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**Reorganization of Manufacturing Sector Statistics due to the Dynamics of its  
Economic Units.**

**Country: México**

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### **Introduction.**

The economic units which produce goods and services are dynamic throughout all of the stages of their life as productive entities, for in order to respond to the market demands, they constantly find themselves forced to make changes in their type of activity as well as in their financial and organization structures.

Currently it's common to find enterprises whose economic and financial power allow them to invest in several countries and in different economic sectors, and to this end they perform processes of restructuring, reengineering, strategic alliances, and the subcontracting of some productive processes.

There are enterprises which change their type of activity, passing from the manufacturing sector to the commercial sector, to the services sector, or to the construction sector, and vice versa. Also, there are others which cease to generate their own production and generate goods or services from a third party through subcontracting schemes.

This dynamic behavior makes it necessary to change the design of the processes dedicated to measure their activity and to update the instruments used for this measurement, such as the surveys, the economic units and the directories employed as sampling frames for the selection of samples from which inferences can be made about the behavior of the units which conform each universe of the study of interest.

This paper presents the manner in which the dynamics of the economic units forced a reassessment of the handling of the directories, the sampling design, and the organization structure of the surveys which measure the behavior of the sector, so that the results obtained reflect reality in a more trustworthy fashion.

The contents of this article were taken from the working documents: "Dinámica de las Unidades Económicas del Sector Manufacturero" made in the Dirección de Estadísticas del Sector Secundario and "Nota Metodológica del Diseño Muestral de la Encuesta de la Industria Manufacturera", made in the Dirección de Diseño y Marcos Estadísticos.

### **1. Characteristics of the Economic Units in the Mexican Manufacturing Sector.**

In the manufacturing sector there are different economic units which respond to different ends or functions: enterprises, establishments and auxiliary units, created and organized to produce goods and services, main enterprises and branches to take advantage of the economic conditions and of the laws of the place where they are located, and finally maquila enterprises when the production they generate does not belong to the unit in question; in order to distinguish them, we have the following definitions:

### **Manufacturing Establishment.**

It is the economic unit which in a single physical location, built in a permanent place and surrounded by fixed constructions and installations, combines actions and resources under the control of a sole property or controlling unit to perform mainly activities of transformation, fabrication, assembly or processing of one or several products totally or partially on its own or for others (maquila).

### **Maquila Establishment.**

It is the economic unit which in a single physical location, built in a permanent place and surrounded by fixed constructions and installations, and under a sole owner or control, performs for others industrial or services processes for the transformation, assembly or repair of temporarily imported merchandise which result in the production of goods and services for exportation and/or for sale in the national market.

The following concept is derived from the origin of the raw materials and the sales destination of the production:

### **Maquila for Exportation.**

It's the generation of goods and services with temporarily imported raw materials which belong to a third party, intended for exportation, under the maquila program established by the Mexican federal government to promote external trade, profiting from the relative advantages between countries.

In this process an enterprise may act as the main plant and another as a branch or else be an independent plant and still perform the the maquila process under the program of Incentives for Exportation managed by the National Department of Economics, which offers fiscal advantages to the economic units which decide to become affiliated.

According to Article 3, Fraction V, of the Decree for the Promotion and Operation of the Maquila for Exportation Industry, "the Maquila Operation is the industrial or services process aimed to the transformation, fabrication or repair of merchandise of foreign origin temporarily imported for its exportation".

From this, a new unit of observation comes up, which has to do not only with questions related to the nature of the organization of its production, but also with administrative and timing situations, such as its inscription to a government support program:

### **Maquila for Exportation Establishment.**

It is the maquila establishment which has its affiliation to the "Maquila for Exportation Program" (MEP) issued by the National Department of Economics.

## **2. Measurement of the Manufacturing Activity.**

Up to the year 2006 the INEGI had two surveys to measure the evaluation of the manufacturing production in accordance with the characteristics of the economic units and with the specific productive processes to generate a product or a service.

- The Monthly Industrial Survey (EIM).
- The Monthly Survey of the Manufacturing for Exportation Industry (EMIME).

### **Monthly Industrial Survey.**

The EIM, was dedicated to measure the most important part of the Total Gross Production (TGP), that is, the value of the manufactured goods, the value charged for the national maquila and the value of repairs and maintenance.

With a sample of 9051 establishments in 2006, the EIM measured the production of the enterprises and establishments dedicated to the transformation of raw materials, taking care not to include the maquila for exportation enterprises incorporated to the maquila program of the MEP.

Also, it measured the Volume and Value by type of product, which makes it possible to construct the Physical Volume of Production Index, used by the System of National Accounts of Mexico (SCNM) to follow up the Gross Production Value.

### Monthly Survey of the Maquila for Exportation Industry.

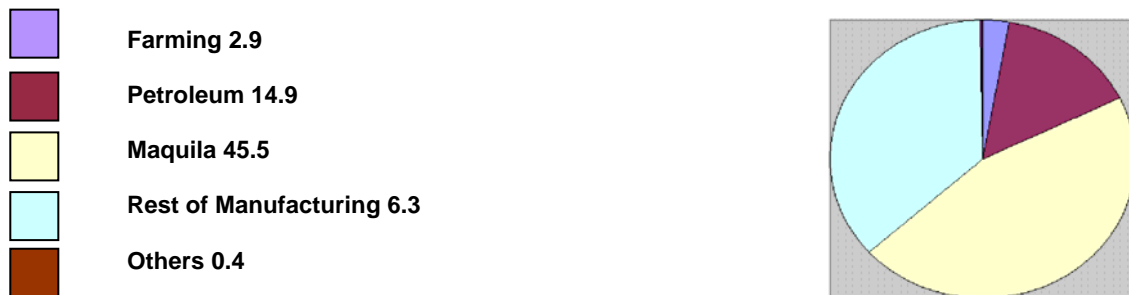
The EMIME captured all the enterprises and establishments which adopted the MEP established by the federal government through the National Department of Economics to promote foreign trade based on the "Decree for the Promotion and Operation of the Maquila for Exportation Industry". The data base was formed by 2592 registers in 2006.

The EMIME basically measured the Value Added, as well as its main components: salaries, gross profits, raw materials, national containers and packaging used, and various expenses.

The Value Added and the behavior of the hours worked make it possible to follow up the economic behavior of this segment, in particular, the Added Value which forms a part of the industrial Gross Internal Product (GNP). But above all, the EMIME was created to measure the impact of the maquila program set forth by the government to promote exports. In this way it became an important source of information for the commercial balance, for the exports originated by the Maquila for Exportation Industry represent approximately 45% of the total, as is shown in the following graph, which presents the participation of the sector in the exports, by type of activity.

### Participation in Exports by activity of the Economic Units

Graph 1



INEGI, Balanza Comercial September of 2006

The total in economic units, hired personnel, production and income are presented in the following chart for the universes of study of these surveys.

**Economic Importance of each Segment in the Manufacturing Industry**  
**Economic Units, Hired Personnel, Total Gross Production and Income of the Manufacturing Industry**  
**Chart 1**

CONCEPT	ECONOMIC UNITS	HIRED PERSONNEL	(Million Pesos)	
			TOTAL GROSS PRODUCTION	INCOME
Total Manufacturing	328 718	4 198 579	2 403 394.6	2 857 684.9
Industry of Transformation	326 249	3 169 073	2 372 172.9	2 614 809.1
Maquila for Exportation Industry	2 469	1 029 506	31 216.7	242 875.8

PERCENT DISTRIBUTION	ECONOMIC UNITS	HIRED PERSONNEL	TOTAL GROSS PRODUCTION	INCOME
Total Manufacturing	100.0	100.0	100.0	100.0
Industry of Transformation	99.25	75.48	98.70	91.50
Maquila for Exportation Industry	0.75	24.52	1.30	8.50

Source: INEGI Economic Censuses 2004.

As may be seen in this chart, according to the information captured by the economic censuses, the maquila for exportation industry has only 0.75% of the total of units for the sector but accounts for 24.5% of the hired personnel, meaning that it is highly intensive in job generation and it also accounts for 8.5% of the income for the sector.

**Importance of the information from the Surveys for the System of National Accounts of Mexico.**

Besides providing information to measure the evolution in the behavior of the manufacturing industry with the passing of time, the industrial surveys provide the fundamental input for the measurement of the (GNP) of the country.

There are three basic methods for measuring the GNP:

- The Production Method.
- The Income Method.
- The Expenditure Method.

In the case of Mexico, the National Institute of Statistics and Geography (INEGI), obtains the GNP using the production method. The productive branches forming it are grouped in three sectors: farming, services and industry; with industry accounting for approximately 21% of the GNP.

The maquila industry and the transformation industry are added in a weighted way to measure the contribution of the industrial sector, so that a change in the conformation of these two segments would generate changes in the calculated amount of the GNP.

**3 Situations affecting the Business Directory.**

The directories which are used as the basis for the sample selection for the surveys that measure the industrial sector come from two sources:

- I. The economic censuses, employed as a sampling frame for the EIM.
- II. The directory of the maquila for exportation enterprises of the National Department of Economics, which is the sampling frame for the EMIME.

After the Economic Censuses of 2004, a matching process was performed to detect the maquila industries which appear in the census directory, with the purpose of removing them from the EMIME directory and in this way eliminate the overlapping between the universes of study for each of the surveys.

Notwithstanding this, the directories are not static, for besides the deaths and births, the economic units present changes derived mainly from the three following situations:

### **Changes in the Type of Activity**

Changes in the type of activity in enterprises and establishments happen when the economic unit is dedicated to produce goods or provide services which are different from those it usually produced or provided. In these cases, the industry may continue to be within the same activity class and in the same sector, if this is so, there is no movement either in the directory or in the statistic; however if it changes class or sector, a change is made where necessary and the directory and the statistic are altered.

### **3.2 Appearance of Auxiliary Maquila Units**

Traditionally, the enterprises had formed auxiliary units which took care of relatively simple aspects of their operations, such as warehouses and distribution units, among others; however, it is becoming increasingly common to find enterprises which form their own personnel controlling and merchandising units; sometimes with a different company name and in other cases under the same company name, at their convenience. Also, there are some shops and establishments which produce, under the maquila system, parts of the production of the main enterprise. These actions made by the enterprises produce important alterations in the measurement of economic activity.

### **Changes in Program**

Speaking of industrial activity, there is no difference in terms of the amount of value added if it is obtained directly in plant or if it comes as a product of the maquila system. However, from the point of view of the organization of the directories used for producing information, when an enterprise entered the program of the National Department of Economics, the maquila universe changed with no changes in its functional structure or its productive process, the only modification was in its fiscal situation. These changes were made continuously in both directories: elimination in one and the consequent inclusion in the other.

The movement of the units from one directory to the other creates several difficulties for the integration of the information presented by the surveys, from alterations in the historical series to possible modifications in the amount of the GNP, in the case of movement of important enterprises. As an example, consider the following hypothetical situation:

Two enterprises belonging to the EIM with one and two establishments respectively, and within the activity class 382302 "Fabrication, assembly and repair of equipment for information processing" adopted the Program of Maquila for Exportation. However, they presented no substantial change in their productive and organization processes.

Suppose that these establishments were moved from one directory to the other, in view of the need to make the directory of Maquila for Exportation Enterprises of the Secretariat of Economics compatible with the directory of the EIM. The impact of this movement is presented in the following chart.

In order to give dimension to its importance, Chart 2 presents the weight of the activity in the different levels of aggregation up to the weight of the manufacturing sector in the GNP.

**Activity weight by level of aggregation**

**Chart 2**

<b>Concept</b>	<b>Percentage</b>
The class in the branch	34.6
The branch in the division	13.6
The division in the manufacturing sector	21.3
The manufacturing sector in the GNP	21.0

Charts 3 and 4 present the monthly variation in hired personnel and in the physical volume of production in the manufacturing sector as a whole, with and without the 3 maquila for exportation establishments, for the class.

**Results 2004-2005, WITH and WITHOUT the Maquila for Exportation establishments.**

**Monthly variation in Hired Personnel**

**Chart 3**

<b>PERIOD</b> 2005/2004	<b>CLASS</b>		<b>BRANCH</b>		<b>DIVISIÓN</b>		<b>MANUFACTURING</b>	
	<b>WITH</b>	<b>WITH- OUT</b>	<b>WITH</b>	<b>WIT H- OUT</b>	<b>WITH</b>	<b>WITH- OUT</b>	<b>WITH</b>	<b>WITH- OUT</b>
<b>JANUARY</b>	7.9	-67.1	6.8	-9.6	2.2	0.0	-0.7	-1.1
<b>FEBRUARY</b>	23.2	-68.6	9.4	-	2.2	-0.6	-0.9	-1.5
<b>MARCH</b>	14.4	-69.0	7.7	11.1	1.0	-1.6	-1.3	-1.9
<b>APRIL</b>	3.9	-68.5	4.7	-	0.7	-1.7	-0.8	-1.3
<b>MAY</b>	6.9	-67.6	4.4	11.2	1.0	-1.2	-0.6	-1.2
<b>JUNE</b>	1.3	68.7	3.5	-	0.6	-1.6	-0.7	-1.3
<b>JULY</b>	10.0	-68.5	4.9	12.5	0.8	-1.4	-0.5	-1.1
<b>AUGUST</b>	10.1	-68.5	6.0	-	1.3	-1.2	-0.2	-0.8
<b>SEPTEMBER</b>	13.4	68.5	3.3	12.9	1.8	-0.8	0.5	-0.0
<b>OCTOBER</b>	84.5	-50.7	12.9	-	2.8	-0.2	0.2	-0.4
<b>NOVEMBER</b>	90.3	-47.0	13.0	14.8	2.6	-0.1	0.0	-0.5
<b>DECEMBER</b>	135.0	-8.7	10.7	-7.2	3.1	-1.5	0.5	-0.1

**Results 2004-2005, WITH and WITHOUT the Maquila for Exportation establishments**  
**Monthly Variation of the Physical Volume of Production Index**

**Chart 4**

PERIOD 2005/2004	CLASS		BRANCH		DIVISIÓN		MANUFACTURING	
	WITH	WITH- OUT	WITH	WITH- OUT	WITH	WITH- OUT	WITH	WITH - OUT
JANUARY	12.4	-67.6	11.9	-28.6	4.0	-4.8	3.8	1.3
FEBRUARY	-16.6	-74.7	-14.5	-40.1	-1.3	0.6	0.9	1.7
MARCH	2.8	-82.0	0.4	-54.3	-2.5	-13.5	-3.8	-7.0
APRIL	-1.9	-75.0	0.3	-34.1	7.3	3.3	6.7	5.5
MAY	-3.4	-79.1	-2.5	-44.2	3.1	-3.4	2.9	1.2
JUNE	-11.7	-84.6	-11.1	-55.6	-3.2	-11.7	0.6	-2.1
JULY	-31.7	-77.0	-29.6	-45.2	-12.3	-8.4	-3.9	-2.5
AUGUST	-1.7	-79.8	-2.3	-45.9	6.7	1.2	3.9	2.1
SEPTEMBER	10.2	-84.7	8.7	-59.9	9.7	-5.4	5.1	0.1
OCTOBER	24.6	-77.1	20.7	-42.4	14.0	1.1	6.4	1.9
NOVEMBER	6.4	-77.9	5.0	-44.7	10.0	3.0	4.2	1.8
DECEMBER	72.1	-73.6	63.0	-37.9	31.6	1.8	10.8	1.2

It can be seen that at the class level there are variations of up to 135% in the hired personnel and of 72% in the physical volume of production when the variation is calculated considering the three maquila for exportation establishments as a part of the universe of study for the EIM. On the other hand, the variation is reduced to -8.7 and -73.6 if they are not considered. Even though these effects are reduced in magnitude as the level of aggregation increases, for the month of December there is a variation of up to 10.8% in the Physical Volume of Production Index for the sector, considering the three maquila for exportation establishments as a part of the universe for the EIM, and of only 1.2% when they are not considered.

The yearly variations by level of aggregation, considering and not considering the three establishments within the universe of study for the EIM are shown in chart 5.

**Results 2004-2005, WITH and WITHOUT the Maquila for Exportation establishments**  
**Yearly Variations of the Physical Volume of Production Index**

**Chart 5**

Variable	Criterion	Class	Branch	Division	Total Manufacturing
Hired Personnel	With the 3 plants	23.2	7.1	1.7	-0.4
	Without the 3 plants	-64.1	-10.5	-0.7	-0.8

Production (PVPI)	With the 3 plants	5.7	4.5	5.6	3.0
	Without the 3 plants	-78.9	-45.9	-3.2	0.4

Source: INEGI. Monthly Industrial Survey (EIM).

As can be seen, the impact of eliminating the three establishments in the EIM directory regarding the Physical Volume of Production Index at the sector level is a yearly variation of 0.4 instead of the 3% which results without making changes in the directory.

#### 4. Design of a new survey for the manufacturing sector.

With the purpose of preventing the problems derived from handling two directories, it was decided to integrate them in a single one, and at the same time to merge the two surveys into one, which was named the Monthly Survey of the Manufacturing Industry (EMIM), having as its universe of study all the sector as a whole, making no distinction whether the units belong to the maquila for exportation program or not.

##### 4.1 Survey Frame.

The new directory was formed by adding the manufacturing establishments included in the census base to the establishments from the Directory of the National Department of Economics not found in the census base. The survey Sampling Frame resulted in a total of 354,478 establishments (maquila and non maquila).

##### 4.2 Sampling Scheme.

The survey design was prepared so as to give results for 237 classes of activity, with 225 of them using a sample obtained through a deterministic design which includes the establishments with the largest participation in the income for the class. In the remaining 12 classes, which have a very atomized structure, probabilistic sampling was used.

##### 4.3 Sample Size.

The sample size according to the type of design is shown in the following table:

Design Type	Number of Classes	Number of Establishments
Deterministic	225	8167
Probabilistic	12	1576
Total	237	9743

##### 4.4 Performing of the Survey and Generation of Results.

The new sample began to be used to perform the survey starting in January 2007, generating results about the behavior of the sector as a whole.

In November 2006 the new Decree for the Manufacturing, Maquila and Services of Exportation Industries known for its initials as IMMEX, was published. In compliance with this new decree, starting in 2007 the Maquila for Exportation Industry statistics are added no longer captured as a support program of the Secretariat of Economics. The INEGI also measures the economic activity of the establishments in the IMMEX program, presenting results in early 2008; however, the affiliation of a establishment to the program does not modify its condition of belonging to the universe for the manufacturing industry, measured by the EMIM.

**Conclusions.**

The definition of the dominions of study for a permanent measurement of the economic activity must be based in the characteristics of the productive process of the economic units and not in considerations of administrative type such as the government support programs for some type of activity.

There are no essential differences between the productive process of a manufacturing establishment and a maquila establishment, so the latter should not be considered as excluded segments for the measurement of the sector activity.

An integral measurement of the industrial sector makes it easy to visualize the dynamics of the different segments of activity and the relationships between them.