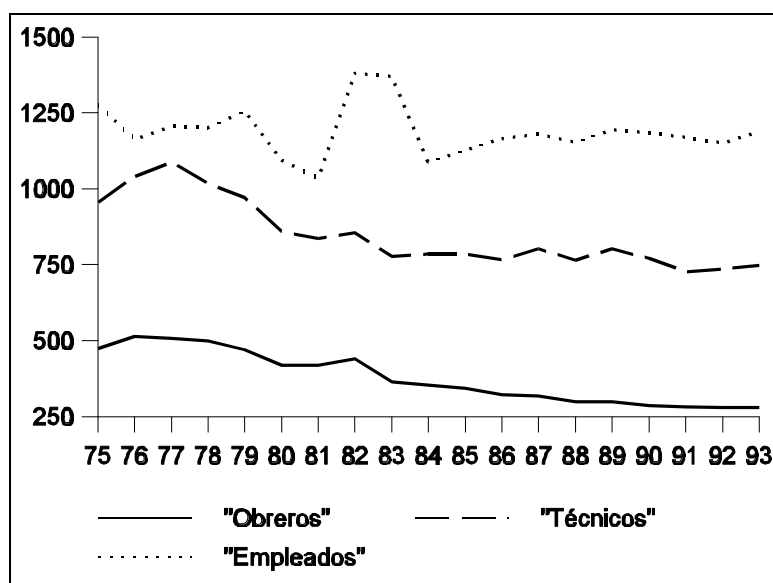
three periods of seven years each, i.e. 1975-1981, 1981-1987 and 1987-1993. These periods can be associated with three distinct economic situations: the first, economic surplus; the second, crisis and the third, economic openness. The real salary in the maquiladora sector varied as follows. In the first period there was a reduction of 12 per cent; 24 per cent during the crisis period, and 12 per cent during 1987-93. On the contrary, manufacturing wages increased 2 per cent during the first period, decreased 37 per cent during the second and increased 9 per cent during the last period. Therefore, the maquilas' workers were penalized during the first and third periods which were relatively favourable for the manufacturing workers. The crisis period affected workers in both sectors alike.

Gambril noticed that the wages in the manufacturing industry were almost double that of the wages in the maquiladoras. In 1975, the maquiladora salary represented 59 per cent of the manufacturing salary and in 1993 wages in the maquiladora sector were 50 per cent of the wages in the manufacturing sector. Therefore, during two decades, the level of wages deteriorated in the maquiladora sector.

During the period 1982-1988 the wage gap between the two sectors shrunk a little. This, however, was not due to an increase in the maquiladora wages but rather to a wage decrease in manufacturing. Since 1988, the real wages in the latter have recovered and the difference between wages in both sectors has been accentuated.

In order to understand and explain this difference, Gambril examined the occupational structure in the maquiladoras and how it related to the wage structure. According to the available classification, three categories of workers were identified; "obreros" (low-skilled production workers), "técnicos" (technicians: high-skilled production workers), and "empleados" (non-production workers). In 1993, the average salary of an "empleado" was 323 per cent higher than that of an "obrero"; and a "tecnico" received 166 per cent more than an "obrero" (Figure 2.2).

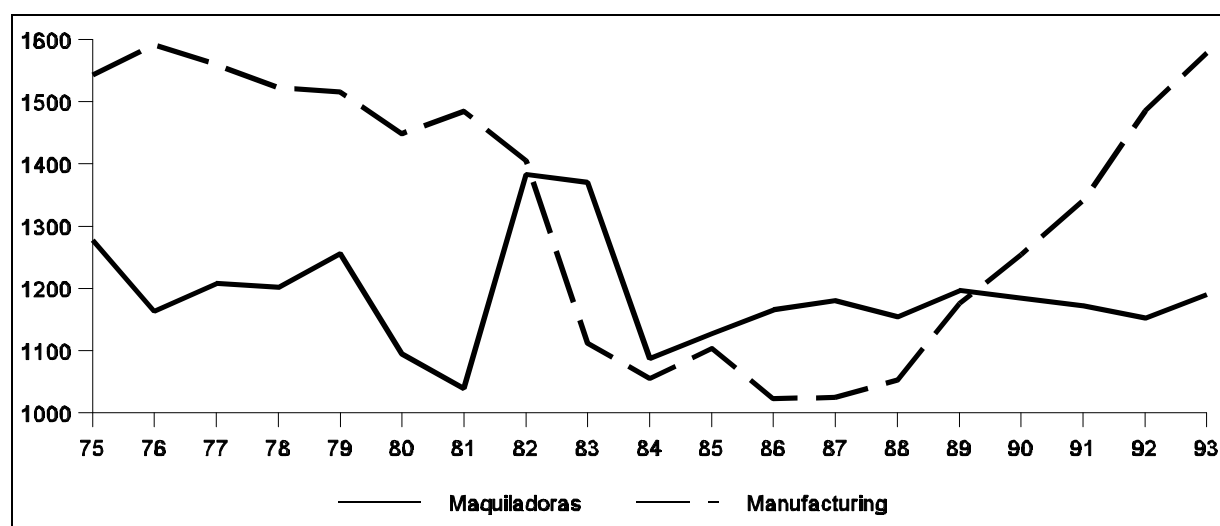
Figure 2.2
Wages of "obreros", "técnicos" and "empleados"
 1975-1993 (Constant Pesos December 1982)



Source: INEGI, Estadística de la industria Maquiladora de Exportación, 1974-82. 1978-88 y mimeógrafos para 1989-93. INEGI, Estadística Industrial Anual, 1975-82. Encuesta Industrial anual, 1983-86. Encuesta Industrial Mensual 1987-93. Índice de Precios de la Comisión Nacional de Salarios Mínimos hasta 1982 e Índice de Precios al Consumidor del Banco de México de 1983 en adelante.

Gambril remarked, however, that the salary of “empleados” in the maquiladoras was closer to the salary of the same category of workers in the rest of the manufacturing sector. During a certain period (1982-1989) their wage was even higher than the manufacturing sector (Figure 2.3). The striking characteristic is, however, the lower wages of manual workers, i.e. “obreros”, in the maquiladoras vis-a-vis the national manufacturing sector. It was pointed out that the surplus of low-skilled labour in combination with increased international competition was the reason for the diversion. Both factors contributed to keeping the wage of production workers at the lowest level in the maquiladora sector.

Figure 2.3
Real wages of “empleados” in maquiladoras and manufacturing industry
 1975-1993 (Constant Pesos December 1982)



Source: INEGI, Estadística de la industria Maquiladora de Exportación, 1974-82, 1978-88 y mimeógrafos para 1989-93. INEGI, Estadística Industrial Anual, 1975-82. Encuesta Industrial anual, 1983-86. Encuesta Industrial Mensual 1987-93. Índice de Precios de la Comisión Nacional de Salarios Mínimos hasta 1982 e Índice de Precios al Consumidor del Banco de México de 1983 en adelante.

This conclusion, however, should be interpreted with caution. In this study maquiladoras were considered as a homogenous group of plants, and changes in wages were analysed in aggregate. This does not seem to reflect the heterogeneity of the maquiladora industrialization. Nevertheless, this study has shown that the general trend of low wages in the maquiladora sector is determined by the remuneration perceived by the unskilled category of production workers. This seems to suggest that an upgrade in the production process of maquiladoras could favour workers in general. An analysis of the wage structure in the Japanese maquiladoras can help to clarify this issue.

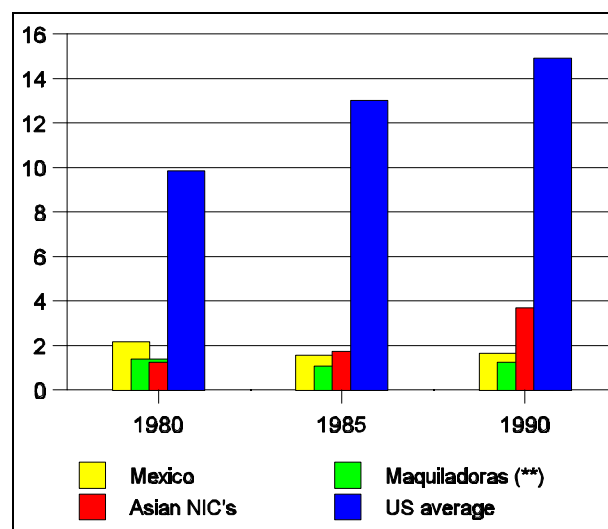
In the Japanese maquilas⁵, wages averaged approximately \$50 per week or between \$1.10 and 1.25 per hour for production workers which is considerably below the US minimum wage of \$4.75 per hour (Kenney and Florida, 1994). The non-wage benefits for regular production workers

⁵ As of 1991, there were about 70 Japanese maquilas. Electronics dominates Japanese maquila activity with 39 plants or 55.7 per cent of the total number of Japanese maquilas. They are concentrated in Tijuana where at least 31 Japanese-affiliated plants are located, employing approximately 15,000 workers (Kenney and Florida, 1994, pp 27-44).

were small and varied by firm. They included: food coupons, small transportation subsidies, company-sponsored parties for Christmas and other holidays, subsidized cafeterias, and paid holidays (Mexican law requires many of these). Wages for higher level employees (e.g. technicians) ranged from approximately \$320 per month (\$1.58 per hour) to \$1,200 per month, evidencing a significant variation by company and skill level⁶. The most highly paid Mexican nationals are managers. They received \$1,500-\$3,000 per month depending on rank, the average being \$2,000-\$2,500. The wages for managers were approximately half that of the United States. At the higher managerial levels, companies gave Mexican managers health insurance, company car, and other benefits expected by US managers (Kenney and Florida, 1994).

Another study based on data collected in personal interviews with 75 production workers employed in eight Japanese maquiladoras located in Tijuana (four consumer electronics assemblers and four electronic parts suppliers) found substantial differences in wages and benefits (Kenney, Contreras, Goe and Romero, 1997) between the “operator” and “non-operator” groups. Taken as a whole, workers in the “operator” group averaged US\$54.50, while the “non-operator” group averaged US\$72.57 per week. This difference became more distinct when stratified by gender. Female operators were found to earn on average \$51.43 a week compared to \$63.43 earned on average by male operators. Wages for females in non-operator work positions were found to average 62.29 per week compared to 81.14 per week for males in the “non-operator” group.

Figure 2.4 Wage evolution for production workers
Benefits included (dollars/hour)



** Benefits average is 22.5% in 1985, 41.3% in 1990, 38.0% in 1995

Source: Echeverri-Carroll (1994) Table 2, and CIEMEX-WEFA (1992)

Hourly Compensation for Production Workers in Manufacturing, 34 countries. U.S. Department of Labor, Bureau of Labor Statistics, Office of Productivity and Technology, April 1990, Unpublished data.

Hourly Compensation for Production Workers in Manufacturing Industries, Mexico 1975-1992. Unpublished Data for Mexico and Maquiladora.

CIEMEX-WEFA, Maquiladora Industry Analysis, Bala Cynwyd, September, 1992.

Non-wage benefits were not usually stratified by work position or gender but there were several exceptions. Most of the workers in the sample from both operator and non-operator

⁶ These wages are difficult to compare because higher paid technicians are graduates of two-year technical colleges, while the lower level technicians are shopfloor operators who have received slightly more training and a promotion (ibidem, p. 31)

groups received paid holidays, medical insurance, on-site dispensary medical treatment, punctuality bonuses for arriving at work on time, and company-sponsored parties for Christmas and other holidays. While these benefits were not received by most of workers in the sample, a greater percentage of workers in the “operator” group received subsidized cafeteria meals, food coupons, and participated in a company-sponsored savings plan as compared to workers in the “non-operator” group.

Wages and income in the maquiladora sector are higher than local minimum wages. Wages in the national manufacturing sector have always been greater than the maquila. Nonetheless, while wages in national manufacturing were 56 per cent greater than in the maquilas in 1980, by 1990 the gap was cut to 30 per cent (Figure 2.4).

2.2 Working and living conditions

In general, working conditions in the maquiladoras have been described as highly risky because of very low on-the-job security measures, with an unhealthy environment and exposure to dangerous substances. Recent research, however, reveals a certain improvement in the situation. Some argue that the working and living conditions in the maquilas are not significantly different from other sectors in the border economy (Alonso, Carrillo and Contreras, 1994, p. 194). Others say that working conditions within the maquiladoras are much better than in the manufacturing industries on the border or in other regions of the country (Sanchez, 1994, p. 312). These changes could be attributed to the labour conditions in “second generation” plants that are better or at least comparable with national standards in large manufacturing companies. As witnessed by Kenney and Florida (1994, p. 258) in their field work on the Asian maquiladoras, “*the plants were well-lit, airy, clean and orderly. In some cases the machines may have been slightly closer together than might be seen in an US factory*”.

This evidence is nevertheless disputed by findings that on average, **maquiladora workers lag behind workers in other sectors** (Sanchez, 1990), **when living conditions are analysed from citywide surveys**. A more recent study on the social and environmental effects of maquiladoras (Sanchez, 1994), shows that maquiladoras’ development has affected the urban structure in the Northern border. It seems that maquiladoras’ workers were no better off than manufacturing workers as regards their access to basic infrastructure (water, electricity, etc.). He concluded that the social costs are higher than the benefits generated by maquiladoras’ operation on the border.

2.3 Job qualification

Although occupations in the maquiladoras are generally considered as unskilled, some research has shown that certain occupations require more participation, responsibility and skills. Carrillo and Contreras (1992), through an evaluation approach that considered individual capacities, job requirements and organizational aspects together, found that workers’ skill has increased slightly considering that the average level of schooling went from six to seven years. As for occupations, the literature has shown that tasks have become more complex for the “second” generation maquilas due to the introduction of high tech manufacturing processes and the adaptation of total quality control (TQC) practices. This finding is, however, controversial. Kenney and Florida (1994) found little evidence of quality control activities in the Japanese maquila plants. In these maquilas such activities did not typically exist and, where they did it, they were quite rudimentary. The reason proposed for the absence of continuous improvement activities was that the production process used in the Japanese maquilas are extremely standardized and, at this stage, few productive improvements are expected. The common practice

in the Mexican plants is to inspect in quality throughout the process by using inspectors and not by depending upon the workers themselves. This is feasible in the Mexican context due to low labour costs. Nonetheless, in most of the plants, the skill requirements continue to be limited due to the low tech, unskilled nature of the work.

In the Japanese maquilas, there was no shortage of operators. But, shortages of skilled technical workers and managers were reported. As argued by Kenney and Florida (1994), *“technical workers were difficult to retain given demand from non-Japanese maquilas and most important, the possibility of crossing the border and securing even a low-wage job which pays \$4,00-5,00 per hour in the United States”*. In addition, and maybe more important, *“it also might be that the highly skilled parts of the work process are simply not located in the assembly part of the commodity chain”* (Kenney, Romero and Choi, 1994, p. 261). As argued by Kenney and Florida (1994), Japanese maquila plants generally specialize in assembly operations, which are the most labour-intensive aspects of the production process. Further, the labour-intensive activities in Mexico are usually in specific product areas which are undergoing severe price competition in the US market⁷, e.g. consumers electronic sector. In these areas, profit margins are low and small labour cost savings can mean the difference between profit and loss. Traditionally, the Japanese maquilas have performed labour-intensive assembly operations, while US or Japanese factories focus on higher value-added products or aspects of the production chain. The Japanese maquilas have become an integral part of the North American strategy of Japanese firms. The role of these maquilas as export platforms is evident in their particular insertion in the Japanese firms' global commodity chain.

2.4 Labour Markets

The transition from a situation of labour market abundance to shortage is one of the most significant changes in the operation of maquiladoras on the border cities. Since the mid-1980s, the structure of opportunities on both sides of the border and the dynamism of the local labour markets has created, a situation of labour shortages in all sectors of the border economy, especially for the maquilas.

Although there have been considerable efforts from maquila managers to reduce the number of leaving, the high rates of turnover have not decreased in the maquila sector as a whole. The maquiladoras have increased wages and money bonuses and other type of benefits and services. Nevertheless, they have had to actively recruit in nearby localities, and sometimes, to move their activities to these sites.

One of the most striking attributes of the maquiladoras is a very high rate of labour turnover. Recent studies have found that turnover rates are still very high (Carrillo, 1993). The average monthly personnel turnover in the maquilas is 12 per cent, i.e. more than 150 per cent a year.

The most common explanation for the high level of work turnover is the bad labour conditions, i.e. low wages and benefits, intense workdays and little hope of career advancement. In addition to these, the poor urban infrastructure in the border cities and the excess of demand for labour relative to supply were also pointed out as relevant factors.

Nonetheless, even when the rates of turnover are very high, not all workers are mobile. A recent probabilistic survey found through discriminant analysis that two life-cycle variables are associated with the probability of worker mobility: age and number of children, or dependents. The

⁷For example, small TVs, small refrigerators, electronic typewriters, automotive or electrical wire harnesses, audio cassette tapes, disposable cigarette lighters and certain semiconductor packages.

average age of the “stable” group of workers was 26, while the “mobile” group was only 20. The “stable” group had an average of 1.2 dependents, while the “mobile” one had only an average of 0.5 (Carrillo and Santibanez, 1993). A more recent study argued that worker mobility might be explained not only by demographic variables but also by the employment perspectives of workers in a particular context of opportunities. Without a prospect of career development, and in a situation of labour shortage, workers perceived maquiladoras jobs as temporary and transitional and part of the survival strategies of households.

Turnover in the Asian maquiladoras averaged approximately 10 per cent per month. This was comparable to turnover rates in US-owned maquilas of 10-20 per cent per month. The lowest monthly turnover rates were approximately 5 per cent, but some companies had turnover rates of 20 per cent. This was especially true for new plants. The general trend was for turnover rates to settle down to the 5-10 per cent range. Absenteeism was also high averaging approximately 5 per cent per day.

The high turnover rate does create problems in accumulating technological knowledge and management skills. Moreover, the high rates of employee turnover made it difficult to develop a capacity to engage in continuous improvement activity. In a high turnover environment training is an investment that might not be justifiable. As concluded by the study of Japanese maquilas (Kenney and Florida, 1994), *“it is unlikely that extensive skill formation and employee commitment to quality can be achieved in environments with turnover of 60-150 per cent per year, educational skills at the sixth grade level and only the most rudimentary training”* (p. 35). High turnover rates make the accumulation of negotiation skills difficult, which contributes to the weakness of the unions and the work force in general.

2.5 Labour relationships

Many studies have insisted that the perception of the regional and local labour environment by promoters and investors is a critical industrial locational factor in the northern border region of Mexico. What is usually understood as a “positive” labour environment is the lack of active unions, a low rate of labour conflicts and the absence or limitation of collective labour agreements.

As stressed by Alonso, Carrillo and Contreras (1994, p. 192), some characteristics have defined the context of labour relationships in the maquiladora sector:

- (i) a low level of labour conflicts is almost pervasive;
- (ii) rates of union membership are higher than 40 per cent of the labour force;
- (iii) there are at least two types of unions, both affiliated to the main national unions.
- (iv) labour agreements mean “protection contracts” for the enterprise and are highly flexible.

It is very difficult to establish just by how much the unions have influenced the labour conditions and the labour environment in the maquiladora sector. The rate of unionization should in theory be a factor that influences the betterment of labour conditions. The evidence suggests that labour conditions have deteriorated all over the country, while on the border they seem better. However, it seems that this positive tendency should be attributed more to labour shortages on the border regional markets than to the institutional and active influence of the unions.

2.6 Employment

Employment in the maquila is indeed temporary even when workers have long term contracts. In 1992, the average tenure of maquila workers in current employment was 1.8 years.

The main characteristic of maquiladora employment has been the dominance of a female labour force (Table 2.1). Some gradual changes in this scenario have been nonetheless observed. While in 1981, 76.7 per cent of maquila employment were women, by 1991 women's share had decreased to 57.2 per cent. As pointed out by Alonso, Carrillo and Contreras (1994, p. 195), other important changes have occurred in the structure of employment in the maquiladoras. For instance, the hiring of married men and women, and persons with previous work experience have increased. They are also hiring growing numbers of male workers. Overall, the share of men employed in maquiladora plants increased from less than 20 per cent to about 35 per cent between 1980 and 1990, but in some sectors like transportation equipment men comprise up to 50 per cent of the workforce (Gereffi, 1994, p. 21).

Table 2.1 Employment evolution in Maquiladoras

	1970	1975	1981	1985	1990	1995*	1997*
Employment							
Total	20 300	62 200	130 973	211 968	460 293	968 200	1 368 900
Border (%)	n.a	n.a.	88.91	87.75	76.07	64.62	63.79
Interior (%)	n.a	n.a.	11.09	12.25	23.93	35.38	36.21
Women	n.a.	n.a.	85 691	120 042	226 224	500 800	906 200
Technicians	n.a.	n.a.	12 545	25 042	54 813	127 000	196 200
Administrative	n.a	n.a.	7 744	13 052	33 859	67 200	89 800
n.a. = Not available							
* Estimated (CIEMEX-WEFA)							
Source: - INEGI. Estadísticas de la Industria Maquiladora, SECOFI, México (several issues).							
- CIEMEX-WEFA, Maquiladora Industry, Bala Cynwyd, September, 1992.							

In the Asian maquiladoras there is a clear-cut gender division of labour. In a study of Japanese consumer electronics maquiladoras, Kenney, Contreras, Goe and Romero (1997) found that the gender composition of workers in the sample was 56 per cent females and 44 per cent males (p. 22). The gender ratio varied significantly by plant with one workforce being entirely male. This finding reflected clearly a gender-based division of labour. At one plant visited, the employees in the television cabinet manufacturing section were almost exclusively men. On the other hand, in printed circuit board stuffing there were only women. In general, but not exclusively, technicians, supervisors and managers were men.

There is little research on the promotion policies within the plants. In a recent survey by COLEF, it was found that six out of ten workers employed in the maquilas came from external markets in entry-level positions; out of the remaining four, two entered from external markets in higher positions, and the other two had been promoted from within. This very much confirms the generalized assumption about the limited internal job ladders that exist in the maquiladoras (Alonso, Carrillo and Contreras, 1994, p. 195).

Regarding dismissals, it seems that unjustified firings - a prevalent characteristic of maquila employment during the 1970s - stopped being a relevant issue due to the extremely high rate of job mobility of the labour force. The expansion of the industrial base has turned this situation into one of "voluntary departures". Firing is no longer a personnel management policy, and job mobility became a process defined by individual choices about employment opportunities.

3. Maquiladoras in the post-NAFTA era: opportunity or threat?

In order to meet the provisions of the NAFTA agreement that took effect in January 1994, the Mexican government amended the 1989 Maquiladora Decree to allow greater sales on the Mexican market. Previously all maquiladora production had to be exported, unless a special exemption was requested from the government for up to 50 per cent of the value of exports. The NAFTA-induced modifications in 1993 allowed that percentage to rise by 5 per cent a year until the year 2001 when they will permit the maquiladora industry to sell its entire production on the domestic market. In the year 2001 the maquiladora plants will begin to function under the same rules as other plants. Then, NAFTA will extend maquila-like privileges to all producers, in stages, irrespective of national origin, location within Mexico, and export orientation.

The other main legal change is rules-of-origin requirements in the NAFTA agreement itself. The maquiladora industry has enjoyed temporary duty-free importation of inputs and equipment, not only from the United States, but also from third countries. Beginning in the year 2001, however, inputs from outside North America will be liable to duty. This change creates an incentive to bring third country suppliers to North America, but not necessarily to Mexico.

The heterogeneity of maquiladoras' industrialization raises some expectations about its prospects and evolution after-NAFTA. By the year 2000, maquilas will have unlimited access to the Mexican market. This change, along with new North American content requirements, could have important consequences on the structure of the maquiladora sector. Can the whole sector benefit equally from the new provisions?

Considering maquiladoras as a sector comprised of technologically segmented groups of firms, spread between several different branches and industries and, therefore, characterized by different development trajectories, it seems that the passage of NAFTA will divide the sector in, at least, two broad groups of firms:

- (i) those able and willing to enter the internal market and become internationally competitive; and,
- (ii) those that will be marginalized.

Members of the former perceive NAFTA as an **opportunity** to consolidate their strategy of becoming world class integrated producers by taking advantage of unlimited access to the internal market. Members of the latter group perceive NAFTA as a **threat** because they will be unable to cope with rising wages and the modernization of their production process. They will lose the possibility of competing internationally. Therefore, the maquiladoras' reaction to NAFTA will shape the geography of the sector and its impact on local and regional economic development.

3.1. The potential divide: some evidence

According to Wilson's (1994, p.150) interviews with maquiladora plant managers in Tijuana on the consequences of the provisions of NAFTA for their businesses, the "new" maquiladoras are best positioned to take advantage of access to Mexico's internal market through NAFTA. As she argued, "*these are the plants whose corporate vision has not been limited to cheap labour assembly. Some of them have already taken advantage of relaxed Mexican laws allowing a percentage of domestic sales*" (p. 150). The Sony Videotec and Hitachi managers, interviewed in Spring, 1994, exemplify this type of vision. The main production, technological and managerial characteristics of these "new" maquiladoras are briefly described below.

As reported by Wilson (1994), Sony has developed a complex of consumer electronics maquiladoras in Tijuana. One of the largest plants is Sony Videotec, with 3,500 employees. The Sony Videotec plant⁸ does far more than assemble televisions and computer monitors with components manufactured elsewhere. It does both R&D and value-added manufacturing in a largely capital-intensive process. Only the packaging operation is labour intensive. The plant has more than 100 Mexican engineers on staff, and it is about to begin production of a TV model designed in-house by these engineers⁹. Videotec is considered an independent profit centre. Its manager reports directly to the corporate headquarters in Japan. The plant has won many Total Quality Management awards.

According to the manager, NAFTA simply validates and speeds the direction in which he was heading the plant, i.e. becoming a world-class manufacturing operation not dependant on a cheap labour advantage, and able to sell on both the US and Mexican markets. Nevertheless, he understands that this regional market vision will not be easily implemented. The bulk of the Mexican market is concentrated in Mexico city, Monterrey, Guadalajara, and other cities that are much closer to Nuevo Laredo than to Tijuana. The US market is concentrated in the northeast and easily reached from Laredo. However, as stressed by Wilson (1994), his strategy will be to focus on the western US market from Tijuana, and compete in the Mexican market despite the disadvantage of transportation costs.

Hitachi, another plant with a forward-looking vision regarding NAFTA, produces TV cabinets and assembles electronic components. The plant does not only manufacture cabinets, but also designs them. It has been selling a small percentage of its cabinets in northern Mexico. However, it envisages to expand its productive capacity to sell cabinets on a large scale in both the US and Mexican markets under the new NAFTA provisions.

The above are examples of maquiladoras seeing NAFTA as an opportunity to expand their markets. There are others, however, “*not well positioned to enter the domestic market*” (Wilson, 1994, p.150). The latter are characterized by a low level of flexible production, labour-intensive assembly and packaging activities which require traditional labour-intensive technology. Their primary advantage is cheap labour. Examples of this kind of “traditional” maquiladoras are Hyundai, Matsushita (Panasonic) and Yaganuma Press (Pioneer). These were also interviewed by Wilson in 1994, the results of which are summarized below.

Hyundai’s original flagship maquiladora, established in the 1970s, assembles electronic components for its twin plant in San Diego. To compete as a world-class producer in the NAFTA market, Hyundai has decided to close the Tijuana plant and upgrade the San Diego plant, which will become almost fully automated. This corporate vision is corroborated by the reported release of more than 600 of its 700 workers from the assembly Hyundai’s plant in Tijuana.

Matsushita¹⁰ (Panasonic) has built up a large complex of supplier maquiladoras in Tijuana that provide electronic components to its other maquiladoras. One such plant, built in 1992, has more than 800 employees. Almost all its inputs are imported, and only a small part of the telephone production is currently sold on the domestic market. The motives for establishing the

⁸ The Videotec plant produces televisions and computer monitors. Its major input, picture tubes (screens), comes from the Sony twin plant in San Diego and accounts for 50 per cent of the total value of production. Semiconductors and electronic circuits are imported from Japan. Deflection yokes and other electronic components are assembled in other Sony maquiladoras in Tijuana for use at the Videotec plant. The final products are packaged at the Videotec plant using packaging material from the San Diego plant (Wilson, 1994, p. 151).

⁹ The design received a Sony award for product innovation (ibidem).

¹⁰ Matsushita manufactures deflection yokes for Panasonic televisions assembled in another Tijuana plant and assembles and package cordless telephones for final consumption, primarily in the United States.

plant in Tijuana were proximity to the US market, and cheap labour. According to the plant manager, the effects of NAFTA on labour costs could undermine the role of the plant in Matsushita's corporate strategy. The plant is not a profit centre and the manager has little scope of action for changing the role of the plant in the corporation's strategy. The manager has already seen some of the effects of NAFTA, as union representatives from Canada and the United States have come to organize the workers in his non-unionized plant to raise wages. He emphasised that the corporation attitude towards NAFTA could be two fold depending on the effects of the new trade agreement on labour costs. If maquila wages rise too much, the plant could move to a cheaper location by the year 2000 or the corporation could decide to maintain the plant simply to fulfil rules-of-origin requirements for NAFTA.

Yaganuma Press, a metal stamping subsidiary of Pioneer with 100 employees in Tijuana, was brought from Japan in 1990, to supply stamped metal pieces to its assembly plant for stereo speakers, thereby eliminating the need to import the pieces from Japan and Singapore. All the plant's inputs come from either Japan (sheet metal) or California (chemicals from Los Angeles and packaging material from San Diego). The machinery brought to the Yaganuma plant from Japan in 1990 was considered obsolete there. The Yaganuma plant itself operates at a loss. Pioneer maintains the plant because of the transportation cost savings and the NAFTA rules-of-origin requirements. Despite the less than leading-edge technology, Pioneer's willingness to subsidize its operation to fulfil NAFTA rules-of-origin requirements could allow the plant to supply metal stamping services to other firms in Tijuana. There is a chance this could become the seed of a much needed metalworking sector in Tijuana that would ease a transition from assembly to manufacturing.

In the case of "traditional" maquilas, NAFTA and its effects on wages could drive them to cheaper labour locations unless their corporate headquarters maintain their operations to satisfy NAFTA's rules-of-origin requirements and minimize transportation costs. These "traditional" maquiladoras, dependent on labour cost advantages, will adhere to their role as labour intensive assembly plants with no change of having their production process upgraded. They will survive under NAFTA until their wage rates get too high or their technology too outmoded.

3.2 A Comparison: Mexico and Canada

In order to further understand the challenges for maquiladoras in the post-NAFTA context and to examine their potential evolution, Verma (1994) examined two plants of an electronics firm, one in Canada and the other in Mexico, and their respective human resource policies and practices.

The Canadian plant is an integrated manufacturing facility that produces high technology digital communications equipment using highly computerized equipment. It was established in the 1950s but upgraded from analog to digital technology in the early 1990s. Product development and innovation are an integral part of the manufacturing operations. It is a large plant employing nearly 3000 workers. Over 75 per cent of its output is sold abroad, 50 per cent in the United States and 25 per cent in over 50 countries around the world. The production workers are represented by a national union, The Canadian Auto Workers Union (CAW), one of the most prominent and pragmatic unions in Canada. About 41 per cent of the shopfloor workers are women. They tend to occupy jobs at the lower skill levels although there are many exceptions to this pattern. Women's representation among managers and engineers is very low; 5 and 9 per cent respectively. According to the CAW policy, the plant does not offer bonuses based on profits or other performance measures. There is no performance appraisal for shopfloor workers. The work week is 40 hours, absenteeism around 5 per cent and turnover is low, i.e. about 1.8 per cent per year. Wages are high (US\$ 21 per hour) compared to other countries and even higher than in this

firm's US plants (US\$ 19). In 1993, wages rose 2 per cent as per contract. The working conditions in the plant are very similar to the typical conditions in most of the manufacturing sector in Canada. However, this plant differs from many others in its commitment to **the skill level of its employees**. The workforce is well trained either formally or on the job. Many production workers do not have much formal education (nearly a third have less than a high school diploma) because they were hired 20 years ago when skill levels were much lower in the plant. The average age in the plant is 42 years. In 1993, the plant invested heavily in training to update their skill. Each employee received an average of 11.8 days of training. By the end of 1993, about 20 per cent of the workers had been cross-trained in a skill of their co-workers. Nearly 30 teams were working on shopfloor problems related to quality, productivity, and safety. The work environment is quite formal because of a variety of work rules in the collective agreement. A grievance procedure is used extensively to address worker complaints as well as any perceived violation of the collective agreement. In a similar vein, the collective agreement contains a procedure for sexual harassment complaints.

In contrast, the Mexican plant, though established in 1993 and well equipped, well lit and air conditioned as any other plant within this company in the United States or Canada, is set up for low skills, low investment in training, and low value-added output. It employed 860 workers in 1993 on two product lines, both largely assembly operations. The products are low-end components and systems used in communication networks. Roughly 80 per cent of the output is exported to the United States. The workforce is very young with an average age of 22 years and predominantly female (90 per cent on the shopfloor). A handful of managers and engineers are also female. The workers are nominally represented by an outside union at an aggregate level. However, the union has no presence inside the plant on a day-to-day basis. Managers are free to take decisions without negotiating with the union. It is also not accurate to say that the union has no impact on the company. When major issues arise, such as wages or major layoffs, the union could orchestrate job actions, e.g. strike. The work week (48 hours) is long according to Canada standards but not Mexico. Absenteeism of 4.6 per cent is slightly lower than in Canada. Turnover, on the other hand, is higher. In 1992, the rate achieved was 120 per cent per year and dropped to 60 per cent in 1993. The plant seeks high school graduates from nearby barrios and puts them through a four-week full-time training programme. No work experience is required. There appears to be very little training beyond the initial input. The plant has not embarked on team work nor on continuous quality improvement programmes yet. Wages are lower than in Canada. Hourly compensation costs for 1993 were US\$ 1.47 per hour. Workers get a bonus of 10 per cent of the profits by law. Their performance is evaluated once a year by the supervisor. There is no local grievance process for small complaints. Managers say they practice an open-door policy and encourage employees to come in to talk about problems. In the case of a major complaint such as violation of labour standards, discipline or discharge, workers can take the company to a labour court for adjudication of the dispute. Despite the high female population in the plant, there is no formal sexual harassment complaint procedure.

Though it is part of the same corporation, the Mexican plant does not benefit from policies developed in Canada and the United States. The output is not aimed at a wide marketplace but rather at other units within the company. A small proportion of the output is directly sold to customers. This plant hires high school graduates without previous work experience. Training is limited to an initial four-week programme. It seems that the lack of an independent product mandate and the absence of design and development functions in-house are partly responsible for their particular human resource policy. Although successful as a mere assembly operation, it may not be able to exploit new developments in the Mexican economy. For instance, it may be ill-prepared to export to a wide customer base that is now accessible to Mexican producers due to

the free trade agreements. Equally, it may not be able to pay better wages to attract better talent or invest in training.

Although the experiences of these two plants are not comparable, specially because they play different roles within the corporation strategy, an examination of their differences is, nevertheless, useful when we try to understand the prospects and evolution of maquiladoras in view of NAFTA. While the Canadian plant was built in the 1950s to produce high value added products with a high-skilled labour force, the Mexican plant was recently built to deal with assembly operations. If the latter intend to benefit from the new trade agreement rules and expand their markets they will need to upgrade their production processes and evolve from pure assembly activities to more value-added production activities. The existing evidence seems to suggest that many maquiladoras may be meeting their current mandates adequately but they may not be prepared to take advantage of the new economic context post-NAFTA. Currently, the main advantage of maquiladoras plants over others has been the low cost of their operations. There is no evidence that maquiladoras were taking advantage of innovative human resource policies developed by parent organizations. In general, a team-based work system, greater employee involvements in the production process, quality programmes or even basic investments in training have not been applied widely in maquiladoras. In order to take advantage of NAFTA and other free trade agreements that Mexico has entered into with its southern neighbours, these plants will have to upgrade their human resource management policies and practices. In fact, these plants run the risk of lagging behind the pace that the domestic economy sets for itself. In that case, they will be unable to attract the skill needed for even the maquila part of their operation thus threatening their financial viability and potential evolution.

A collaborative relationship between plant managers, local government, labour, and community representatives could address bottlenecks such as education and training, local infrastructure, and services. This could also help the maquiladoras' evolution from export platforms to integrated manufacturing centres. However, the heterogeneity of the sector suggests that, if the latter are to be realized, many plants as the one described above will have to make new investments in human resources and introduce innovations in their respective policies.

A major concern is, however, how to push beyond the enclave model of export-oriented industrialization (EOI) represented by the traditional, labour-intensive maquiladora plants in order to adopt a more dynamic, industrially upgraded development strategy that would generate higher income and skill levels for workers, and at the same time, allow Mexican exports to be internationally competitive in technology advanced industries.

4. "Maquiladoras" in a global perspective ¹¹

The heterogeneity of the maquiladora industrialization, which comprises flexible production plants (no more than 18 per cent), mass production plants, and labour-intensive assembly plants, could be "*the result of the diversity of links and commodities chains in which the maquila operations are involved*". This reflects "*the heterogeneity of the external sector to which they are linked, the functional roles imposed by their principals, and the evolution itself of the local managerial and labour force pool*" (Alonso, Carrillo and Contreras, 1994, p.191). In this section we will examine *maquiladoras'* prospects for economic integration in the global economy. Maquiladoras and EPZs in East Asia will be studied and compared according to their

¹¹ This section draws on Gereffi, 1994.

evolution through the “**global commodity chains**” (GCCs)¹². Lessons could be learned from an intra-regional comparison on how to insert the “maquilas” into international and regional markets. Moreover, this international comparison can provide some indication on the conditions under which countries can move from labour-intensive towards a more skill-intensive structure of exports.

4.1. Maquiladoras in Mexico vs. East Asia EPZs

Mexico’s maquiladora programme and the EPZs in the EA New Industrialising Countries (NICs) both started as labour-intensive export enclaves that were set up in the 1960s to attract foreign investment, especially in the apparel and electronics industry. Despite this common starting point, there are a number of important differences that have led these programmes to divergent paths.

The first difference is related to the primary economic objectives of these industrialization processes. Whereas Mexico’s maquiladora programme was set up initially to provide **jobs** in the northern border region and discourage migration into United States, the top priority of the EA EPZs was to generate the **foreign exchange** needed to sustain their economic growth. In addition, the sources of foreign capital and the destination of exports were quite different in these nations. Since the beginning, Mexico’s maquiladora programme has been overwhelmingly oriented to the United States, both as a source of capital investment and as virtually the sole destination for its exports.

The EPZs in the EA NICs, on the contrary, have flourished with the flows of Japanese funds¹³, specifically in the case of Taiwan and the Republic of South Korea. At the end of 1986, in Taiwan, Japanese investors held 30 percent of direct foreign investment on the island. In the Republic of South Korea, Japan was the leading foreign investor in 1986 with over one-half of all direct foreign investment, while the US had a minimal share (less than 5 per cent) of the total. In the electronics industry, Japanese investment accounted for 94.2 per cent of the total, compared to 3.7 per cent from the United States. In the production of machinery the ratio was 85.1 per cent by Japan to 4.2 per cent by the United States, and in production precision products 84.7 per cent and 0.1 per cent, respectively (Castillo and Ramirez Acosta, 1993, p.73). As reported by Gereffi (1994), the US is much more significant as the major market for Taiwan’s and the Republic of South Korea’s booming manufactured exports, but at the end of the 1980s it still accounted for less than 40 percent of the overseas sales of these two NICs.

These differences in the **origins, financing and external orientation** of the assembly-oriented maquiladoras in Mexico and East Asian EPZs are important because they contribute to the different trajectories that export-oriented industrialization (EOI) has followed in these nations. In Mexico, until the mid-1980s, maquiladora plants were a low-wage export enclave with virtually no connection to the rest of the domestic economy via either material inputs or local sales. They were concerned to the labour-intensive assembly of simple manufactured goods from imported components and relegated, therefore, to an export processing (EP) role in North America. It was

¹²Countries are connected to GCCs through the goods and services they supply in the world economy. These trade linkages can be conceptualized as a set of five major export roles: (1) primary commodity exports; (2) export-processing assembly; (3) component-supply subcontracting; (4) original equipment manufacturing (OEM); and (5) original brandname manufacturing (OBM).

¹³Some scholars considers the Japanese model of foreign direct investment as the reason for the success of the EA EPZ vis-a-vis the US and European model. Compared to the latter, the Japanese model of multinational business operations contributed much more for the development of the local economy through the process of subcontracting which favoured technological assimilation and adaptation by firms in the zones and outside of them.

just in the last years, that a “new” generation of maquiladora plants, mostly Asian-owned, began to push beyond the enclave model to the production and export of component parts in technologically advanced industries. In less than three decades, maquiladora plants had an explosive growth; from about 50 establishments in the 1960s to more than 2,000 in the 1990s with an average employment of 300 persons per plant. In the East Asian NICs, however, EPZs have been declining since the mid-1970s in response to rising wages in the East Asian nations, intense competition from lower-cost neighbouring countries¹⁴, and the systematic efforts of these nations to upgrade their mix of export activities by moving towards more embedded forms of export-oriented production based on skill- and technology-intensive products. The EPZs in Taiwan and the Republic of South Korea were, therefore, only the first organizational stage in a diverse sequence of export activities. Rather quickly, the geographically restricted EPZs gave way to “bonded factories” that qualified for the same export incentives as the EPZs, but could be located anywhere in the country as long as the vast majority (usually more than 70 per cent) of their production was destined for overseas market. In this sense, local firms in the EPZs as well as outside of them have formed a unique symbiotic relationship with Japanese companies through subcontracting. As a result of this effort to incorporate EPZs into a nationwide export-oriented development strategy and to continually upgrade their national portfolio of industries, science-based industrial parks were created in the 1980s. They were located close to science-oriented universities and good public infrastructure in order to encourage domestic as well as foreign computer, telecommunications, advanced electronics, and precision-machinery firms to invest in research and production facilities on or near their premises. These high-tech R&D parks were explicitly conceived of by East Asian governments as part of a conscious effort to creating international competitiveness in dynamic knowledge-intensive industries. The strategy was, therefore, to promote high quality and internationally competitive exports rather than relying on the static comparative advantage of cheap labour in the EPZs. The production of finished consumer goods by local firms became the major export niche filled by East Asian NICs in the world economy during the past several years. A number of firms in these NICs that succeeded in this export niche are currently pushing beyond it to design and sale their own-brand merchandise. This change in the competitive strategy in the EA NICs allowed them to compete effectively with advanced industrialised countries.

4.2 Maquiladoras’ integration: possible scenarios

The experience of the East Asian EPZs in comparison with maquiladoras’ in Mexico offers parameters for forecasting the course of the maquiladoras during the 1990s. As proposed by Gereffi (1994), several scenarios or “alternative futures” for maquiladoras can be envisaged. These scenarios correspond to distinct stages in the evolution of an export-oriented economy. They entail the involvement of various kinds of economic actors, and they have quite different implications for national development and Mexico’s role in the ongoing process of North America integration.

Scenario 1: Export processing assembly

The export processing role emphasizes the labour-intensive assembly of simple manufactured goods from imported components, typically in foreign-owned plants. The main advantages of EPZs for the host country are jobs and foreign exchange earnings. Since they rely on cheap labour with minimal skills, EPZs represent the first stage of EOI for most Third World countries. Although every region of the Third World has some experience with EPZs, these zones

¹⁴Philippines, Malaysia, Thailand, Indonesia, and China.

have tended to migrate from the most advanced to lesser developed nations of the Third World as influenced by their labour costs.

According to this scenario, Mexico could perpetuate the dualistic structure embodied in its current maquiladora sector. The “old” low skilled, labour-intensive assembly plants would continue to serve the apparel and basic electronics industries, while the “new” higher-skilled, more technology-intensive plants would make components and finished products for automobile, computer, television, and machinery industries. The latter would evolve to the component-supplier role. Although there probably would be some deepening of the “old” maquilas with the passage of NAFTA, this scenario would intensify the disparities in labour markets of varying skills and wage levels in Mexico.

The primary economic agents in this scenario is the US-based firms that supply the material inputs, and Mexican assembly factories that provide the labour. Apart from creating jobs and earning foreign exchange, this scenario would not help maquiladoras’ insertion into international and regional markets because of the lack of forward linkages with their suppliers and backward linkages with locals.

Scenario 2: Component-supply subcontracting

Component-supply subcontracting refers to the manufacture and export of component parts in technologically advanced industries in the NICs, with final assembly usually carried out in the developed countries. The major advantage of this export role is that it can facilitate industrial upgrading and technology transfer in the NICs, and it may generate significant backward linkages to local suppliers.

The component-supplier role has been a major niche for Latin American NICs’ manufactured exports during the past two decades. Mexico and Brazil have been important production sites since the late 1960s for vertically integrated exports by transnational corporations (TNCs) to core-country markets, especially the US. This is most notable in certain industries, like motor vehicles, computers, and pharmaceuticals¹⁵. By the 1970s, component-supply exporting had become an integral part of the regional division of labour in East Asia’s electronics industry.

An interesting variation on the component-supplier subcontracting are the “triangle manufacturing” arrangements. These are subregional cooperation zones with its own “core” and “peripheries”, which came into being in the 1970s and 1980s in East and Southeast Asia (Henderson, 1989). The essence of triangle manufacturing is that it involves neighboring countries at different levels of development that cooperate in the outsourcing and assembly of various kind of products, ranging from cars to computers to clothes. The participants each have specific roles, e.g. one is the service and finance centre, the other provides investment capital and technological expertise, and the third one offers land and labour.

Mexico could make a conscious effort to attract investors in the high-tech, high-value-added industries associated with the “new” maquiladoras, and allow investments in the simple, unskilled assembly operations of the “old” maquiladoras to migrate to lower-wage countries in Central America and the Caribbean. To a certain degree, this is already happening in Mexico, although East Asia is much further along in this process. The governments in South Korea, Singapore, and, to a lesser degree, Taiwan, are actively discouraging investments in labour-intensive industries in order to promote the industrial upgrading of the economies.

Although Mexico is unlikely to dispense entirely with its low-wage, export-processing activities because of its large unemployed and underemployed population, the Mexican

¹⁵ American and Japanese automotive TNCs, for example, have advanced manufacturing plants in Mexico and Brazil for the production of engines, autoparts, and even completed vehicles for the US and European markets.

government could promote higher-value-added intensive activities by requesting actively new investments in technology-intensive areas and by enhancing the training opportunities for workers who would be employed in these sectors.

The main economic agents in this manufacturing arrangement are transnational corporation (TNC) subsidiaries in Mexico that export needed parts to their US factories making the finished products. Although Mexican-owned firms can contribute to increased levels of domestic content in this scenario, this trend can be neutralized by the movement of US, Japanese, and European parts suppliers to Mexico in an effort to maintain the links already established with TNCs in their home markets.

Scenario 3: Original Equipment Manufacturing

While the second scenario is most likely in the near future, a third scenario offers the best possibility for new export growth in the Mexican economy in the long run through original equipment manufacturing (OEM).

This stage in the development of an export economy refers to the production of finished consumer goods by local firms, where the output is distributed and marketed abroad by large trading companies, foreign retail chains, or branded marketers. This has been the major export niche filled by the East Asian NICs in the world economy. In 1980, Hong Kong, Taiwan, and South Korea accounted for nearly three-quarters of all finished consumer goods exported by the Third World to OECD countries (UNCTAD, 1995).

The main advantage of the OEM export role is that it enhances the scope for local entrepreneurs not only to learn how to make internationally competitive finished consumer goods, but also to generate substantial backward linkages to the domestic economy because production is controlled by local firms. The major drawback is that it is very difficult to establish forward linkages to the developed country markets, where the biggest profits are made in the importing and marketing of these consumer items.

The OEM carried out in East Asia requires the exporting firms to make an entire product according to the specifications of the buyer. The contract manufacturer must have the capability to interpret designs, source the needed inputs, monitor product quality, meet the buyer's price, and guarantee on-time delivery. The "old" and "new" maquiladoras, by contrast, only do assembly or component-supply manufacturing. They do not produce finished consumer goods for export.

While this scenario offers the greatest potential benefits in terms of industrial deepening and local value-added in Mexico, it requires an extensive network of high quality services and intermediate goods industries that Mexico lacks. East Asian countries have been successful in this area because the majority of their exporting firms are domestically owned, and the vast distance from their main export markets (especially the US) has required them to develop their own supporting industries.

As stressed by Gereffi (1994), in order to make the shift to OEM of finished goods for US buyers, the Mexican companies will have to "learn to export" by adhering to strict international standards in areas such as price, quality, standardized sizing, and delivery schedules. While this process is underway in some of the "best-practice" Mexican firms, the most likely option in the short run is for Asian manufacturers with strong links to US buyers to enter Mexico (and neighbouring countries in the Caribbean basin) as new supply points for the US market.

Scenario 4: Domestic and Overseas Retailers of local Brands of Consumer Goods.

The final stage in the development of an export economy is to move beyond contract manufacturing for foreign buyers to the establishment of proprietary brand names that allow exporters to have their own presence in retail networks. The Republic of South Korea is perhaps the most advanced of the Third World countries in this regard, with Korean brands of automobiles (Hyundai), computers (Leading Edge), and household appliances (Samsung and Goldstar) sold in North America, Europe, and Japan.

This brand name/retailing option also called **original brandname manufacturing** (OBM), while the most remote for Mexico at present, establishes a standard against which successful export industries must be evaluated. Domestic entrepreneurs that are internationally competitive in manufacturing and that can create strong brand image are the main economic agents that have an incentive for forward integration into retailing.

In summary, the evolution from the export processing assembly to OBM in Mexico corresponds to four distinct modes of integration with the international economy as discussed above. These include different agents at each stage: Mexican branch plants integrated with apparel and electronics companies located in the United States (Scenario 1); TNC subsidiaries and some Mexican parts suppliers (Scenario 2); Asian and eventually Mexican OEM producers of finished consumer goods exported directly to US retailers and brand-named companies (Scenario 3); and domestic entrepreneurs with a vested interest in exporting local rather than foreign brands of products (Scenario 4).

While each level of exporting is progressively more difficult to establish because it implies a higher level of domestic integration and local entrepreneurship, the benefits for national development and international competitiveness are correspondingly greater as countries move from the first to the fourth option. Mexico appears to be moving from Scenario 1 to Scenario 2, while the East Asian NICs are moving from Scenario 3 to Scenario 4. Instead of being merely contract manufacturers for foreign buyers who sell their wares in American and European department stores, East Asian firms are exporting under their own brand names with a focus on supplying the booming Asian markets.

Although Mexico is moving up the industrial export ladder from clothes to complex components for computers, it has a long way to go before matching the success of the EA NICs. Mexico's insertion into the international division of labour remains quite different from that of East Asia. A major limitation is Mexico's weak manufacturing infrastructure. Advanced industrial production requires a stable workforce, high-quality suppliers, and efficient transportation system. This is especially true as production process become increasingly automated, more tightly integrated organizationally and spatially, and operate according to just-in-time (JIT) principles. Mexico currently lacks the developed working class, labour skills, and the physical and manufacturing infrastructures needed to meet the requirements of such advanced industrial production.

The East Asian NICs have been successful in upgrading their export industries in large measure because of their highly efficient networks of suppliers for intermediate goods (e.g., textiles, plastics, metals) and components (e.g., semiconductors, computer chips, autoparts). These supporting industries allowed East Asia's exporters to receive high quality inputs at world-market prices. In addition, the East Asian NICs have developed a full range of local design, financial, transportation, and communications services that give them major advantages over other Third World production locations. The high priority given to education has been an important ingredient in the moving up the ladder of technology and upgrading the skills of the labour force, allowing

initially immensely low wages to increase through improved job skills¹⁶. Therefore, the EA countries assembly operations have become a **spring board** for industrialization, a **spur** to international competitiveness, and an **engine** for economic growth.

A major concern for Mexico has been, however, how to push beyond the enclave model of export-oriented industrialization (EOI) represented by its traditional, labour-intensive maquiladora plants in order to adopt a more dynamic, industrially upgraded development strategy. In order to successfully carry out this shift, Mexico needs to move from its wage-depressing export strategy to more productivity-enhancing strategies. Up to now, Mexico has been able to take the “easy road” to export expansion, since sharp devaluation of the Mexican peso in the 1980s depressed real wages in the manufacturing sector by over 50 per cent. The EA NICs, on the other hand, are moving in the opposite direction. They have diversified their exports in face of a substantial appreciation (rather than devaluation) of their currencies, rising (not declining) real wages with low inflation, and labour scarcity (rather than labour surpluses). Moreover, Mexico will need to make significant investments in the nation’s infrastructure and to upgrade the educational system will be crucial for securing investment that will create higher quality jobs. Mexican capital must become more aggressive in seeking out opportunities to supply foreign assemblers. Supplier linkages are extremely important because supplying world class corporations provides an opportunity for upgrading the quality of indigenous suppliers thus accomplishing a level of technology transfer that is much deeper than just training employees.

The absence of a regional production base is a major obstacle to maquilas’ transition from an assembly export-platform to a component supplier with local entrepreneurs actively pursuing economic niches as suppliers and even beginning their own assembly activities. With the arrival of NAFTA and the growing participation of Asian investment in the maquiladora sector, the role played by low-wage EOI strategy in Mexico has to be reevaluated. Whether Mexican manufacturers, rather than the US or Asian ones, will step forward to promote the needed synergies with local suppliers to boost local development and upgrade their export participation in regional market is still an open question.

5. Conclusions

The recent literature recognizes that a quantitative and qualitative evolution has occurred in the maquiladora sector since its inception in 1965. In quantitative terms, there was a clear expansion of employment and production throughout the years. The maquiladora sector has become Mexico’s largest foreign exchange earner¹⁷ and has been the most dynamic industrial sector. In qualitative terms, a significant improvement in labour conditions, production processes and work organization was also observed. The most evident changes are occurring in industrial branches and in products subject to intense international competition, which in turn pushes firms to increase the quality of their products and induces organizational changes to also increase productivity as in the auto parts and electronics establishments.

This evolution in itself, however, does not assure an industrial transition from assembly operations towards more skilled and technologically advanced, value-added activities. The sector is actually comprised of a “mosaic” of plants with different technological and organizational levels.

¹⁶Testimony to the fact that their wages are now a multiple of those in Mexico is that some EA countries have begun to locate their own assembly plants there.

¹⁷ except oil production.

Some of them will be unable to follow the tendency towards a more advanced production process. They will be trapped in the low-value production stages of the commodity chain which do not require a highly skilled labour force. Actually, the maquiladora industrialization process is characterized by the coexistence of different development trajectories. These trajectories are related to their insertion into international markets and the regional economy, which directly affect the labour conditions and requirements at the local level.

In terms of labour conditions, the skill profile of the labour force is expected to improve gradually with the increase of “*second generation plants*”. However, the evidence shows the continuing low skill level of the labour force engaged in the “second generation” plants and the limited application of new production and management methods. Moreover, most of the studies continue to consider maquiladoras as a homogenous sector, functioning through a common principle. Therefore, many suggestions provided by the literature fail to provide a comprehensive idea of the industrialization process. As a result of this non-differentiated approach in the research, there are at least two shortcomings in the explanation of changes in wages, labour conditions and skills in the maquiladoras. First, the actual labour shortage in the local labour market has not been taken into consideration when studying labour conditions. Maquiladoras continue to be studied in isolation from their local context. The second is the lack of the global context in most of the analyses. Labour conditions are overall appreciated from the perspective of a localized industrial agglomeration, with disregard to their articulation in specific commodity chains and productive linkages that would define them as functional units. This participation is determined at the higher levels of the firm or corporate structure, and by the institutional local and regional forces at work. Actually, we are dealing with operations that represent different development trajectories and technological and organizational requirements imposed by endogenous and exogenous defined elements to their process of manufacturing.

In terms of requirements at the local level, export processing industries in Mexico fail to generate the necessary synergies for industrial development through backward and forward linkages with the local economy. The major reason was based on the legal and economic context in which these activities were established. The former clause 807 (currently 9802.00.80), which establishes that only US-made components are exempt from import duties when the finished product is shipped back to the United States, constituted a major impediment to increasing such linkages between the activities in the maquilas and the local economy. This also limited the usefulness of maquiladoras as stepping stones to higher stages of industrialization. Therefore, a “vicious circle” of low-cost development, which rarely induce the firm to invest in its labour force to make it more productive was created (Sengenberger, 1992). It seems that the new maquiladoras are already more integrated in the domestic economy and using higher level of local inputs. However, these inputs have been provided not by Mexican companies but by subsidiaries located in Mexico or nearby.

With the North American Free Trade Agreement (NAFTA), however, and the increased access to the local market, more and more suppliers may be attracted to Mexico. They may also foster transfer of technology which will induce the upgrading of skills at the local level. If this situation becomes viable in Mexico, the maquiladora assembly role may evolve to one of component supplier and maybe, towards specification contracting. This process requires a gradually increasing involvement of local firms and promoting substantial linkages to the domestic economy. This move requires, nevertheless, an extensive network of high quality services and intermediate industries that Mexico lacks. In order to successfully carry out the shift from labour-intensive maquiladoras plants to a more dynamic, industrially upgraded development strategy, Mexico must develop labour skills, highly qualified suppliers and the physical infrastructure needed to meet the requirements of such advanced industrial production. **This “high-road” strategy could be pursued by local and regional government interventions focused initially on how**

to take advantage of clustering or economies of agglomeration and boost a higher degree of interfirm cooperation. Subcontracting could be one promising area of action. The experience of East Asian export processing zones (EPZs) shows that this process generates spillover effects in the domestic economy through the increase level of integration between the industrial activity of the enclave economy and foreign companies. Firms in the Third World are in general vertically integrated because of lack of reliable sources of local supply. But once they cluster together, they start to develop interfirm relationships, contracting out specialized services, sharing equipment and information about suppliers, markets, etc. With the change in the maquiladora regime due to the passage of NAFTA, there will be a greater possibility for local supply, which were discriminated against the previous maquiladora programme. The development of just-in-time (JIT) networks in the frontier region might mean that there is a greater demand for local suppliers, local technical assistance and local labour to produce parts quickly in order to make JIT production possible. If these firms that are using JIT practices continue to demand local specialized services they will promote the creation of local capability so much needed to incorporate these maquilas into a nation-wide export-oriented development strategy.

The provisions of NAFTA seem to promote such an endeavour. By the year 2001, the distinction between assembly and other activities will disappear as the special treatment of maquiladoras will be abolished. Some firms are already taking advantage of the new economic context imposed by NAFTA in order to become world-class producers. Others, however, will not follow them because they are trapped in the “low-road” strategy based on the static comparative advantage of cheap labour in the EPZs. There is no doubt that these plants will have to upgrade their human resource policies and practices to take full advantage of NAFTA and other free trade agreement that Mexico has entered into with its southern neighbours. There is no doubt as well that the country will have to modernize local scientific and technological research and development institutions in order to supply the skills demanded for global competition.

The “new” maquiladoras can be seen as an opportunity for enhancing Mexico’s industrial development and integration into the global economy in a more advantageous competitive position. However, a major policy issue is indeed how to take advantage of the regional concentration of firms in the border area to generate the needed regional production base and local capabilities to move further up the industrial export ladder. One of the most serious challenges faced by Mexican policy-makers in the early twenty-first century is perhaps to implement a coherent policy to encourage such developments and take the opportunity opened by the new trade agreement to incorporate the maquiladoras into an overall strategy of national development.

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