CHARACTERISTICS OF MEXICAN LEATHER FOOTWEAR INDUSTRY AND ITS INTERNATIONAL TRADE ACTIVITY EVOLUTION OF THE LAST DECADE, CORRELATION OF PRODUCTIVITY AND COMPETITIVENESS

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Abstract: This study aims to analyse the effect of globalization for the Mexican leather footwear industry at a firm-level, during the last decade. In this work the analysis of competitiveness is based on the definition given by the Organization for Economic Cooperation and Development: 'a measure of a country's advantage or disadvantage in selling its products in international market'. Then, the productivity of the Mexican leather footwear industry was calculated using the Latin American-KLEMS Model that relates gross output to primary (Capital and Labor) and intermediate inputs (Energy, other intermediate goods, and Services). Furthermore, firms were categorized considering the number of employees, the annual value of production and the commercial diversification in order to calculate the correlation Pearson coefficient of both mentioned variables, for each group. Results show firstly, that the correlation of production value with number of exporting companies is bigger than the importing companies' correlation. Secondly, that the correlation of Total Productivity Factor (TPF) to exports is strong (0.7028); and finally, that the correlation of Total Productivity Factor (TPF) to imports is also significant (0.6511).

Keywords: Competitiveness, Productivity, Firm-level, Imports, Exports

Subject classification codes: F14, F16, L67, R12

1 Introduction

Globalizations as an economic process, produces different effects in terms of magnitude and direction in each region, country, industry and even firm involved in this phenomenon often considered as natural as well as controversial.

> ‘Most economists agree that globalization provides a net benefit to individual economies around the world, by making markets more efficient, increasing competition, limiting military conflicts, and spreading wealth more equally around the world. However, the general public tends to assume that the costs associated with globalization outweigh the benefits.’ Kuepper (2016)

The referred net benefit implies that some countries and industries obtain more profit than others, it is interesting to analyse that the result depends not only on the stage of development of the country, but also on the particular characteristics of the economic sector and even more on the firm-level characteristics. This study aims to analyse the effect of globalization for Mexican leather footwear industry during the period 2007-2013 due to the absence of recent studies that try to find out the correlation between productivity and competitiveness. For this study it is considered the definition of competitiveness given by OECD: ‘a measure of a country's advantage or disadvantage in selling its products in international market’ OECD Organization for Economic Cooperation and Development (2014). Additionally, the productivity of Mexican leather footwear industry was measured according to LA-KLEMS, the project that created a database on measures of economic growth, productivity, employment creation, capital formation and technological change at the industry level, initially for all European Union member states from 1970 onwards, and later on extended to some other economies of the world. CEPAL Economic Commission for Latin America and the Caribbean (2016)

The rest of this paper is organized as follows: In section 2 the recent literature is reviewed. In section 3 information of Mexican leather footwear industry is presented and the firms are categorized considering the number of employees, the value of annual production and the commercial diversification. In section 4 the methodology used to get the Total Productivity Factor TPF of Mexican leather footwear industry is described. Section 5 presents the results of Pearson correlation coefficient followed by Section 6 where the results are discussed and the conclusions are presented.

2 Literature Review

According to the theory of comparative advantages, if countries in international trade specialize in producing the goods and products, in which their relative labor productivity or their relative expenditure cost is more favourable, that leads to the development of an international division of labor, from which each country benefits Krugman (1994) and Krugman (2002).

The theory of competitive advantages reflects to the new conditions of the global competition. Michael Porter claims that today the theory of comparative advantages does not provide an acceptable explanation about the international division of labor Porter (1990). Porter’s proposal (1998) to development is the theory of competitive advantages, which systematizes the development phases of countries and the new elements of the international (and regional) division of labor. The competitive advantage of a given country or region depends on economic structure, the development level of the institution system and the quality of its operation, governmental economic policies and ideas on regional development.

The competitive strategies of globally competing companies and the regional clusters exploit dynamic agglomeration economies. Defining the new economics of competition, Porter (2001) highlights six fundamental factors: level, focus, addresses, economic and social policy, geographical unit and sources of company success.

Lately, and favoured by the increasing availability of data, some researchers have been concerned to distinguish the economical behaviour of the two main actors in international trade: importers and exporters considering the particular characteristics of the firms that conform each group.

In their review of firms from the United States in international trade, Bernard (2007) draws attention to the strong correlation (0.87) between industries with high shares of importing firms and those with high shares of exporters. They find that 79% of importers also export. Their descriptive analysis shows that both types of firms show many similarities in their performance measures. Both, exporters and importers are more productive, larger, capital, and skill intensive than firms that do not have any trading relationships with the rest of the world. However, they do not split firms into separate groups to show how firms that perform both activities differ from the other group of firms. Moreover, they do not analyse how firms in different trade groups differ in growth performances.

In another study, Muuls (2009) analyses Belgium firms and divides them into four trading groups as two-way traders (both, importing and exporting), only exporters, only importers, and non-traders. It was found a positive relationship between labor productivity and importing for Belgium firms.

Vogel (2010) performs a similar analysis for German manufacturing firms. In addition to show the positive link between importing and labor productivity, evidence on direction of causality in this relationship was found. The significance of self-selection of more productive firms into importing and learning effects of importing was also studied, and as a result, evidence on the selfselection hypothesis was also found.

Although analyses in these studies are informative, none of them analyze firm growth and their contribution to the Total Production of Factors according to the KLEMS model and their conclusions on the two-way traders being more productive and larger only indirectly shows these firms' higher growth potential.

Moreover, Vogel (2010) uses turnover per employee as their measure of labor productivity. This measure, as well as other measures of labor productivity, suffers from the unobserved price effects on measuring productivity. As Seker (2011) mentions, it is difficult to isolate firm's intrinsic efficiency with these measures.

It is often criticized the practice of considering just exporting performance as the trade variable of interest; Estefahani (1991) uses three-stage cross-country equation systems to show the importance of including importing activities. Investigating 31 semi-industrialized countries Estefahani concluded that exports' primary contribution is to finance the import of intermediate products.

In addition, Awokuse (2008) mentions that little attention has been paid to the importance of imports, in his research he used a quarterly data for three Latin-American countries from the beginning of the 1990's to April 2002. By considering real Gross Domestic Product (GDP) growth, real exports, real imports, gross capital formation and labor force concluded that the exclusion of imports and singular focus of many past studies on just the role of export as the engine of growth may be misleading or at best incomplete' Awokuse (2008)

Ifwarson (2010) establishes that difference between countries growth rates can only partly be explained by increases in the employment of the basic factors of production: capital and labor. Instead the differences are mainly due to different rates of increase in productivity of the inputs'.

Considering the posture of Aghion (2009) regarding that it is possible that long-run income growth rather might be caused by technological progress in this study LA-KLEMS Model (Latin America Kapital, Labor, Energy, Materials and Services) is used because it is included ICT's factor (Information and Communication Technologies) and related aspects are included.

Kunst (1989) establishes that focus should be on productivity rather than income, supporting the idea of calculating the Pearson product-moment correlation coefficient taking into account

the Total Factor Productivity (TPF).

Since the seminal works of Grossman (1991), Aghion (2005) and Romer (1990), many studies have found technological innovation to be the main determinant of growth.

The objective of this study is to find a correlation between the firm evolution during the analysed period (2007-2013), the total production value of the industry and the total productivity factors (considering LA-KLEMS Model). Moreover, detailed firm level dataset from of the Mexican leather footwear industry is provided to represent how every group of firms is differently correlated with the selected variables (firms are categorized by number of employees into five groups: '0-10', '11-50', '51-250', '251-500' and '501 and more'; by annual value of production into four categories: '1-10,000 USD', '10,0001-100,000 USD', '100,0001-1,000,000 USD' and '1,000,001 USD and more'; and by commercial diversification into 6 categories: 'trade with 1 country', 'trade with 2 countries', 'trade with 3-5 countries', 'trade with 6-9 countries', 'trade with 10-14 countries', 'trade with 15-19 countries', and ' trade with 20 and more countries').

3 Footwear Industry

3.1 Global Panorama

The textile and footwear industry is vital for the economy of some countries, both in terms of the number of people it employs and the revenues it generates. In the last half century, this industry – which was concentrated in industrialized nations in the mid-twentieth century – has gradually spread to developing countries. The global 'redistribution' of this industry began in the late 1960s, with the expansion of new manufacturing centers in Asia. In some cases, particularly in South Asia, imported fabrics were progressively substituted with national ones as a domestic textile industry began to take shape.

Many developing countries applied this strategy and, over the last 20 years, textile (including footwear) production has grown at an average global rate of 1.2%, with variations depending on the level of development of the country in question. In more industrialized economies, for example, growth has averaged 2.7%, compared to 3.6% in Asia. Tradegood (2013).

Nonetheless, many developed countries still have viable textile industries that operate mainly at the top end of the market. And thanks to restructuring and modernization measures, several still feature on the list of the world's top ten textile exporters in terms of the value of their products.

Nowadays, global shoe production stands at 24 billion pairs a year, 60% of which are exported. Global trade in non-sporting footwear is valued at approximately US$15 billion a year. Footwear with leather uppers accounts for a massive 85% of this total. Tradegood (2013).

China alone produces approximately 9.5 billion pairs a year, 7 billion of which are exported. The most spectacular growth has probably been posted by China and India –which manufactures 700 million pairs of shoes a year– ousting countries like Italy that were once major producers, but whose annual output has now fallen to 400 million pairs. Tradegood (2013).

Brazil is an interesting, but equally successful case that falls somewhere between the Chinese and Italian models. In the last 25 years, the country has tripled its output and positioned itself among the large global exporters, due largely to its strategy of supplying the USA with ladies' shoes in the medium-to-low price range. Annual shoe exports are valued at US$1.6 billion, 70% of which –mainly ladies' shoes– are intended for the USA, where Brazil is the leading supplier of women's footwear with a 42% market share, followed by China with 38% and Italy with 10%. Tradegood (2013).

3.2 Mexican Footwear Industry

The footwear industry is important for the Mexican economy due to the fact that in 2015 produced 251,000,000 pair of shoes that accounts for 0.43% of Gross Domestic Product (GDP) and 0.90% if considered the complete productive chain of the sector. In about 11,538 firms employs 579,000 people INEGI National Institute of Geography, Statistics and Informatics (2015).

Figure 1 shows that mexican footwear industry is heavily concentrated in eight cities of the country: a) Leon, Guanajuato (57.8% of total value production), b) Guadalajara, Jalisco (10%), c) San Francisco del Rincon, Guanajuato (6.7%), d) Purisima del Rincon, Guanajuato (3.9%), e) Zapopan, Jalisco (3.1%), f) Iztapalapa, City of Mexico (1.4%), g) Toluca, Mexico State (1.3%) and h) San Mateo Atenco, Mexico State (1.2%) that represents 85.4% of the national production of the sector. CICEG Chamber of the Footwear Industry of Guanajuato State (2015).

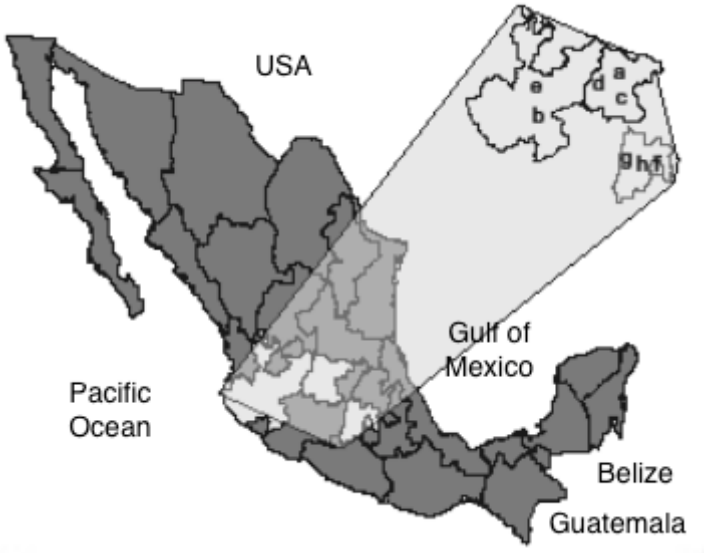

Figure 1 Concentration of Mexican footwear industry.
Data source: (INEGI National Institute of Geography 2014)

According to APICCAPS, the Portuguese Footwear, Components and Leather Goods Manufacturers' Association (2015) Mexicans buy around 303 million pairs of shoes a year, which translates into about 2.5 pairs, per capita. CICEG Chamber of the Footwear Industry of Guanajuato State (2015).

3.2.1 International Trade

As reported in CICEG Chamber of the Footwear Industry of Guanajuato State (2015), 27,496,141 pairs of the 251 million pairs of shoes the country manufactured in 2015 were exported. In that year exports reached $552,321,104 USD positioning Mexico in value world ranking 26th (volume world ranking 27th) while imports stood at 80,041,098 pairs (965,328,657 USD) that is the volume world ranking 25th (value world ranking 21st). The main international market for Mexican-made shoes was USA (76.17%), followed by Netherlands (5.08%), Guatemala (4.19%), Colombia (2.66%), Panama (1.70%), Japan (1.31%), Chile (1.19%) and others (7.7%) (AGA General Customs Administration 2015).

The most important product exported by the Mexican footwear industry is footwear made with leather upper that accounted for 74.3% in 2013. Ten countries received 94.1% of these

exportations, and it is important to highlight that the USA received 82.6% of these products during that year INEGI National Institute of Geography (2014).

On the other hand, in terms of imports in 2015, China provided 55% of the pair of shoes followed by Vietnam (27%), Indonesia (7%), Spain (2%), and others (9%) (AGA General Customs Administration 2015).

In the 1990s, the Mexican footwear industry benefited from the dismantling of trade barriers, particularly the lifting of duties provided by the North American Free Trade Agreement (NAFTA). However, since 2000, the industry has faced growing competition from countries like China, a situation that was compounded when the latter joined the World Trade Organization (WTO). On the upside, fiercer competition has forced the sector to take stock and shore up its activities Tradegood (2013).

There is evidence that Mexican footwear industry production has been increasing, in 2013 even more than the rest of the Mexican manufacturing industry rate, however, during the studied period (2007-2013) the exportation activity is mixed with a decrease during 2007-2010 and an increase during 2011-2013, followed by a decrease registered in 2014.

This last result might be ambiguous but it is important to mention that the volume of Mexican footwear exportations to USA, the most important market for these products, has been as follows: for 77% in 2007, 85.2% in 2009, 81.5% in 2011 and 82.6% in 2013, without a clear tendency after the analysis it is possible to conclude a reduction of the activity evolution (INEGI National Institute of Geography, 2014).

Considering the definition of competitiveness formulated by OECD that compares both international trade activities: imports and exports, these results might imply a loss of competitiveness for Mexican footwear industry since imports for this same industry have been increasing during the period 2007-2013, except in 2009. In fact, since 2002 the Mexican footwear industry registered a commercial deficit (higher imports than exports) that by itself represents a Mexican industry decline in global competitiveness.

It is also significant to mention that in 2013, the most important product imported by Mexico was footwear made of fabrics (32.9%), followed in second place for footwear with uppers of leather (31.9%) and in third place footwear made of rubber or plastic (27.4%). In 2013, 96.4% of footwear products was imported from ten different countries of which 77.5% was imported from only 3 of them: China (35.4%), Vietnam (29.9%) and Indonesia (12.2%) INEGI National Institute of Geography (2014).

In general terms, a few firms, that are also the largest of the industry, carry out both, imports and exports. In 2012, 58.1% of exports were concentred by only 23 companies and 28 firms realized 70.9 % of imports. However, in 2013, 213 companies had exporting activity and 185 importing activity INEGI National Institute of Geography (2014); this gives evidence that Mexican firms are not able to face globalization process at a same level even they might be interested to profit the advantages of global trade. For this reason firm level analysis was made considering different variables: number of employees, annual value of production and commercial diversification. Figure 2 and Figure 3 show graphically the evolution of the Mexican footwear exporting firms, by number of employees from 2007 to 2013.

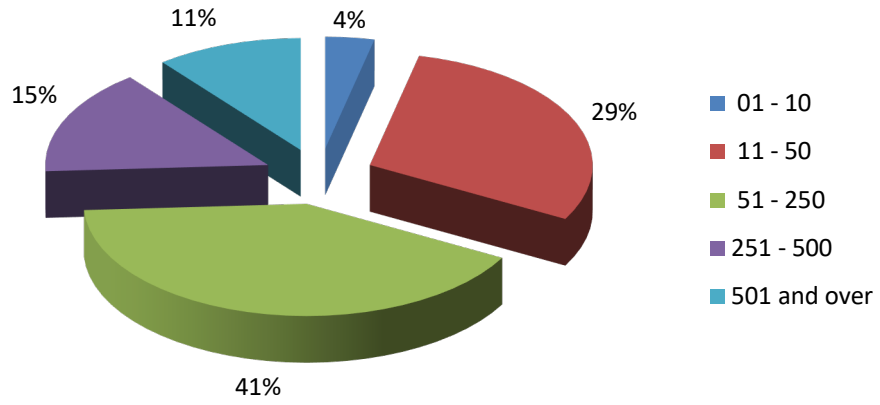

Figure 2 Mexican footwear exporting firms, by number of employees (2007).
Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics 2013)

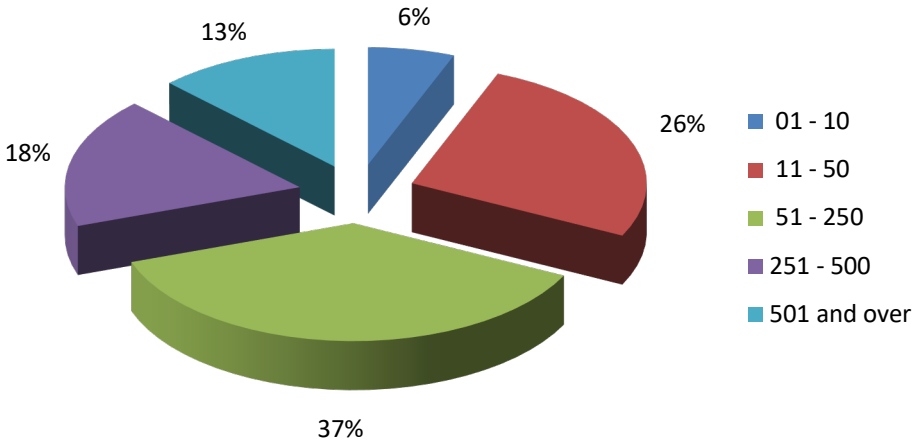

Figure 3 Mexican footwear exporting firms, by number of employees (2013).
Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics 2014)

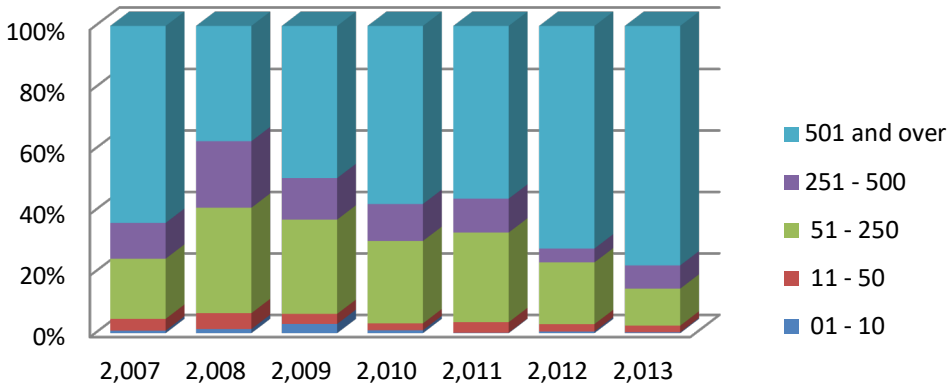

Figure 4 Mexican footwear volume exports (thousands of USD), by number of employees (2007-2013)
Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics 2013) (INEGI National Institute of Geography, Statistics and Informatics 2014)

Analysing the information presented in Figure 4, it can be observed that large footwear exporting firms (251-500 employees and 501 - >) have become more important through period 2007-2013; one of the implications of this fact was registered in 2008, when the international financial crisis begun in USA and caused that exportations of these 2 groups falling around 48%; only 5 years later this difficulty was overcome. It is also important to notice that in 2013 the recovery has not been possible for medium (51-250), small (11-50) and micro (01-10) organizations that have not reached the level of exportations of 2007. This is a first approach to the way in which the size of the organizations of this industry influences the way in which they face the economic difficulties and in general the world competition. The productivity of organizations and relations with international trade activity will be discussed later in section 4.

Continuing with the analysis in terms of number of employees, Figure 4 and Figure 5 show graphically the evolution of the Mexican footwear importing firms from 2007 to 2013.

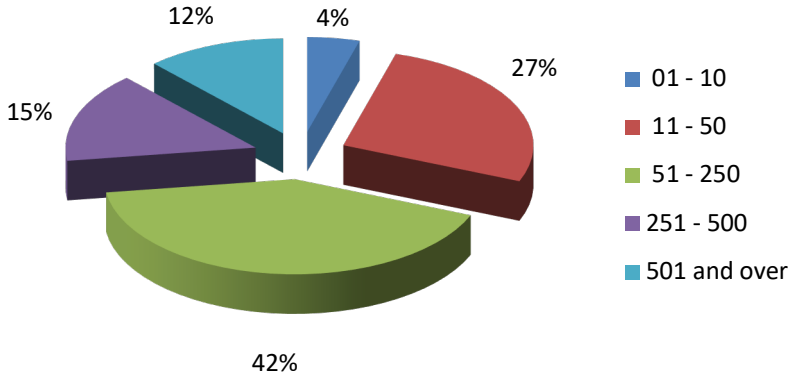

Figure 5 Mexican footwear importing firms, by number of employees (2007).
Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics 2013)

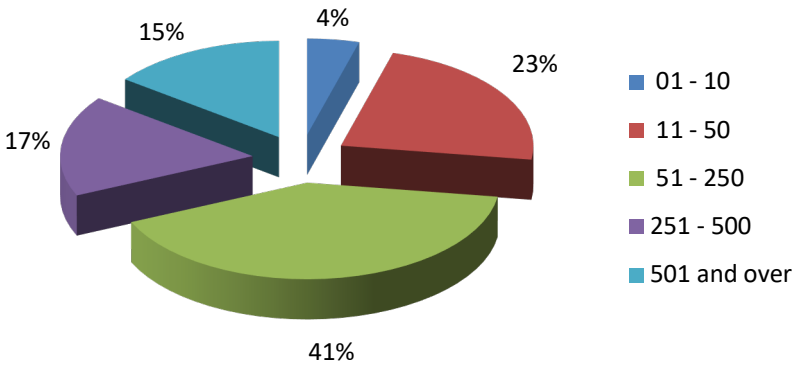

Figure 6 Mexican footwear importing firms, by number of employees (2013).
Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics 2014)

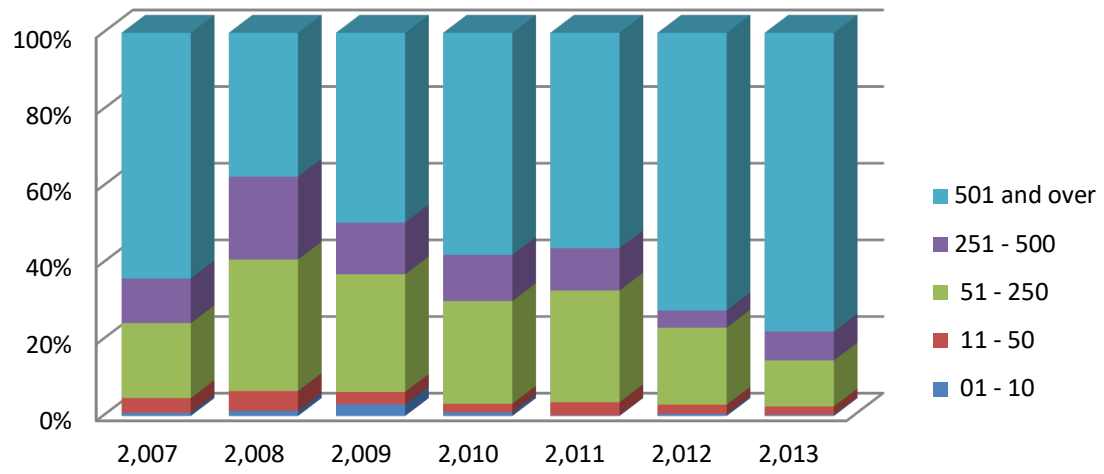

Figure 7 Mexican footwear volume imports (thousands of USD), by number of employees (2007-2013).

Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics 2013) (INEGI National Institute of Geography, Statistics and Informatics 2014)

Derived from the analysis of this information presented in Figure 7, it can be observed that large footwear importing firms (251-500 employees and 501 – >) had also become more important through period 2007-2013, as it occurred with exporting firms. In 2008 when the international financial crisis begun, imports fell around 33%, less than the export activity; one of the reasons is that origin market of imported products is Asia. But it is meaningful to observe that until 2012 only the largest companies in terms of employees (250- > category) were able to reach their 2007 import levels and for 2013 no other group of footwear industry have had this recovery capacity, making possible to affirm that although the imports fall was initially lower, the effects were greater due to the recovery time.

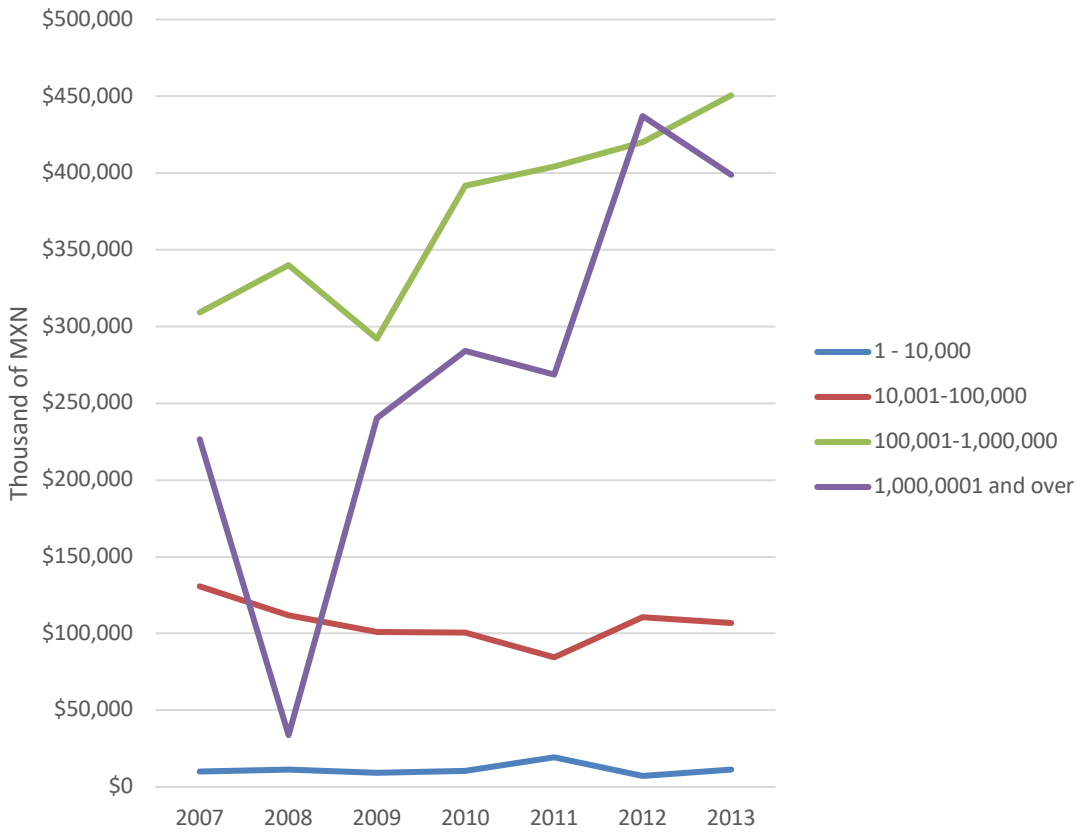

Figure 8 Mexican footwear volume exports (thousands of MXN), by value of production (2007-2013).

Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics 2013) (INEGI National Institute of Geography, Statistics and Informatics 2014)

Figure 8 shows that the firms with a volume of exports of 1-10,000 and 10,001-100,000 Mexican pesos (MXN) are the most stable and constant in their tendency over time. However, during the period 2007-2013 the first group (1-10,000) growth of around 12% was quite poor, and for the second group (10,001-100,000) was registered a fall of 18%. The 100,001-1,000,000 group is the strongest of the studied period because it registered a growth all years, except in 2009. Finally, and despite being the group of higher production (1,000.001 and >), its affectation of 85% was the biggest in 2008; a recover of level exports was reached the following year but that fall evidences the exposure when the market is so concentrated.

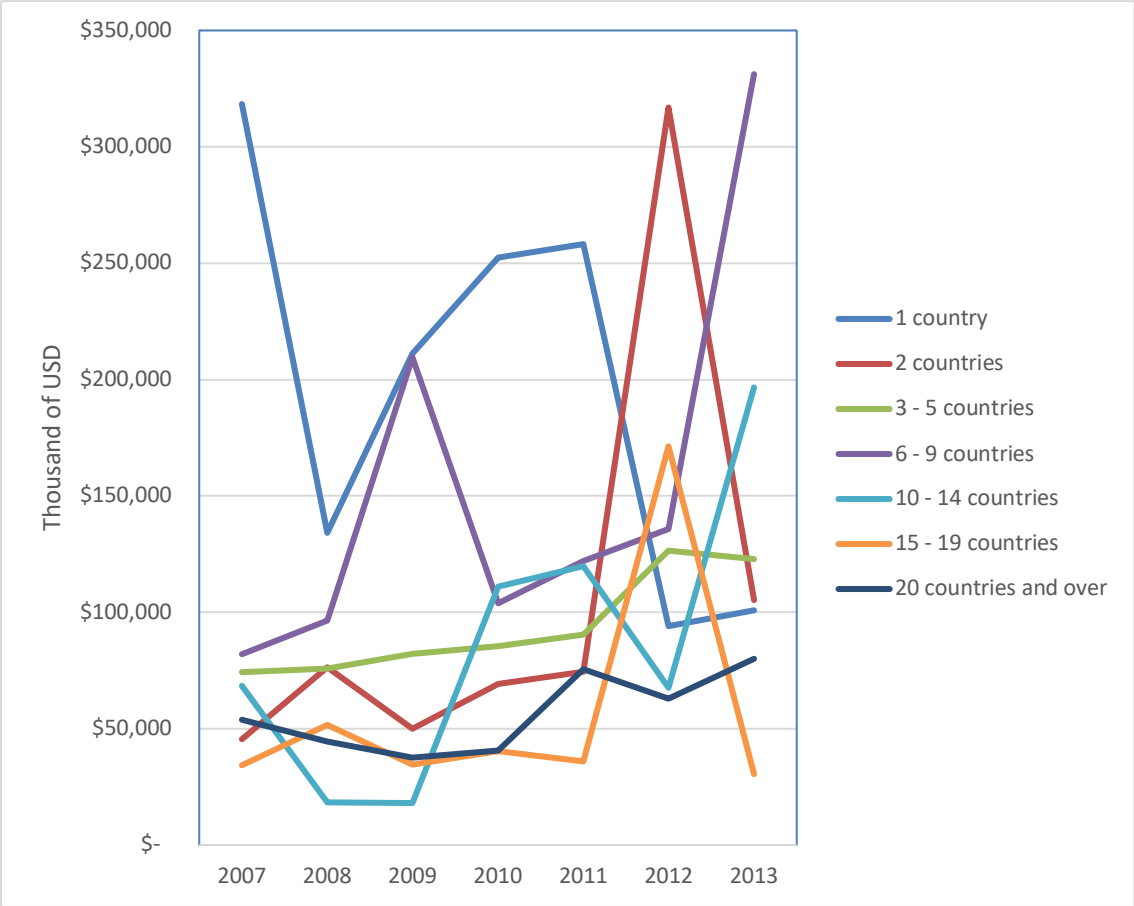

Figure 9 Mexican footwear volume exports (thousands of MXN), by market diversification (2007-2013).

Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics, 2013) (INEGI National Institute of Geography, Statistics and Informatics, 2014)

Information presented in Figure 9 confirms the negative effects of market concentration. It is evident that firms that only export to one market were much more affected than those that export their products to more than one country. In the case of Mexican exporters the main market is often USA. Indeed, the first group (1 country) is the only one that has not registered a growth in their exports during studied period; in 2013 it exported less than one third of the 2007 volume exports. The main implication of this is not only the necessity, but also the urgency to increase market diversification for firms that try to be competitive in global markets, where crisis appeared regularly in different regions of the world.

It is worth to mention that an excessive market diversification seems not to be recommendable since the firms that export to 15-19 countries registered a fall of 11% during 2007-2013 and those that exported to 20 - > countries registered a growth of 48%. Although the latter may be seen as a good result, it is not when compared to the growth of 131% reached by the 2 countries category, 66% by 3-5 countries category, 304% by 6-9 countries category, and 188% by 10-14 countries category.

Without the pretension to establish a rigid rule and given the dataset analysed, it is observed that for an exporting firm in this industry, to have from 2 to 14 different markets seems to be the best option.

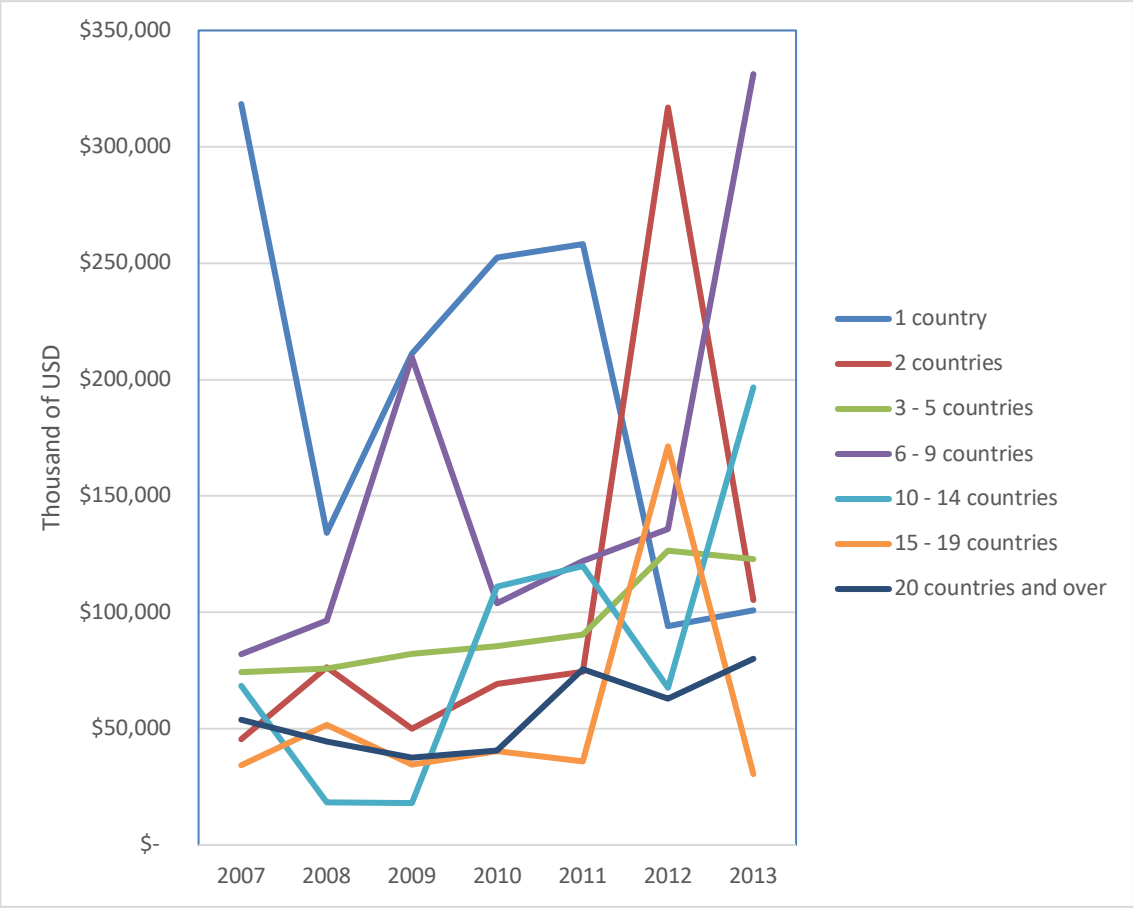

Figure 10 Mexican footwear volume imports (thousands of MXN), by value of production (2007-2013).

Source: Authors' elaboration with information of **(**INEGI National Institute of Geography, Statistics and Informatics, 2013) (INEGI National Institute of Geography, Statistics and Informatics, 2014)

Figure 10 shows that the firms with annual production of 1-10,000 and 10,001-100,000 Mexican pesos (MXN) are also the most stable and constant in their tendency over time, similar to what was represented in Figure 6. The remarkable fact of this figure is that for the importing activity, the 1,000,001 - > group had a growth of 77% being the only category that is over the 2007 level imports. Thus, the import activity is concentrated in large companies that take advantage of the accesses to foreign products to satisfy specific needs of price or quality.

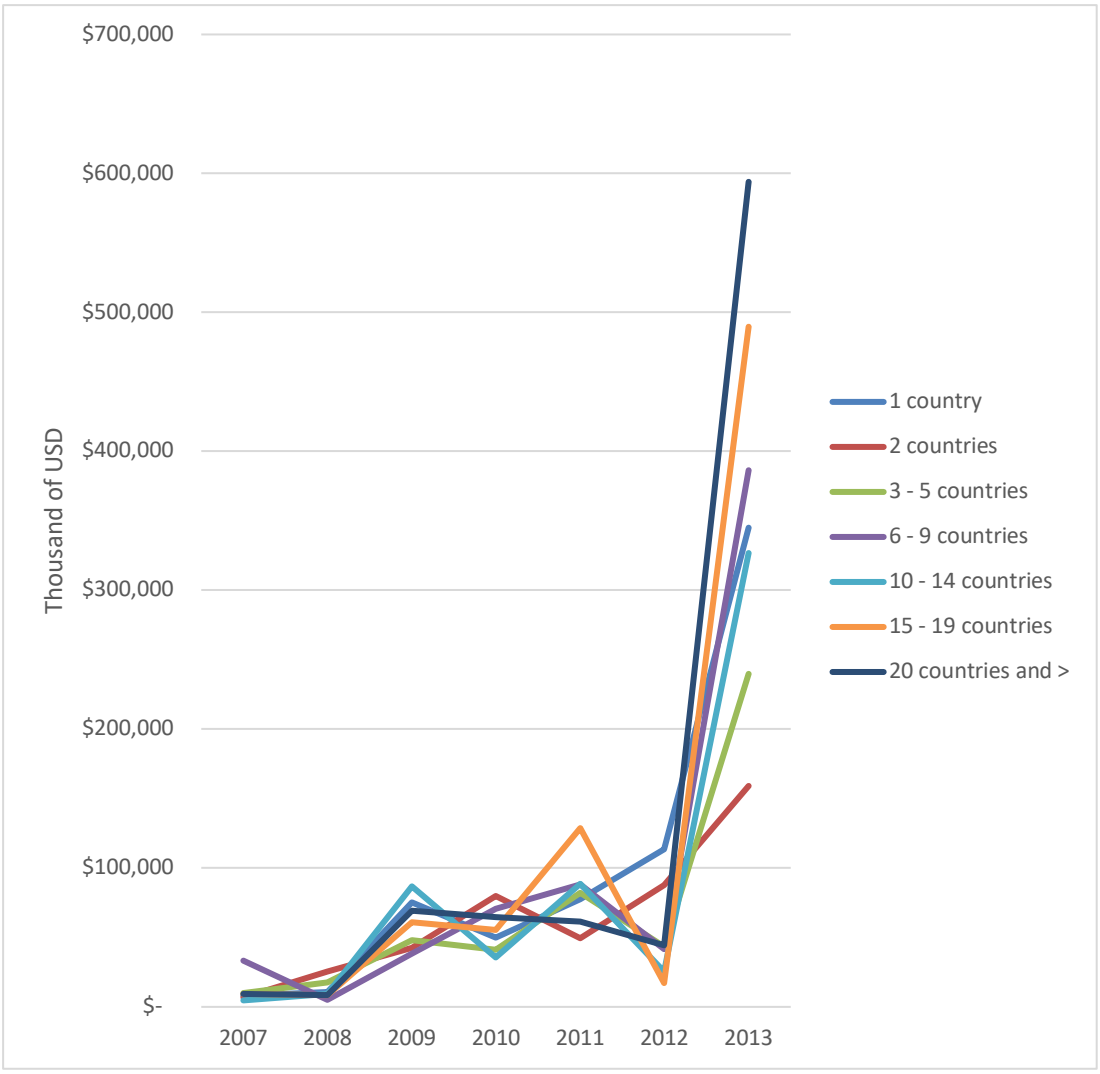

Figure 11 Mexican footwear volume imports (thousands of MXN), by market diversification (2007-2013).

Source: Authors' elaboration with information of (INEGI National Institute of Geography, Statistics and Informatics, 2013) (INEGI National Institute of Geography, Statistics and Informatics, 2014)

Figure 11 shows a generalized growth of level on imports during 2007-2013. Particularly in 2013, there was a considerable increase in the level of imports that is explained by the exchange variation of the Mexican peso against the US dollar.

4 Total Productivity Factor (TPF)

The measurement of the productivity of the different factors involved in the production process has been contemplated in the agenda of economic issues since (Solow 1957) in his work proposed a practical way of measuring the productivity. This measurement is carried out; by estimating a residual, which is used to represent the increase or decrease of the production which is not explained by the increases or decreases of the different factors involved in productivity (capital and labor in first place) and which can be associated with the term productivity of factors we know nowadays.

Later developments incorporated methods to measure this residual incorporating other factors such as energy, materials and services. These developments are concentrated on what is known as growth accounting (Bureau of Labor Satistics 1982), in which by the construction of index numbers, the residual and the contributions to the growth of the factors involved in

production can be estimated.

Table 1 included in this study present the contributions to the growth of the factors involved in the production process, as well as the contribution of each of them: capital and work, taking into account also the incorporation of more factors methodologically limited such as energy, materials and services, as well as the total productivity of the factors related to the growth of the value of production in terms of constant values at 1995 prices (INEGI Statistical Institute for Geography, Statistics and Informatics 2014).

4.1 Sources of Information

To calculate the TPF the following sources of information were considered:

- Publications of Goods and Services Accounts (CBYS) of the National Accounts System of Mexico (SCNM). This is the main source of information by providing data of the main economic variables and the jobs.
- Monthly Industrial Survey 1989-2009, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- Monthly Manufacturing Industry Survey 2007-2011, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- Annual Industrial Survey 1989-2009, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- Annual Manufacturing Industry Survey 2008-2011, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- Trade, services and construction companies' surveys, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- Economic censuses 1993, 1998 and 2003, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- National Employment Survey (ENE) 1988, 1991 and 1995-2004, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- National Survey of Occupation and Employment (ENOE) 2005-2011, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- Supply and Use Tables 2003 (COU), published by the National Institute of Geography, Statistics and Informatics of Mexico.
- Input Matrix Product 2003, applied and published by the National Institute of Geography, Statistics and Informatics of Mexico.
- Minimum Salaries, of the National Minimum Salaries Commission Minima.
- The balance of payments, 1989-2011 series, published by the Bank of Mexico.
- Producer and Consumer price indices, series 1989-2011; from the Bank of Mexico
- Finally, the Administrative Records of several companies, considered by the National Institute of Geography, Statistics and Informatics of Mexico.

4.2 Methodology

Traditional sources of economic growth are capital (K) and labor (L). Therefore, emphasis on the importance of both the quantity of used factor, and its contribution to the growth product has been highlighted. In addition to capital and work, the contribution of the intermediate inputs used in production, considering energy (E), Materials (M) and Services (S) are incorporated in the measurement of Total Productivity Factor (TPF).

The capital factor is formed by ICT (Information and Communication Technologies) and non-ICT assets. For the labor factor, eighteen different typologies have been considered, corresponding to work hours, identified by sex, 'male' and 'female'; by age groups, '15-29', '30-49' and 'over 50', and disaggregated by levels of schooling: 'low' which corresponds to primary

education, ‘half up’ which corresponds to High school and ‘high’ which corresponds to higher education.

Considering these factors, within the conceptual framework of growth accounting and the LA-KLEMS Model the TPF was estimated, in order to know the participation and contribution to the product of the various factors. All calculations are performed over time, for reasons of exposure, the time subscripts. The KLEMS model is based on a function of production of the form:

$$\int(x) = (K, L, E, M, S) \qquad (1)$$

A change in the product can be expressed as follows:

$$\Delta Y = \alpha\Delta K + \beta\Delta L + \gamma\Delta E + \varepsilon\Delta M + \theta\Delta S + \Delta A \qquad (2)$$

Where K, L, E, M, S mean capital, labor, energy materials and services respectively, the Δ symbol means growth; the greek letters $\alpha, \beta, \gamma, \varepsilon, \theta$ are the contributions of factor considered in the production value; and letter A is the indicator of the TPF.

In order to obtain the TPF indicator as a residual, the weighted variations of the factors mentioned above are subtracted from the value production change:

$$\Delta A = \Delta Y - \alpha\Delta\mathrm{K} - \beta\Delta L - \gamma\Delta E - \varepsilon\Delta M - \theta\Delta S \qquad (3)$$

TPF considers technological change, innovations techniques, changes in the way of administration and organization of enterprises, as well as changes in the social composition.

4.2.1 Capital services

The methodology to calculate the capital services is based on (OECD 2009). In this document it is recommended to start the calculation of this services by identifying some investment data: formation brute of capital fixe (FBKF). Referencing the series of the investment to a specific year allows to have the stock in comparable and referenced ‘efficiency units’ to a specific year. The FBKF by destination in constant values of the basis year, is used in the application of the perpetual inventories to obtain the stock of capital net total or stock wealth; it starts with the obtaining of the initial stock:

$$Stock\ inicial = FBKF_{inicial}/(TC_{FBKF} + \delta) \qquad (4)$$

Where:
TC_{FBKF}= Long-term growth rate
δ = Depreciation rate

The depreciation rate used in this method is calculated through the double decline that relates the useful lives of the assets with a coefficient of decline, this rate is used in the rest of the calculations.

The total capital stock is calculated as follows:

$$W^R = W^I + FBKF - \delta\,(FBKF + W^I) \qquad (5)$$

Where:
W^R = total capital stock
W^I = initial capital stock
$FBKF$ = formation brute of capital fixe

δ = depreciation rate

Obtaining the total stock, the next step is to calculate the productive stock that is considered as part of the total stock participating in the production.

$$K^t = FBKF + W^R \qquad (6)$$

Where:
K^t = productive stock

To complete the calculation of the capital services it is necessary to estimate a rental price of capital (Cost of user or use). This price is not obtained directly because it is difficult to know the price of income from second-hand capital assets, besides the owner of the capital goods often is also the producer himself and the price is unknown. Therefore, it is necessary to estimate it. This process begins by obtaining the rate of return on capital (Endogenous) for economic activities involved in this project:

$$r = \frac{\left\{\frac{SBO+T}{IPC} - \Sigma_{k=1}^{N}[\delta(1+i)-i]K\right\}}{\Sigma_{k=1}^{N} K} \qquad (7)$$

Where:
SBO = Gross operation surplus
IPC = Consumer price index
T = Others taxes
δ = Depreciation rate
i = FBKF prices index
K = productive stock

With the obtained rate of return, then the user cost is calculated followed by the capital services using the following equation:

$$U = (IPC)\,[r + \delta\,(1+i) - i]K \qquad (8)$$

Where:
U = User cost
r = Return rate
δ = Depreciation rate
i = FBKF prices index
K = productive stock

Finally, in the construction of the capital services indices the user cost is considered as a weight, being the productive stock the indicator of the variation of each asset to construct Laspeyres type chained volume indexes and Paasche, which serve as a basis to forming the Fisher ideal index:

$$ISk_F = \sqrt{ISk_L * ISk_P} \qquad (9)$$

Where:
ISk_F = Capital services Fisher index
ISk_L = Capital services Laspeyres index
ISk_P = Capital services Paasche index

4.2.2 Labor services

When estimating productivity it is recommended to measure the input labor without considering

the number of people, but the measurement of hours worked, given that: 'For each one of the worker categories, it is assumed initially that the flow of labor services is proportional to hours worked' (Jorgenson Dale W. s.f.).
Derived from the above it is clear that for the measurement of labor services is constructed a flexible chained index that takes into account the average of two underlying periods:

$$SL = \sum_{i=1}^{n} \frac{1}{2}\left[\frac{(w_t * H_t + w_{t-1} * H_{t-1})}{\sum w_t * H_t + \sum w_{t-1,} H_{t-1,}}\right]\left(\frac{H_t}{H_{t-1}}\right) \qquad (10)$$

Where:
SL = Labor services index
w = Salary per hour
H = worked hours

This equation shows how the labor services was calculated, considering the following: Weighting of the worked hours worked by the participation of each breakdown of labor (gender, age and schooling) in the total remuneration for the studied period (t) and the previous period (t-1) multiplied by the simple variation of worked hours.

4.3 Total Productivity Factor (TPF) Mexican Footwear Industry Results

After analysing and securing the capital and labor productivity factors, and intermediate inputs, the next step is to estimate the TPF starting from the growth of the production value and the contribution of capital services opened to ICT and non-ICT assets; labor services, by age groups and levels of scholarship; and the opening of energy, materials and services intermediate inputs.

Subsequently, the residual or TPF was calculated from growth of the production value and the difference with the total contribution of the productive factors.

5 Results

In general, when analysing separately the tendency of the production value and weight contributions of the components: Capital services (K), Labor services (L), Energy (E), Materials (M) and Services (S); it is observed that the growth or fall of TPF is mainly determined by the production tendency.

Table 1 Production of Mexican Footwear Industry

	Production value	Total Productivity Factor
2007	**-1.61**	**-2.1**
2008	**-3**	**-2.98**
2009	**-4**	**-3.09**
2010	**9**	**2.78**
2011	**-1.74**	**-1.41**

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Table 1 shows the production value and the total productivity factor for the Mexican footwear industry. It is convenient to mention that analysis was made considering only years 2007-2011 due to information of 2012 and 2013 years is not currently available.

In conclusion, it can be observed that the growth of TPF, is negative in almost all the years, determined by the small growth of the production value associated with growth in capital services and labor services that reduce the residual, i.e. Total productivity factor (TPF). It was also observed that a growth in the input does not necessarily generate a growth in production, which lead to study in detail the way to foment the total productivity factors.

5.1 Pearson Correlation Coefficients

In Table 2 is summarized the Pearson Correlation Coefficients obtained for the relation between production value to exporting and importing firms respectively. Also is shown the total productivity factor to total exports and also imports.

Table 2 Pearson Correlation Coefficients, Mexican Leather Footwear Industry (2007-2011).

ρ (Production value - exporting firms)	0.4915	0.7028	ρ (Total Productivity Factor - exports)
ρ (Production value - importing firms)	0.3219	0.6511	ρ (Total Productivity Factor - imports)

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Table 3 indicates that firms of the '51-250' and '501 and >' groups, have a strong correlation to the exports. It is interesting to notice that the '251-500' group has a weaker correlation to that same variable, different from expected result. Additionally, the '01-10' group has a stronger correlation than the '11-50' group. These results seem to imply that correlation of '01-10' and '11-50' groups is nonlinear to exports.

Table 3 Pearson Correlation Coefficients, Exports – Exporting firms by number of employees (2007-2011).

Description	01 - 10	11 - 50	51 - 250	251 - 500	501 and >
ρ (exports - exporting firms)	0.3547	0.1192	0.8593	0.5423	0.9591

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Table 4 shows that '501 - >' group have a very strong correlation to average exports which can be easily explained by the competitiveness and acquired knowledge by the firms of this category. The results of '11-50' and '51-250' categories have almost the same magnitude in absolute values, but opposite direction; thus an increase or decrease in any of the variables have a contrary effect for each group.

Table 4 Pearson Correlation Coefficients, Average exports – Exporting firms by number of employees (2007-2011).

Description	01 - 10	11 - 50	51 - 250	251 - 500	501 and >

ρ (average exports - exporting firms)	-0.2373	-0.5182	0.5983	0.1535	0.918

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Table 5 indicates that the '100,001 – 1,000,000' group has a stronger correlation to exports than the '1,000,001 - >' group which is different from expected result. In fact the result of the '1,000,001 - >' group is almost of the same magnitude than the '1-10,000' group.

Table 5 Pearson Correlation Coefficients, Exporting firms by number of employees - Exports (2007-2011).

Description	1 -10 000	10,001-100 000	100,001 - 1,000,000	1,000,001 - >
ρ (exporting firms - exports)	0.4401	0.0611	0.9144	0.4703

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Table 6 shows that the '10-14 countries' category by diversification market has the strongest correlation to exports; the difference from the '1 country' category is not so considerable but the risk for this category of reduced exports during crisis time is extremely high, as Figure 9 shows.

Table 6 Pearson Correlation Coefficients, Exporting firms by diversification market - Exports (2007-2011).

Description	1 country	2 countries	3 - 5 countries	6 - 9 countries	10 - 14 countries	15 - 19 countries	20 - > countries
ρ (diversification market - exports)	0.5173	0.0267	0.2115	0.1332	0.7749	C*	C*

*C means confidential information due to few firms

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Table 7 demonstrates that Pearson Correlation Coefficients Imports - Importing firms for all the groups ('01-10'- '11-50', '51-250', '251-500' and '501 - >') are very strong; more than the obtained resulted for the exporting activity of the Mexican footwear leather industry. Therefore it is necessary to promote the exports and to reorient the type of imported products to create products of more added value to strengthen this industry.

Table 7 Pearson Correlation Coefficients, Imports - Importing firms by number of employees (2007-2011).

Description	01 - 10	11 - 50	51 - 250	251 - 500	501 - >
ρ (imports - importing firms)	0.8246	0.7559	0.6692	0.7384	0.7665

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Table 8 shows that the average imports correlation to average imports is negative for the '1-10' and '11-50' groups while it is positive for the rest of the groups. It is observed that for the '50-250' group the relation is almost perfect.

Table 8 Pearson Correlation Coefficients, Average imports - Importing firms by number of employees (2007-2011).

Description	01-10	11-50	51 - 250	251 - 500	501 - >
ρ (average imports - importing firms)	-0.0835	-0.1752	0.95	0.5629	0.6045

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Table 9 indicates that correlation coefficients are negative for the '1-10,000', the '10,001-100,000'and the '100,001-1,000,000' categories and only positive for the '1,000,001 - >' category. This demonstrate this group is the best to be objective of importing reorientation activity.

Table 9 Pearson Correlation Coefficients, Importing firms by value of production - Imports (2007-2011).

Description	1 -10 000	10,001-100 000	100,001 - 1,000,000	1,000,001 - >
ρ (importing firms - imports)	-0.6154	-0.7133	-0.8037	0.821

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

Finally, Table 10 shows that market diversification seems to be more important for importing activity than for exporting activity even for the '10-14 countries' group and for the '20 - > countries' group the importing firms correlation to imports is negative.

Table 10 Pearson Correlation Coefficients, Importing firms by diversification market - Imports (2007-2011).

Description	1 country	2 countries	3 - 5 countries	6 - 9 countries	10 - 14 countries	15 - 19 countries	20 - > countries
ρ (diversification market - imports)	0.7247	0.6048	0.5055	0.1885	-0.1924	0.7108	-0.2242

Source: Authors' elaboration with information of (INEGI Statistical Institute for Geography, Statistics and Informatics 2014)

6. Conclusions

The main implications of the shown results (see Table 2) are the following: Firstly, the correlation of production value with number of exporting companies is bigger than the correlation with importing companies.

In the first case, 0.4915 cannot be considered a strong relationship between both variables only when considering the characteristics of the Mexican leather footwear industry, previously explained in section 3.

Then it is possible to understand that a few firms contribute to the production value growth of the industry and that the number of importing firms seems to be not as important (0.3219) as the first mentioned. It is essential to keep in mind that some exporting firms are also importing companies thus, this factor has to be considered in a holistic way.

Secondly, the correlation of Total productivity factor to volume of exports is strong (0.7028) and from this it is concluded that is a very important factor to get a higher level of competitiveness for the whole industry. Efforts must be directed to encourage the exporting activity, mainly in companies of medium size and try to sell their products to a wide range (2-14) of different countries.

Finally, the correlation of Total productivity factor to imports is also significant and has to be considered when industry and market projections are made. If a more diversified offer of products is available in Mexican intern market, strengthened by the importation of good quality products, the competitive capacity of Mexican producers will be increased, which will gradually be strengthened and able to compete better in the global market.

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