

**LABOR AND PROFESSIONAL SKILLS IN A GLOBALIZED  
REGION: A JOB MARKET ANALYSIS IN MEXICO'S NORTHERN  
BORDER.**

Alfredo Hualde  
El Colegio de la Frontera Norte  
Tijuana (México)  
ahualde@colef.mx

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## Summary

Mexico's northern border, considered as an assembly area for exports, suffered interesting changes since the mid eighties with the installation of transnational facilities with a larger organizational and technological complexity. The transformations that took place would make you think that the region can obtain competitive advantages that are not based on low wages due to the skills observed in the technical and professional areas of the job market.

However, the 2000 – 2003 crisis has brought a shadow of doubt to this possibility. For the first time since the mid seventies, losses in employment, closures of plants (a number of them moved to China ) renewed the debate about the sources of competitiveness of the region, technology, wages, organizational structures or all together.

This proposal submits an analysis that investigates in detail the structure of the job market in three border cities: Tijuana, Ciudad Juárez and Mexicali-, always taking into consideration the differences created by the plant size, the type of industry (electronics and auto parts), and the source of capital. Data have been taken from a representative survey with managers in 298 plants during a research project sponsored by the Mexican Consejo Nacional de Ciencia y Tecnología (Conacyt).

Data on the job market relates to other data that describes the structure of the jobs by department in such way that it is possible to obtain a classification of the *organizational complexity* of the companies.

The existence of different departments such as product design or environmental, indicate the most recent functions adopted by the plants installed at the border; but the relative scarce number of people in these departments can also be interpreted as a clear indication of their functions.

The most general conclusion is that the job market's structure has not changed substantially in recent years, and even in years of crisis, it keeps very stable. Data on direct employment also shows an increase in education and in age, compared to studies made at the end of the eighties. Finally, the reduction in job turnover is perhaps the clearest effect of the crisis on direct employment. More stable workers could receive a more continued training and improve their

wages through a career in the plants, but lower turnover is too recent to evaluate if this possibility is really happening in the companies.

All observations that lead to a stagnant situation in the job market structure as described above, do not invalidate observations from other research work concerning an interesting learning process among medium to high-ranking maquiladora employees (Hualde, 1995, 2001, Contreras, 2000).

To grasp this contradictory picture of the maquiladora in Mexican border cities we have divided this paper in the following sections: first, we refer to recent contributions of theoretical thinking to regional development and how labor is considered in this framework. Secondly, we describe the main features of the maquiladora labor market in the cities mentioned before;. Thirdly, main characteristics of day to day work and professional trajectories are briefly depicted. Finally, we discuss about knowledge and skills in the border regions trying to point out their limits and potential.

## **1. Globalization, regions and labor**

Since the early eighties a new interest centered in regions or territories has emerged in the field of social sciences. There is a wide consensus among scholars of different disciplines about the importance the region has been gaining as a center of economic development in times of globalization.<sup>1</sup>

The region is considered an actor enabled to shape its development (Boscherini and Poma, 2000; Benko and Lipietz, 1994; Dini, 1996; Florida, 2000). The “re-emergence” of regions or the “new regionalism” is a symptom of the new role the region, based not on uniformity but on particular competitive advantages.

Advantages no longer refer mainly to resources or infrastructure, but to the institutional configuration they have acquired, the social network that support institutions, their orientation toward innovation and the different relationships that firms and other institutions develop. All these elements are present in pioneer works on the Italian industrial districts (Becattini, 1988/1989; Capecchi, 1992), in works that are critical of this concept (Poma, 2000) and in research describing

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<sup>1</sup> There is a dialectical movement in the configuration and transformations of the space-time axis. It is necessary to analyze co-presence and its relation with the way in which remote places connect almost simultaneously by making use of the new information technologies and communication systems (Giddens, 2001)

other experiences such as that of Silicon Valley (Kenney, ed. 2000) or theories regarding the experiences of different *production worlds* or regional innovation systems (Acs, De la Motte, Paquet, 2000; Salais and Storper, 1993).

These authors share the following elements:

- an emphasis on cooperation among firms, between firms and institutions and among institutions, between public and private actors whereby collective action translates into systemic competitiveness (Meyer-Stamer, 2000) or into collective efficiency (Humphrey and Schmitz, 1995)
- the importance of networking
- trust* as an important convention of behavior among actors
- the consideration that tacit knowledge is even more important than codified knowledge (Villavicencio, 2000; Nonaka and Takeuchi, Von Krogh, Hualde, 1999).

But, as it has been pointed out in the nineties, important differences have also arisen in the international debate concerning regional development. Among others, the following are important issues:

- the limits of a regional model based –the industrial district- on small and medium-sized firms vis-à-vis the power of large transnational corporations (Schoenberger, Amin and Robins, 1991, . . . );
- the possibility of reproducing the successes experienced in other regions that do not share the unique social network and dynamics of the most successful district. Following the example of Silicon Valley, Cohen and Fields note that trust is constructed with economic efficiency and performance and not through old social links as those described by Putnam in the Italian case. (Cohen and Fields, 2000).
- the dubious social advantages for workers in regions with industrial districts (Pollert, 1993);
- a regional identity is a positive characteristic for regional competition, but may become a factor of rigidity when conditions change and it is necessary to modify forms of behavior, institutions or the products and processes in the territory (Becattini and Rullani, 1994).
- when networks are weak, they can be experienced negatively as a density that translates into redundant actions, red tape, etc.
- institutions have a main role, but only some of them can be apt for the development of the region; their character can be diverse: institutions based on social capital, institutions exclusively oriented to the market or institutions geared to benefits (Amin, 1999).

A different approach can be found in theoretical proposals that explain development through global chains. This alternative analytical framework was developed in the early nineties with empirical support in *traditional* industries (Gereffi and Korzeniewicz, 1995). Lately, an attempt to reconcile theories based in industrial districts –or endogenous development- and global value chains is notorious in authors as Humphrey and Schmitz (2001) or Gereffi and Bair (2003). They all stress the importance to analyze local networks, horizontal links and *untraded interdependences*; at the same time, they emphasize that the specificity of the global chain in technological, productive and competitive aspects should be understood. Depending on what kind of chain regions and firms are embedded, learning, jobs and even social benefits will be different. This is a dynamic approach in which changes towards more skilled activities, more complex products or more efficient processes has been called *upgrading*.

But *upgrading* in developing countries is usually a hard path in which more brain intensive operations not always can be attained. The specificities of the value chain influence the possibilities of upgrading. Four types of relationships can be distinguished: Arm's length market relations,

networks, quasi hierarchy and hierarchy. Different forms of chain governance have different upgrading implications:

-Insertion in a quasi-hierarchical chain offers very favourable conditions for fast process and product upgrading but hinders functional upgrading.

-in chains characterized by market-based relationships process and product upgrading tend to be slower (not fostered by global buyers) but the road to functional upgrading is more open.

-chains characterized by even networks offer ideal upgrading conditions but are the least likely for developing country producers because the high level of (complementary) competences required.

As far as border cities are concerned, some of the mentioned elements have been found: there are networks among professionals, the representatives of business associations work or have worked as managers in the maquila and the educational institutions sign agreements with the most important maquilas.

However, an important part of the dynamic of the maquila plants is explained by global phenomena of a sectorial or commodity-oriented nature. The large plants still depend on strategic decisions taken in Asia or in other regions of the world. As far as knowledge in the plants is concerned, which undoubtedly has been emerging in recent years, it is still concentrated in the technical sectors, mainly among the engineers and managers.

Under the perspective of the labor market analysis, at least, three important characteristics of the border labor market can be an obstacle for deeper learning and more fruitful upgrading:

-the flexibility of labor relations: unions pro-management and a low rate of unionization are among others salient specificities of the *regulation* of the labor market

-turnover and instability in the labor market have been identified as an obstacle to steady learning during working life

-a low rate of education of the labor force is also a difficulty to improve production techniques and learning.

## **2.The economy and the labor market in Mexico.**

Since the mid – eighties, the Mexican economy has accomplished a series of changes oriented towards the economic opening, deregulation and privatization of a very significant portion of public corporations. Deregulation strongly influences the job market and there are important reductions of minimum and average salaries. The term that best describes the general process suffered by the job market is flexibility or “flexibilization”. This means an increase of sub-contracting, temporary or part-time contracts, an increase in the number of small businesses, job

instability and an increase in immigration to the US (Hualde y Ramirez, 2001, De la Garza, Salas, 2001)

From the nineties to date, Mexican economy has evolved through four stages:

- a) From 1990 to 1994, there is a modest increase of jobs and production.
- b) In 1994 there is a financial crisis, a monetary devaluation, decreased production and contraction of employment.
- c) Between 1995 and 1997, there is a relative important recuperation and the job levels prior to 1994 are recovered. .
- d) From the fourth quarter of 2000 and up to today, the economy is again stagnant and there is an increase in unemployment and in informal non-protected employment.<sup>2</sup>

However, the maquiladora employment doesn't necessarily follow the cycles of the job market in general. For example, when unemployment decreased in Mexico in 1995, maquiladoras had a strong augmentation in employment, but in 2003 the maquiladora employment market is stagnant after having lost some 300,000 thousand jobs. This is mainly because of the downturn in the US and regulatory problems suffered by the industry because of NAFTA. According to NAFTA regulations, by the year 2001 all maquiladoras would be ruled by the same fiscal regime custom tariffs as all other Mexican industries, but this has in fact not happened.

Thus, within a national context of small businesses and informal market growth, and stagnation of production, the maquiladora industry has absorbed a great number of jobs with a salary lower than that of normal manufacture, but formal employment anyway since all its employees must be affiliated to the social security system, IMSS. From the point of view of maquiladora, job market labor relations are defined by a weak regulation, except for that of Matamoros. The presence of labor unions does not impede – and some instances it promotes-, extremely flexible labor contracts, and the fact that labor relations are defined more in a personal basis rather than a collective one.

## **2.1- Context of the analyzed cities.**

Since we concentrated our analysis in only three cities, it is convenient to specify some of the characteristics of each one of them that could explain differences in the job markets.<sup>3</sup>

Of the three cities, Ciudad Juarez is the oldest and the first one to have a maquiladora industry. Juarez has had the largest number of maquiladora jobs and the largest facilities. This city's

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<sup>2</sup> We mean economic activities on non-insured workers.

<sup>3</sup> A recent review of maquiladoras in ten Mexican cities can be found in De la O and Quintero (coord.), (2002).

dependency on the maquiladora jobs is larger than the other two. It is also a city that has received an important number of migrants, but they generally come from the state of Chihuahua or adjacent states, and this differentiates it from Tijuana.

Tijuana is the city where the maquiladora industry and the population registered the fastest growth, during the eighties and the nineties, and it differs from Juarez in three important ways: a) a larger specialization in electronic industries; b) a larger participation of Asiatic industries, mainly Japanese and c) smaller plants than those in Juarez.

Finally Mexicali, just like Tijuana also specializes in electronic industries –computers and televisions- that settled down during the nineties, in a mostly administrative and agricultural city. From the population point of view, Mexicali is a more stable city with a minor incidence in migration than the other two.

### **2.3.- Job Market structure in the maquiladora industry.**

*A very stable and relatively homogeneous occupational structure.*

From its very initial stages in the early sixties, the maquiladora industry has been considered as a sector where unskilled labor prevails. However, later investigations have introduced interesting variations concerning the job market structure, without forgetting the fact that professional and technical people were and still are the minority. Rendón y Salas (2001:68), mention that between 1980 and 1999, the proportional number of technicians increased from 9.5% to 13% of employees.

Besides, as we have mentioned in other works, averages concerning participation of different categories of workers in the maquiladoras, do not allow detailed comparisons between the differences of the employment structure between plants and cities. One of the objectives of this article is to examine differences and similarities from a quantitative perspective and to compare them to other research that have used other methods.

According to INEGI's data<sup>4</sup>, the cities with the largest number of technicians are the border cities and Guadalajara. However, our review for the second part of the nineties and the period 2000-2003 shows interesting results *for all maquiladoras* in Tijuana, Ciudad Juarez and Mexicali.

- a) Differences between cities are negligible
- b) The city with the largest number of technicians is Mexicali, not Ciudad Juarez,

- c) The job structure hardly has any variation in the years we reviewed. This means that the crisis affects in the same way technicians, administrative personnel and direct workers.

¿Is this tendency similar if we only consider electronic and automotive maquiladoras from our survey? The poll made by El Colegio de la Frontera Norte shows differences concerning the maquiladora industry's structure. Ciudad Juarez is the city with the largest plants and the largest proportion of auto-parts industries. In comparison, in Tijuana, where electronic industries are very important, occupational structure has more *unskilled labor*, with 78% of direct workers. Mexicali is just between these two cities with almost 75% of direct workers and a little bit above 10% of technicians. In any event, the three cities have a smaller proportion of direct workers in the analyzed sectors, than the rest of the maquiladora industry in general.

The city with the largest number of technicians is Ciudad Juarez with a total of 15%. There are no great differences between cities concerning the number of administrative personnel. Curiously, Ciudad Juarez is the city with a smaller number of management people. Mexicali has the largest number of managers, and Tijuana is in between.

In all three cities, the direct percentage of workers is smaller than the national level where the percentage is always near 80%. Thus, *electronic and auto parts maquiladoras in these three cities have a structure somewhat less intensive concerning direct work, than the rest of the maquiladoras in each one of these same cities and the maquiladoras on a national level.*

¿How can we explain the larger intensity of technical work in Ciudad Juarez? ¿Is it because of the importance of the auto parts sector in comparison with electronics in the other two cities? The answer, considering the data from the survey, is that, at least on a partial basis, it can be explained because of the importance of an economic sector or the other. In reality, the auto parts sector has less direct work (73%), than the electronic sector, but differences are lesser than those the cities present between them.

Also, the analysis of the data by city and by sector, indicates a larger technical workforce in the auto parts industry, but differences are not that great concerning the electronic sector.

One fact that draws attention is the stability of the maquiladora job structure during the decade of the nineties and the beginning of the 2000's. An interesting aspect that arises from INEGI's data is that none of the three cities had an increase in technicians during the nineties. According to this information the increase happened in the later part of the eighties.

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<sup>4</sup> Instituto Nacional de Estadística, Geografía e Informática

On the other hand, if the job structure of the studied sector has less direct workers, it is still very different from Mexican manufacturing. Rodríguez Vargas (2002:116) thinks that maquiladoras have one administration employee (includes technicians), for each three workers. The proportion in the maquiladora industry is one to every thirteen.

### **Job structure by source of capital**

One aspect that has called upon researchers since the end of the eighties is the specificity of the plants according to the source of the capital. Especially in Tijuana it was considered that Asian plants –mainly the Japanese-, were the most technologically advanced. However, the structure of the labor market does not show a more qualified composition in Japanese plants. .

*European plants have the largest number of direct workers, but among USA, Asian and Mexican plants, there is scarcely a difference, although the first ones have a lesser number of employees.* There are no differences either, in the proportion of technicians by the source of the capital, although in this classification Mexican plants have the first place, which is very surprising. Finally, Asian and European have the largest number of administrative personnel and Asian and Mexican plants have the largest number of managers. One could think that these two types of employees are important for Asian plants, since they generally fill these positions (administrative and managerial), with Asian personnel.

If the analysis is further investigated, it shows some more interesting variations by country:

- a) Japanese plants, although having about 75% of direct workers, occupy the first place in the proportion of technicians and the second place concerning administrative personnel. However, they have a very small proportion of managers, compared to Korean and other Asian plants.
- b) Korean plants are the ones with the highest proportion of direct employees, and an important number of managers.
- c) The rest of the Asian maquiladoras have an important number of directors or managers.

This suggests means that non-Japanese Asian plants have a very hierarchal organization with a strong administrative presence. *On the other hand, the difference in technicians between Japanese, Mexican and American plants is not very significant.*

Analysis of the plants by their size is important because one tends to think that large plants have a larger proportion of technical and administrative personnel, but in the cities where the survey was applied there are two significant findings: First, the micro plants are the ones with more technicians and administrative personnel, and second, differences between small and large plants are not that important.

About this, we offer the following explanation: with reference to micro-plants, simply because they are so small, the presence of technicians modifies the job structure in relative terms. This is confirmed for example, in the case of engineers because micro-plants generally have two engineers or less but in relative terms this is very high.

The second result is more interesting: Large plants say their percentage of technicians is 12.5%, and small ones have 11%. Medium-sized plants have more direct employees and those with the least technicians have 9.6%.

#### **Presence of engineers.**

The number of engineers is generally considered an indicator of technology for industries and territories.

With specific reference to the presence of engineers, we found the following results: most of the plants –36.3%– declare that they have a number between 3 and 10 engineers. In the lower ranks 7.14% mentioned they have no engineers amongst their personnel, and 18% say they have one or two engineers at the most.

| <b>Value</b> | <b>Frequency</b> | <b>Percent</b> |
|--------------|------------------|----------------|
| None         | 21               | 7.14           |
| -2           | 54               | 18.37          |
| 3-10         | 107              | 36.39          |
| 11-20        | 46               | 15.65          |
| 20+          | 66               | 22.45          |
| <b>Total</b> | <b>294</b>       | <b>100</b>     |

By cities, Ciudad Juarez is the location with the largest number of engineers. None of the investigated plants lacks engineers amongst their personnel. On the other hand, 35% of the interviewed plants in Ciudad Juarez have more than 20 engineers. Tijuana is on the other side and only 12.6% of the interviewed plants have more than 20 engineers. Most plants in Tijuana have

between 3 and 10 engineers. Mexicali is in the middle and it is more like Tijuana than Ciudad Juarez.

By sectors, the auto-parts industry has a larger proportion of engineers than the electronic plants.

| Engineers    | Source of capital |       |       |        |        |
|--------------|-------------------|-------|-------|--------|--------|
|              | Mexico            | USA   | Asia  | Europe | Others |
| None         | 25.0%             | 3.7%  | 5.8%  | 9.5%   | 0.0%   |
| 2 or less    | 18.8%             | 21.1% | 17.4% | 4.8%   | 0.0%   |
| 3-10         | 40.6%             | 32.3% | 42.0% | 23.8%  | 50.0%  |
| 11-20        | 12.5%             | 15.5% | 18.8% | 14.3%  | 50.0%  |
| 20 or more   | 3.1%              | 27.3% | 15.9% | 47.6%  | 0.0%   |
| <b>Total</b> | 100%              | 100%  | 100%  | 100%   | 100%   |

Even more surprising is some the data about the presence of engineers in the plants, according to the source of the capital. European plants that, as we have seen, do not have a very important number of technical employees , do have an important number of engineers: almost half of them declared to have 20 or more engineers. However, we must remember they are very large plants.

On the other hand, it is significant that one quarter of the Mexican plants do not have engineers amongst their personnel.

Finally, a larger percentage of American plants, -around 27%, have 20 engineers or more, while the percentage of Asian plants with more than 20 engineers is no more than 16%

If we analyze the presence of engineers in a more detailed way by source of capital, we can conclude that plants from Europe and the USA have a more significant quantity of engineers than Asian plants; Mexican plants are in the last position.

These figures indicate that engineers represent in general terms about 5% of the labor market which is seems quite low. More significative is that 25% of the Mexican plants do not employ engineers at all.

## **PART II. Characteristics of the direct work force.**

|   | CITIES  |          |        | TOTAL       |
|---|---------|----------|--------|-------------|
|   | TIJUANA | MEXICALI | JUAREZ |             |
| Percentage of women                               | 51.7    | 47.7     | 49.1   | <b>50.0</b> |
| Percentage with previous work experience          | 67.2    | 69.5     | 72.0   | <b>69.4</b> |
| Average number of plants where they worked before | 2.8     | 2.3      | 3.9    | <b>3.1</b>  |
| Average number of years of seniority              | 3.6     | 3.1      | 3.8    | <b>3.6</b>  |
| Average age (years)                               | 25.2    | 26.4     | 26.9   | <b>26.0</b> |
| Average years of education                        | 7.4     | 8.4      | 7.7    | <b>7.7</b>  |

The idea that the maquiladora industry is a feminized industry is not valid anymore. The numbers of our research are very similar to those of INEGI. The survey shows that men and women are equally divided in the work force. There are no big differences between cities, although Mexicali seems to be the city with the lesser percentage of women, followed by Ciudad Juarez. Tijuana, with a percentage of 51.7 of women, is the only city where women are a slightly larger percentage than men.

Data concerning seniority, number of maquiladoras, percentage of women with previous labor experience, shows a strong pattern: Ciudad Juarez is the city with workers with more experience and seniority. Tijuana is always in second place and Mexicali with a more recent maquiladora industry, is the city with the least experienced work force. However, differences between Tijuana and Mexicali are not as strong as one could think, is one takes into consideration that maquiladora industry arrived in Tijuana in the eighties and in Mexicali. Even more so, according to the interviewed managers, the percentage labor with previous experience is somewhat larger in Mexicali than in Tijuana.

Concerning the average age of employees, Juarez occupies first place, Mexicali second and Tijuana, third. Finally, with respect to years of education, Mexicali clearly occupies first place, over Ciudad Juarez and Tijuana.

This data allows us to clearly differentiate job markets. Ciudad Juarez would be the place where direct employees have more seniority and have gone through a larger number of maquiladoras. Tijuana, generally speaking, occupies second place and Mexicali probably has a lesser proportion of migrants –and in consequence a higher degree of education-, and shows relatively high seniority rates and work experience, if one considers that here the maquiladora industry is the most recent one.

The norm of the job market according to the activity can be described as follows: Masculine with more seniority, somewhat older and with slightly higher education, in the auto – parts sector.

### **Turnover**

One of the characteristics of the border area job markets, especially in maquiladoras, has been the high work turnover rate. Several studies have tried to describe this problem according to certain characteristics of the work force – migrants, young people, -cycle of life amongst women-, kind of work, and other factors (Hualde 2002).

All these factors that certainly were important till the crisis of 2001-2003, cease having any importance when the job offer decreases substantially. This is shown by results of the survey when compared the data from the previous month to the survey with the turnover average of 2001, the year before the investigation was done.

However, before reviewing the turnover from a temporary perspective, it is interesting to check some information that can give a good idea about where the turnover concentrates:

By source of capital, Asian and Mexican plants during the year 2001 had a larger turnover than American plants. This can be associated with salaries and the handling of human resources – mainly discipline, that do not reflect in the investigation.

Between these two dates the turnover rate results spectacular:

It descends from 15.5% to 4.8% in Mexican plants; from 7.5% to 3.7% in American plants; from 12% to 5.7% in Asian plants and 7.65% to 5.2% in European plants. This means that Asian plants have the highest turnover rate, led by the Japanese, but differences between plants are much smaller since the crisis.

According to this information Ciudad Juarez where the proportion of American plants is the highest, shows smaller turnover percentages than Tijuana and Mexicali.

Without a doubt, the reduction of turnover rates must mean savings associated with hiring, and a possibility to consolidate better training amongst the direct employees. There would also be better conditions for employees to have longer careers and a sense of belonging towards the company. However, now days any changes happening in the maquiladoras because of the smaller turnover, are unknown.

### **Organizational structures of the companies as a reference to occupational structure.**

One of the results of this investigation on the maquiladora plants along Mexico's northern border is the larger organizational complexity of some plants, compared with the investigations of the first eighties. If we accept that in a scale of production complexity, we could go from simple assembly to the product design, we can examine the obtained results according to the departments plants include in their organizational schema:

| %                 | YES   | NO   | TOTAL      |
|-------------------|-------|------|------------|
| Production        | 98.64 | 1.36 | <b>100</b> |
| Quality Assurance | 95.59 | 4.41 | <b>100</b> |
| Maintenance       | 93.56 | 6.44 | <b>100</b> |

|  |       |       |            |
|--|-------|-------|------------|
| <i>Systems</i>                               | 64.07 | 35.93 | <b>100</b> |
| <i>Purchasing</i>                            | 81.36 | 18.64 | <b>100</b> |
| <b>Strategic Planning</b>                    | 39.66 | 60.34 | <b>100</b> |
| <i>Production or manufacture engineering</i> | 77.63 | 22.37 | <b>100</b> |
| <i>Environmental control</i>                 | 62.71 | 37.29 | <b>100</b> |
| <i>Training</i>                              | 69.15 | 30.85 | <b>100</b> |
| <b>Design engineering</b>                    | 26.44 | 73.56 | <b>100</b> |
| <b>Product development</b>                   | 21.69 | 78.31 | <b>100</b> |
| <b>Marketing and or customer service</b>     | 31.53 | 68.47 | <b>100</b> |
| <b>Government affairs</b>                    | 46.44 | 53.56 | <b>100</b> |

There is a basic organizational structure that encompasses three departments: production, quality control and maintenance. More than 90% of the interviewed plants have these departments.

In second place we find the mid organizational structure. In this classification we include plants that have, systems, purchasing, manufacturing engineering, environment control and training. More than 50% but less than 90% of the interviewed plants have these departments.

In third place there is what we call a *complex* organizational structure, formed by departments than only exist in 50% or less of the plants. These departments deal with four different activities: a) strategic planning, b) marketing and c), product design, development or investigation and d) government affairs. The three first activities indicate a larger level of autonomy from the mother company.

The last one would indicate an interest from the plants to somehow participate with local authorities in different matters.

This type of structure presents different aspects when the average number of employed persons in those departments is examined, and it does not necessarily coincides with the above – mentioned classification. Although a relatively important number of plants have an environmental and training departments, the number of employees is very reduced. In environmental we found 2 person in the Mexican plants, between 2 and 3 in the American plants, and around 3 both in the Asian and European plants. This coincides with qualitative studies we did we have made about “the new environmental professions” in the maquiladora industry. A significant number of plants have an environmental department because local authorities demand compliance of certain regulations;

but because of the same reason, the number of employees is reduced since generally they are not dedicated to improve the process. On the other hand, the design centers or design engineering centers in European and Asian plants with these departments have a somewhat larger number of employees: nine persons in the Asian and between 10 and 11 in the Europeans.

### **Wages in the maquiladora industry**

Traditionally, one of the most criticized aspects of the maquiladora industry has been the wages. Since the late eighties, wages have been equal to two or three minimum daily salaries, without any important variation up to this time. One of the arguments of the criticism is that wages are not related to productivity, but with competition with countries in South East Asia. Also, wages in the maquiladora industry have been subject in the last twenty years to fluctuations in the rate of exchange. For many authors, the great investments during the eighties and the nineties were a direct product of the cheapening of labor in Mexico. Lately the discussion on wages does not only cover direct employees. Other investigations have estimated the differences between the direct workers and the technicians (Hualde 1999).

Rendón y Salas (art.cit: 68), compare salaries and wages of maquiladoras and general manufacturing between 1987 and 1999. Income differences between maquiladoras and general manufacturing oscillate irregularly in those years, but manufacturing income is always higher. At the end of the nineties, maquiladora wages seemed to converge with those of general manufacturing, but in 1999 the difference is once more very noticeable. In contrast, salaries paid to technicians, administrative personnel and employees in maquiladoras, increase considerably in the second half of the nineties, winning over the average salaries of general manufacturing.

The survey done by Colegio de la Frontera Norte obtained some interesting data by city, sector and source of capital.

### **Salaries by city and sector**

The average weekly wage by city—including fringe benefits-, for direct workers is 774 pesos. Multiplied by four to calculate the average monthly income, it is about 3000 pesos, -300 US dollars- or around three minimum salaries.

By city, Tijuana and Mexicali pay very similar wages slightly over 800 pesos a week, while in Ciudad Juarez salaries do not reach seven hundred pesos. As we will immediately see, this happens only in this wage classification, because technicians and engineers in Ciudad Juarez are the best paid amongst the three cities in question.

Technicians earn roughly twice the amount of direct employees. Their average income is 1,596 pesos a week, which means an average monthly income of 6,000 pesos. It is an income 50% higher than the average salary for technicians in Mexico that around the year 2,000 was 4,000 pesos a month. It is also higher than the average income in general manufacturing, calculated that year around 4,151 pesos (Hualde 2003). Probably real differences are somewhat smaller since Colef's investigation was in the year 2,001 and it includes fringe benefits. Nevertheless, average salaries for technicians in the maquiladoras we investigated, seem to be higher than the average in the rest of Mexico.

As it was mentioned above, Ciudad Juarez has the highest salaries, although differences with Tijuana are minimal. Mexicali is in third place with a difference of approximately 30%. Finally concerning engineers, the average weekly salary is 3,800 pesos, but differences between cities are notable. The biggest difference is Ciudad Juarez where average weekly salaries are above 4,000 pesos, while in Tijuana they are 3,650 pesos and in Mexicali, only 3,414 pesos.

Data shows a notable salary dispersion with differences from 1 to 5 for direct employees and also notable differences between cities. In this instance, Ciudad Juarez is the city with the biggest salary disparity; precisely the city with a more technical job structure.

A good part of the explanation of these differences relates to the sector. In all categories, income in the auto parts industry is higher than that of the electronic industry.

### **Salaries by source of capital**

When it comes to source of capital, there are some interesting differences. Mexican and US plants direct workers receive the highest salary, with a weekly average of 811.5 pesos. Asian and European plants also pay similar salaries between them, but they are around 10% lower than the ones mentioned above.

Technicians are paid in the following order: European, US, Mexican and Asian, with a difference between the first and the last ones, of about 30%.

Finally, the best paid engineers according to the survey, would be those working for US plants, followed by the European, Asian and finally the Mexican.

In the next section we will describe the kind of activities that each of the mentioned employees do in the border' maquiladora industry.

### **What do people do in the maquiladora industry?**

*“What tends to disappear through integral automation are the routine, repetitive tasks that can be precoded and programmed for their execution by machines. It is the Taylorist assembly line that becomes an historic relic (although it is still the harsh reality for millions of workers in the industrializing world)*

(Castells, 2001: 257-258)

What is revealed by the research on the maquila workers' specific labor activity in Tijuana?<sup>5</sup> It shows that most work is manual although it is sometimes carried out with instruments that do not require complex technical knowledge, such as electric soldering or microscopes. This is a description corresponding to assembling in industries producing electric/ electronic products, medical instruments and toys, which are the economic activities where employment has been concentrating progressively.

Although assembly work along classical lines is frequent, there is also more integrated manual work, in work stations where workers are more *multi-task* operators, rather than multi-skilled workers.<sup>6</sup> Work on the line, however, is not the only activity carried out by direct maquila workers. Since firms aim to improve product quality, they increase the number of workers devoted to inspection, supervision and quality control, other do measuring tasks and even simple programming tasks (Hualde, 1999a). The type of task depends to a large extent on the product. Sound systems, for example, are checked in closed chambers in order to detect loudspeaker fidelity.

In general, these operations demand care, concentration and in some cases manual skill which many managers claim women are more competent. In this sense, *gender images* continue operating, although masculine employment in border cities is progressively reaching 50%.

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<sup>5</sup> The description of tasks came from observation in plants, and interviews with workers. It is qualitative and significant, and cannot be analyzed in statistical terms.

<sup>6</sup> The workers diversify their knowledge, but without broadening their cognitive basis to carry their tasks out.

Another *positive* dimension of work on the assembly line coexists with other less friendly realities of everyday work. Excessive attention and concentration on detailed tasks produces tiredness, boredom and may even cause occupational injuries and disease (Kouros, 1998). On the other hand, this type of work lacks the characteristics of enriched work: variation, creativity, and autonomy. In general, it is not recognized in a more tangible and beneficial way with implications on the maquila workers' life conditions.

The clean and illuminated facilities that large and modern companies have today undoubtedly represent a move forward with regard to previous precarious work places. Management professionalization and courses in human relations for supervisors probably humanize everyday work in the maquila in Tijuana. But, there are basic rights, such as collective bargaining, that have not evolved substantially.<sup>7</sup>

We could summarize the observations made above noting that although in some areas work in the maquila presents more favorable conditions than in previous stages, it is clear that the situation continues to be more deficient with regard to *employment conditions*. Research into this reality has undoubtedly found elements that coincide with other situations that are far away in time. The *proletarian condition* in the border cities is characterized by: an income that does not allow the workers to consume what is not indispensable (except young single female workers); the weak nature of the relation with the firm; and a legal guarantee, the collective bargaining agreement, with little relevance to ensure employment stability or other working conditions (Castel, 1995: 328).

### Technicians

There are three types of technicians in the maquila on the border: engineers who have not completed their studies; technicians graduated from middle and higher education colleges and the so-called empirical technicians. The maquila demands technicians specialized in electro-mechanics, electronics and maintenance. To a lesser degree, it also requires technicians in machinery, tools and production. Their main functions are equipment installation, maintenance, repair and programming.

In interviews with young technicians we confirmed heterogeneity regarding the types of technicians and their time of training. The labor and life trajectories followed by those graduating from technical courses vary considerably. Many of them went into higher studies because they considered that technicians faced limited job opportunities. In this sense the lack of a defined identity among technicians compared to professionals is a salient finding in the maquiladora industry.

The interviews also indicate that in some cases, the quantitative importance of which we cannot estimate, male technicians in particular have long professional careers. In cities like Tijuana, young people often work and study at the same time. Some technicians start to work in the maquila as operators, then get a technical degree and later on graduate as engineers. It should nevertheless be noted that the plants have not foreseen any mechanisms for this type of professional upgrading. Technicians negotiate the conditions under which they can work and study with their employers on

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<sup>7</sup> The conflict in Han Yon in 1997, a Korean firm, is the most recent significant example of a conflict that derived into an attempt to create independent trade unions in Tijuana (Carrillo and Kopinak, 1998).

an individual basis. They usually request more flexible schedules. However, they not always get what they want and in any case their negotiation power derives from good personal relations. It is not guaranteed that upon returning with their technical degree they will immediately get a significant increase in their wages.<sup>8</sup>

As we said before, technicians' main tasks are repairs and maintenance. The education they get is essentially practical, although some large plants offer longer courses which, for some technicians, compensate for their low wages.

There is also an important difference between graduates from technological schools, those who are currently studying engineering, and those seeking to become more specialized technicians. The latter are not limited to the tasks they have been appointed, they adjust equipments and may even introduce incremental innovations.

### **Engineers and professionals**

Without a doubt, engineers and professional staff whether they work as such or as managers, are the stratum with the most solid and long-lasting careers in the border maquilas. They also receive the most interesting training both from a technical and organizational point of view.

Training is of course the way in which the plants try to close the gap between acquired knowledge and the knowledge the plant requires. This, however, does not mean that the most deficient professionals receive more training. The opposite is the case. Plants offer greater training opportunities to the engineers who progress most, who show a greater learning capacity and an interest in learning. Many of them request the firm send them to courses they find out about through fax, e-mail, or other means. In other words, training to a certain extent depends on the workers' strategies.

Reducing learning to training is a second mistaken idea. Learning involves different dimensions and is acquired through a variety of means. So-called informal learning continues being essential to the maquila and external mobility enriches it.

One of the interviewees systematized his way of seeing learning with the following words:

"I consider that what I have learned is due to three factors: sharing with people who have more experience, the every day problems we have that push us to use or create new problem-resolution methods as well as the basic methods we were school taught". (E. V., manufacturing engineer, 4 years' experience).

In subsequent studies conducted on local engineers employed in the maquila in Tijuana and other cities along the border in Northern Mexico, we have noted various important characteristics (Hualde, 1995, 2001a, 2001b):

- There is an important variety of tasks: logistics, production, manufacture, human rights management, process engineering and even design.

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<sup>8</sup> These are results of a training project, "Aprendizaje, empleo y capacitación de técnicos y trabajadores en la industria maquiladora de Tijuana y Mexicali" sponsored by the Mexican Council of Science and Technology (Consejo Nacional de Ciencia y Tecnología, 35049-S).

- Ascending professional trajectories up to the most highly recognized management and general management, mainly in plants with North American capital (Contreras, 2001). Asians reserve the highest positions for Asians exclusively.
- Turn-over between different plants with the objective of completing the learning provided. There are cases of local engineers being recruited by headquarters in the United States after working in border cities.
- Training in the plant and headquarters. Asian plants send certain groups of engineers (as well as technicians and workers) to train at their headquarters.
- Among the engineers, there is a web of social networks that enable the creation of flexible teams in different plants. This type of collective can be compared to what has been called "action communities" (Zarifian, 2001) or practice communities.

However, local engineers have not been able to create in significant numbers new firms to create a more integrated network of plants in the border cities. Only in Ciudad Juarez, about one hundred of small and medium tool making workshops appeared since the beginning of the nineties. But, as we have pointed out this is not enough to build and endogenous development in the border cities.

## **Conclusions**

### **1.- Employment**

Data concerning the structure of the job market in maquiladoras in the analyzed cities, show two interesting aspects according to INEGI's numbers: differences between cities are minimal and they hardly vary since the second half of the nineties and up to the end of 2002. Available numbers by states also indicate a great regularity in the proportion of employment, even in the latter years. A similar proportion of direct, technical and administrative jobs were lost.

When the three cities and the two sectors (auto parts and electronics) are analyzed, there are some interesting differences. In average the three cities have a smaller percentage of direct jobs, thus concentrating a larger proportion on the jobs in technicians, administrative and direction personnel.

The city with the highest percentage of technical employment is Ciudad Juarez. However, differences in percentages between labor and administration are not that big in each of the analyzed cities. The largest concentration of technicians is in Ciudad Juarez and this is because of the larger number of auto parts plants in this city. It is not because of the larger presence of US plants, since the Japanese occupy first place when it comes to the proportion of technicians in their employment structure, although the difference with the other plants is minimal.

Concerning direct work, some results show up. Ciudad Juarez is the city with the most experimented, most senior and oldest work force. Nevertheless, direct employees with the highest degree of education are in Mexicali, perhaps due to the lesser number of migrants that arrive to this city.

Turnover has suffered an important change due to the crisis. In 2001, average rates were as high as 9.4%, reaching up to an average of 14% in Mexicali. The highest rate was in the Asian and Mexican plants. At the moment of this investigation, there is a strong fall of the turnover rates, and differences by source of capital are minor. In spite of this, US plants have the smallest turnover.

## **2.- Organizational complexity of the plants**

According to the existence or inexistence of certain departments in the investigated plants, we can establish an organizational complexity scale. A *basic* organizational structure is that of the plants with only three basic departments: production, quality control and maintenance. These three departments can be found in more than 90% of the investigated plants.

A intermediate organizational structure is that of the plants that have the above – mentioned departments, plus Systems, Purchasing, Production or Manufacturing Engineering, Environmental and training. These departments can be found in more than half the plants, but in less than 90%.

Finally we consider that plants with a complex organizational structure are those that have all the departments we mentioned above, and they also have: strategic planning, marketing, product design or engineering design and government affairs. Less than half of the plants have these departments.

## **3.- Salaries**

Average monthly wages of direct employees are almost equal to three minimum salaries, just as they were by the end of the nineties, and they represent a moderate poverty income.<sup>9</sup>

However, the most interesting factor is the differences between cities and employee groups. While in Ciudad Juarez direct employees receive a smaller wage than in the other two cities, technicians and engineers in this city are by far the best paid amongst all three cities. Salary dispersion is much bigger amongst professional people than that of direct employees. These results had already been noted in other investigations (Hualde and Zepeda, 2002)

Concerning income by source of capital, in almost all employees' classification, US plants are the ones that pay the highest salaries. Mexican and Asian plants show lower salaries, except for direct employees. In this case, Mexican plants pay a better wage than US plants.

In this sense, the investigation shows a result that should be carefully reasoned: although the income received by direct employees is not enough to satisfy their basic needs, it is higher than more of 50% of the Mexican PEA. Concerning the engineers, the numbers we mentioned, plus other partial numbers in other studies (Hualde, 2002), show that professional people mainly administrators-, earn salaries similar to those of general manufacturing.

In spite of the differences with more industrialized countries, the patterns found in the labor market of the border cities, is quite similar to the so called Anglo-Saxon model observed for the United States and Great Britain and described by Crouch et al (1999:86).

“In both countries, the level of statutory labor protection being low, most employment security is provided by employers; they are concerned to provide this for employees whom they want to retain, which mainly means well-educated staff in whom the firm is therefore willing to invest a good deal of training. At the other end of the scale, a large number of low skilled workers can be employed and easily disposed of if they are not needed, with little attention to their training and with a frequent recourse to the external labor market.”

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<sup>9</sup> Zepeda (2003) mentions that two minimum salaries are equal to the poverty line. A recent newspaper article that mentions numbers from the private sector (CEESP), says that 60% of Mexican PEA earns less than three minimum salaries. It also mentions that to be able

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