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The Crisis of the Maquiladora Model in Mexico

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This article analyzes production models of the export-oriented maquila in Mexico, understood as the combinations between technological level and work organization system, labor relations flexibility, manpower characteristics, and business strategies, using for the first time the special module of the ENESTYC representative survey and information resulting from field work in 200 establishments. This work proposes that the maquila crisis in Mexico at the beginning of this century was not only because of the economic recession in the United States and Chinese competition but also because of the structural limitations of the sector's main production models, which have contributed to a crisis in labor productivity growth.

Keywords: *maquila; productivity; work conditions; production model*

The Decree for the Promotion and Operation of the Export Maquiladora Industry of 1998 defines the maquila as industrial or service process that implies transformation, elaboration, or repair of merchandise of foreign origin, permanently or temporarily imported for its later export.

The legal regimen of maquila in Mexico implies that the company that formally registers as such in the Ministry of the Economy may temporarily import the inputs, machinery, and equipment necessary for assembly, transformation, or repair of export products, without paying import or value-added taxes or compensatory fees; in addition, the company shall enjoy exemption from export taxes by the Mexican government and by the U.S. government. With the signature of NAFTA, since 2001, all maquila production may be sold in Mexico. In terms of taxes, the maquilas pay only income taxes, and their exports are exempt from payment of added-value taxes (IVA).

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Table 1
Indicators of Crisis of the Maquila

	2000	2001	2002	2003
Employees	1,291,232	1,198,942	1,071,209	1,062,105
No. of establishments	3,598	3,630	3,003	2,860
Rate of growing physical volume of production	13.8	–9.7	–9.1	–1.0
Rate of growing of productivity	0.9	–2.8	1.7	–0.1
Exports (millions of dollars)	79,467	76,881	78,098	77,476
Foreign investment in maquiladoras (millions of dollars)	2,983	2,172.2	2,043.5	1,961.1

Source: Author's calculations from Fox (2004).

During the decade of the 1990s, the maquila became the central nucleus of the economic export model in Mexico. In the year 2000, manufactured goods represented 28.7% of total internal product. Manufacture in that year was responsible for 87.3% of exports. The maquila export industry has occupied a central place within the manufacture sector, representing 47.9% of manufacture exports in 2000.

However, the maquila along with the manufacture sector in general entered into crisis beginning in the year 2000. Personnel occupied between 2000 and 2003 dropped 17.7% (–9.7% by 2004), the number of maquiladora establishments decreased 20.5% (–21.7% by 2004), and the growth rate of physical volume of maquiladora production reported negative rates beginning in 2001. The productivity growth rate was also negative in 2001 (–2.8%), very low in 2002 (1.7%), and negative again in 2003 (–1.0%). Maquila exports between 2000 and 2003 dropped to 2.5% and direct foreign investment dropped to 34.3%. Although the mentioned indicators have improved since 2004, there is still no certainty that the maquila will be able to recover the role it held in the 1990s in the Mexican economic model. In this context, many voices have asked whether the maquiladora model reached its limit and if it is possible to pursue a different path of economic growth (Table 1; Bair, 2002).

The causes of this crisis have been attributed to three primary factors:

1. Fall in demand for maquila products because of economic recession in the United States in the early part of this century;
2. Competition from other countries with lower wages than Mexico, such as China and Central American countries, provoking closure of maquila plants in Mexico and their relocation to those countries[1];

3. Growth of maquila wages in Mexico in recent years, reducing the sector's profit margin.

Except for the first of these theories, the explanations implicitly accept that the maquila is a sector based on low wages, and therefore when this national advantage is eliminated, the maquila tends to leave the country or simply close its plants. From the point of view of Mexico's economic development, the question is whether the maquila is an acceptable route for growth of the economy and dignified jobs. The optimistic position accepts that the maquila began as Taylorist–Fordist-type assembly work, with unskilled labor; repetitive, tedious, and standardized activities measured in times and movements; technology based on manual tools or nonautomated machines; and abundant women and low wages, with very scarce production and service chains within the national territory. However, advocates of this position add that the maquila has tended to transform itself since the 1980s into an activity not only limited to assembly but also incorporating processes characteristic of manufacture, with automated technology, new forms of work organization, better qualified workers, and an increase in the percentage of production technicians (CEPAL, 1998), and a masculinization of the workforce because the latter two of these factors have implied greater technological learning and the formation of clusters and other production and service chains (Carrillo & Hualde, 2002; Gereffi, Spencer, & Bair, 2002; Lara, 1998).

In other words, the optimistic view presents the maquila as an acceptable route of industrial development through upgrading of simple assembly to complex manufacture (Echeverri-Carroll, 1990). The arguments of upgrading as an evolutionary process recur to various arguments:

1. Empirical evidence, through case studies, that partial aspects of a modern maquila are already present in Mexico (Kenney, 1998).
2. Analogy with Southeast Asia, where countries such as South Korea, Taiwan, Singapore, and Hong Kong began in conditions similar to those of Mexico and are currently exporters of manufactured products with high value added (Gereffi et al., 2002).
3. The idea that in Mexico, there are other advantages aside from low wages, such as proximity to the U.S. market, the infrastructure in Mexico, energy costs, an educated workforce, and labor and social peace. These conditions would make Mexico continue to be attractive even if wages were not as low as in other countries. Therefore, if wages were not the primary competitive advantage, maquilas would tend toward processes with higher value added, more qualified labor, and better wages (Shaiken, 1990).

4. The theoretical discussion regarding the end of Taylorism–Fordism, which in the case of the maquilas would mean that the Taylorist–Fordist plants would have the productivity growth limitations characteristic of this production model and would therefore tend to change this model toward another Toyotoist-type model,[2] of Lean Production or Flexible Specialization, which would be the most profound explanation of whether generational change has occurred in the maquila sector (Wilson, 1996).
5. The thesis of three generations of the maquila, which implies transition from a first generation consisting of simple assembly, Taylorist–Fordist processes and unskilled labor, to a second that would apply new forms of work organization and semiautomated or automated technologies, and to a third that would be centered on knowledge production with high skilled labor (Carrillo & Hualde, 1997; Lara, 1998).
6. The thesis that affirms that the maquila is not a branch, an industry, or a production model, but rather a sector characterized only by a tariff regimen, and therefore many possibilities of types of technologies, organization, and workforce would fit within the maquila sector. In other words, there is no production or industrialization logic exclusive to the maquilas, but rather they are characterized only by being registered in a tariff regimen (Carrillo, 1992).

It is evident that the optimistic arguments are only partially complementary, whereas contradictory in other aspects: Those that refer to upgrading can hardly coincide with the idea that the maquila is a simple tariff regimen because there would be transition to a more advanced production and industrialization model, and the maquila would therefore be a model in transformation. The idea of old, intermediate, and new maquila generations would also point toward production and industrialization forms, not to mention those that analyze upgrading as the result of the crisis of Taylorism–Fordism.

It is true that part of the attraction of being a maquiladora is exemption from taxes and tariffs, but it is valid to ask whether the said tariff regimen together with other factors, such as low wages, preferentially attracted maquila companies with certain production characteristics. It is also permissible to ask whether certain relations with the surroundings played a role in this process of attraction, as industrialization model (Dussel, 2002).

Many of the previous questions can be summarized in whether the maquila is a production and industrialization model, understanding the first as a production configuration composed of a certain technological level, work organization style, labor relations and labor conditions type, workforce profile (sociodemographic, skills, and wages), labor and management cultures, and industrialization in the sense of production and service chains in both

Table 2
Index of Productivity in the Maquila (1993 = 100)

Year	Index
1993	100.0
1994	103.7
1995	104.0
1996	103.5
1997	97.6
1998	97.1
1999	96.8
2000	97.5
2001	94.5
2002	95.0

Source: Author's calculations from INEGI (1999, 2001).

directions, linkage with the technological, labor, and financial markets and with the region or country's labor relations system, with economic policies, with the internal and external market, and with the rest of industry, agriculture, or services (Buitelaar, Padilla, & Urrutia, 1999).

Both production models and industrial models, in certain market, institutional, or political conditions, may reach their limits in terms of growth of productivity and competitive advantage. The question therefore is whether it is possible to characterize central production models in the maquila, contrary to the thesis that suggests it is a simple tariff regimen, and whether current difficulties in the maquila sector are in part explained by limits in the ways it produces. Analysis of these problems must look inside the production processes and their linkages with their surroundings, under the assumption that the production forms may be related to the sector's economic variables. In a complementary manner, if obstacles were to exist in Mexico for expansion of upgrading in the maquila, what would be the causes and the differences with the process followed in the developed countries of Southeast Asia (Table 2; Wilson, 1996)?

Evolution of productivity in the maquila was stagnant between 1990 and 1993 (De la Garza, 2005), followed by growth in 1994, 1995, and 1996, and general decline thereafter beginning in 1997. In other words, prior to the crisis that began in 2000, productivity growth in the maquila already faced obstacles that before 2000 had nothing to do with decreased demand for its products in the U.S. market or yet with the flight of maquilas to Central America or China. The dependence of value added in relation to wages,

which during the 1990s was maintained around 80%, is not only a general indicator of scarce automatization but also of dependence of maquila profits on the evolution of the real wage in the maquila. Furthermore, beginning in 1990, a trend developed of decreasing profit margins in the maquila, from 4.5% in 1990 to 2.5% in 2000 (the relation between profits and value added fell from 27% in 1991 to 20% in 2001). This crisis, dating prior to the present century's fall in production and export and employment levels, probably implicates a productivity crisis originated in internal factors in the production processes as limitations for increasing productivity. These limitations may in abstract be located in the technology, work organization, labor relations, workforce profile, production and service chains, and/or labor and management cultures present in this sector (Buitelaar & Perez, 2000).

General Profile of the Maquila[3]

Bibliography on the maquila is very abundant, and although it is mostly made up of case studies, these nonetheless contribute to the polemics mentioned in the first section. Regarding the existence of post-Fordist maquilas, there are studies that affirm this based on the presence of high technology in some companies or segments of the production process, and on partial applications of New Forms of Work Organization (Wilson, 1996). But no study demonstrates that latest manufacturing technology characterizes the majority of maquila plants. In a different vision, a study on the maquila in Kopinak (1999) found no post-Fordist maquilas, and Corona (1994) reported a rate of 74% assembly-plant maquilas in 1991, similar to the information provided by the Maquiladoras Association in 2002, which calculated 80% assembly maquilas.

Regarding presence of New Forms of Work Organization, the empirical studies demonstrate broader expansion of new organizational styles than of cutting-edge technologies. However, the majority of authors consider that these are partial applications, in particular of total quality and just-in-time, with little worker involvement and participation (Kopinak, 1999). Sklair's (1996) field work found that the majority of operations carried out by workers are routine and standardized. Kenney (1998) in turn identified large differences in human resources management between factories in Japan and Mexican maquilas. Wright (2001) refers to frequent Taylorism–Fordism in the maquila; Sargent and Matthews (1999) recognize that the maquila provides better jobs than others in maquiladora cities, but for "persons who struggle to survive in the bottom economic and social scale" (p. 15).

Table 3
Importance of Large Establishments (More Than 250 Workers) in the Maquila of Exporting

	1999	2001
Percentage of total establishments	43.1	36.2
Percentage of total employees	87.3	78.8
Percentage of fix capital	96.3	76.1
Percentage of value of production	82.5	81.1

Source: Author's calculations from INEGI (1999, 2001).

Carrillo (Carrillo & Hualde, 1997) together with Lara (1998) are the primary advocates of the upgrading thesis. The first author is the father of the theory of three generations of maquila and has recently referred to fourth and fifth generations. Finally, more recent studies have attempted to demonstrate that the maquila tends to develop clusters of suppliers of inputs and services, and that there are important technological learning processes in their interior, to shore up the supposed multiplier effect of maquiladora investment in the country.

Nevertheless, as we noted earlier, almost all the optimistic research regarding upgrading is based on case studies or at best on partial surveys of the maquila. No study has used, for example, the module of the ENESTYC of 1999 and that of 2001 that implied a census of this sector.

Below we will analyze whether it is possible to speak of general characteristics of the maquila, or if it is a sector without a defined profile as affirmed by the thesis that the maquila is simply a tariff regimen.

The majority of personnel occupied in the maquila, of capital invested, and of production value corresponds to the large establishments of more than 250 workers, as seen in Table 3.

An important proportion of capital in the maquila is foreign, although its percentage of invested foreign fixed capital dropped drastically with the crisis, from 96.72% to 76.28% of total investment. Mexican capital appeared to be more resistant to the economic difficulties, although not necessarily because of its better competitiveness but possibly because of fewer international relocation options. In 1999, 64.1% of maquila establishments were of foreign capital, a number that dropped to 54.1% with the crisis. In 1999, 81.4% of subsidiaries were made up by majority foreign capital, whereas the majority of nonsubsidiaries (68.4%) were dominated by national capital. The majority of foreign-owned maquilas are subsidiaries of their company

Table 4
Importance of Relations Abroad in the Maquila

	1999	2001
Percentage of foreign-owned establishments	64.1	58.2
Percentage of foreign fixed capital investment	96.7	76.28
Percentage of subsidiaries among foreign-capital establishments	98.4	63.7
Percentage of U.S.- and Canada-owned among foreign establishments	87.4	90.4
Percentage of U.S. and Canada subsidiaries among total foreign subsidiaries	87.7	91.0
Percentage of U.S. and Canada capital among those of foreign capital	96.7	76.3
Percentage of exports toward United States and Canada	90.4	95.5
Percentage of inputs imported from United States and Canada	82.15	80.2
Percentage of total income obtained by exports	73.5	85.4
Percentage of imported inputs in total inputs	87.4	87.1
Percentage of exports toward the United States and Canada	90.39	95.5

Source: Author's calculations from INEGI (1999, 2001).

headquarters, although these establishments also decreased their participation in the sector's fixed capital from 98.39% in 1999 to 63.65% in 2001. In other words, the maquila plants that most often closed operations in Mexico following the crisis were the subsidiaries, whereas the foreign companies that were not subsidiaries more often remained. The previous data contrast with those of manufacture in general, in which establishments dominated by foreign capital made up 22.4% in 1999, whereas foreign capital was and is owner of the majority of maquila establishments. However, the problem of subordination of maquila plants to decisions from company headquarters abroad is aggravated by the fact that the majority are subsidiary branches, but also that practically all the maquilas, be they subsidiaries or not, are subcontractors of companies abroad, from which decisions are issued regarding technology to be used, raw materials and their origin, product characteristics, and of course destination of sales. In other words, the maquila does honor to its name in the classic sense: *company which by order carries out production tasks for another.* As we will see, a disadvantage of the maquila will be to limit national business capacities, from the moment in which the primary decisions in the maquila are generated abroad (Table 4).

Among foreign maquiladora establishments, U.S. capital clearly predominates (87.4% in 1999), as well as among maquila plants that are subsidiaries held by foreign capital (87.7%). It should be added that predominance of foreign capital is greater than the large size of the establishment. Maquilas from Canada, Germany, France, the United Kingdom, Japan, and Switzerland,

Table 5
Percentual Distribution of the Sources of Income of the Maquilas in 1998 and 2000

Source of Incomes	1998	2000
Exports	73.5	85.4
Selling in internal market	2.0	2.0
Subcontracting, services of repair and maintenance	23.9	16.1
Others	0.6	3.5

Source: Author's calculations from INEGI (1999, 2001).

which conform the primary group of maquiladora countries in Mexico, concentrate more in the large establishments.

The maquila is fundamentally an export industry toward North America (United States and Canada), and in particular toward the United States. Total exports directed to North America increased following the crisis, from 90.39% in 1999 to 95.5% in 2001 (Table 5).

The maquila continues to be a de facto export sector even with the crisis of demand in the United States (73.5% of total maquila income was obtained from its exports in 1999, increasing to 85.4% in 2000) and the proportion of sales in the national market is small (2%). On the other hand, in second place in terms of total income is that obtained through subcontracted work involving either manufacture performed for other establishments or repair or maintenance services; the first of these is the most important of the two, although such subcontracted manufacture dropped substantially with the crisis.

In synthesis, the maquila is a sector of de facto manufacturing establishments, with a small proportion of service maquilas, of U.S. capital, which imports the majority of its inputs, obtains the majority of its income from exports, is dominated in terms of capital, number of workers employed, and exports by the large companies with more than 250 employees, and an important part of which is made up by subsidiaries of large foreign corporations. In this light, it would not be unusual if we were to find—more than erratic behaviors without appreciable trends—strategies corresponding to the large globalized corporations with international division of their production processes, and in particular, emphasis on determined advantages for localization in Mexican territory, which other authors have analyzed for global and multinational capitals. Below we will see whether it is possible to define production models for the maquila in their dominant production processes,

within the understanding that the search for absolute uniformity is useless in any empirical research.

Production Models in the Maquila

The predominance of nonautomated machine tools in the total value of maquila machinery and equipment is clear (83.22% of total machinery and equipment value in 1998, dropping to 53.6% in 2000), and especially in the large establishments (83.8% in 1999, dropping to 53.8% in 2000). In the medium and small establishments, the majority of machinery and equipment value is found in manual equipment; in other words, we cannot even classify maquila processes as mechanized in almost half the cases. However, it appears that the maquila companies that closed or left were primarily those with low technology, although increases in highest-technology machinery were not very noteworthy. The importance of automated equipment is considerably less than that of machine tools in general, especially in the large establishments. The importance of automated equipment probably corresponds more to assembly lines than to latest-generation equipment. High-technology equipment, identifiable in the indicators of this survey, especially in machine tools operated with computerized numerical control and robots, means very little in the overall sector (3.6% of total value of machinery and equipment in 1998, increasing to 6.5% in 2000). The comparison with the modern equipment of general manufacture is noteworthy: automated equipment represented 25.7% of total value of machinery and equipment in manufacture, compared to 10.26% in the maquila in 1998; machine tools with numerical control, 6.5% versus 2.4%; those with computerized numerical control, 6.2% compared to 3.3% in the maquila, and robots, 1.3% versus 0.34%. In other words, in general terms, although the numbers present an increase in percentage of modern equipment with the crisis, it is possible that this is because the plants with the most outdated equipment were those most prone to close as a result of the crisis (Table 6).

From the previous indicators, we may conclude that the majority of equipment and machinery in the maquila is not of high technology, and that presence of the most advanced is reduced to small percentages.

In reference to research and development, 16.9% of maquila establishments reported in 1998 that they had carried out some type of R&D in their own establishment. However, only 5.3% designed new products, machinery, or equipment. In contrast, 59.6% of the establishments declared payments for technology transfer or purchase.

Table 6
Distribution of Value of Machinery and Equipment in Operation in Maquila (1998 and 2000)

	Total	
Type	1998	2000
Tools	7.3	17.6
Automatic equipment	10.3	36.8
Machine tools	76.0	36.0
Machine tools with numerical control	2.4	3.0
Machine tools with numerical control computerized	3.3	4.9
Robots	0.3	1.6

Source: Author's calculations from INEGI (1999, 2001).
Note: The difference from 100% is due to rounding up.

The maquila's primary source of technology is company headquarters. This is particularly intense among large establishments (64.3% in 1999), dropping to 35.7% in medium-sized companies and only 23.5% in small companies. The second source of technology is through study of literature, consultants, and attendance at specialized events. This source is less important in the large establishments (0.7%), whereas it reaches 38.9% in the medium and 27.1% in the small companies (1999). This indicator of use of literature, consultancies, and events probably masks a very traditional form of technology acquisition in Mexico, which is copying or building based on models, which does not imply payment for technology transfer or royalties. In addition, maquiladora activity is considered too volatile to risk significant technological investments.

The situation regarding investment in technological innovation in the maquila becomes clearer with Table 7. Machinery and equipment purchase may be considered a form of innovation, but if it refers to purchase of conventional machinery and equipment, it should be excluded. On the other hand, it would be the simplest version of innovation that does not suppose research and development; it is true that a newly purchased machine or item of equipment requires technological learning by personnel, but this process cannot be compared with one in which there is actual invention or innovation of new processes or products. Something similar could be said about investment in basic engineering and technical advisory and even advisory in administrative technology, which is almost always limited to use of new computer packages for administration. Use of patents and brands supposes some kind of

Table 7
Percentage of Incomes of the Maquila Invested in Technology in Maquila

	Mexican Establishments		Foreign Establishments	
Type of Investments	1997	2000	1997	2000
Purchase of machinery and equipment	1.75	1.56	1.12	1.0
Basic engineering and technical consultancy services	0.21	0.12	0.04	0.05
Technology in offices	0.03	0.06	0.01	0.08
Other	0.01	0.00	0.01	–
Total	2.0	1.82	1.2	1.15
Research and development	0.00	0.07	0.00	0.01
Royalties	0.00	0.00	0.01	0.01

Source: Author's calculations from INEGI (1999, 2001).

advisory from the selling company to personnel of the purchasing company, but the learning processes normally cannot be compared to those of companies with R&D departments. In this sense, investments by national maquiladora companies in research and development are buried in the ridiculous 0.01% within the category of "other," whereas the foreign companies dedicated 0%, and it should be recalled that foreign companies represent the majority of capital investment. In 1998, the total figures appear to be higher because for the national maquilas, the majority corresponded to machinery and equipment purchase, whereas the category of "other" was maintained at 0.01%. In the foreign maquilas in 1998, R&D expenditures were reported of 0.01%, the same as that of the national companies, in comparison with the 0.53% for general manufacture. The only companies that dedicate that negligible amount of 0.1% of their income to research and development are the large maquilas, both national and foreign, whereas medium-sized companies pursue none of this type of activity. Research and development investment being so small, the majority of establishments that carried it out did so through transfer from their company headquarters, which means that practically no R&D actually takes place in the maquilas. Considering such important presence that exists of subsidiaries of large corporations, it may be assumed that this is not a random result but rather a strategy of labor division with empirical consequences such as those outlined, the maquilas therefore being nongenerators of the technology they use, and this not being the latest technology, with this sector's technological development limited to transfers and copies (Table 8).

Table 8
Percentage of Establishments in Maquila That Make Complex Changes in Work Organization

Type of Change	1999	2001
Just in time	7.0	8.4
Statistical control of process	7.1	15.6
Total control of quality	29.8	24.4

Source: Author's calculations from INEGI (1999, 2001).

The second large dimension of what we are considering maquila production models is work organization. The majority of changes in organization of the work in the maquila were within the Toyotaist organizational style, but in simple forms such as quality circles or layout changes. In contrast, those implementing more complex transformations such as Just-in-Time, Statistical Process Control, or Total Quality Control, are the minority (figures should not be totaled because a same establishment may have implemented all the changes simultaneously). In any case, organizational changes have been more frequent in the maquila than hard technology modifications, and the figures illustrate that changes in work organization, ranging from the most simple to the most complex forms, are present in the majority of companies. However, the virtuous circle of new forms of work organization does not close if it does not affect the company in the conscience of its workers, achieving their identity with the work and the company and their involvement and participation. As we will see below, the high rates of voluntary turnover of personnel during the 1990s may have been related to the absence of this moral component in the new forms of work organization, the low wages, alienated and intense labor, and lack of professional paths among other factors.

The third large dimension of the sociotechnical configurations is labor relations, two important aspects of which are bilaterality with unions or workers, and labor flexibility.

The percentage of maquiladora establishments with a union is high (53.9% in 1999 and 56.8% in 2001) and the CTM (leading central union in Mexico) occupies the primary position, followed at a distance by CROC and CROM, rounding out the three primary corporate central unions in Mexico. Comparing with the general manufacture sector, percentages of unionized workers are similar: 46% in general manufacture versus 42.3% in the maquila in 1999 and 44.6% in 2001. Maquila experts have identified two models of union–company relations in the sector. The predominant model in Tijuana is of collective bargaining agreements that are practically

sweetheart contracts[4] (De la O & Quintero, 1992), with virtual absence of unions from the workplaces and broad managerial prerogatives to organize the labor process and manage the workforce. The other is a traditional corporative union model present in the maquila in Matamoros, which maintains almost 100% monopoly of workforce hiring and secures some economic benefits beyond those required by law in the Matamoros region. However, both models leave management to unilaterally handle the production process with no union interference. In comparison with unionism in the industrial sector in general, not even the case of Matamoros resembles the type of relations that have been established by large national unions with corporative-type companies because these unions (the oil workers' union, electrical workers of the Federal Electricity Commission, textile workers, automobile assembly workers) hold important defensive influence within the work process, and although their bargaining agreements in general have been flexibilized, the unions continue to hold influence regarding promotions, task distribution, internal mobility, and defensive negotiation of introduction of new technologies or work organization forms. A collective bargaining agreement of the Matamoros maquila is not comparable within those of the central nucleus of union corporativism; it would have more in common with those of Tijuana than those of the nonmaquiladora automotive assembly industry. In contrast, the bargaining agreements of the Matamoros maquila might resemble those of corporative unions in medium manufacturing companies in terms of benefits and bilaterality between union and company. In other words, in this case, it is not sufficient to consider them traditional corporativist bargaining agreements; it is necessary to add their character as low-profile sweetheart and bilaterality. On the other hand, the other union and hiring model in the maquila resembles that of sweetheart contracts and unions.

The labor flexibility that is widely extended in the maquilas does not mean that these establishments do not regulate fundamental aspects of how the workforce is managed, generally to the benefit of management. A frequent form of regulation includes specifying in the collective bargaining agreements that decisions will be made by management. In other words, the high regulation rates could be conceptualized as unilateral regulation in terms of work process decisions, with the unions commonly maintaining monopoly in personnel hiring, albeit only formally, considering that with sweetheart unions, management also holds broad prerogatives in this area.

The majority of maquiladora establishments do not employ temporary workers, although their numbers increased slightly between 1999 and 2001. The primary motive for employing temporary workers when it does occur is in response to increased demand in product volume. In 1999, temporary

Table 9
Indicators of Networks Between Companies in Maquila and Productive Chains

Type of Links (in %)	1999	2001
Maquila establishments that subcontracted others as maquilas	18.0	0.03
Total production made by others as maquila	10.44	14.1
Maquila establishments that subcontracted others as establishments	4.2	2.8
Value of production made by subcontractors	4.0	5.0
Maquila establishments subcontracted for others as companies	2.9	2.2
Incomes of maquila being subcontracted	6.99	11.56

Source: Author's calculations from INEGI (1999, 2001).

workers accounted for 3.2% of the total workforce. The percentage of subcontracted workers, hired on an hourly and honorarium basis, is also very scarce to date. But these figures are repeated for general manufacture. A possible explanation is that considering the fact that collective bargaining agreements in the maquila provide minimal benefits and protections, in many aspects no more than those required by labor law, and the majority of maquilas operate with sweetheart contracts and low wages, plus the fact that the sector to date has experienced apparent labor peace, companies may not see the need to subcontract or to employ temporary workers or to attempt to deunionize their plants (Table 9).

As we pointed out at the beginning of this report, there is polemic regarding the spin-off impact of the maquila in terms of production chains or subcontracting in the rest of the country. The ENESTYC survey defines "to do maquila for another company" as carrying out a part of transformation outside of the contracting company installations, and "subcontracting" as the transformation that takes place in the installations of the company itself but by workers of the subcontracted company, whereas in other studies, both of these situations would be classified as subcontracting. In any case, production chains may imply that the maquila contract out tasks, which in turn are "maquila" tasks, with other companies within Mexico or subcontractor companies. In this sense, the percentage of establishments that contracted out maquila tasks or subcontracted work to others dropped substantially with the crisis. On the other hand, the percentage of the value of the work that was "maquila-ed" increased, and the percentage of the value of production subcontracted to others also slightly increased. The other production chain line is when maquila in turn carry out maquila tasks or work as subcontractors for other companies in Mexico. In this aspect, the percentage of maquilas

Table 10
Percentage of the Employees in Maquila by Gender and Category

	Total		Men		Women	
Category	1999	2001	1999	2001	1999	2001
Total	100.0	100.0	50.7	49.7	49.3	50.3
Managers	1.4	1.3	91.0	74.2	9.0	25.8
Clerks	18.1	19.1	59.0	54.1	41.0	45.9
Specialized workers	19.3	21.0	57.5	53.4	42.5	46.6
General workers	61.2	58.6	49.9	46.4	50.1	53.6

Source: Author's calculations from INEGI (1999, 2001).

that were subcontracted by other companies dropped, although their income for carrying out subcontracted tasks increased. In any case, these percentages are low and indicate no trend toward strengthening production chains. In the same manner, the percentage was also low of maquila companies carrying out joint activities with other establishments, be they maquilas or others. The highest percentage of such activities involved shared use of machinery and equipment (7% of the maquilas did so in 1999), whereas joint activities in sales, credit, and research and development were much scarcer. Diverse factors may influence this inability of the maquila to establish broad production chains in Mexico:

1. Company headquarter policies that mandate importing inputs from the headquarters or between subsidiaries as global or multinational strategy oriented toward profitability of the international chain and not toward a segment of the chain located in a given country in particular, much less toward development of the industrial network of a nation.
2. The national deficiencies of companies in Mexico to produce just-in-time, with quality and productivity that are homogenous and sustained just in time, and at competitive prices.
3. The legal regimen itself of the maquila that provides tax exemption for input imported, thereby providing no incentive to substitute foreign suppliers with nationally based companies.

The fourth large dimension of the sociotechnical configurations is workforce profile, which includes the sociodemographic aspect (age, education, gender, and marriage status), the labor aspect (skills, distribution by occupational categories, workweek, training, and seniority), and wage (base wage, benefits, incentives, and bonuses; Table 10).

Table 11
Percentual Distribution of Employees in Maquila by Schooling and Category

	Primary School Unfinished and Without Any Schoolarity		High School		Technicians		University	
Category	1999	2001	1999	2001	1999	2001	1999	2001
Total	51.1	42.6	31.1	35.5	12.2	15.6	5.6	6.2
Managers	0.0	1.2	0.0	2.9	12.6	14.1	97.4	81.8
Clerks	23.3	17.0	26.9	8.6	28.3	33.1	21.5	37.9
Specialized workers	41.3	35.9	37.9	38.2	18.9	22.2	1.9	3.7
General workers	63.7	54.1	31.0	38.0	5.3	7.5	0.0	0.5

Source: Author's calculations from INEGI (1999, 2001).

Gender distribution in total personnel occupied in the maquila has tended to equalize, as opposed to the 1980s when the female workforce clearly predominated. This is particularly true among general workers (who have no particular skills), whereas men predominate among management, office employees, and specialized workers. The percentage of total occupied personnel with no particular skills continues to be very high (61.2% of total personnel occupied in 1999, dropping to 58.6% in 2001). Among general laborers exclusively, this percentage of unskilled workers reached 76% of workers in 1999, dropping only somewhat to 73.6% in 2001. In other words, the maquila continues to be the location of unskilled labor. Comparing with the manufacture sector, 33.4% of general manufacture laborers are skilled workers, versus 19.3% in the maquila. Differences remain regarding gender composition in the maquila compared to general manufacture, in which the male workforce made up 71.1% versus 50.7% in the maquila in 1999 (Table 11).

Among total personnel occupied in the maquila, workers with only primary school educations or less predominate (51.1% in 1999, dropping to 42.6% in 2001) followed by those with high school completed (31.1% in 1999, increasing to 35.5% in 2001). At the executive level, professionals broadly predominate. Office employees are divided between those with high school completed and those with preparatory or technical school studies. Skilled workers for the most part have primary or high school studies completed, whereas among general workers, who make up the large majority of the maquila workforce, more than half have primary school completed at

Table 12
Percentual Distribution by Seniority and Category of Maquila Employees

	More Than 1 Year		1–3 Years		3–5 Years		5–10 Years		More Than 10	
Category	1999	2001	1999	2001	1999	2001	1999	2001	1999	2001
Total	33.5	28.8	33.8	35.4	17.4	18.2	11.3	12.1	3.9	5.5
Managers	12.0	9.9	23.3	23.5	21.6	21.4	24.1	25.6	19.1	19.6
Clerks	24.0	18.3	32.2	33.9	22.1	19.7	15.8	18.9	5.8	8.3
Specialized workers	26.0	21.9	34.9	34.5	20.1	24.7	14.7	13.3	0.4	5.6
General workers	38.4	32.6	33.6	34.9	15.7	16.2	9.4	11.7	2.9	4.6

Source: Author's calculations from INEGI (1999, 2001).

most. Although that percentage dropped between 1999 and 2001, more than 50% remain in this situation. These conclusions refute the myth of high educational levels among maquila workers that has been disseminated by partial studies of the sector. As we have already seen, the crisis in the maquila has translated into preference among those companies that do not close for workers with higher educational levels, whereas the trends of the 1990s in terms of predominance of occupied personnel with low educational levels have not yet been reverted, in particular among general workers. According to the ENESTYC, the level of middle-school education is that sought in the majority of maquilas for skilled workers, and that of primary school completed for general workers. In other words, regardless of the educational levels available in the labor market, the hiring policy of maquiladora managements coincides with the levels found empirically in these companies, a possible indicator of lack of pursuit of higher skill levels because of the characteristics of the production processes (Table 12).

In 1991 (Carrillo & Santibáñez, 1993), the monthly rate of external turnover in the maquila was 10%, although this figure varied among cities and branches: Maquilas along the northern border had the highest turnover rates (Tijuana 12.7% and Ciudad Juárez 10.9% monthly), and by branch, those in textiles (15.8%).

In 1999, the majority of total personnel occupied (67.3%) had no more than 3 years in the establishment, whereas in 2001, this segment was widely outpaced by those with between 1 and 3 years. In contrast, seniority among those at the executive level ranged between 1 and 10 years in the establishment. The majority of office workers had between 1 and 5 years with the

Table 13
Wages in Maquila/Wages in Manufacturing Sector × 100

Year	Percentage
1994	56
1995	61
1996	61
1997	63
1998	62
1999	60
2000	57
2001	63
2002	64.8
2003	64.9
2004	64.7

Source: Author's calculations from the STyPS (2005).

company, and specialized workers between 0 and 5 years. In contrast, the majority of general workers had less than 1 year working in their current place of employment in 1999, although in 2001, they were surpassed by those who had held their employments between 1 and 3 years. It continues to be true that the majority of workers, who are the general workers, have little seniority in the maquila: 67.5% with less than 3 years and 32.6% with less than 1 year in 2001. The external turnover rates are one of the explanations of the short seniority of the majority of maquila workers. In these conditions, it is difficult to imagine that despite the fact that new work organization forms have spread in this sector, worker involvement and participation could take place in a sincere manner in the case of the majority of this working class with such brief history in any given company. Nevertheless, the crisis brought some important changes; workers tend to rotate less than before, and employers prefer to retain personnel with greater seniority over those with less time in the company (Table 13).

Between 1994 and 2003, remunerations in the maquila (including base wages, benefits, incentive bonuses, and overtime) increased in comparison with those in general manufacture, but they have never surpassed them (in 2004, the maquila paid only 64.7% that paid by manufacture). In 2004, manufacture paid an average wage of 4.4 dollars per hour, compared to 2.8 dollars in the maquila (Table 14).

The most substantive proportion of incomes obtained by maquila workers are through base wages, accounting for 68.5% of remunerations in 1999, a proportion that increased considerably to 80.2% in 2001. Overtime pay

Table 14
Percentual Distribution of Kind of Remunerations of Employees in Maquila

Kind of Remuneration	1999	2001
Base wages	68.5	80.2
Overtime	10.0	4.5
Benefits	18.4	13.8
Other remunerations	3.1	0.5

Source: Author's calculations from INEGI (1999, 2001).
Note: They exclude contributions to social security.

constituted 10% of total incomes in 1999, dropping to only 4.5% in 2001. Social benefits also dropped from 18.4% in 1999 to 13.8% in 2001. It should be noted that other income channels include attendance, punctuality, and productivity bonuses, among others, which together accounted for the already very low percentage of 3.1% in 1999, dropping to the ridiculous amount of 0.5% of total income in 2001. In other words, the crisis has been confronted in the worker remunerations aspect by reducing the variable portion, especially overtime, bonuses, and incentives, leaving more weight to the fixed remunerations corresponding to base wages.

From the point of view of production models, the majority of maquilas are assembly plants, using intermediate technology (nonautomated machinery), and carrying out practically no research and development but rather obtaining technology from company headquarters. The maquilas have introduced organizational changes, although in the majority of cases they are the most simple forms, such as quality circles. The predominant model is probably Taylorism–Fordism mixed with other partial elements, commonly the most simple aspects of Toyotaism. The majority of maquilas have unions, although other studies suggest that many of these may be or may act as sweetheart unions. The majority of the workforce is permanent, which is a general characteristic of manufacture in Mexico. Production chains are scarce. The male proportion of the workforce has been increasing, although the male–female ratio has stabilized at currently around 50–50. Growth of the male workforce has not been coupled with increased worker skills, and be they male or female, the majority of workers are unskilled, although educational levels tended to increase to middle school level. Seniority tended to increase from predominance of less than 1 year among general workers to an average between 1 and 3 years at a given establishment. Workweeks continue to be long, and the percentage represented by productivity bonuses within total

remunerations is very low and tending downward. Wages continue to be low, insufficient to sustain an average family.

In other words, we are far from having in the maquila not only the third generation (knowledge-production maquila) referred to by Jorge Carrillo, but there are also doubts as to the form acquired by the second. At the least, it has presented without high technology and certainly with strong Taylorist and Fordist elements, in addition to a poorly paid workforce characterized by high turnover and low skill levels. During the maquila crisis years, a decrease was observed in the total number of large establishments and in the percentage of workers employed in the same. The average age of the large establishments increased, and foreign capital continued to hold the majority although the percentage decreased notably. In other words, the companies that left or went broke with the crisis were more often large establishments, of foreign capital, subsidiaries of other companies, and the youngest establishments. However, their character as exporters toward the United States has not diminished, nor has the proportion of imported inputs among total inputs, indicating that the crisis did not stimulate substitution of imported inputs with national sources, which coincides with the low figures maintained of indicators of production chains.

Production Models in the Maquila of the Southeast Central Region of Mexico

The export maquila present differences in terms of branches (the primary branches are those of autoparts, textiles, and electronics), region (the oldest is the northern border, although the maquila has now spread throughout almost the entire country), type of capital, establishment size, and so on. In its origins, the maquila was located in northern-border states, later spreading to locations in almost every Mexican state, possibly in search of lower wages and other regional advantages. In this section, we will analyze the maquila located outside the northern states, which are the most studied. Although the field research did not cover all the other maquila sites, it did include the most important of the nonnorthern maquila, in particular that located in the states of Aguascalientes, Puebla, and Yucatan, which are the areas of greatest maquila concentration outside the northern border. This research allowed comparison with the national information produced by the ENESTYC in the sense of very similar conclusions.

The field work with a sample of 200 maquila establishments outside the northern Mexican border region provides us with a more precise image of the problem of production models in the maquila based on the EMIM

Table 15
Percentage of Productive Operations of Transformations for Type of Machinery and Equipment

Type	Percentage of Operations in Production
Hand tools	22.88
Machinery tools and nonautomated equipment	37.12
Machinery tools and automated equipment not computerized	20.01
Automated and computerized	11.81
Integrated systems of manufacturing	3.27

Source: Author's calculations from the EMIM (difference with 100% correspond to others) (2003).

(Maquila Production Models Survey—*Encuesta Modelos de Producción en la Maquila*) and complementary instruments (Table 15).[5]

Considering the type of machinery and equipment with which transformation is carried out in the production processes, it is very noteworthy that the majority of operations (60%) are carried out with nonautomated equipment (tools or nonautomatic machinery and equipment), and those carried out with computerized devices, integrated or not in networks, make up a stark minority (15%). This reaffirms that, regardless of where the technology is developed, the maquilas do not use the highest technologies in general production, but rather use what is closest to the needs of intense use of manpower. In a complementary manner, the majority of maquilas considered themselves to be using outdated technology. Visual quality control predominates, and establishments do not use just-in-time, do not develop their own technology, do not carry out research and development, and acquire technology from company headquarters or purchase it from other companies (Table 16).

We have developed an integrated index of work organization type (see Appendix) that coincides with our considerations on Taylorist–Fordist predominance (nonautomated technology; routine, standardized and measured tasks; and unskilled labor) in the maquila in 76.9% of establishments. This predominant organizational form is congruent with intense use of unskilled manpower and with low and medium-level, generally nonautomated technologies (Table 17).

In addition, a flexibility index was elaborated considering the numerical forms (capacity of company to employ or unemployed workers in accordance with production needs), functional aspects (company capacity to move its workers or designate them to diverse tasks within the production process),

Table 16
Indicators of Level of Technology

Indicators	Percentage of Establishments
With backward technology (autoevaluation)	51.0
With visual quality control	76.9
Without just-in-time	61.5
Develop this own technology	14.3
Without research and development	82.7
Get technology from matrix or from other companies	69.4

Source: Author's calculations from the EMIM (2003).

Table 17
Models of Work Organization

Model of Work Organization	Percentage
Taylorist–Fordist	76.9
Toyotaist	23.1

Source: Author's original calculations from the EMIM (2003).

Table 18
Level of Flexibility

Level	Percentage of Establishments
Low	38.7
Medium	46.8
High	14.5

Source: Author's original calculations from the EMIM (2003).

and wage (wage in function of worker productivity and performance), pondered through factorial analysis (see Appendix). The results demonstrate predominance of low and medium levels of labor flexibility (85.3% of establishments). High flexibility may also be associated with new forms of work organization, whereas in contrast, the Taylorist forms that imply that a specialized operator exist for each work post and preferably does not move, do not favor multiskilled labor. The predominance of permanent workers and the limited importance allocated to bonuses in the maquila also work against flexibility (Table 18).

National trends related to the profile of manpower employed in the maquila are confirmed for the southeast-central region: gender distribution is currently almost even (42.6% of general laborers are male), average age is young (the

Table 19
Percentage of Establishments in Maquila Without Links With Other Companies in Mexico

Type of Cooperation	Percentage Without Cooperation
Research in markets and selling	93.9
Contracting of employees	82.5
Training	77.5
Research and development	91.8
Publicity	91.8
Purchase of raw materials	66.7
Purchase machinery and equipment	66.3
Share use of machinery and equipment	82.7
Other	95.9

Source: Author's original calculations from the EMIM (2003).

majority of general laborers are between 18 and 26 years of age), seniority is low (the majority of general laborers have been employed at their current establishment for less than one year), educational levels are low (the majority have only primary school completed or incomplete), turnover is high (80.5% of workers who leave a company due so voluntarily), and the general perception predominates among these workers that wages are low (Table 19).

Regarding maquila linkages with other companies within national territory, data gathered by the EMIM demonstrate that the large majority do not carry out market or sales research, hire or train personnel, pursue research and development, carry out publicity, purchase raw materials, acquire machinery and equipment, share use of machinery and equipment, or carry out any other activity with other national companies. Of these activities, shared purchase of machinery, equipment, or raw materials are the most common, but occur in far fewer than half the maquilas. These data are congruent firstly with the emphasis on imported raw materials, machinery and equipment from abroad, which relates to the motive for maquila registration of import-tax exemption. Nevertheless, the tax regimen is not enough to explain the limited reach of other types of chains and cooperation with other companies located in Mexico. The percentage of these maquilas' production value subcontracted to other companies in Mexico did not surpass 3.7% in 2003, and in turn the percentage of incomes obtained through work subcontracted to them by other establishments was no more than 15.6% that year.

Once again, headquarter policies may play a fundamental role, with their global vision of segmentation of the production process at the international level (Table 20).

Table 20
Models of Production in Maquila Establishments in Mexico

Models of Production	Percentage
Fordist organization, low or medium technology, low or medium flexibility and low or medium qualification	47.2
Fordist organization, low or medium technology, low or medium flexibility and high qualification	7.5
Fordist organization, low or medium technology, high flexibility and low or medium qualification	9.4
Fordist organization, low or medium technology, high flexibility and qualification	3.8
Fordist organization, high technology, low or medium flexibility and qualification	9.4
Toyotaist organization, low or medium technology, flexibility and qualification	17.0
Toyotaist organization, low or medium technology and flexibility and high qualification	3.8
Toyotaist organization with high technology and low or medium flexibility and qualification	1.9
Total	100.0

Source: Author's original calculations from the EMIM (2003).

To summarize the analysis of predominant production models in the maquila in Mexico, the microdata obtained on maquila establishments through the EMIM survey were used to construct the most common profiles in technology, organization, flexibility, and workforce skill level. There is no doubt that profiles predominate in the maquila of southeast central Mexico that link Fordist organization, low or medium technology, low or medium flexibility, and low or medium skill levels (47.2% of establishments), followed by a precarious Toyotaism characterized by Toyotaist organization (team concept, multitasks, and internal mobility) with low or middle skill levels, without extensive decision delegation, and with low or medium technology and flexibility. That is, predominant production models are confirmed to begin with Taylorism–Fordism, followed by precarious Toyotaism, both without high skill and technological levels, with scarce delegation of decisions toward workers, and low skills, and wages.

Conclusions

The theoretical discussion regarding transition from Taylorism–Fordism to post-Fordism is relatively settled, in that the most serious authors consider

that various production models are currently in play (Boyer & Frayssenet, 2000), and that those based on low wages are not a thing of the past. Furthermore, hybrid production models currently exist in practice, and therefore there is no evolutionary line from Fordism to post-Fordism, but rather production configurations that only partially obey generic pressures from the world market, which are joined by nonuniversal national, regional, or local factors, and the conceptions of the primary actors regarding restructuring, within which are included the business or management cultures, and those of other actors in labor relations. These factors operate under differentiated national state policies and institutions that have not been strictly homogenized by globalization. In this sense, it is difficult to sustain that generational evolution of the maquila would be the result of the limits of simple assembly to increase productivity and quality, as intrinsic limits of Taylorism–Fordism. Global pressures to increase productivity and quality, in particular for a sector overwhelmingly oriented toward export to the global market as is the maquila, cannot be satisfied only through post-Fordism.

On the other hand, upgrading in Southeast Asia took place associated with, among other factors, a state policy of export promotion, which cannot be compared with the simple open market policies of Mexican neoliberalism. In this regard, Corona (1994) states that the lack of local chains of the maquila with suppliers is because of lack of sufficient Mexican supply, especially of components, many of which are high technology and subject to frequent innovations, and to poor quality of Mexican products and lack of timely deliveries, the existence of long-term contracts between maquila establishments and their corporate headquarters, and to input prices.

Furthermore, the maquila is from its outset a tariff regimen—although as we have seen, it may be a form of producing and linking with the international market and the local context—and companies register as maquilas looking from the start to avoid import taxes. In other words, competition of imported inputs with those produced nationally is not only in price or quality but the savings implied by tax exemption must also be factored in.

Globalization has implied differentiated homogenization processes (greater in the financial markets) and also in the arsenal of technologies and work organization forms. However, there is no doubt that diverse production models currently coexist in the world. According to the GERPISA group, and in just the automotive industry, Sloanism, Toyotaism, Hondism, and Taylorism–Fordism can all be found (Boyer & Freyssenet, 2000). Furthermore, the concrete contents of work organization or labor relations forms, even with similar names, may vary widely among countries. This is illustrated in the case of Montiel's (2002) research on work teams in the Mexican final-assembly automobile industry and also in some maquila studies (Kenney, 1998). In other words, it

is insufficient to state that certain common organizational forms exist between countries, given that they may be applied with distinct contents, and therefore point toward different production models. Something similar occurs with labor relations. It is not enough to mention that in Mexico they also tend toward flexibility and decentralization because emphases may be very different (Bensunsán, 2003; De la Garza, 2001; De la O & Quintero, 1992).

Production models in the maquila probably range between two primary types, one more akin to Taylorism–Fordism, and the other a type of precarious Toyotaism. As we noted earlier, they are two models that intermix, and do not have well-defined limits in Mexico. In any case, both make intensive use of manpower, generally use nonautomated machine technology, and apply partial aspects of total quality, but with task segmentation among low skilled workers instead of technicians and engineers. It is difficult to imagine that among most of these workers, who are general laborers with high turnover rates, identity might be forged with the job (De la O & Quintero, 2001), the company, or the union. In addition, one of the main advantages of the maquila is its fiscal regimen, that is, tax exemption on imports of inputs, machinery, and equipment and on added value, and in connection with the demand for its products that are directed primarily toward the United States, the preferential adherence to the rule for which only the value added in Mexico is subject to import tariffs. In these conditions, it is not unusual that the maquilas do not overcome the low levels of national integration or that they establish weak production chains within the country. Labor relations are apparently formal and in effect a high proportion of maquilas and workers have unions, and labor regulation exists. Nevertheless, in the majority of cases, it is a passive corporativism that allows management to maneuver in the production process and that does not demand benefits much beyond the minimum established by Mexican Labor Law. One exception worth verifying is the situation around the city of Matamoros, which nonetheless is far from the central nucleus of labor relations represented by the large national industrial unions such as that of oil workers.

Both Taylorism–Fordism and that which we have referred to as precarious Toyotaism, dominant configurations in the maquila, are based on low wages and labor intensification, and in this sense, they confront limitations to productivity growth: worker physical and mental resistance, but especially social resistance that in conditions other than those of the maquila might take the form of a strike, but the maquila has more often gone the route of individual worker claims filed in labor courts, outside of the unions, or—more likely—voluntary turnover. Voluntary turnover is more frequent among younger, single, more educated and male workers, and many of its

causes have been analyzed by experts, who suggest possible common motives of boredom, fatigue, poor health and safety conditions, lack of occupational training or career paths, and even those attributed to poor living conditions, which may be summarized in the prevailing maquila production models and their inability to stabilize the workforce because of their focus on labor intensification and low wages, with labor division forms that segment operational tasks from tasks of conception, and with seniority structures that do not foster professional careers within the companies, in which little training is provided (Catanzarite & Strober, 1993). The low wages are necessarily associated with workers' poor living conditions, which only partially can be attributed to lack of public services infrastructure along the northern border. It is not surprising that the young, unmarried, more educated men are most likely to quit (Miller, Hom, & Gomez-Mejia, 2001); they have the least to lose, preferring the *nomadic labor path* to precarious Toyotaist labor conditions (Kopinak, 1995). These operational conditions of maquila production models, with their limits in workforce resistance, also impose limitations on productivity growth. This could conform a sector-wide productivity crisis because the Toyotaist circle is unable to close; the high turnover with little worker identification with company and productivity may hardly be associated with authentic participation and involvement of workers in the struggle for competitiveness and productivity, especially with low bonuses. But the maquiladora models in Mexico reach beyond the companies formally registered in this tariff regimen, and characteristics such as those described can be found in other companies, branches, and regions that are not formally maquilas. The predominant models found in the maquila are likely also those prevalent in Mexican manufacture, and their limitations may also be similar (De la Garza, 2003).

Abbreviations

CEPAL: Comisión Económica parea América Latina de las Naciones Unidas
CROC: Confederación Revolucionaria de Obreros y Campesinos, segunda confederación corporativa
CROM: Confederación Revolucionaria de Obreros de México, tercera confederación corporativa
CTM: Confederación de Trabajadores de México, principal confederación
EMIM: Encuesta Modelos de Industrialización en México
ENESTYC: Encuesta Nacional de Empleo, Salarios, Tecnología y Capacitación
GERPISA: Groupe d¨Etude et Recherche Permanent sur 1¨industrie et les Salariés de 1´Automovile

INEGI: Instituto Nacional de Estadística Geografía e Informática, órgano oficial del gobierno mexicano
IVA: Impuesto al valor agregado
STyPS: Secretaría del Trabajo y Previsión Social

Methodological Appendix

The methodological details may be consulted in the book: Enrique de la Garza (coord.) (2006). *Modelos de Producción en la Maquila de Exportación*. Mexico City, Plaza y Valdés-UAM.

A technological level index was calculated as follows: 0.5 (technological level in production) + 0.2 (technological level in quality control) + 0.3 (if research and development is carried out). Regarding technological level in production, the index considered the percentage of production operations according to a scale of equipment or machinery: tool, nonautomated machinery, noncomputerized automated machinery, and computerized automated machinery. In quality control, the scale applied used the following classifications: no quality control, visual, with nonautomated equipment, and with automated equipment.

Three levels were considered for work organization type: traditional, Taylorist–Fordist, and Toyotaist. The dimensions considered for the three were personnel who carry out quality control, maintenance personnel, postassignment procedure, promotion procedure, existence and use of job postmanuals and time and movement studies, form of personnel supervision, communication forms, internal personnel mobility, level of worker participation in decisions, and existence of group forms of work.

For labor flexibility, the following equation obtained from factorial analysis was used: .795 (numerical flexibility) + 0.17 (functional flexibility) + 0.34 (wage flexibility).

To calculate the extension of the production models, establishment profiles were considered in which were combined work organization type, technological level, labor flexibility level, and workforce skill level. The resulting percentages were the most frequent combinations of levels, in such a way that the results were inferred from the statistical analysis.

Notes

1. The impact of Chinese manufacture on Mexican maquila exports toward the United States is verified, despite the more elevated transportation costs from China to the United States. Over these years, Mexico has been displaced by China as primary supplier of apparel and electronics to the United States, and in the case of autoparts, the distance is reduced to China's favor.

2. Production model inspired the historic experiences of the Toyota company in Japan, in particular the organizational form using team concepts of work, quality circles, universal craft, and internal mobility with worker involvement and participation in favor of productivity.

3. The sources used in the following two sections are the national survey of the maquiladora export industry carried out by INEGI, and the maquila module of the ENESTYC survey that exists for the years 1998 and 2001.

4. In Mexico, sweetheart unions and contracts (*sindicatos y contratos de protección*) refer to unions and collective bargaining agreements that are officially registered vis-à-vis labor authorities, but workers ignore the fact that they belong to a union or the content of the contract. It is a type of simulation of worker representation and of regulation of the labor relation, negotiated between union leaders, managers, and governmental authorities.

5. The primary instrument was a survey of maquila establishments stratified by size in the states of Zacatecas, Aguascalientes, Michoacan, Guanajuato, Queretaro, Mexico, Tlaxacala, Puebla, and Yucatan. A minimum of 20% of the registered establishments was taken from each state (a census was carried out in those states with few maquila establishments), and these sites were proportionally distributed by size: large (more than 250 workers), medium (100–250), and small (between 15 and 99 workers).

References

Bair, J. (2002). Beyond the maquila model? Nafta and the Mexican apparel industry. *Industry and Innovation*, *9*, 203-225.

Bensunsán, G. (2003). Alternancia política y continuidad laboral: Las limitaciones de la propuesta del CCE/CT. In A. Bouzas (coord.), *La reforma laboral.* México: Sin Editorial.

Boyer, R., & Freyssenet, M. (2000). *Modelos de producción.* Buenos Aires: Humanitas.

Buitelaar, R., Padilla, R., & Urrutia, R. (1999). *Centroamérica, México y República Dominicana: maquila y transformación productiva*. México: Comisión Económica para América Latina y el Caribe CEPAL.

Buitelaar, R. M., & Perez, R. P. (2000). Maquila, economic reform and corporate strategies. *World Development*, *28*, 1627-1642.

Carrillo, J. (1992). *Condiciones de empleo y capacitación en las maquiladoras de exportación en México*. México: STyPS-COLEF.

Carrillo, J., & Hualde, A. (1997). Maquiladoras de tercera generación: El caso Delphi-GM. *Comercio Exterior*, *47*(9) 747-757.

Carrillo, J., & Hualde, A. (2002). *Veinte años de estudios sobre la industria maquiladora de exportación en México* (Tijuana: Colef), Video.

Carrillo, J., & Santibáñez, J. (1993) *Rotación de personal en las maquiladoras de exportación de Tijuana* (Tijuana: STyPS-Colef).

Catanzarite, L. M., & Strober, M. H. (1993). The gender recomposition of the maquiladora workforce in Ciudad Juarez. *Industrial Relations*, *32* 133-147.

CEPAL. (1998). *Centroamérica, México y República Dominicana: Maquila y transformación productiva.* México: Author. Sede Subregional en México.

Corona, A. (1994). Reestructuración regional en México, variables macroeconómicas y TLC. *Problemas del Desarrollo*, *XXV*(96), Enero-Marzo, 77-92.

De la Garza, E. (2001). *La Formación Socioeconómica Neoliberal.* México: Plaza y Valdés.

De la Garza, E. (2003). *Compañías y Trabajadores en México al inicio del Siglo XXI*. México: STyPS.

De la Garza, E. (coord.) (2005). *Modelos de Exportación en la Maquila de Exportación en México*. México: UAM-Plaza y Valdés.

De la O, M. E., & Quintero, C. (1992). Sindicalismo y Contratación Colectiva en las Maquiladoras Fronterizas, los casos de Tijuana, Cd. Juárez y Matamoros. *Frontera Norte4*(8), Julio-Dic, 7-88.

De la O, M. E., & Quintero, C. (coords.) (2001). *Globalización, Trabajo y Maquilas.* México: Plaza y Valdés.

Dussel, P. E. (2002). Ser maquila o no ser maquila, es esa la pregunta? *Comercio Exterior*, *53*(4), 10-19.

Echeverri-Carroll, E. (1990). The future of the maquila industry in Mexico. *Trade, foreign investment, and competitiveness, Japan Business Study Program series* (pp. 60-64). Austin: University of Texas. Graduate School of Business, Bureau of Business Research in association with the Japan External Trade Organization.

Fox, V. (2004). *Cuarto informe de gobierno*. México, DF: Presidence of the Republic.

Gereffi, G., Spencer, D., & Bair/J. (eds.) (2002). *Free trade and uneven development*. Philadelphia: Temple University Press.

Instituto Nacional de Estadística Geografía e Informática (INEGI). (1999). Encuesta Nacional de Empleo, Salarios, Tecnología y Capacitación. México, DF: INEGI.

Instituto Nacional de Estadística Geografía e Informática (INEGI). (2001). Encuesta Nacional de Empleo, Salarios, Tecnología y Capacitación. México, DF: INEGI.

Kenney, M. (1998). Learning factories or reproduction factories. *Work and Occupations 25*, 269-304.

Kopinak, K. (1995). Gender as a vehicle for the subordination of women maquiladora workers in Mexico. *Latin American Perspectives*, *22*(2) 23-40.

Kopinak, K. (1999). *Desert capitalism*. Arizona: University of Arizona Press.

Lara, A. (1998). *Aprendizaje tecnológico y mercado de trabajo en las maquiladoras japonesas*. México: UAM/Porrúa.

Miller, J. S., Hom, P. W., & Gomez-Mejia, L. R. (2001). The high cost of low wages: Does maquiladora compensation reduce turnover? *Journal of International Business Studies*, *32*, 28-45.

Montiel, Y. (2002). *Un mundo de carros*. México: CIESAS.

Sargent, J., & Matthews, L. (1999). Exploitation or choice? Exploring the relative attractiveness of employment in the maquiladoras. *Journal of Business Ethics 18*(2), 213-226.

Secretaría del Trabajo y Previsión Social (STyPS). (2005). Estadísticas Laborales. México, DF: STyPS.

Shaiken, H. (1990). *México in the global economy*. La Jolla: Center for US–Mexican Studies.

Sklair, L. (1996). *México: La industria maquiladora*. Santiago de Chile: Naciones Unidas, Comisión Económica para América Latina y el Caribe.

Universidad Autónoma Metropolitana (UAM). (2003). Encuesta Modelos de Industrialización en México (EMIM). México, DF: UAM.

Wilson, P. (1996). *Las Nuevas Maquiladoras en México*. Guadalajara: UdeG.

Wright, M. W. (2001). Desire and the prosthetics of supervision: A case of maquiladora flexibility. *Cultural Anthropology*, *16*(3) 354-373.

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