MULTISECTORIAL ANALYSIS AND STRUCTURAL CHANGE OF THE MEXICAN ECONOMIC FOR 2008-2012

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ABSTRACT

Identify structural change in an economy is essential to define the new direction to be taken by policymakers in any field. Therefore, in this paper an analysis of structural change for the period 2008-2012 is performed, from the social accounting matrix constructed for Mexico for each of these years, following a methodology of linear multiplier. For this, first, key sectors are determined, followed by Economic Lanscape to identify intersectoral relations, and accounting multipliers are decomposed to determine the direct, indirect and induced effects of an exogenous unit impact, and finally are determined labor multipliers.

Among the main results are that by 2012 was obtained as key sectors to Trade and Real Estate Services, while for 2008 only was detected as the key to Commerce. This

classification confirms the Mexican economic reality, as its economy has been export-oriented and is the sector that represents higher proportion of GDP. As strategic sector for 2012 was identified manufacturing industries, reinforcing its importance as a leading supplier of intermediate goods and engine of the economy. The same proportion as drivers beware that for 2008, except to Corporate for 2012 ranks as driver. Finally, Mining and Electricity sectors remain independent.

Similarly, it was identified that the manufacturing industries and real estate services reflect the greatest economic impact to interact with all productive sectors. However, the strongest intersectoral relationship is given with manufacturing and educational services.

This analysis determined that for the period 2008-2012 structural change is not detected, despite a distinct change in intersectoral relations, corroborating that the structure of the economy remains stable for a period of five years.

About multiplier decomposition, for both years is detected that the sectors as greatest overall effect on the economy are health services, educational services and legislative activities, which for one year to another, only changes its position and level of impact. Instead, the greatest direct effect for 2008 is presented by manufacturing industries, while for 2012 it is presented by electrical energy. For both years, the highest indirect effect is presented by electric energy and the largest induced effect is presented by the Educational Services. However, the sectors with greatest change from one year to another are Corporate, Real Estate Services and Services cultural and sports recreation.

Finally, although the sectors with the greatest capacity to generate employment for that period remain stable, the sector with the largest capacity is primary sector, followed by other services and support services business. The sector with the lower capacity to generate jobs are Mining, Corporate and Real Estate Services. It is noted that for 2012 even though the same structure as for 2008, the employment generation capacity has decreased significantly.

This analysis concludes that the Mexican economy does not show major signs of structural change, a situation borne out through the inter-relationships shown in economic landscape although, there has been a shift of sectors on their level of importance as growth drivers, also is noted a loss of capacity to generate employment.

However, the fact that trade and real estate services are classified as key, explains why the Mexican economy cannot grow steadily like other economies in the world. A sector-based economy exploiting raw materials and processed through a developed industry as a manufacturing industries, take over other sectors and would be great for other input suppliers.

Keywords: Social Accounting Matrix, Structural Change, Linear Multipliers, Multisectoral Models.

1. INTRODUCTION

Analyzing the economic structure of a region or country, turns out to be a fundamental task for policymakers, since in this way it is possible to make the decisions taken correspond to the real needs. For this, there are different economic models, but the reality is that some do not consider the structural changes presented in the economy, a situation that can be analyzed through multisector models.

Analyzing any economic decision will affect the different agents and markets of the economy due to the interrelation between them. However, these effects can be identified following an extended linear methodology of the traditional Input-Output analysis proposed by Leontief, which identifies the multiplicative effect produced before an increase in income. Initially, these models were applied to an input-output matrix (IOM), (Leontief, 1970; Schultz, 1977; Cella, 1984), but it was not possible to capture some effects on final demand distribution or the effects of the distribution of productive factors among the agents of the economy. With the introduction of the Social Accounting Matrices (SAM) to the Input-Output analysis, the circular flow of the economy was closed, allowing a complete analysis of the interrelationships of the economic agents (Pyatt and Round 1979, Defourney and Thorbecke , 1984; Llop and Manresa, 2004). Economic structure of a region or country, turns out to be a fundamental task for the policymakers, since in this way it is possible to make the decisions taken correspond to the real needs. For this, there are different economic models, but the reality is that some do not consider the structural changes presented in the economy, a situation that can be analyzed through multisector models.

But for these analyzes under these characteristics, the construction of an SAM is essential. A SAM is a representation of the macroeconomic accounts of a socioeconomic system, which capture transactions and transfers among all economic agents of the system (Pyatt and Round, 1985a). It is a database that shows in matrix format all the productive accounts of an economy in a period and, it represents an x-ray of the intersectoral transactions of an economic system, its operations of production, and distribution, use and accumulation of income.

Although the expanded Input-Output analysis to SAM provides a broad overview of the economic structure and information relevant to policymakers in economic policy-making in Mexico, there has been a considerable lag in the construction of these, especially due to the lack of basic information for its construction such as the IPM and the updating of national accounting. However, from the IOM built for 1980 different updates were made for the years 1993, 1996 and 2000 with which it was possible to construct SAM by Sobarzo (1990, 1991a) and Jaime (1992). In addition, Ramírez and Wallace (1999) construct a SAM for the year 1990, where they detail at the same time the ratio of the level of disaggregation used in the submatrices that compose it. Later, Harris (2002) constructs a SAM for the year 1996 where it divides the economy between an urban region and four rural ones.

For 1996, Núñez (2003) constructs a SAM with which he makes a structural analysis of the Mexican economy and designs an Applied General Equilibrium Model (AGEM) to analyze the Procampo and Progresa social programs, and Chapa (2000) constructs a Matrix for the same year to study the effects of trade openness. Subsequently, the National Institute of Geography and Statistics (INEGI by acronyms in Spanish) publishes an IOM for 2003, giving a new reference for the construction of MCS with updated data; From this, Núñez (2014a) elaborates an MCS macro for 2003 consistent with the national accounts. Barbosa, Vázquez and Matus (2009) construct a MCS for 2004 using national accounts and updating through cross entropy as well as Aguayo, Chapa, Ramírez and Rangel (2009) who build an SAM for the same year to analyze the generation and the redistribution of income in Mexico. Among other SAM's constructed are those of Blancas (2006) who make a SAM for 1990 in which it includes financial sectors to analyze links between financial institutions and Ramírez (2007) who builds a SAM for the year 2000 with the objective of analyzing the studies given to the agricultural sector. Finally, Beltrán et al. (2016) construct a SAM from the IOM provided by INEGI for the year 2008 with which they perform a structural analysis of the Mexican economy for that year.

This paper has scientific relevance due to the novelty in the construction of the SAM for Mexico with the last update made by INEGI and the applications made with respect to the economic structure of the country. In fact, the construction of SAM alone is of great importance, since from this it is possible to deploy different applications, as would be the measurement of the impact that any economic policy would bring on the different economic agents.

Consequently, this study aims to build a SAM for Mexico, taking advantage of the update made by INEGI for 2012, maintaining the accounting identities and macroeconomic relationships presented by the IOM, which subsequently elaborates a multisectoral model for 2008-2012, to analyze the structural changes presented in the Mexican economy for this period, and thus to gather relevant information for subsequent economic analysis.

This research comprises 5 sections: the second includes the methodology used for the construction of the SAM of Mexico for the year 2012 and a detailed description of its construction. The third section recounts each of the methodologies used in structural analysis. The fourth section includes the main results of the comparative analysis and finally the fifth section contains the main conclusions.

2. DATA BASE AND METHODOLOGY

SAM is a double-entry table that shows economic transactions both income flows and expenditures among all agents of an economy for a base year. It is built on the information

provided by the IOM and the national accounts, allowing the circular flow of income. These matrices must be linked to a model that shows the causal relationships between variables (Thorbecke, 1985). They fulfill the basic macroeconomic and microeconomic identities, by respecting the underlying conditions of equilibrium that are subsequently endogenously reflected when a general equilibrium model is implemented (Sancho & Cardenete, 2014).

Although Pyatt (1988) describes in detail the structure of SAM, the first one was constructed by Stone (1962). Nowadays they are known as an important tool of economic analysis.

However, the first approximation obtained from an economy based on a SAM, are the linear models as an extension of the Leontief models applied to an IOM. The main difference between IOM's and SAM's is that IOM does not allow for deepening of sectoral interrelationships and therefore only capture interindustrial effects, while SAM manages to close the flow of the economy and, therefore, allows to deepen in economic analysis through multisectoral models.

Table 1. Diagram of a Social Accounting Matrix

	Production	**Productive Factors**	**Institutional Sectors**	**Capital**	**Foreign Sector**
Production	Intermediate consumption		Consumer and public sector consumption	Gross Capital Formation	Exports
Productive Factors	VA payments to factors				
Institutional Sectors	Taxes/activities, goods and services	Allocation of factor income to Institutional Sectors	Current transfers between institutional sectors	Taxes/capital goods	Transfers from the rest of the world
Capital		Consumption of fixed capital	Saving institutional sectors		Foreign Savings
Foreign Sector	Imports		Transfers to the rest of the world		

Source: Cardenete & Moniche (2001)

Table 1 shows the scheme of a SAM. In this, the income obtained by sales of goods and services produce remunerations for activities and productive factors. These revenues form the added value that is distributed to the institutional sectors that in turn allocate them for spending or saving towards productive sectors or towards themselves, which generates new incomes and starts a new cycle.

For the elaboration of the SAM for 2012, the symmetric domestic IOM (product by product) by sector of activity for the total economy, for 2012, published by INEGI (2014) and expressed in million pesos. The different disaggregations use information from the accounts of goods and services (CByS) (INEGI, 2014a), and the accounts by institutional sectors (CSI) (INEGI, 2014b). Below is a detailed description of its elaboration that serves as a reference for future research, and demonstrates transparency during this process. From the IOM for 2012, SAMMEX-12 is elaborated, rearranging it and adding it according to the required information.

Once the IOM is rearranged, it is written in SAM format as shown in Table 3. The purpose of showing the before and after the IOM is to show the transparency of the supported values. That is, when households are included, taxes on goods and services net of subsidies presented in private consumption for MXN 616,928 million are allocated to this account. When the investment account is included, it is assigned MXN 3,016,559 million that give the activities to this one, corresponding to gross formation of fixed capital and variation of stocks. The same happens with the new account Rest of the world (RoW) with 576.094 million MXN for investment, coming from the total imports of the economy. This is followed by each of the accounts presented.

Table 2 shows the activities added, but these should be disaggregated as they are presented in the original IOM. The next step is to disaggregate household income and household consumption. According to CSI, the ISR paid by households and companies are respectively 513,106 and 489,792 million MXN, which at the same time are paid to the government with a total of 1,002,899 million MXN. The gross savings of the companies of 1,662,320, the government is 333,172, of households is 1,214,153 and the rest of the world is 205,315 all in millions of MXN. Now, RoW's payment for work is MXN 12203 million which is included in the amount paid to households and transfers to households in remittances is MXN 298,432 million.

A new account is then opened to separate the other taxes on production from the Gross Operating Surplus (GOS) of MXN 1,134,651 million[1]. Now, according to the CSI, the government pays to households both social benefits other than social transfers in kind and other current transfers of MXN 427,043 million.

The production that the households consume is adjusted, going from 9,290,542 to 9,486,501 according to the CByS and maintaining the same initial structure. This same procedure is applied to the investment, adjusting its value to 2,820,601. However, since the partial SAM is still not balanced, the differences between investment and private

[1] Due to the lack of information by INEGI on the accounts of goods and services for 2012, the values corresponding to the other taxes on production were updated from the official values for the year 2008.

consumption are distributed according to the weight of each sector. With this, the SAM is perfectly balanced.

However, in some circumstances it is interesting to identify the effects of different economic policies on households, so that this SAM presents a disaggregation of these by income decile. For this, once the deciles are inserted in the matrix, we proceed to disaggregate the income and the expenses. Household disaggregation's are done using the National Survey of Household Income and Expenditure Survey (ENIGH by its acronym in Spanish) for 2012. As a result, income from work, social contributions and other social benefits are first disaggregated, followed of the benefits from government programs and income from other countries. From the ENIGH a distribution rule is created for each of these and, distributed among the deciles under the same structure presented in this one.

Once the income is disaggregated, expenditures are broken down, starting with private consumption and taxes on goods and services and income tax. For this, we follow the same procedure above from the ENIGH information for the year 2012. Finally, we disaggregate savings and imports of households, following the same procedure of previous accounts. With this, the SAMMEX-12 is balanced. Table 3 shows an aggregated version of it.

The structure of the disaggregated matrix is finally in accordance with Table 4. SAMMEX-12 considers 35 endogenous accounts including the 19 productive activities, the remunerations to productive factors, societies, capital, private consumption and households. In addition, it considers 7 exogenous accounts which are the government and its disaggregation of taxes, the account savings-investment and the rest of the world. It is important to note that the SAM constructed in this study is transparent and can be replicated by any researcher if it is of interest.

Once defined the SAMMEX-12, it is possible to realize different applications. In this case, the structure of the Mexican economy for the 2008-2012 period is analyzed, following a multisectoral methodology, to identify structural change starting from the SAMMEX-12 and the MCSMX-08 built by Beltrán et al. (2016).

For this, the methodologies presented in the following section are applied.

Table 2. SAMMEX- aggregate

	Productive Sectors	Labor	Capital	Enterprises	Households	Goverment	Capital account	Rest of the world	Total
Productive Sectors	7.594.193				9.486.501	1.992.687	2.820.601	4.591.162	26.485.144
Labor	4.216.575							12.203	4.228.778
Capital	9.670.501								9.670.501
Enterprises			9.670.501						9.670.501
Households		4.228.778		7.474.165	9.486.501	427.043		294.851	21.911.339
Goverment	1.221.267			489.792	1.130.035	2.704.208	18.265		5.563.567
Capital account				1.662.320	1.214.153	333.172		205.315	3.414.960
Resto of the world	3.782.607			44.223	594.149	106.458	576.095	167.501	5.271.033
Total	26.485.144	4.228.778	9.670.501	9.670.501	21.911.339	5.563.567	3.414.960	5.271.033	

Source: Own elaboration based on total domestic IOM for Mexico

Table 3. Structure of Social Accounting Matrix for Mexico 2012. SAMMEX-12

Account	Description	Account	Descripion
1	Agriculture, animal breeding and production , forestry , fishing and hunting	22	Other social benefits
2	Mining	23	Capital
3	Electric power	24	Enterprises
4	Construction	25	Private consumption
5	Manufacturing industries	26	Decile I
6	Trade	27	Decile II
7	Transportation and storage	28	Decile III
8	Mass media information	29	Decile IV
9	Financial services and insurance	30	Decile V
10	Real estate and rental of personal property and intangible services	31	Decile VI
11	Professional, scientific and technical services	32	Decile VII
12	Corporate	33	Decile VIII
13	Services business support and waste management and remediation services	34	Decile IX
14	Educational Services	35	Decile X
15	Health and social care	36	Governmet
16	Cultural and sporting services, recreation, and other recreational services	37	Income tax
17	Providing temporary lodging and preparation of foods and beverages	38	Tax on goods and services, net of subsidies
18	Other services except government activities	39	Taxes less subsidies on production
19	Legislative activities	40	Other taxes on production
20	Labor	41	Capital account
21	Actual social contributions to social security	42	Rest of the world

Source: Own elaboration

2.1. LINEAR MULTIPLIERS

Multipliers linear models is a traditional methodology for input-output analysis, but resumed towards social accounting matrices; first, because it closes the circular flow of income and secondly, because the information collected for this is more disaggregated and can even reach a level of disaggregation permitted to existing information for this. In other words, this methodology is an extension of a model of Leontief input-output matrix applied to a social accounting matrix.

For the formulation of these models, according to Stone (1978) and Pyatt and Round (1979), first accounts that are considered exogenous determined, a change arises in an exogenous variable and is verified as it is affecting the whole economy. Generally, accounts

that are considered exogenous are those usually determined outside the economic system, and represent possible instruments for economic policy decision; the most used are the Government, the capital account and foreign sector. Endogenous accounts usually are productive activities, private sectors and added value.

From Pyatt and Round (1979) the following expression is obtained:

$$Y_m = (I - A_{mm})^{-1} \cdot A_{mk} \cdot Y_k \quad (1)$$

$$Y = M \cdot X_m \quad (2)$$

Where, Y_m is a column vector of endogenous income accounts, $(I - A_{mm})^{-1}$ is presented as M and linear matrix multiplier; this matrix is interpreted as the impact that a unit increase in the exogenous accounts on the income of each of the endogenous accounts; Furthermore, I is the identity matrix and A_{mm} is the matrix of mean spending propensities of the endogenous accounts. $A_{mk}.Y_k$ and X_m represents the sum of income injections accounts issued by exogenous and endogenous received.

The matrix linear multiplier M indicates the accounts that generate greater spillover effects on the income of the total economy. With this matrix M, we can identify sectors that have a greater ability to boost income levels of the total economy also known as entrainment. This can be determined according to Rasmussen (1956) in which the average values of the elements of columns and rows of the matrix M with the average value of all rows and columns are compared.

From this, the absorption and diffusion effects can be obtained, which refer to the homogeneity in the transmission of these effects. The diffusion or entrainment effect is obtained by adding the elements of each column of matrix M, as follows:

$$M_{.j} = \sum_{i=1}^{n} m_{ij} \quad (3)$$

This equation shows the accounts that have the greatest expansion effects on the total income of the economy. That is, it indicates how much is the increase in the total income of the endogenous accounts when there is an exogenous unit increase of income in the account j.

Similarly, the absorption effect is obtained through the addition of the elements of each row of the MCS, as follows:

$$M_{i.} = \sum_{i=1}^{n} m_{ij} \quad (4)$$

This shows the accounts that absorb in greater proportion the growth produced in the income of the economy. That is, it indicates the increase in the income of the account i before the exogenous unitary increase of income in the economy.

2.2. ANALYSIS OF KEY SECTORS

Being more explicit, adding the rows of the matrix M the absorption or forward linkages (FL), representing the effects of a unitary injection of income exogenous accounts on endogenous accounts effect is obtained, brought on that represents that row. That is, this effect indicates the level of income that is absorbed by endogenous accounts.

On the other hand, adding the columns of the matrix M the total effect it has on the income of economic agent's unitary exogenous injection of income on an endogenous account is obtained; This effect is known as diffusion effect or backward linkages (BL). The BL reflects the accounts that are most significant for external injections, as they cause further expansion of this income on the total economy. These values are obtained as follows:

$$FL_i = \frac{M_{i.}}{\frac{1}{n}\sum_{j=1}^{n}\sum_{i=1}^{n} m_{ij}} \tag{5}$$

$$BL_i = \frac{M_{.j}}{\frac{1}{n}\sum_{j=1}^{n}\sum_{i=1}^{n} m_{ij}} \tag{6}$$

Based on the indices found above, the Forward linkages or link forward and backward linkages or link back, you can determine the relationship between the absorption effect and diffusion effect. Considering the above, it can establish a link between these as follows; this shown in Table 2:

- *Key sectors:* are defined as those who have backward linkages and forward linkages higher than average (BL>μ(BL) ∧ FL>μ(FL)). That is, these sectors have absorption and scattering effect above the mean; These are distinguished because they have large effects on the overall economy, i.e. are large buyers and sellers; so economic policies focused on these areas, be transmitted to a greater degree the rest activating the economy.

- *Driving sectors:* are those that have a BL above the mean (BL>μ(BL)) and FL below average (FL<μ(FL)) are characterized by their ability to push other sectors, i.e., diffuse the effects of exogenous shocks to other sectors unaffected themselves.

- *Strategic sectors:* These have a BL below the average (BL<μ(BL)) and FL above the average (FL>μ(FL)) are characterized by intermediate goods suppliers use for other sectors, with when making strategic decisions and production prices for the total economy.

- Independent sectors: They have a BL and FL below the average (BL<μ(BL) ∧ FL<μ(FL)). So, its effects on the economy are on a smaller scale, i.e., these accounts do not cause significant spillovers but also react to the effects of other accounts.

Table 4. Classification of sectors according to the forward linkages (FL) and backward linkages (BL)

	BL > μ(BL)	**BL < μ(BL)**
FL > μ(FL)	Key sectors	Strategic sectors
FL < μ(FL)	Driving sectors	Independent sectors

Source: Own elaboration

2.3. MULTIPLIER DECOMPOSITION OF ACCOUNTING

The methodology explained above, but includes valuable information about the structure of the economy to analyze, shows how it has been transformed and distributed such injection in all endogenous accounts. These allow quantify the linkages between endogenous accounts.

Multipliers decomposition can be performed by a multiplicative decomposition exposed in more detail in Pyatt and Round (1979), and other additive decomposition according to Stone (1978). With these three matrices where interdependence between different accounts in obtaining income shown are obtained. For the proposed analysis will consider the additive decomposition yields more intuitive results.

Based on this additive decomposition of the multipliers is obtained:

$$M = I + (M_1 - I) + (M_2 - I) \cdot M_1 + (M_3 - I) \cdot M_2 \cdot M_1 \quad (7)$$

Where $M - I$ is the total net leverage, $N_1 = M_1 - I$ are the direct net effects, $N_2 = (M_2 - I) \cdot M_1$indirect net effects and $N_3 = (M_3 - I) \cdot M_2 \cdot M_1$are induced or circular net effects.

With this, when removing the initial injection of exogenous income economy can apply the multiplier process and the additive decomposition these three effects[2] are determined as shown above.

- *Total Effect:* Includes direct, indirect and induced effects.
- *Direct effect:* (I+A), is the effect that occurs due to the adjustment of production that meets the new levels of final demand made on the activities of each sector.

[2] The definitions are presented according to Cardenete & Delgado (2011)

- *Indirect effect:* (MI-I-A), is the effect due to new demands for inputs required to adjust the output of each sector with a new final demand.

- *Induced effect:* (Ma-MI) is the effect due to income growth according to the demand on activity levels.

2.4. THREE-DIMENSIONAL LANDSCAPE OF THE MEXICAN ECONOMY

The matrix multiplier or MPM product is derived from the MCS and with this, you can analyze the sectoral interdependencies of the economy. This matrix can produce a three-dimensional landscape through structural path analysis methodology, which visually reflects the productive sectors impacting higher proportion than average, generated by changes in themselves, and sectors are influenced generated by changes in the rest of the economy and the interaction among themselves. This methodology is based on Sonis et al. (1997).

The multiplier product matrix (MPM) identifies the change in the sum of all elements of the inverse matrix due to changes in technical coefficients. This is defined as

$$MPM = \frac{1}{\sum_i \sum_j M_{ij}} \left[M_i . M_{.j} \right] \tag{8}$$

This is also known as field strength of the first order of influence. For this, the element (i, j) represents the first order change occurred in the sum of all elements of the inverse matrix when the technical coefficient (i, j) changes. This analysis of the information generated by the backward linkages and Forward Linkages. Taking the MPM, you can develop a three-dimensional landscape of the economy to be analyzed which identifies the sectors with above average impact produced by changes in themselves, and sectors that are influenced by changes presented in the rest of the economy and the relationship presented in all sectors of the economy.

2.5. EMPLOYMENT MULTIPLIERS

According to Cardenete and Delgado (2011), employment multipliers indicate the expansionary effect of final demand shocks, i.e., the sensitivity of each sector in terms of employment demand. This multiplier is determined for each production sector as follows:

$$E_j = \sum_{i=1}^{n} w_{n+1,i} b_{ij} \tag{9}$$

where,

$w_{n+1,i} = \frac{Y^{e_i}}{X_i} * Y^{e_i}$, It is the job of each productive sector

X_i, is the total output of sector i

b_{ij}, es el elemento ij de la matriz M de multiplicadores obtenida con la MCS.

3. ANALYSIS AND RESULTS

Based on the previous methodologies, a comparison is made between the Mexican economy for 2008 and 2012, obtaining the following results.

3.1. IDENTIFICATION OF KEY SECTORS

Table 5 shows the different sectors according to their BL and FL values, following the classification presented in table 6. It is important to indicate that the sectors that presented a larger BL by 2012, that is, those that have (14), business support services (13) and legislative activities[3] (19), which, when compared to 2008, turn out to be the same, with a change in hierarchy as legislative activities lost A place, while business support service won one. This value BL says that for each exogenous injection of a weight made in educational services, 1,146 pesos are generated in the Mexican economy, reason why policies focused on these sectors would have greater effects on the income level of the economy.

On the other hand, the sectors that have a higher FL for 2012, i.e. those that have a greater absorption capacity, are manufacturing (5), commerce (6) and real estate services (10), maintaining the same structure of the 2008, but presenting changes in the order of these as in the previous case. The FL value is interpreted as the increase of 2,755 in manufacturing industries generated by an increase of one peso in the economy.

As can be seen in table 5, there has been a small movement between sectors for the period studied, since some sectors that were previously strategic for 2012 are key, such as real estate services (10), and some formerly independent They become promoters, as corporative (12). It is observed that the same composition of the number of sectors per year is apparently maintained, except for the key and strategic sectors that have been increased and reduced by one respectively.

[3] Legislative activities include economic units devoted primarily to the establishment of laws; To the administration and application of public resources; Regulation and promotion of economic development; To the impartation of justice and to the maintenance of security and public order; To activities to improve and preserve the environment; To the administrative activities of social welfare institutions; To external relations activities, and to safeguarding national security. The sector also includes international and extraterritorial economic units with physical location in our country, mainly dedicated to providing economic, commercial and technological cooperation and support; To represent their respective countries in the political, commercial and diplomatic aspects and to provide military support. (INEGI, 2013).

Table 5. Classification of sectors from BL and FL for years 2008 and 2012

Key Sectors					
2008			2012		
Description	FL	BL	Description	FL	BL
Trade	1,288	1,076	Trade	1,335	1,066
Real State services	1,116	1,097	Real state services	1,219	1,073
Strategic sectors					
Description	FL	BL	Description	FL	BL
Manufacturing industries	2,346	0,817	Manufacturing industries	2,755	0,716
Driving sectors					
Descripion	FL	BL	Description	FL	BL
Transportation and storage	0,920	1,035	Financial services	0,524	1,046
Financial services	0,405	1,091	Support services for business	0,398	1,117
Mass media information	0,464	1,053	Temporary accommodation services	0,376	1,050
Temporary accommodation services	0,438	1,102	Primary Sectors	0,373	1,002
Support services for business	0,339	1,083	Other services	0,362	1,046
Other services	0,423	1,054	Professional services	0,337	1,099
Professional services	0,504	1,070	Educational services	0,216	1,146
Primary sector	0,444	1,042	Health services	0,209	1,071
Educational services	0,291	1,127	Corporate	0,181	1,048
Health services	0,275	1,081	Cultural entertainment and Sporting services	0,170	1,072
Construction	0,150	1,016	Transportation and storage	0,825	0,981
Legislative activities	0,134	1,126	Mass media information	0,434	0,985
			Construction	0,212	0,970
			Legislative activities	0,125	1,100
Weak sectors					
Description	FL	BL	Description	FL	BL
Electric power	0,423	0,813	Mining	0,368	0,408
Mining	0,378	0,477	Electric power	0,341	0,931
Corporate	0,198	0,755			
Cultural entertainment and Sporting services	0,164	0,089			

Source: Own elaboration

For the detection of sectors, the classification criterion becomes flexible to 0.95, including those BL that have a value higher than this, as well as the one performed by Cardenete (2011), where it takes as representing BL that one that exceeds 0,8 because the MCS used in its research has a high degree of aggregation and it is not possible to capture any sector as a key. This relaxation of the criterion is carried out since several sectors have a

BL very close to one, reason why it is more intuitive and in agreement with the Mexican economic reality, that they are classified as driving sectors and not independent.

The classification of sectors corroborates the Mexican economic reality, since trade has become a pillar for the economy, specifically in the strengthening of SMEs and exports, to respond to the demand for the internationalization of economies and the attraction of foreign investment. In addition, internally it dynamizes the different sectors of the economy, since its proportion is 15% of the Gross Domestic Product (GDP). On the other hand, real estate services have shown significant signs of recovery, with a share of GDP of 11.4% for 2012. This, thanks to new global trends of preferring to rent offices, land and cars, trucks and other land transport, such as machinery and equipment, rather than buying them through leasing and renting, thus avoiding depressions and paying non-deductible taxes.

As for manufacturing industries, they continue to be the engine of the economy in Mexico and a strategic sector, being suppliers of intermediate goods for other sectors. In fact, this sector is the one with the highest proportion of GDP with 17%. Its importance lies in the fact that Mexico has become an important center in maquila and automobile manufacturing worldwide, in addition, that foreign direct investment usually goes to this sector.

However, as drivers are kept transport, mail and storage, and construction, pushing other sectors, expected situation as the construction sector has always been characterized as a revitalizing of the economy, along with the transport they are Fundamental for the good functioning of the other sectors.

Another interesting result is the permanence of temporary accommodation services and preparation of food and beverages as a driver of the economy. This sector has been in the sights of the federal government since Mexico is expected to be the fifth tourist destination in the world by 2018, according to the Ministry of Tourism. This sector is the third source of foreign exchange and an important source of job creation.

In addition, the mining[4] sector remains an independent sector. This is mainly since the Mexican state-owned company responsible for oil and gas extraction and processing, PEMEX, has had low incomes for many years, especially because of the government's high tax burden, which finances approximately one- Federal budget, a situation that does not allow it to invest in technology and expand its production levels. In addition, the global oil crisis that has brought down oil prices has helped underperform the sector in Mexico.

On the other hand, as Moreno (2009) points out, this sector with a tradition in the country has been hit by the global trend, the excess supply of foreign-generated production,

[4] Mining includes the extraction of oil and gas, mining of metallic and non-metallic minerals and services related to mining (INEGI, 2013).

the use of recycled products that produce a Low price, and especially, for the demand for minerals that are not produced in Mexico. These two situations mean that the mining sector in Mexico has lost importance, remaining a sector with little impact on other sectors of the economy.

3.2. THREE-DIMENSIONAL LANDSCAPE OF THE MEXICAN ECONOMY

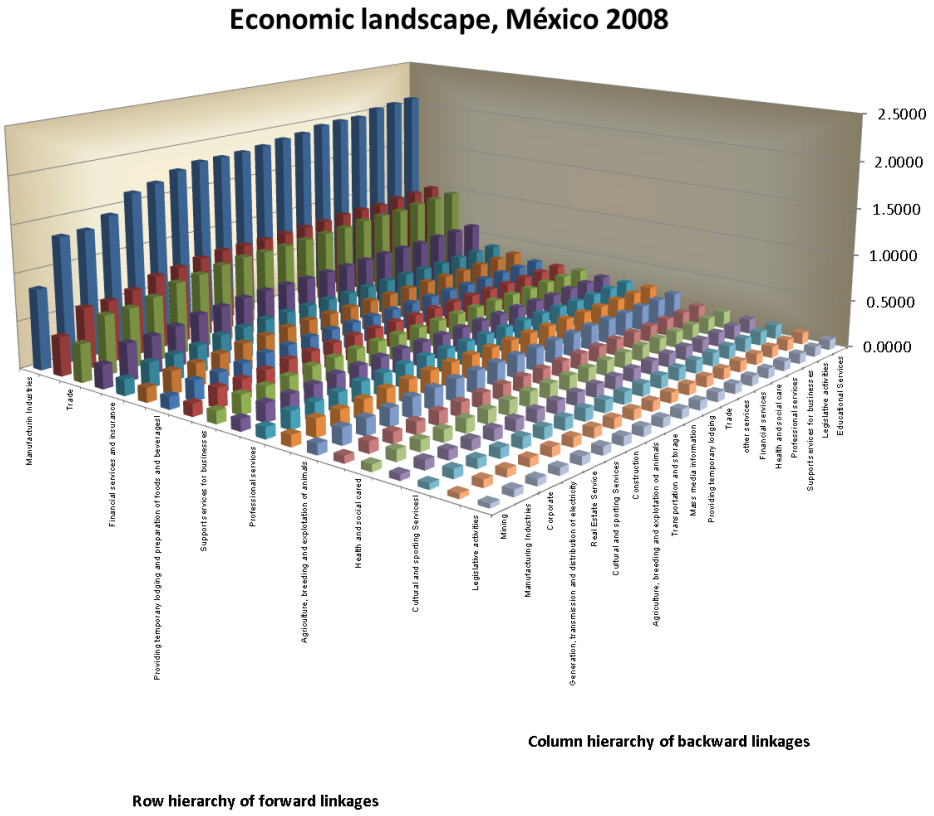
To identify cross-sectoral relationships, the MPM of 2008, in addition to that of 2012, is plotted against 2008, to benchmark the Mexican economy and identify the structural change for this period.

Figure 1 shows the landscape of the Mexican economy for the year 2008. From this it is identified that the manufacturing industries sector (5) together with real estate services (10) reflect the greatest economic impact when interacting with all sectors of the economy. It is also observed that the most important cross-sectoral relationships are generated by manufacturing industries when they interact with educational services (14), and the intersectoral relationship that has the least impact on the economy is legislative activities (19) when it interacts with mining (2).

On the other hand, in organizing the 2012 MPM based on 2008 as shown in Figure 2, it is possible to determine that, although a change in intersectoral relations can be seen, it cannot be affirmed that there is a substantial structural change in the Economy, expected situation due to the analysis period of only four years, corroborating that the structure of the economy remains stable for approximately a five-year period[5]. It can be observed that manufacturing industries continue to have the greatest economic impact with all productive sectors, with a special intersectoral relationship with education services. However, unlike the economic structure for 2008, the commercial sector (6) has regained greater importance for 2012, together with business support services (13), the primary sector (1) and construction (4). It is also observed that sectors such as electricity, water and gas (3) lost importance in terms of impact on the economy.

[5] This statement is important since MCSs are usually not built for each year because of the lack of actual information for their preparation. It is very common for this type of analysis to use an MCS for a period of no more than five years for any economic analysis.

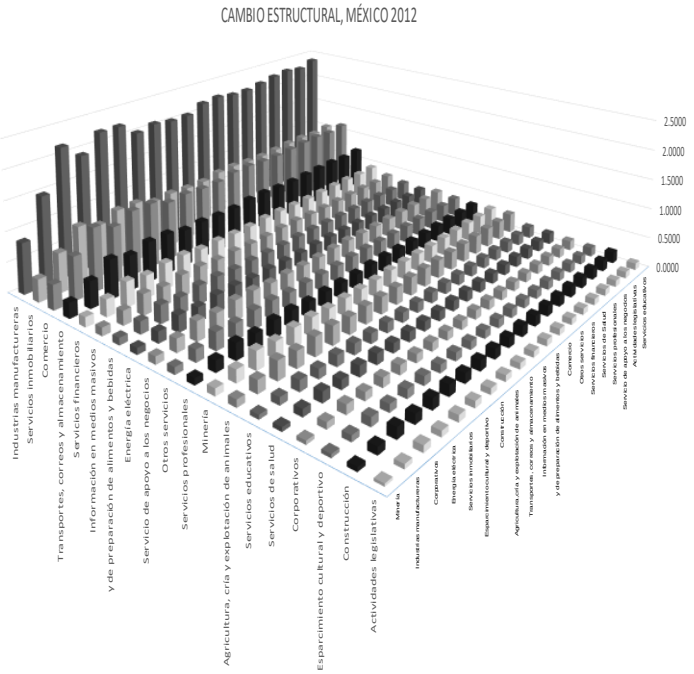
Graph 1. Three-dimensional landscape of the Mexican economy for the year 2008.



Source: Own elaboration

This situation again corroborates the economic reality of the country, highlighting the importance of manufacturing industries as the main contributor of Mexican GDP and how it is linked to all productive sectors, because it is the main producer of input for the other sectors. In addition, it reaffirms the Mexican economy's orientation towards exports and trade, and undoubtedly to the provision of services that together have the highest percentage of GDP with more than 50%.

Graph 2. Three-dimensional landscape of the Mexican economy for the year 2012 based on the year 2008



Source: Own elaboration

3.3. MULTIPLIERS DECOMPOSITION

However, to complete the cross-sectoral analysis, we include the decomposition of multipliers, which determine the direct, indirect and induced effects of the Mexican economy, as can be seen in Table 6. These show a different picture to the previous links Studied, since from these we can identify how an exogenous injection is transformed into an increase of the income of the endogenous accounts.

The productive sectors in table 6 are ordered according to their total effect exerted on the Mexican economy. The indirect effect is calculated considering only the endogenization of the productive sectors, whereas the capital, labor and private consumption accounts are included as endogenous for the calculation of the induced effect.

For 2008, the sectors with the greatest total effect are health services (15), educational services (14) and legislative activities (19), while those with the least total effects in the economy are mining (2), corporations (12) and real estate services (10). However, it should be noted that by 2012 the sectors with the greatest total effect remain the same, but in different

order, with the most effective legislative activities (19), followed by educational services (14) and health services (15). However, it can be observed that manufacturing industries (5) have become part of the sectors with the least total effects in the Mexican economy, because they generate less induced effects than the other productive sectors.

Likewise, the sector that has the most direct effect for 2008 is the manufacturing industries (5), that is, this sector for every increase of demand in the economy, generates 1,413. However, by 2012, the sector with the greatest direct effect was the electricity, water and gas sector (3), generating in the economy 1,397 for each increase in demand. As for the indirect effect, for 2008 and 2012 the sector with the greatest indirect effect was electricity (3) that an increase in the demand of these sectors drag other sectors generating 0.198 and 0.185 respectively.

Finally, education services (14) have the greatest effect induced for both 2008 and 2012. This means that an increase in the demand for these sectors is transformed into an increase in the demand of all sectors in that proportion.

However, the sectors that present the greatest change from one year to the next are corporate (12), real estate services (10) and cultural and sports leisure services (16), indicating signs of structural change in the Mexican economy from the point of view of View of the effects produced.

Table 6. Comparison of multiplier decomposition 2008-2012

2008					2012					Variation 2012-2008		
Account	**Total effect**	**Direct effect**	**Indirect effect**	**Induced effects**	**Account**	**Total effect**	**Direct effect**	**Indirect effect**	**Induced effects**	**Account**	**Description**	**Total effect**
19	3,168	1,238	0,099	1,831	19	3,192	1,284	0,119	1,789	15	Health services	0,10
3	3,153	1,509	0,281	1,362	14	3,080	1,108	0,042	1,931	14	Educational services	0,10
4	3,093	1,437	0,218	1,438	15	3,068	1,262	0,103	1,702	7	Transportation and storage	0,07
9	3,092	1,362	0,134	1,596	7	2,996	1,361	0,165	1,470	11	Professional services	0,06
17	3,001	1,258	0,114	1,628	9	2,995	1,353	0,129	1,513	13	Support services for business	0,04
16	2,985	1,272	0,110	1,604	13	2,990	1,147	0,053	1,789	18	Other services	0,02
8	2,979	1,322	0,134	1,523	11	2,956	1,232	0,075	1,648	19	Legislative activities	0,02
14	2,976	1,095	0,037	1,844	17	2,942	1,289	0,119	1,534	10	Real state services	-0,03
15	2,963	1,203	0,089	1,671	3	2,917	1,397	0,185	1,335	6	Trade	-0,06
1	2,960	1,319	0,156	1,485	16	2,917	1,237	0,091	1,589	17	Temporary accommodation services	-0,06
13	2,953	1,188	0,075	1,690	4	2,908	1,344	0,156	1,407	16	Cultural entertainment and Sporting services	-0,07
12	2,949	1,385	0,153	1,410	18	2,882	1,225	0,080	1,577	1	Primary sector	-0,09
7	2,922	1,286	0,124	1,512	1	2,874	1,306	0,143	1,424	9	Finantial services	-0,10
11	2,900	1,236	0,089	1,575	6	2,832	1,192	0,067	1,573	12	Corporate	-0,15
6	2,887	1,215	0,085	1,587	12	2,798	1,201	0,058	1,540	4	Construction	-0,18
18	2,857	1,195	0,086	1,576	8	2,781	1,267	0,092	1,423	8	Mass media information	-0,20
10	2,724	1,086	0,036	1,602	10	2,690	1,083	0,032	1,575	3	Electrical power	-0,24
5	2,691	1,420	0,182	0,089	5	2,452	1,387	0,149	0,916	5	Manufacturing services	-0,24
2	2,025	1,174	0,075	0,776	2	1,651	1,140	0,053	0,457	2	Mining	-0,37

Source: Own elaboration

3.4. EMPLOYMENT MULTIPLIERS

To finalize the structural change analysis of the Mexican economy for the period 2008-2012, the employment multipliers presented in Table 8 are analyzed. In this, it can be seen that the productive sectors with the greatest capacity to generate employment in response to exogenous impacts in demand for the year 2008 are agriculture, breeding and exploitation of animals (1), other services (18) and business support services (13), generating 11, 9 and 7 jobs per million pesos Injected into those sectors. However, the sectors with less dynamism in employment generation are mining (2), corporations (12) and real estate services (10), with less than one job per million pesos injected into these sectors.

However, it should be noted that in 2012, the same structure as in 2008 remained practically unchanged, showing stability in the employment multipliers for the period studied. Nevertheless, the capacity to generate employment has decreased considerably for this year, from 61 jobs generated to 43 jobs for every 19 million pesos that enter the Mexican economy, except for corporations (12), which presented an increase in its multiplier.

Sectors with greater capacity to generate employment are classified as driving sectors, so that economic policies oriented to these sectors not only boost other sectors, but contribute to the reduction of unemployment in the country.

On the other hand, it should be noted that although the primary sector presents a 3% share of GDP, its capacity to generate employment is very important, being the main generating force of the country with a multiplier of 9.29. According to information provided by the IPM for 2012, this sector represents 16.81% of the total jobs in the economy, however, it represents only 1.94% of the total remuneration of employees.

Table 7. Employment multiplier for 2008-2012

Account	Productive sectors	Multiplier	
		2008	2012
1	Primary sector	16,355	9,297
18	Other services	8,730	6,448
13	Support services for business	7,552	4,920
17	Temporary accommodation services	4,642	2,846
4	Construction	4,551	2,558
14	Educational services	4,340	3,125
19	Legislative services	4,118	2,551

6	Trade	3,064	2,193
15	Health services	2,768	2,071
7	Transportation and storage	2,447	1,356
16	Cultural entertainment and Sporting services	2,380	1,313
11	Professional services	1,559	1,347
5	Manufacturing services	1,241	0,606
3	Electrical power	0,921	0,455
12	Corporate	0,747	0,313
8	Mass media information	0,742	0,545
9	Finantial services	0,686	0,544
2	Mining	0,642	0,186
10	Real state services	0,169	0,182
Total		67,653	42,856

Source: Own elaboration

4. CONCLUSIONS

This research contains a detailed explanation of the construction of a SAM for the Mexican economy called SAMMEX-12, taking advantage of the latest update made by INEGI of the IPM. This seeks to achieve transparency in the methodology, as they are rarely included. From this matrix, an analysis of structural change of the Mexican economy for the period 2008-2012 was presented, following four methodologies; Analysis of accounting multipliers for the detection of key sectors, a three-dimensional landscape of the Mexican economy through the methodology of structural path analysis, the multiplication of direct, indirect and induced multipliers and, finally, the detection of employment multipliers.

The first applications made through this methodology show the sectors that have the capacity to stimulate the production of other sectors through changes generated in themselves or those that are stimulated by changes in the rest of the sectors. For this first case, it is concluded that for 2012 the trade sector continues to be key, and real estate services are identified within the same classification. On the other hand, the corporate sector that for 2008 was independent, for 2012 is classified as an impeller.

The fact that as key sectors are trade and real estate services, explains why the Mexican economy cannot grow steadily as do other economies in the world, since an economy based on sectors that exploit and process raw material through Of a developed industry, take more of other sectors and would be great suppliers of inputs for others. In this

area, the manufacturing sector is identified as a strategic sector, playing the role of supplier of intermediate goods in the Mexican economy, however, it is important to clarify that, in order to achieve greater economic growth, Play a key role. The importance of the key sectors lies in their ability to move the entire economy, but at the same time, in times of crisis could slow down the proper functioning of this.

Manufacturing industries have a greater economic impact by interacting with all sectors of the economy, especially with educational services, which at the same time have the greatest total effects, again confirming the importance of their activation. Similarly, trade for 2012 has improved its inter-industry performance by interacting with all productive sectors.

On the other hand, the driving sectors identified mainly as primary and tertiary sectors, for 2008 and 2012 maintain the same structure, although their driving capacity has diminished. The sector of construction and transport, mail and storage, with its dynamising capacity of the economy and pillar of the same, stands out, being always present in the elaboration of the development plans in different countries.

Finally, again the electric power sector, for 2012 has the greatest direct and indirect effect of the economy and educational sectors the greatest indirect effect. The primary sector continues to be the country's main source of employment, despite the loss of importance in proportion to the GDP that it has been presenting over the years.

Temporary accommodation and food and beverage preparation services are classified as driving the economy. This sector has been in the sights of the federal government since this sector is the third source of foreign exchange and the fourth source of employment generation.

It is concluded that the Mexican economy does not show great signs of structural change in spite of the global crisis presented in the analyzed period, a situation corroborated by the inter-industrial relations shown in the three-dimensional panorama, although if a shift of the sectors in their level of importance and as promoter of growth. In the same way, the employment multipliers reflect a loss of their generating capacity in all sectors. However, sectors such as corporate, real estate services and recreational cultural and sports services have important changes regarding the way the income is distributed for that period. These changes are attributed as possible effects of the economic crisis, however, since the IPM for 2012 is an update of the 2008, which is the basis for the construction of the SAMMEX-12, fails to fully capture all Effects produced by the crisis, but if it gives us a good approximation of this.

Asimismo, se corrobora que la construcción de una MCS por si sola es un importante hallazgo, ya que a partir de esta es posible elaborar diferentes análisis multisectoriales. Por

otro lado, identificar sectores con mayor capacidad para impulsar y tirar de otros sectores, puede marcar la diferencia al momento de la planeación económica, permitiendo dirigir las decisiones de política sobre aquellos sectores con mayores efectos de distribución de la renta y hacia aquellos con mayor capacidad de generar empleo. Además, que las decisiones tomadas a partir de un análisis multisectorial podrían ayudar a encaminar a la economía hacia un crecimiento sostenido, ya que anticipadamente muestra los sectores a impulsar.

Also, it is corroborated that the construction of an MCS by itself is an important finding, since from this it is possible to elaborate different multisectoral analyzes. On the other hand, identifying sectors with greater capacity to boost and pull other sectors can make the difference in economic planning, allowing policy decisions to be directed at those sectors with greater income distribution effects and those with greater Capacity to generate employment. In addition, the decisions taken from a multisectoral analysis could help steer the economy towards sustained growth, since in advance it shows the sectors to be promoted.

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