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Production, Growth and International Competitiveness of Mexican Honey

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Abstract

The objective of this research is to analyze the competitiveness and participation that the main honey exporting countries have, and their behavior in the global market, opening the way to other emergent economies in the international blocks battle and the economic globalization. The American study case is shown because it is the main buyer and for the importance that its providers have in the commercial balance, contrasting the competitive performance between Mexico and its competitors using the competitiveness of exportations in the market method for the 2001-2006 period. The national importance of the exportations to the American market of the apiculture sector for Mexico during the last 16 years is approached in the first section; in the second section it is shown how apiculture has developed internationally using a disclosed advantage index, in the third section the behavior of exportations and importations is shown, and finally a competitiveness analysis is made using the constant market participation analysis method (CMPAM).

Keywords

Economic Globalization, Apiculture Sector, Competitiveness Analysis

1. Introduction

The competitiveness analysis started in the 17th century, classic economists made reference to the absolute advantage, starting with Adam Smith who made researches about the specialization of a country as a way to obtain better profits by focusing on commerce as a the generator of international growth, according to Smith the absolute advantage was found in the specialization of a country as a way of minimizing the absolute costs (Lombana & Rozas, 2009), afterwards David Ricardo sustained that commerce is a source of mutual benefits for the

countries. Even though both theories are arguable, the truth is that Adam Smith and David Ricardo set the ground for international commerce that is now taken into account by the specialists who have also signaled that the inter and intra industrial commerce can impulse the economic growth of a nation (García, & Maldonado, 2013).

On the other hand, Michael Porter set the bases of competitiveness in his work "The competitiveness advantage of nations" where he stressed the fact that the abundance of a country depends directly on its competitiveness based on its productivity, he also signals that among the macroeconomic aspects that open the way for competitiveness in a quantitative way we may find the commercial performance and the payment balance (Lombana & Rozas, 2009).

2. Apiculture in Mexico

The bee-keeping activity in Mexico is traditionally found in the south of the country for its geographic characteristics that allow to create the proper habitat and bee production through the variety and availability of the flora and fauna, making Yucatan the main honey producing entity followed by Campeche (SIAP-SAGARPA, 2017) (**Figure 1**).

Economic and socially, apiculture has great importance because of the number of jobs in the rural countryside, and also because a great part of the production is destined to the international commerce allowing to obtain foreign currency, just between 1995 and 2008 apiculture captured in average 12.4% of foreign currency for the national livestock subsector, while in the agriculture and livestock sector it represented the 12.4% (Magaña & Leyva, 2011).

Magaña, Moguel, Sanginés, & Leyva (2012) hold that Mexico is the sixth world producer, placed below China, Argentina, Turkey, Ukraine, and the United States, in terms of exportation it is placed below China and Argentina, with the main destiny being the European market where it is recognized for its quality and nutritional properties.

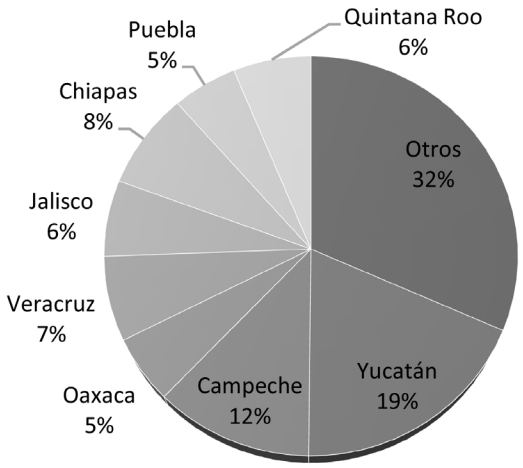

Figure 1. Bee population (hives). Source: own making with SIAP-SAGARPA data (2017).

The food, agriculture and fishing information service (SIAP-SAGARPA, 2016) points out that nowadays that 68% of the production is exported, its main destinations are Germany, The United States, and The United Kingdom.

3. Theoretical Premise

Few authors have studied honey in the international market; most of the researches are focused in the local market.

Magaña & Leyva (2011) determined that the production costs of honey delve into the payment of the workforce and the purchase of the consumable goods, causing a variation in the profitability of the apiculture exploitation. However, besides this, their results show profitability maintaining its social and economic importance and showing its competitiveness linked to the exterior.

Other experts (González, Rebollar, Hernández, & Guzmán, 2014) have calculated the commercialisation margins of the product determining that it is the retailers who obtain in average the biggest margin in August, October and January.

Contreras, Pérez, Echazarreta, Cavazos, Macías, & Tapia (2013) focused in the apiculture at Jalisco mentioning the loss of competitiveness in the international market adding origin variables such as high production costs, the difficult access to credit and the laggard of technological innovation. They also mention the main problems that the beekeeper faces and the ones where he may have an influence or not: climate change, African bees, lack of training and organization of the beekeepers, hive diseases (varroosis and loques) retailers and the abundant competition.

On the other hand, Magaña, Saginés, Lara, Salazar, & Leyva (2017) studied the competitiveness of honey concluding that there is international participation and presence of Mexican honey even with the negative environmental events.

With all the previous information, this paper object if is to quantify the worldwide competitiveness of Mexican honey, in its main exporting destinations (Germany, The United Kingdom, and The United States) facing Argentina (its main competitor in Latin America) under the hypothesis that Mexican honey is competitive in relation to its competitors.

4. Methodology

To achieve the set goal, data from honey importations and exportations to the main destinations was used, once they were obtained, the rate of comparative and revealed advantage (VRE) was analyzed, this rate was implemented by Balassa (1965, quoted by Omaña, Almora, Cruz, Hoyos, Quintero, & Fortis, 2014) its results show that while the magnitude grows, the nation is considered more specialized a competitive.

The rate VRE is defined as:

$$VRE_{ai} = \frac{\left(X_{ai}/X_{ni}\right)}{\left(X_{ar}/X_{nr}\right)} \tag{1}$$

where:

VRE_{ai} = is the relative advantage of the merchandise "*a*" exportations in the country "i";

X_{ai} = is the value of the merchandise "*a*" exportations in the country "*i*";

X_{ni} = is the value of the total exportations (except for merchandise "*a*") in the country;

X_{ar} = is the value of the merchandise "*a*" exportations in the world (except for the country "*i*");

and finally

X_{nr} = is the total value of exportations (except for merchandise "*a*") in the world (except for the country "*i*").

Omaña et al. (2014) indicate the possibility of identifying the VER for a specific market using the value of importations.

With these indicators we know what the competitiveness of Mexican honey exportations have represented thorough time. Then the rate of relative advantage of exportations proposed by Vollrath (1991) is calculated, this is a way of measuring the competitive advantages for agricultural products through the determination of a rate for specific agricultural products that uses real data from commerce and allows to differentiate the countries with a competitive advantage for a specific product from those who don't have it, and it also makes it easier to compare the trends of revealed competitiveness among the countries that compete in the market with this product.

$$s = \frac{q}{Q} \tag{2}$$

where the meaning of each variable is:

s = Market participation of a specific country.

q = Exportations from the country to the reference market.

Q = Exportations from the group of competitor countries that export to the reference market (Standard).

Take the previous formula and find q and then make a differentiation regarding time, obtaining:

$$\Delta q = q^1 - q^0 = s^0 \Delta Q + Q^1 \Delta s \tag{3}$$

$$\begin{aligned} \Delta q = {} & s^0 \Delta Q + \left[\sum_i s_i^0 \Delta Q_i - s^0 \Delta Q\right] \\ & + \left[\sum_i \sum_j s_{ij}^0 \Delta Q_{ij} - \sum_i s_i^0 \Delta Q_i\right] \sum_i \sum_j Q_{ij}^1 \Delta s_{ij} \end{aligned} \tag{4}$$

$$s^0 = \frac{q^0}{Q^0} = \frac{\sum_i s_i^0 Q_i^0}{\sum_i Q_i^0} \tag{5}$$

$$s^1 = \frac{q^1}{Q^1} = \frac{\sum_i s_i^1 Q_i^1}{\sum_i Q_i^1} \tag{6}$$

$$s^H = \frac{q^H}{Q^H} = \frac{\sum_i s_i^0 Q_i^1}{\sum_i Q_i^1} \tag{7}$$

$$\text{Structural Effect} = s^H - s^0 = \frac{\sum_i s_i^0 Q_i^1}{\sum_i Q_i^1} - \frac{\sum_i s_i^0 Q_i^0}{\sum_i Q_i^0} \tag{8}$$

$$\frac{\sum_i s_i^1 Q_i^1}{Q^1} - \frac{\sum_i s_i^0 Q_i^0}{Q^0} = \frac{\sum_i s_i^0 Q_i^1}{Q^1} - \frac{\sum_i s_i^0 Q_i^0}{Q^0} + \frac{\sum_i s_i^1 Q_i^0}{Q^1} - \frac{\sum_i s_i^0 Q_i^0}{Q^1} + \frac{\sum_i s_i^1 Q_i^1}{Q^1} - \frac{\sum_i s_i^0 Q_i^1}{Q^1} - \frac{\sum_i s_i^1 Q_i^0}{Q^1} + \frac{\sum_i s_i^0 Q_i^0}{Q^1} \quad (9)$$

$$\Delta Q = rQ^0 - Q^0 + \left[\sum_i r_i Q_i^0 - rQ^0\right] + \left[\sum_i \sum_j r_{ij} Q_{ij}^0 - \sum_i r_i Q_i^0\right] + \left[Q^1 - \sum_i \sum_j r_{ij} Q_{ij}^0\right] \quad (10)$$

$$\Delta Q_i = \sum_i \Delta q_j = \sum_i q_{ij}\left(\frac{\Delta M}{M}\right) + \sum_i q_{ij}\left[\left(\frac{\Delta M_j}{M_j}\right) - \left(\frac{\Delta M}{M}\right)\right] + \sum_i q_{ij}\left[\left(\frac{\Delta q_{ij}}{q_{ij}}\right) - \left(\frac{\Delta M_j}{M_j}\right)\right] \quad (11)$$

Demand effect Structural effect Competitiveness effect

5. Results

Rate of comparative revealed rate (VRE).

Grid 1 shows the VRE of Mexico and Argentina, in the international and German markets, it is observed that, even if Argentina shows rates with higher relevance in the international market, showing more competitiveness and that justifies its placement in the global market of honey producers, a negative trend is shown in its numbers, it is the same situation for Mexico. The results contrast

Grid 1. Rate of comparative revealed rate (VRE).

Year	Mexico		Argentine	
	International	Germany	International	Germany
2001	2.37	55.44	35.92	165.32
2002	3.47	54.96	39.55	148.74
2003	3.20	34.94	41.50	161.56
2004	3.24	47.36	37.01	136.84
2005	2.17	34.82	46.75	195.96
2006	2.79	23.58	47.71	167.96
2007	3.20	29.80	37.06	134.55
2008	3.51	28.33	31.63	131.17
2009	3.42	30.14	27.86	116.57
2010	2.87	30.39	25.74	100.50
2011	2.75	34.97	28.64	64.61
2012	2.87	32.94	28.15	74.40
2013	2.70	38.05	25.54	39.03
2014	3.01	42.81	24.29	35.47
2015	2.98	43.80	20.96	34.70
2016	1.77	27.58	20.67	74.79

Source: own making.

with the description of Magaña et al. (2017) who reported Mexico as the 1st place in honey competitiveness among the producing nations; however it coincides when it is affirmed that "National production has experienced an evident diminution". The same event happens in the destination market they share, the competitiveness of both countries has decreased as the period of study goes by. The merchandises flux has revealed less efficiency in Mexico and loss of competitiveness for both.

In the last 100 years, the gradual industrialization of the regions has taken to important changes in terms of demand, that derivate from the exportation of manufactured products. On the other side, industrial equipment and the modern transportation are important for the consumable goods of the textile industry, it is also well known that with the pass of time, producing nations have shown different degrees of adaptability to this process.

The purpose of this investigation is to make an analysis of the changes in the worldwide demand of honey exportations and the competitive position of the main producing nations in the world. With the objective of determining the market fee changes, the global market may also be explained by the composition of each product from the country's exportations or by the fee of the global market of a country of the global market. It is also explained by the difference between the hypothetical market fee and the change fee, caused by the structural changes in the international market. The difference between real (final) and hypothetical, the fee was referred on how the change was caused by changes in competitiveness. This method will later be known as "constant analysis of the market's actions" (Fagerberg & Gunnar, 1985).

The Shift-Share technique has been one of the most used methods when it comes to analyzing the growth in employment or rent of certain region. Even if it has an elevated popularity degree, that has been observed for decades within its multiple application, it has been highly criticized. The APCM it's an alternate term of the widely spread "change-participation" analysis (shift-share analysis) initially used by Creamer (1943). Also, the constant market participation method, CMS, is used; this method was popularized by Leamer and Stern (1970), which is a statistic technique that allows decomposing the growth in exportations to study their behavior and evaluate the degree that the structural factors and competitiveness explain its development in certain period.

Grid 2 shows the change in a country's exportation that is composed from the addition of 3 effects: structural effect, competitiveness effect or residual, and interaction effect or second order, which are determined by the expression. This means that the sales of the honey market have increased up to 234% in 2016, in the 2001 period of analysis, the result is independent from the increase or decrease that each enterprise has experienced.

Grid 3 shows that the German importations from Mexico have increased in the period analysis to a 220% on the other hand if we compare them with the Argentineans we can see that the increase was of 112% which represents un advantage for Mexico, that has a 232% raise in the analyzed product.

Grid 2. Mexico total honey exportations and participations (millions of dollars).

Year	Total international exportations	Honey international exportations	Mexico's total exportations	Total honey exportations	Honey exportations to Germany	Honey exportations to USA	Honey exportations to the UK
2001	6,115,023,861	457,500	158,386,217	28,074	15,576	4206	1589
2002	6,404,339,571	719,123	160,750,540	62,654	27,143	21,059	5471
2003	7,463,959,157	960,487	164,906,509	67,947	30,119	19,572	5146
2004	9,086,145,834	855,816	187,980,442	57,408	34,444	7412	8783
2005	1.0343E+10	708,646	214,207,306	31,836	16,414	2222	4382
2006	1.1953E+10	829,915	249,960,546	48,381	24,618	4735	6033
2007	1.3778E+10	894,129	271,821,215	56,454	31,346	5496	8426
2008	1.5973E+10	1,307,665	291,264,809	83,789	48,000	3788	11,274
2009	1.2317E+10	1,272,840	229,712,337	81,239	49,935	4580	10,013
2010	1.5061E+10	1,488,506	298,305,075	84,743	45,925	9799	8250
2011	1.8074E+10	1,699,967	349,326,582	90,359	49,474	9430	8688
2012	1.846E+10	1,763,852	370,706,658	101,497	55,471	19,707	9715
2013	1.896E+10	2,078,161	379,949,273	112,352	58,644	20,262	14,298
2014	1.897E+10	2,334,422	396,881,846	147,037	61,365	28,602	11,620
2015	1.6523E+10	2,274,653	380,600,857	155,986	76,658	21,400	15,551
2016	1.5862E+10	2,244,747	373,882,951	93,725	42,647	23,425	9518

Source: own making with trade map data from different years.

Grid 3. Mexico total honey importations and participations (millions of dollars).

Year	German importations in Mexico	Total value of German importations in Mexico	Value of honey importations in Germany	Total value of importations in Germany	Value of the German honey importations in Argentina	Total value of the German importations in Argentina	Honey Importations value in Germany
2001	17,734	1,384,541	112,286	486,022,068	28,702	751,475	112,286
2002	22,390	1,202,158	166,189	490,450,056	44,300	878,976	166,189
2003	24,475	1,745,656	241,470	601,761,022	70,153	1,082,124	241,470
2004	30,175	2,020,455	226,479	718,150,018	53,101	1,230,478	226,479
2005	19,237	2,570,031	167,654	779,819,058	51,785	1,229,159	167,654
2006	15,115	3,787,160	156,119	922,213,393	46,388	1,631,426	156,119
2007	27,609	5,110,368	192,036	1,059,307,813	50,068	2,052,646	192,036
2008	36,382	6,248,455	247,517	1,204,209,300	67,705	2,511,118	247,517
2009	36,599	4,448,935	256,093	938,363,080	64,344	2,022,483	256,093
2010	40,155	4,875,634	289,073	1,066,816,800	63,815	2,343,378	289,073
2011	46,676	6,052,116	277,955	1,260,297,500	45,034	3,160,171	277,955
2012	46,406	5,616,998	291,269	1,161,213,200	47,575	2,549,398	291,269
2013	55,806	5,246,946	331,859	1,187,314,600	24,394	2,236,347	331,859
2014	56,108	4,944,296	322,029	1,214,955,700	20,245	2,153,462	322,029
2015	67,817	5,038,653	325,011	1,057,616,386	18,101	1,697,239	325,011
2016	39,144	5,781,836	260,348	1,060,672,017	32,252	1,756,872	260,348

Source: own making with trade map data from different years.

For the honey exportation competitiveness, first a complete analysis of its behavior is made, from the value at production, the evolution of exportations, importations, and this give us the first approach.

Grid 4 shows that the method breaks down into three parts the raise in Mexico's honey exportations to the American, German and British markets during the period of study.

The first part called structural effect shows the impact of the growth of the exportations of the specific goods basket that the country exports. This effect is measured by applying to each exporting branch, the growth they registered in the total importer market, substracting the growth that would result if these branches would have expanded to the global rate that made it the total importer market.

A positive value is obtained when the Mexican exportations to the American market are controlled by merchandises that have a higher increase in exportation than the increase level of the manufacture of the United States.

The competitiveness effect has the most important meaning in this method. It tries to explain the changes in the country's participation in the global market that results from the next elements: 1) the variation of the relative prices of the products; 2) The capacity that the exporting country has to attend promptly and efficiently the needs of global demand; 3) the technological innovations; and 4) the incidence of trade politics.

The structural effect, the competitiveness effect and the structure effect are positive for all the countries, which represents the raise of honey demand has favored the countries that have a positive rate. However the growth effect and the market effect offer an improvement of the competitiveness to all the countries, even if the competitiveness effect turned out to be significant to the positive rates.

The structural effect for Mexico is 10,185, Germany 10,639, United States 35,245 and United Kingdom 10,215, the competitiveness effect favors the United States with 23,524 and the growth effect is better for the United Kingdom. 75,689 are positive for all countries, which represents that the increased honey demand has favored countries that have a positive index. However, in the expansion area of the United States has been favored with 7869, Mexico shows an area of opportunity.

Grid 4. Market participation.

Effect	Equation	Mexico	Germany	United States	United Kingdom
Structural effect	Sj0ΔQj	10,185	10,639	35,245	10,215
Competitiveness effect	ΔSjQj0	19,202	20,203	23,524	15,693
Growth effect	St0ΔQj	12,589	7846	32,546	75,689
Market effect	Sj0ΔQj −St0DQj	−2891	4128	7869	4250

Source: own making with trade map data: 2001-2016.

6. Conclusion

Mexican honey exportations have grown rapidly from the mid 80's and Mexico's participation in the global market with this product has risen considerably in a relatively short period.

The analysis presented in this work suggests that the growth of Mexican honey exportations is associated with an extraordinary improvement of its competitiveness in relation to the other competitor countries.

This higher competitiveness derives from its advantages given by the low cost of the manufacture and the favorable natural conditions, best production techniques and the exterior market demand.

The German and British market study cases suggest that a great part of the honey exportations growth during the 2001-2016 period can be attributed to the improvements in competitiveness. However, the results of this work suggest that this raise is associated with general factors but not with the specific competitiveness of the American market.

On the contrary, the German and British competitiveness in this specific market seems to have increased. This seems to show that these countries have certain advantages compared to Mexico, such as lower transportation costs, higher efficiency in the commercialization system, and a preference in tax payments from the United States.

According to the data that was obtained, we may project that the international honey demand will keep growing and Mexico disposes of potential advantages to increase its participation in the market. However, the traditional, comparative advantages are not enough to maintain themselves in specific markets like Germany, where the trade costs are important to compete with other offers. If Mexico wishes to sustain or expand its participation in the United Kingdom's honey market efforts, it must be made to improve the efficiency of its commercialization and transportation system and gain access to the free tax market.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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