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Presentation of the Content

In the first article we present, *Analysis of the level of financial education, debt, and the use and knowledge of credit cards in a multiple banking branch in the city of Navojoa, Sonora*, by MURILLO-FÉLIX, Cecilia Aurora, ACOSTA-MELLADO, Erika Ivett, GALVAN-CORRAL, Alberto and QUIROZ-CAMPAS, Celia Yaneth, with affiliation in the Instituto Tecnológico de Sonora, as following article we present, *Income disparity in southeastern Mexico: A reflection from economic indicators*, by SALVADOR-GARCÍA, Yazmin Denisse, MAY-GUILLERMO, Erika Guadalupe and DE LA CRUZ-MAY, Samuel, with ascription in the Universidad Juárez Autónoma de Tabasco, Instituto Tecnológico Superior de la Región Sierra and Universidad Intercultural del Estado de Tabasco, as the third article we present, *Informal sector in Mexico, a practical and simple taxation proposal to bring more people into the formal sector and get them to pay their taxes*, by DÍAZ, Gabriel, ORANDAY, Sara, MENDOZA, Lilibet and MALTOS, Adán, with secondment in the Universidad Autónoma de Coahuila, as the last article we present, *Analysis and interpretation of financial statements under conditions of uncertainty*, by MADRIGAL, Francisco, AYALA, Sandra and CHAVEZ, Leonel, with ascription in the Instituto Tecnológico de Estudios Superiores de Zamora.

Analysis of the level of financial education, debt, and the use and knowledge of credit cards in a multiple banking branch in the city of Navojoa, Sonora

Análisis del nivel de educación financiera, endeudamiento y uso y conocimiento de tarjetas de crédito en una sucursal de banca múltiple de la ciudad de Navojoa, Sonora

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Abstract

This research shows an analysis of financial education, debt, and use and knowledge of credit cards. This research was a case of study and the object of study were costumers of a multiple banking branch in the city of Navojoa, Sonora, a questionnaire was applied to a probabilistic sample of type subjects, resulting in 201 surveys, the Rivera instrument and Bernal (2018) is divided into three categories: a) financial education, b) indebtedness and c) use and knowledge of credit cards, the level of financial education, indebtedness and use and knowledge of credit cards of bank users was determined Furthermore, ANOVA tables were made to analyze the level of significance of sociodemographic variables with the categories analyzed.

Financial Education, Indebtedness and use, Knowledge of credit cards

Resumen

La presente investigación muestra un análisis de educación financiera, endeudamiento y uso y conocimiento de tarjetas de crédito. La investigación fue un estudio de caso y los sujetos de estudios fueron los clientes de una sucursal de banca múltiple de la ciudad de Navojoa, Sonora se aplicó un cuestionario a una muestra probabilística de sujetos tipo dando como resultado 201 encuestas, el instrumento de Rivera y Bernal (2018) está dividido en tres categorías: a) educación financiera, b) endeudamiento y c) uso y conocimiento de tarjetas de crédito, se determinó el nivel de educación financiera, endeudamiento y uso y conocimiento de tarjetas de crédito de los usuarios del banco y además se realizaron Tables ANOVA para analizar el nivel de significancia de variables sociodemográficas con las categorías analizadas.

Educación Financiera, Endeudamiento, Uso, conocimiento de tarjetas de crédito

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Introduction

There is a growing degree of global awareness of the need to promote positive changes in economic behavior and in the levels of financial education of individuals and households. This awareness is the consequence of several factors, including economic challenges and evidence of low levels of financial education, along with the negative effects on individuals and households that this entails (OECD, 2005).

Likewise, economic growth brings with it the need for people to know how to manage their personal finances and to benefit from the more developed financial markets. In this sense, financial education initiatives can become an important complement to financial inclusion processes and poverty reduction measures. (García, Grifoni, López, & Mejía, 2013)

Policy makers recognize the need to address gaps in financial literacy through broader programs and initiatives, such as national financial literacy strategies (Grifoni and Messy, 2012; OECD / INFE, 2012). Financial education has thus become a priority for public institutions worldwide, as well as for international organizations, multilateral institutions and international forums such as the OECD, the World Bank, the G-20, the Cooperation Forum. Asia-Pacific Economic (APEC) and the Association of Southeast Asian Nations (Asean).

In this sense, according to the Organization for Economic Cooperation and Development (OECD), financial education is defined as: “the process through which individuals acquire a better understanding of financial concepts and products and develop the necessary skills to make informed decisions, evaluate financial risks and opportunities, and improve their well-being”(2005: 26). Therefore, financial education plays an important role for both developed and developing countries. The lack of financial education is associated with socioeconomic status, gender, age, level of education, cultural factors and other aspects linked to the race or ethnicity of the individuals. (Lusardi, 2008)

According to Atkinson and Messy (2012), in a study carried out for the OECD in 14 countries, and whose objective was to analyze the variations in financial knowledge, behavior and attitude in these regions, it was determined that the level of financial education A person's skills can be measured by his or her knowledge of finance, such as budgeting, managing money, and choosing the financial products that make the most profit. The results were a lack of financial knowledge in a considerable proportion of the population in each of the surveyed countries. These results allowed participating countries to identify needs and gaps in the provision of financial education and to develop national policies or strategies.

Incorrect or misinformed financial decisions can have negative effects on people's style and quality of life. A topic of great importance related to the knowledge of financial education is debt due to the use of credit cards. Due to the proliferation and access to credit cards, individuals have a greater possibility of credit purchases, however, although many consumers are able to use their credit card correctly, others seem to be unable to manage spending (Mansfield et al. ., 2013).

Carrillo, (2017), defines as debt with a credit card the accumulation of values consumed in current or deferred with this means of payment and deferred payment. Sanzana (2010) pointed out that “consumer credit is perhaps the clearest and most everyday sample that shows the way in which subjects fall into debt” (p. 2). Several authors (Roberts & Jones, 2001; Grable, 2014) also pointed out the importance of the study of debt, especially with credit cards, due to the important role that this means of payment plays in the economy; which has become a fact of life for most individuals and are part of the consumer culture (Mansfield et al., 2013). Individuals are inevitably confronted with decision-making and the consequences of incorrect financial decisions, can have effects on style and quality of life (Braun et al., 2016), as an example, an explosive growth of individuals in bankruptcies from 1970 to 2002 in the United States (Livshits, 2015), placed the issue of financial decisions with credit cards as the focus of study in several investigations.

A study by the National Youth Institute (INJUV, 2014), showed that 37% of young people between 18 and 24 years old declared that they had debts, loans or credits in their name. This proportion increased to 47% in young people between 25 and 29 years old. The study also indicated that the main debt items were: university credit (43%); credit cards (39%); and consumer loans (30%). In addition, according to the 7th National Youth Survey (2012), which was carried out in the Bio Bío Region, in Chile, 31.2% of young people between 15 and 29 years old were in debt.

Cornejo et al. (2018) in their research, analyzed what was the level of indebtedness and financial education of young adults in the city of Chillán, a broader age group that could be prone to borrowing in Chile, the results obtained showed that in knowledge financial 39.4% of those surveyed were classified as having no financial knowledge; 51.5% registered low knowledge; 8.1% reached a medium level knowledge; and 1% showed high knowledge. In Level of financial education 28.3% of the young adults surveyed showed a low level; 69.7% an average level; and 2% showed a high level. Regarding the Indebtedness: 45.5% declared that they have no debts with banks and / or commercial houses, but 54.5% indicated that they do.

In this same sense in Ecuador, Maitte & Ordoñez (2020), in their research on financial education and level of indebtedness in the city of Riobamba in the period 2019, points out that to determine the level of financial education, there are three ranges of which according to the surveys carried out from 4 to 7 corresponding to the acceptable level of financial education with 48.04%, with 27.68% comprising the range from 8 to 10 giving an excellent level of financial education, and with 24.28% of critical level It ranges from 0 to 3. With regard to debit cards, 55.61% have this card and 44.39% do not use; 51.17% do not have a credit card and 48.83% do have this type of card, but 57.44% do not know in detail how a credit card works. Regarding the knowledge of the total amount to be paid at the end of the term of a loan, having 69.71% of affirmative answers; Regarding the interest rate, it was obtained that 67.10% if you know what the interest rate is; but 56.40% are uninformed about the compulsory insurance offered by the credits, and 60.57% who do not know the expenses associated with the credits.

It can be seen that today many people have the idea that financial education is a complex subject and that only a few can understand. This situation has affected the making of useful decisions and the adequate administration of economic resources (CONDUSEF, 2013). In fact, the world of finance in general is considered an inaccessible and incomprehensible issue for the majority of the population in Mexico, causing, in a certain way, people to make economic decisions based on trial and error (BANXICO, 2008). The lack of financial education is considered a probable obstacle for the saver to become an investor and decide to place their surplus money in the formal environment (Zaldivar, 2012).

In Mexico, a large part of the population does not have access to the formal financial system. The results of the National Survey 131 Financial Education and Inclusion on the Penetration and Knowledge of Financial Services carried out by the Ministry of Finance and Public Credit (SHCP), in 2006, showed that 85% of households did not have access to financial services, and one of the factors that explained the low penetration of these services was the lack of financial education (GAUSSC, 2007). According to data from the National Commission for the Protection and Defense of Users of Financial Services, about 62 out of every 100 Mexicans lack financial education (CONDUSEF, 2010).

The growth in indebtedness of Mexican households in recent years (González Amador, 2015) is an indication of insufficient financial education and well-being. In Mexico, until a few years ago, it was not possible to measure the financial skills of the population, because there were no indicators, however, interest has aroused more and more, as is the case of the Sixth Financial Inclusion Report (Consejo Nacional de Inclusión Financiera, 2014), which reports that 66% of the population does not have the habit of saving and even worse, 51% have not considered the form of subsistence when they reach their old age. Figures that show the importance of studies that allow analyzing the subject from a diversity of contexts and that, in addition, demonstrate the magnitude of the lack of knowledge that the Mexican community in general has on the subject.

In Mexico, a large part of the population does not have access to Financial Education. According to data from the National Commission for the Protection and Defense of Users of Financial Services, about 62 out of every 100 Mexicans lack financial education. (CONDUSEF, 2010), which prevents Mexicans from using this skill properly.

The lack of financial education in the Mexican population is mainly reflected in the scarce use of financial products and services, in bad habits when acquiring them, in the ignorance of their rights and obligations, as well as in the lack of financial planning. This has a negative impact on their well-being and quality of life, at the same time that financial institutions do not reach the required levels of competitiveness and that the economic development of the country stops (García, Grant and Mejía, 2015). Lack of saving habits, little culture of foresight, income and expenditure planning, causes the population to make risky economic decisions that involve learning from their mistakes (Zaldívar, 2012) and the State of Sonora is no exception.

In Mexico, within the financial products that financial institutions offer to the population, credit is one of the most important because it allows people to improve the management of economic resources, offering them the possibility of facing emergencies, enjoying goods and services, even when you do not have the necessary liquidity to pay immediately and even make investments or start business (CNBV, 2016).

One of the ways of acquiring consumer credit is credit cards, these have become one of the main alternatives for formal credit. According to the National Survey of Financial Inclusion (ENIF) 2018, the departmental or self-service store credit card is the formal credit product that more people have contracted: 15.1 million adults in Mexico have one (61% of those who have contracted a formal loan), a result very similar to 2015.

In addition, this same survey highlights that the Northwest region of the country has the highest percentage of people with a formal loan, since 4 out of 10 people have taken out a bank loan or with some other financial institution. It is followed by the Northeast region with 39%, and last, the South Central and East region with 28% of its population with formal credit.

In recent years, credit through this financial product has boosted total consumer credit and, like the rest of the components of this portfolio, its dynamics is closely linked to the performance of economic activity and particularly to people's income. However, many people do not use them properly, because they do not have the necessary knowledge to handle them or do not know everything that having them entails, even reaching the degree of indebtedness.

Due to the above mentioned, the following research question arises.

What is the level of financial education and the level of indebtedness that credit card users have in the population of the city of Navojoa Sonora?

Objective

Analyze the level of financial education and indebtedness of the inhabitants of the city of Navojoa, Sonora through a measurement instrument to be able to identify the influence that financial education has on making indebtedness decisions.

Theoretical Foundation

According to BANSEFI (2010), credit is the money acquired through a loan, which can be used temporarily. After a defined period of time that money must be returned to its owner, generally paying interest or a charge for its use. Financial institutions can offer various types of loans for different needs.

A credit is nothing more than the name given to the loan of money that a financial institution grants to a person, with the commitment that in the future that person will return these resources, along with an interest rate, either to through installments or in a single payment. Credit is a tool that makes it possible to improve access to consumption and thereby make a qualitative leap in the quality of life, especially meeting basic needs. Credit is known to be one of the engines of the overall national economy. But you can fall into situations of over-indebtedness when you handle yourself irresponsibly and that is when people often cannot meet their obligations.

In this sense, credit cards are defined as a safe and fast way adopted as a form of payment to obtain consumer credit that makes it easier for the user to pay without having cash at that moment (Zunzunegui, 2006). This is a means of payment that benefits merchants by its simple method where they can charge in a safe way benefiting the merchant, the consumer for their quick purchase and the financial institution that provides the credit card service in exchange for a percentage called interest.

Within the cited literature, it was found that according to Mendoza (2016), there is a budget restriction within consumer choices. Consumers generally have an established fixed income, and in some cases an income that is variable and in some cases occasional. Within the consumption function, it is known that the marginal propensity to consume is related to income, to which autonomous consumption is added to income (Net, 2014).

Modigliani and Brumberg (1954), consider that when all households expect the same income, the elasticity of consumption against income will be unity, so that, in the presence of short-term fluctuations in income, the proportion of income consumed it will tend to fall with income and the elasticity of consumption with respect to income will be less than one. Almost all the empirical developments in the economic literature consider in one way or another the hypotheses of permanent income or the life cycle. Bunting (2001) considers that assuming that all households have the same permanent income is impossible, that all surveys on consumer spending carried out in the US show that individual incomes differ due to the quality of human capital, demographic characteristics (gender, age, race) or health status.

Autonomous consumption is a function of other variables outside the income level, such as: exchange rates, interest rates, or access to credit (D'Angelo, 2011). When a consumer has an additional income to her fixed income, then this amount is destined to the consumption. The problem is when more use is made of this type of income, which brings with it a greater economic burden, because people tend to get used to high consumption while that income is available.

The effect experienced after the transfer of the extra income consists of an increase in the family's debt due to the request for loans to cover obligations (Granell, 2014).

Method

The methodology used was through a case study in a first-tier bank using the qualitative method. According to the orientation and type of information, the type of case study in this research is explanatory since it seeks to know the cause and effect of the variables under study, as well as the degree of relationship that exists between them, in this case financial education, debt, use and knowledge of the credit card.

The subjects under study of this research are the credit card users of a multiple banking branch in the city of Navojoa Sonora called "Banco Popular", an institution that provides banking services and products to a certain sector of the population with financial needs. savings and financing.

To obtain the data, a structured instrument consisting of 19 questions was applied, divided into three categories: a) level of financial education, b) level of indebtedness and c) use and knowledge of the credit card. The sample was determined probabilistically for a higher level of confidence. The formula of Murray and Larry (2009) was used

Where:

n = the size of the sample.

N = population size.

Standard deviation of the population that, generally when you do not have its

value, a constant value of 0.5 is usually used.

Z = Value obtained through confidence levels.

e = Acceptable limit of sampling error.

In this case, they have 20,000 credit card users as the population of the Plaza del Mayo branch, resulting in the number of 201 in the sample to be treated, making use of convenience sampling, considering such sample as homogeneous, where the subjects under study have the same characteristics.

For the data analysis, the software called SPSS Statistics 24.0 was used, cross tables were made to determine the relationship between variables.

The instrument to carry out the sampling was taken from the research of Rivera and Bernal (2018), this instrument is divided into three categories that are financial education, indebtedness and knowledge about the use of credit cards, the results could result in three levels: high, medium and low. In the financial education category, the maximum score is 16 points, divided into three to determine the level where the sum of the responses is between 0-5 for the low level, between 6 and 10 for the medium level and values equal to or greater than 11 high level. In this way, a lower score means a lack of financial education.

Regarding the category of indebtedness, the sum has a total of 11 points to know how indebted the subject is. Of this total, it is considered a low level of 0-3 points, medium level 4-7 points and greater or equal to 8 high level. Likewise, in the category of use and knowledge of credit cards where the maximum to be obtained is 8 points of suitable answers. Where the levels are as follows between 0-3 low level, 4-6 medium level and values equal to or greater than 7 high level.

A validity and reliability analysis of the items was carried out and the Cronbach's Alpha statistic gave a result of .945, calculated in SPSS, which means that the instrument is reliable.

Results

A total of 201 instruments were applied, which represents the total statistical sample, the results show that in the financial education category 46% of the people surveyed do not make a budget, 36% if they save, 58% have requested some Once a personal credit, which shows that they also use other credit products. However, only 42% of those surveyed analyze the payment possibilities when acquiring a loan.

Knowing how to determine the amount that will be paid at the time of acquiring a loan is one of the most important knowledge that, according to Lusardi and Tufano (2009) allows to establish the level of financial education that people have. In the present study, 31% of the respondents do not know how to calculate it, which shows a medium level of financial knowledge.

In the debt category, 74.5% of those surveyed have only one credit card, while 17.5% have two and 8% more than two; 68% of the subjects have never stopped paying their monthly payment while the remaining 32% have. 62% of those surveyed allocate 20 percent of their income to pay their credit card debt and 38% have an additional credit on their credit card.

Regarding the category of level of use and knowledge of the credit card, 42% responded that they did not know the additional cost of having cash from their credit card, 56% of them have ever withdrawn cash from their credit card and 27% do not know what the interest rate is that they charge on their credit card and 91% if they know their due date for payment of their credit card.

An ANOVA analysis was also performed to analyze the significance between the sociodemographic variables and the categories of the instrument.

ANOVA			
		Sum of squares	Sig.
Financial education	Between groups	0.716	0.522
	Within groups	1658.802	
	Total	1659.518	
Indebtedness	Between groups	10.165	0.040
	Within groups	1871.754	
	Total	1881.919	
Use and knowledge of the credit card	Between groups	0.162	0.806
	Within groups	2106.486	
	Total	2106.648	

Table 1 ANOVA with gender factor
Source: Elaboration with own data

As can be seen in Table 2, in the category “indebtedness” there is a value of .040, as the significance is less than 0.05, it is that gender and the level of indebtedness are significant.

It is important to mention that for it to be significant and for the variable to have an influence on each category, the value must be less than .05.

ANOVA			
		Sum of squares	Sig.
Financial education	Between groups	1.91	0.672
	Within groups	1879.904	
	Total	1881.814	
Indebtedness	Between groups	18.187	0.034
	Within groups	2088.086	
	Total	2106.273	
Use and knowledge of credit card	Between groups	5.388	0.28
	Within groups	1653.509	
	Total	1658.897	

Table 2 ANOVA with marital status
Source: Elaboration with own data

In Table 2 in the category “indebtedness” there is a value of .034, which means that the marital status of the respondents does influence the level of indebtedness of the surveyed subjects.

ANOVA			
		Sum of squares	Sig.
Financial education	Between groups	1.91	0.035
	Within groups	1879.904	
	Total	1881.814	
Indebtedness	Between groups	18.187	0.034
	Within groups	2088.086	
	Total	2106.273	
Use and knowledge of credit card	Between groups	5.388	0.028
	Within groups	1653.509	
	Total	1658.897	

Table 3 ANOVA with education level factor
Source: Elaboration with own data

Table 3 shows that there is a linear significance level between the three categories and the level of studies of the subjects under study.

Category	Average per category
Financial education	10
Indebtedness	7
Use and knowledge of credit card	5

Table 4 Average level by category
Source: Elaboration with own data

Finally, Table 4 shows a level of financial education, indebtedness and use and knowledge of credit cards in the three categories, the level reached is medium.

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Discussion

Talking about financial education in Mexico is still a subject with taboos and where the country is developing, the findings found in this research are not the opposite, there are sectors of the population that do not have access to this information. The results agree with the findings found by Stango and Zinman (2009) who determined that those who cannot correctly calculate interest rates on a loan are more indebted and that those with a low level of financial education are prone to over-indebtedness. Similarly, Gathergood (2012) and Disney and Gathergood (2011) showed that the population of credit card users who have low levels of financial education is related to indebtedness, since they use high-cost credit. In this same sense, in this study it was found that the level of financial education is medium, since 56% of the people surveyed make a budget, but only 32% always now and 58% claim to have requested other types of credit, information that agrees with the findings of Cornejo et al. (2018) who analyzed the level of indebtedness and financial education of young adults in the city of Chillán, their main results were that in financial knowledge, 39.4% of the respondents were classified as having no financial knowledge, 51.5% low knowledge, the 8.1% reached a medium level knowledge; and 1% showed high knowledge.

Regarding the significance of sociodemographic variables, it was found that the marital status has a level of significance of the level of indebtedness, in agreement with the study carried out by Virost and Ruiz (2014), who found that the dummy variable of having a partner was observed to be significant and it has a positive sign, that is, the fact that the head of the household has a partner, serves as financial backing, so that the head of the household continues to borrow more.

In the same sense, the variable level of studies turned out to be significant for the level of financial education, indebtedness and use of the credit card, with a significance level of .035, .034 and 028 respectively, as in the Virost study and Ruiz (2014), who found that the dummy variable having high school education is significant and positive, that is, if the head of the household has a greater number of studies, he will go into debt more largely because he has higher wages that are related with his studies.

Conclusions

In conclusion, the level of financial education, indebtedness and use and knowledge of credit cards is medium, according to different studies it is a situation at the national level, it is important to carry out actions at the national, state and regional level to improve this level, since people with high levels of financial education are able to make better financial decisions and make proper use of their credit cards (Lusardi and Scheresberg, 2013).

The sociodemographic variables of marital status and educational level are variables that have an influence on the levels of the three categories, the items on indebtedness have a higher level of significance with married people or in common union and the items of use and knowledge of the card credit with the level of studies of the respondent.

The objective of the present research was fulfilled, obtaining at the level of the three categories and the factors that have the greatest significance in debt decisions.

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M Income disparity in southeastern Mexico: A reflection from economic indicators

Disparidad del ingreso en el sureste de México: Una reflexión a partir de indicadores económicos

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Abstract

The objective of this document is to analyze the distribution of income in the states of the southeast region of Mexico during the period 2010-2016, to identify the levels of inequality in economic matters. For this, a documentary, descriptive and longitudinal investigation was carried out, analyzing six economic indicators reported by the Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL) for the period studied: 1) Gini coefficient, 2) population in poverty situation, 3) vulnerable population by income, 4) population in extreme poverty, 5) population with income below the extreme poverty line by income and 6) population with income below the income poverty line. The results indicate that Chiapas, Guerrero and Oaxaca were the most vulnerable states due to low income levels, high poverty in general, and prevailing inequality in the region. In contrast, the state with the least economic vulnerability was Quintana Roo. The main contribution of the study lies in the identification of the poorest and most vulnerable states in the southeast of Mexico, as well as in the formulation of recommendations for the better distribution of income and poverty reduction in the analyzed region.

Distribution, Income, Inequal

Resumen

El objetivo del presente consiste en analizar la distribución del ingreso en las entidades federativas de la región sureste de México durante el período 2010-2016, para identificar los niveles de desigualdad en materia económica. Para ello, se realizó una investigación documental, descriptiva y longitudinal, analizando seis indicadores económicos reportados por el Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL) para el período estudiado: 1) Coeficiente de Gini, 2) población en situación de pobreza, 3) población vulnerable por ingreso, 4) población en pobreza extrema, 5) población con ingreso inferior a la línea de pobreza extrema por ingresos y 6) población con ingreso inferior a la línea de pobreza por ingresos. Los resultados indican que, Chiapas, Guerrero y Oaxaca fueron los estados más vulnerables debido a los bajos niveles de ingreso, a la alta pobreza en general y a la desigualdad imperante en la región. En contraste, el estado con menor vulnerabilidad económica fue Quintana Roo. La principal aportación del estudio radica en la identificación de los estados más pobres y vulnerables del sureste de México, así como en la formulación de recomendaciones para la mejor distribución del ingreso y reducción de la pobreza en la región analizada.

Distribución, Ingreso, Desigualdad

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Introduction

In Mexico, each region has conditions for its development by virtue of its own characteristics, resources and infrastructure. In a territory delimited by historical, economic and cultural regions, there is a great diversity of natural and human resources, which enable production from specialization, generating comparative advantages. However, the economic and social inequality that exists is notorious (Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food of Mexico [SAGARPA], 2011).

At the beginning of this century, Mexico was classified by the Economic Commission for Latin America and the Caribbean (ECLAC) among countries with high levels of inequality, on a par with countries such as Nicaragua, Dominican Republic, Chile, Guatemala, Paraguay, Argentina, Bolivia, Brazil, Honduras and Colombia (ECLAC, 2019). Economists suggest that the concentration of income in a small number of inhabitants violates economic growth (Barcelata, 2008), because in countries with high levels of inequality there is a tendency to implement economic policies that only benefit the social sectors with greater power, instead of looking at the large groups of population that have the lowest income levels (Sánchez, 2009).

In Mexico, these phenomena have caused social erosion, an imbalance that generates more Mexicans without access to heritage, health and education (Ordóñez, 2018). The creation of jobs and the improvement of working conditions are utopias that have only remained as a hope for nationals, since trade openness, the contraction of wages and low social security coverage collide with the development of the population (Pozas, 2010).

For this context, Household Income, Gross Domestic Product and Level of Economic Activity suggest a diagnosis of the territories, which reflects their levels of consumption, employment and well-being (Vielma, 2011), at this point the economic policy making Using an ethical and social judgment, it aims to reduce inequality gaps and create opportunities for all Mexicans (Planning Committee for the Development of the State of Tabasco [COPLADET], 2019).

Historically, in the second half of the 20th century, projects necessary for the construction of highways, bridges and basic infrastructure were carried out in the southeast of Mexico; This work is currently not finished, since there are areas that are isolated and difficult to access (Capdepon-Ballina & Marín-Olán, 2014).

On the other hand, tourism has been one of the activities that at the national level has generated income and jobs, and in the region it has not been an exception, for example, the progress of Cancun represented a strategy for the development of the services sector and currently generates millions of income for the country (Medina-Argueta & Palafox-Muñoz, 2019); Thus, tourism begins to have relevance in Mexico, as an economic phenomenon that facilitates obtaining the necessary foreign exchange for the acquisition of capital goods in support of industrialization (Gutiérrez-Pérez et al., 2014).

Similarly, another important activity is energy, represented by the extraction of oil and natural gas, which created development poles in the seventies and eighties in Veracruz, Tabasco and Campeche (Guzmán-Sala, Mayo-Castro, Pérez - Sánchez, 2012).

Livestock and agriculture in the southeastern region of Mexico supplied the country with meat, fruits, vegetables and primary dairy products (Ministry of Agrarian, Territorial and Urban Development [SEDATU], 2014). However, when referring to the impacts that the economic growth of the southeast region has generated in the dimensions of sustainability, it is identified that, in environmental matters from 1970 to date, the externalization of costs has been very evident, reflected in the pollution of the ecosystem and negative effects for primary activities (SEDATU, 2014).

In addition to this, the distribution of wealth for a long time was considered an unpleasant and politically sensitive issue (Guerrero-de-Lizardi, 2015), because the government actions undertaken by all countries empower women and men, but there are still poverty gaps that must be worked on (Ortiz & Cummins, 2012). So the concern about the redistribution of wealth in the world is relatively recent; since the priority was economic growth; However, today there is the need to face global challenges in solidarity (OECD, 2018), forging a society with expectations, based on the information provided by the media, so that the media demand on social justice and access to opportunities must be reflected in the fair distribution of income (Esquivel, 2015); Political and social actors have a predominant role in demanding fair conditions for human development (Rosales, 2017). In this order of ideas, social struggles have demanded the distribution of income that is exercised in all sectors of the different ideologies, areas and places where the national, state and municipal agendas have set the issue that concerns this research (Borri, 2009).

On the other hand, social programs have been an important element that has impacted on income distribution in developing countries (Abramo et al., 2019). In some countries, resource transfer programs have been conditioned on households that must have a socially productive behavior, thus reducing poverty rates; unemployment insurance, hiring subsidies and job creation programs have also supported this task (Abramo et al., 2019); This is how economic growth, social policies and the labor market are key to the study of income distribution, which should seek progress towards general economic well-being (Bárcena, 2011).

Given the above, the objective of this document is to analyze the distribution of income in the states of the southeast region of Mexico during the period 2010-2016, to identify the levels of inequality in economic matters. The statistical data object of analysis by indicator, frame each one of the states of the southeast of Mexico: Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Puebla, Tabasco, Veracruz and Yucatán.

Literature review

Distribution of income in Mexico

Income or rent refers to the flow of wages, interest, earnings and other things of value received, during a period, by the various monetary agents Samuelson and Nordhaus (2002). In turn, wealth is understood as the set of current, fixed and deferred assets, belonging to a person (Encalada-Encarnación et al., 2018). Both can be obtained through the elements of production: land, labor, capital and organization (Ministry of the Economy [SE], 2020).

The distribution of wealth or income is the way in which the total product generated by a country is distributed between workers and employers (Moreno, 2013). According to ECLAC (2019), income distribution creates an extremely powerful social entity, which owns wealth from its origin, or has expropriated it from others, and distributes it in the way that entity thinks it is. It is convenient (ECLAC, 2019; Girondella, 2008).

According to Tezanos et al. (2013) income distribution is a trigger for economic development. Therefore, the way it is distributed has been a relevant issue for the economy of any country or region (Campos & Monroy-Gómez-Franco, 2016).

However, at the global level one of the biggest claims today is the distribution of income and it represents one of the main criticisms that have been made of capitalism (Navarrete, 2016), since not being fair it represents a setback in the welfare of all or most of the population (Tezanos et al., 2013). Income inequality in a nation is described by political, economic and social elements (María et al., 2019; OECD, 2012).

For Moreno (2013) the elements that affect income distribution are, firstly, that the state determines the economic policy that must be followed; secondly, companies also decide with the corresponding autonomous faculty, and lastly households, in their character of consumption units.

From another perspective, Hernández (2013) mentions that within the economic elements that affect the distribution of income, there is the disparity of wages, given the differential in productivity between the same workers and also with respect to the owners of capital (International Organization of the Labor [ILO], 2017). In this sense, the arrival of a certain group to power always entails the rise of new characters who do not necessarily have the adequate preparation (Hernández, 2013).

From the orthodox theory of economics, it is proposed that inequality in the distribution of income, as well as power, together with market imperfections, influence policies and the design of institutions (Gordillo, 2013). This means that in the markets, resources are not assigned based on efficiency but on other criteria, such as the perpetuity of power of those who already hold it, instead of achieving sustained economic growth with social harmony (Cortes & de Oliveira, 2010).

Everything worsens, at the time when income is concentrated due to factors such as lack of transparency, abuse of power, granting of privileges, and above all obstacles to freer and fairer competition (Coutiño, 2015). From the political point of view, the discussion of this issue becomes more acute in electoral times, because each candidate from the sectors that support him poses the problem of distribution, suggesting projects in his proposals (Mendoza, 2011).

In the social sphere, there is a critical exposition of the general policy of income redistribution (ECLAC, 2019) and of the role that the State must assume to guarantee the population growth, development and equity (Escutia, 2012). In this regard, Puryear and Mallow (2010) consider that the State has two ways of reducing inequality and poverty, on the one hand, through the provision of high-quality public services and, on the other hand, by implementing economic support programs (Gauna, 2014).

In Mexico, Coutiño (2015) maintains that there is a high degree of economic inequality, since on the one hand it is possible to see the flourishing business environment together with a privileged bureaucrat class, meanwhile, on the other side there is most of the population, Mexicans who live with one or two minimum wages daily (Colegio de México [CM], 2018).

In this regard, Aguilar-Ortega (2011) points out that in Mexico there are regions that concentrate a large part of the income in a small number of people and also areas where the situation is the opposite, generating serious imbalances. For his part, Sánchez (2006) identifies that Chiapas, Guerrero and Oaxaca are the states with the highest levels of income inequality and therefore poverty in the southeast of Mexico.

Income measurement

Income measurement requires both quantitative and qualitative methods. Therefore, for many years different indicators have emerged to measure inequality and income distribution (Favila & Navarro, 2017). Among the quantitative methods that exist to calculate the distribution of wealth, we find per capita income, which is obtained by dividing the total GDP generated by a country by its number of inhabitants (Atuesta et al., 2018); and the Lorenz curve that measures the percentage of income corresponding to the percentage of the population (Medina, 2001).

Despite the information provided by these two methods, there is another that has been the most widely applied, called the Gini coefficient, which consists of calculating a factor that according to its proximity to the value 0 indicates absolute equality, while a value closer to unity, it shows greater inequality (Martínez, 2008).

In addition to these methods, the National Council for the Evaluation of Social Development Policy (CONEVAL, 2018), concentrates the results of the Household Income and Expenditure Surveys (ENIGH) regarding indicators of inequality and poverty in Mexico for the years 2010, 2012, 2014 and 2016. Among these indicators, the following stand out:

- Gini coefficient. Which measures the economic inequality of a society, takes values between 0 and 1; a value that tends to 1 reflects greater inequality in income distribution; on the contrary, if the value tends to zero, there are greater conditions of equity in the distribution of income.
- Population in poverty. It locates the person who has at least one social deprivation (in the six indicators of educational backwardness, access to health services, access to social security, quality and spaces of the house, basic services in the house and access to food) and their income is insufficient to purchase the goods and services they require to satisfy their food and non-food needs.
- Vulnerable population by income. This indicator considers the population that does not present social deprivation but whose income is less than or equal to the welfare line.
- Population in extreme poverty. It covers the population that has three or more deficiencies, out of six possible, within the Social Deprivation Index and that, in addition, is below the minimum welfare line; People in this situation have such a low income that, even if they were to dedicate it entirely to purchasing food, they would not be able to acquire the necessary nutrients for a healthy life.
- Population with income below the extreme poverty line by income. It is one who receives an income lower than the value of the food basket per person per month.
- Population with income below the income poverty line. It is the one that receives an income lower than the total value of the food basket and the non-food basket per person per month.

However, these methods are not totally effective if their results are considered absolute truth when measuring the improvement in quality of life (Rivera & González, 2017); For this reason, in the qualitative approach, the measurement of income distribution is complemented with the Human Development Index, which includes three areas: health, education and access to goods and services (Jáuregui, et al., 2012).

Poverty and economic lag in Mexico

According to CONEVAL (2014), poverty is defined as a lack of purchasing power to acquire goods and services that satisfy basic needs. Unquestionably, the economic inequality that prevails in Mexico has generated a considerable increase in poverty in recent years (Mora-Rivera & Morales, 2018).

In this regard, Navarrete (2016) points out that this has generated important social changes in the lifestyles of poor families, which has had an impact over the years, and according to Cortes (2010), it is from the decade of the eighties that as a consequence of the abrupt falls in the income caused by the crises; Poor households resorted to sending their children, youth, the elderly and women who would otherwise remain at home to work and to grouping households to reduce the effect of fixed costs on the family budget (Halter et al., 2014).

By 2015, Mexico had 119,530,753 inhabitants, of which 55.3 million were in poverty (CONEVAL, 2014; National Institute of Statistics and Geography [INEGI], 2015).

Emphasizing in the context of economic inequality, it is necessary to point out that both in the countries and in the territories that comprise it, it is determined by differences in income and consumption (Aguilar, 2016); This is how in the last decade there has been a disparity in the population's living standards (Cortés, 2013).

Statistically, poverty and income inequality are related, there is a positive correlation between levels of poverty and inequality in Mexican states (Mora-Rivera & Morales, 2018). In other words, if inequality decreases; poverty will decrease faster.

Today, wealth is rapidly becoming the most important source of power and influence in the world, as the extreme concentration of wealth is the cause of political capture, in other words, excessive and undue influence on the taking of decisions and the democratic processes that this wealth allows the country's elites (Fuentes-Nieva, 2016).

Due to the above, and the other factors that have been described, in national governments there is a tension on the existing statistical results on the distribution of income in developing countries, such as Mexico (Favila & Navarro, 2017). The gap between the government's point of view on economic performance and the opinions of society is caused not only by the measurements that emerge in the system of national accounts, but also by other variables, notably the consumer price index and the income of families (Favila & Navarro, 2017).

These measurements are based on the fact that a family has a wealth, in which there are values of some assets, such as a personal business or a residence, which are quantified and through surveys are added in a result of a specific territory. Therefore, the importance of studying the distribution of wealth and its role in decision-making (Guerrero-de-Lizardi, 2015).

In a general panorama, economic inequality leads to an interest in the implementation of various policies in the search for equity and income distribution in Mexico (Mckenzie & Rapoport, 2004). Country where a high level of inequality is statistically shown in its southeastern states according to international standards, which in terms of theoretical contributions these indicators can delay the growth of developing countries (Abramo, Cecchini, & Morales, 2019).

Methodology to be developed

A descriptive, documentary research with a longitudinal design was carried out. The data was obtained from the 2018 statistical annex of the poverty report in Mexico, published by CONEVAL based on the results of the Household Income and Expenditure Surveys (ENIGH). The indicators considered were:

- Gini coefficient.
- Population in poverty.
- Vulnerable population by income.
- Population in extreme poverty.
- Population with income below the extreme poverty line by income.
- Population with income below the income poverty line.

The unit of analysis corresponds to the results obtained by indicator in each of the states of southeastern Mexico (Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Puebla, Tabasco, Veracruz and Yucatán) during the period 2010-2016. This period was selected in order to observe the most recent and available trends and behaviors of the selected indicators.

For the purposes of the analysis, the states belonging to the southeast of Mexico were listed in alphabetical order and the value obtained in each indicator was recorded according to the year evaluated. Subsequently, the means of each indicator by state were calculated to compare the results.

Likewise, to interpret the Gini coefficient, the values closest to the unit were selected to designate the states with the greatest income inequality; opposite case of those more distant that were considered states with less inequality.

In relation to indicators 2, 3, 4, 5 and 6, the highest means were considered to classify the states with the highest levels of poverty and vulnerability; Consequently, the lowest average obtained places the states with the lowest levels of poverty and vulnerability in the southeast region of Mexico.

Results

In the present research it was identified that, for the indicators under study in the years 2010, 2012, 2014 and 2016, the states of the southeast of Mexico are more vulnerable due to low income levels, high poverty in general and inequality that prevails in the area are: Chiapas, Guerrero and Oaxaca.

In contrast, the state with the lowest levels of economic vulnerability is Quintana Roo. The results obtained in each indicator are described in the following tables.

In relation to the indicator of economic inequality, presented in table 1, it is observed that the highest average registered in the study period is located in the state of Chiapas with a value of .51, which indicates that it is the state with higher level of economic inequality, based on the Gini coefficient closest to unity.

However, the states of Oaxaca and Campeche are close to reaching these levels of inequality since they register averages of .50 and .49 respectively. Otherwise, the state of Quintana Roo that registers the lowest average, obtaining a value of .46, which places it with the lowest level of economic inequality in the region.

Federal entity	2010	2012	2014	2016	Average
Campeche	.514	.533	.500	.426	.49
Chiapas	.541	.535	.517	.444	.51
Warrior	.516	.533	.489	.414	.49
Oaxaca	.509	.511	.513	.447	.50
Puebla	.481	.485	.572	.396	.48
Quintana Roo	.477	.477	.494	.389	.46
Tabasco	.478	.516	.456	.409	.47
Veracruz	.533	.493	.490	.440	.49
Yucatan	.462	.461	.511	.419	.46

Table 1 Gini coefficient expressed as a percentage corresponding to the states of southeastern Mexico for the period 2010-2016

Source: Prepared based on estimates from CONEVAL (2018)

Regarding the percentage of the population living in poverty, Table 2 shows that the state of Chiapas has the highest percentage in the region, obtaining 76.62%, followed by Guerrero with 66.72% and Oaxaca with 66.52%; while the lowest percentage corresponding to 34.54% is registered for the state of Quintana Roo.

Federal entity	2010	2012	2014	2016	Average
Campeche	50.505	44.664	43.588	43.768	45.63
Chiapas	78.483	74.687	76.209	77.081	76.62
Warrior	67.571	69.696	65.218	64.407	66.72
Oaxaca	66.987	61.937	66.750	70.401	66.52
Puebla	61.483	64.470	64.537	59.440	62.48
Quintana Roo	34.627	38.793	35.882	28.847	34.54
Tabasco	57.096	49.690	49.571	50.852	51.80
Veracruz	57.579	52.644	58.005	62.160	57.60
Yucatan	48.321	48.857	45.857	41.872	46.23

Table 2 Percentage of population living in poverty in the states of southeastern Mexico for the period 2010-2016

Source: Prepared based on estimates from CONEVAL (2018)

According to Table 3, the highest percentage of the vulnerable population by income was registered in the state of Yucatán with 6.35%, while the lowest percentage was found in the state of Oaxaca with 1.84%.

Federal entity	2010	2012	2014	2016	Average
Campeche	4.320	5.571	3.997	4.796	4.67
Chiapas	2.369	1.730	2.497	2.727	2.33
Warrior	1.978	2.250	2.647	3.217	2.52
Oaxaca	1.294	1.656	2.095	2.328	1.84
Puebla	5.567	4.221	5.120	6.206	5.28
Quintana Roo	4.739	6.189	6.251	4.312	5.37
Tabasco	4.132	3.006	2.349	2.594	3.02
Veracruz	4.527	3.985	5.018	4.973	4.63
Yucatan	6.438	6.252	6.955	5.742	6.35

Table 3 Percentage of vulnerable population by income in the states of southeastern Mexico for the period 2010-2016
Source: Prepared based on estimates from CONEVAL (2018)

Based on the percentage of the population living in extreme poverty in the states of southeastern Mexico, Table 4 indicates that for the years 2010, 2012, 2014 and 2016, Chiapas is identified as the state with the highest registered percentage corresponding to 32.59 %, followed by Guerrero and Oaxaca with percentages of 27.74% and 26.94% respectively, while the state of Quintana Roo registered 6.51%, being the lowest percentage of the population living in extreme poverty in the region.

Federal entity	2010	2012	2014	2016	Average
Campeche	13.784	10.448	11.063	6.657	10.49
Chiapas	38.273	32.171	31.829	28.079	32.59
Warrior	31.830	31.711	24.452	22.962	27.74
Oaxaca	29.245	23.318	28.334	26.880	26.94
Puebla	17.031	17.606	16.161	8.958	14.94
Quintana Roo	6.426	8.413	6.979	4.237	6.51
Tabasco	13.565	14.301	11.029	11.769	12.67
Veracruz	18.757	14.261	17.154	16.403	16.64
Yucatan	11.720	9.832	10.686	6.148	9.60

Table 4 Percentage of the population living in extreme poverty in the states of southeastern Mexico for the period 2010-2016

Source: Prepared based on estimates from CONEVAL (2018)

Table 5 reflects that the highest percentage of the population with income below the extreme poverty line by income was presented in the state of Chiapas corresponding to 48.99%, followed by Guerrero and Oaxaca with 38.67% and 38.22% respectively, while the lowest percentage represented by 13.04% was registered in the state of Quintana Roo.

Federal entity	2010	2012	2014	2016	Average
Campeche	21.617	20.563	19.199	15.770	19.29
Chiapas	50.891	46.705	48.458	49.884	48.99
Warrior	38.760	45.127	35.578	35.193	38.67
Oaxaca	36.202	34.387	42.106	40.202	38.22
Puebla	27.658	32.943	31.853	23.115	28.89
Quintana Roo	12.054	16.562	14.302	9.258	13.04
Tabasco	22.380	23.625	17.871	19.569	20.86
Veracruz	27.773	24.026	29.184	30.566	27.89
Yucatan	17.889	16.619	20.715	11.775	16.75

Table 5 Percentage of population with income below the extreme poverty line by income in the states of southeastern Mexico for the period 2010-2016

Source: Prepared based on estimates from CONEVAL (2018)

For its part, Table 6 shows that the highest percentage of the population with an income below the income poverty line was registered in the state of Chiapas with 78.95%, followed by Guerrero, Oaxaca and Puebla, with 69.25%, 68.36% and 67.76% respectively; while the lowest percentage was located in the state of Quintana Roo.

Federal entity	2010	2012	2014	2016	Average
Campeche	54.825	50.236	47.585	48.564	50.30
Chiapas	80.853	76.418	78.705	79.808	78.95
Warrior	69.549	71.946	67.865	67.624	69.25
Oaxaca	68.282	63.593	68.845	72.729	68.36
Puebla	67.050	68.690	69.657	65.646	67.76
Quintana Roo	39.365	44.983	42.133	33.158	39.91
Tabasco	61.228	52.696	51.919	53.445	54.82
Veracruz	62.106	56.629	63.023	67.133	62.22
Yucatan	54.759	55.108	52.811	47.614	52.57

Table 6 Percentage of population with income below the income poverty line in the states of southeastern Mexico for the period 2010-2016

Source: Prepared based on estimates from CONEVAL (2018)

Conclusions

In the study carried out, it was possible to identify that, as Aguilar-Ortega (2011) points out, in Mexico there are regions that concentrate a large part of the wealth in a small number of people and areas where the situation is opposite, creating serious imbalances, particularly in the region southeast of the country.

The analysis of the indicators under study shows that the southeast region of Mexico is an area with high inequality in the distribution of income, registering an average percentage of inequality of 48% based on the estimate of the Gini coefficient for the period 2010-2016, presenting a tendency to increase for subsequent years. Therefore, the income disparity in the Mexican southeast is generating a larger population in a situation of poverty and vulnerability, which coincides with that reported by Cortés (2013) who points out that, in Mexico, economic inequality prevails in its population, particularly in Mexico. certain geographical areas.

In this sense, it was identified that this inequality has a significant impact on the state of Chiapas, where despite having registered a gradual decrease in the Gini coefficient during the period studied, it continues to hold the first place in economic inequality in the southeast of the country with an average of 51%. In addition, this federative entity registered the highest percentage of vulnerability and lag in four of the evaluated indicators: population in a situation of poverty represented by 76.62%, population in extreme poverty corresponding to 32.59%, population with an income below the extreme poverty line by income with 48.99% and population with income below the poverty line by income through 78.95%. These findings coincide with those found by Levy et al. (2015) who point out that in Chiapas the per capita income is the lowest and also rank it as the state with the highest poverty and extreme poverty in the country.

Likewise, it was identified that Guerrero and Oaxaca are the two states that are most likely to present a situation similar to that of Chiapas, since they recorded values of poverty in general and economic inequality very close to those obtained by Chiapas in the aforementioned indicators. In this sense, it should be noted that, since the beginning of this century, Sánchez (2006) reported that Chiapas, Guerrero, and Oaxaca are the southern states with the highest levels of poverty and lag in the areas of health, education and housing; however, 10 years after having identified this problem and submitted proposals; In the present research, it was found that these states continue to occupy the first places of backwardness and poverty in the region.

On the other hand, the state of Quintana Roo stood out for being the state with the least economic inequality and the lowest levels of poverty in general, which is assumed to be related to the tourist activities that have boosted its economy during the period studied, since according to Gutiérrez-Pérez et al. (2014) it is considered that tourism is a possibility for the development of economically less favored areas.

The distribution of wealth despite being a topic on the agendas of International Organizations such as the United Nations, the Organization for Economic Cooperation and Development, the International Monetary Fund and the World Bank; It has not been able to be totally solved, and it is that the National Development Plan, the State and Municipal Development Plans include a series of public policies for the generation of jobs, business competitiveness and social development; through programs and actions such as transfers, scholarships and social assistance; However, they have not been enough to cover the entire population, which grows geometrically.

Although the economy mentions that resources are scarce, the truth is that these being used in a rational way can generate a positive impact on the population. The southeast region of the country has natural and non-renewable resources such as hydrocarbons, which can generate the necessary conditions for development. Tourism, agriculture, livestock, oil and natural gas extraction are some of the predominant economic activities in the region, in addition, states such as Puebla and Yucatan have industrialized, exporting a large amount of manufacturing.

Economic development is achieved with a balanced income distribution, since, in Mexico, a large part of the capital is concentrated in a small number of people (Sánchez 2006). Mexico, its governments and social actors have the fundamental role of seeking that present and future generations have what is necessary for their well-being. Every day, economic science generates more information that can be used for the implementation of policies, which is why a deep, objective and truthful analysis of this data is required.

The recommendations that emerge from this study for a better income distribution and poverty reduction in the southeast region of Mexico are the following:

- Promote the generation of decent employment with fair remuneration, which helps the minimum wage to ensure the well-being of the most vulnerable population by income.
- Design and implementation of income redistributive policies in favor of the most disadvantaged population and sectors in the areas of education, health, energy and housing.
- Provide the population with free public resources that suit their needs.
- Promote food security and quality of life.
- Implementation of a more transparent social program evaluation system.

Likewise, future research suggests analyzing the social deprivation indicator, which considers the following parameters: deficiencies in access to health services, social security, quality and spaces in housing, basic services in housing, food, and educational lag. In addition, it is recommended to make a comparison between the regions that have had a greater participation in economic globalization and that belong to the less unequal areas of Mexico. The above in order to identify the existing gap between the regions with a fairer income distribution and that therefore generates a better quality of life for its inhabitants.

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Informal sector in Mexico, a practical and simple taxation proposal to bring more people into the formal sector and get them to pay their taxes

Sector informal en México, una propuesta de tributación práctica y sencilla para incorporar a más personas a la formalidad y que paguen sus impuestos

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Abstract

Informality in Mexico is about alarming levels, since according to INEGI, hovers around 60% in proportion to the Gross Domestic Product (GDP), and that at least 25 of every 100 pesos come from this sector for the year 2012; because of this, it is imperative to create mechanisms for people who are in the informal start to include the tax base, but that is not only nomination but also make payment of their taxes according to their ability to pay, since the tax reform implemented as of the year 2014 in our country, according to the Organization for Economic Cooperation and Development (OECD), Mexico has not had a significant increase in tax revenue.

Informality, Tax collection, Taxation scheme

Resumen

La informalidad en México se encuentra sobre niveles alarmantes, según datos del INEGI, oscila alrededor del 60% en proporción con el Producto Interno Bruto (PIB), y que por lo menos 25 de cada 100 pesos provienen de este sector para el año de 2012; debido a esto, es imperioso crear mecanismos para que las personas que se encuentran en la informalidad empiecen a incluirse a la base de contribuyentes, pero que no sea solamente de nombramiento, sino que además realicen el pago de sus impuestos conforme a su capacidad contributiva, ya que con la reforma fiscal implementada a partir del ejercicio 2014 en nuestro país, según datos de la Organización para la Cooperación y el Desarrollo Económico (OCDE), México no ha tenido un incremento importante de ingresos fiscales.

Informalidad, Recaudación fiscal, Esquema de tributación

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Introduction

For many years, informality in Mexico has been one of the major problems afflicting the country, and immediate action must be taken. Given the current macroeconomic situation, in which oil prices have experienced various ups and downs, it is urgent to create more efficient tax collection systems that represent an incentive for the country's income, since continuing to rely on these resources for national financial stability could lead to even more complicated situations for the country, and therefore it is difficult to think that economic growth could be achieved with these elements, since in the absence of additional income, or at least projected income, the government must take immediate action. It is therefore difficult to think that economic growth could be achieved with these elements, since in the absence of additional revenues, or at least the projected ones, the government has to make adjustments to the budget, as in the current case, in which a budget cut has already been announced, representing \$124.3 billion pesos, and in terms of GDP it is 0.7% (El Economista 2015). 7% (El Economista 2015), see figure 1, which shows the various items that should have been considered in this budget cut.

RECORTE PREVENTIVO

La baja en los precios del petróleo, una desaceleración global y una mayor volatilidad ante la inminente alza en las tasas de interés de Estados Unidos, obligaron a las autoridades a realizar un ajuste al gasto. Del ajuste, -42% fue en dependencias y entidades del gobierno, sin incluir los recortes propuestos a los presupuestos de Pemex y la CFE.

DEPENDENCIA Y ENTIDAD DEL GOBIERNO	PRESUPUESTO ASIGNADO EN EL 2019 (MILLONES DE PESOS)	RECORTE	PRESUPUESTO ACTUAL	MODIFICACIÓN %
SCT	126,546.2	13,820.0	114,326.2	-9.4
SEP	305,057.1	7,800.0	297,257.1	-2.6
SAGARPA	92,141.8	7,388.0	84,953.8	-7.8
CDNAGUA	50,563.3	6,400.0	44,163.3	-12.7
SEDESOL	114,504.0	3,750.0	110,754.0	-3.3
SALUD	134,847.6	3,339.0	131,508.6	-2.5
GOBERNACION	77,066.3	2,000.0	75,066.3	-2.6
SHCP	45,691.9	1,900.0	43,791.9	-4.2
ISSSTE	208,258.6	1,500.0	207,258.6	-0.7
SEDENA	71,273.7	1,200.0	70,073.7	-1.7
CONACYT	33,706.7	900.0	32,806.7	-2.7
SEMARPA	67,976.7	760.0	67,216.7	-1.1
SEDAFU	22,080.9	700.0	21,380.9	-3.2
PRO	170,283.5	600.0	16,423.5	-3.5
ECONOMIA	20,908.1	500.0	20,408.1	-2.4
RELACIONES EXTERIORES	8,100.5	500.0	7,600.5	-6.2
SECTUR	6,844.9	500.0	6,344.9	-7.3
MARRA	27,025.5	450.0	26,575.5	-1.7
TRABAJO	5,134.6	200.0	4,934.6	-3.9
PREVIDENCIA	2,256.2	150.0	2,106.2	-6.9
SENER	3,088.8	80.0	3,008.8	-2.6
FUNCIÓN PUBLICA	1,483.9	20.0	1,463.9	-1.3
TOTAL	1'441,697.0	52,265.0	1'389,432.0	-3.6

GRÁFICO: EL FUENTE: SCHP

Figure 1 Public spending cuts

It is important to mention that, according to recent data issued by the OECD, as indicated by Dainzú Patiño of El Financiero (2015), Mexico has not recovered in terms of tax collection, even with the tax reforms implemented since 2014, so it is urgent to implement taxation schemes that help to increase tax revenues, since the need has become an obligation, due to this, the country is obliged to generate virtuous circles of business creation, jobs, etc., but that these businesses, in addition to being created or growing, contribute part of their profits in the form of taxes, But these businesses, in addition to being created or growing, must also contribute part of their profits in the form of taxes, considering for this purpose both the taxpaying capacity and the vital minimum so that these taxes are fair and equitable.

Background

The concept of the Informal Sector was first introduced in the early 1970s by Keith Hart (2012), who referred to the part of the labour sector that did not have the necessary benefits required by workers.

Likewise, in terms of the informal sector itself, it could be mentioned that: are economic activities carried out by individuals who, out of convenience or ignorance, decide not to comply with their tax obligations, either because they find the paperwork very complicated, being on the taxpayers' register, or because they see a panorama of limited or minimal profits when paying the corresponding taxes, and because there is so much unemployment, the last option left to them is to self-employ in some business, whether fixed, semi-fixed, or through the internet, in order to provide their family with the basic or minimum vital sustenance.

For Martín Carlos Ramales Osorio (2013) the term informality encompasses various factors such as:

"From the economic point of view: "the informal sector can be characterised as the non-modern or non-capitalist sector of the economy, where the use of capital is relatively low, small-scale economic activities predominate".

Now, as already mentioned, informality in Mexico, according to INEGI statistics, was as follows in 2012, as shown in Figure 2.



Figure 2 Measurement of the Informal Economy 2003-2012, Base 2008.

The data provided in the figure above shows the following: "For the year 2012 the measurement of the Informal Economy showed that 25.0% of GDP is informal and is generated by 59.8% of the informally employed population. Likewise, 75.0% of GDP is generated by the Formal Sector with 40.2% of the formal employed population.

In other words, for every 100 pesos of the country's GDP generated, 75 pesos are generated by 40% of the formally employed.

While 25 pesos are generated by 60% of the informally employed".

The same organisation also indicates how this sector is distributed according to figure 3.

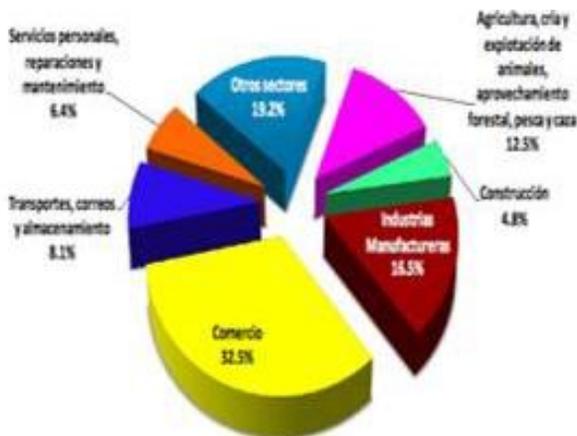


Figure 3 Gross Value Added of the Informal Economy, by sector of economic activity. Percentage Structure 2012

This means that: "The Informal Economy by sector of economic activity for the year 2012, shows that commerce is the most important sector as it contributes 32.5% of the Informal Gross Value Added (GVA), followed by the group of service activities (restaurants, entertainment, education, rentals, among others), which together represent 19.2%; in third place are the manufacturing activities with 16.5% of the GVA, while agro-industrial activities with 16.5% of the GVA. 2%; in third place are manufacturing activities with 16.5% of GVA, while agricultural and livestock activities are in fourth place with 12.5%; in fifth place transport, mail and storage with 8.1%; in sixth place other services except government activities with 6.4%, and in seventh place, construction with 4.8%".

It should be noted that this sector is basically nourished by micro and small enterprises, where the type of organisational structure is generally family based, where several members of the family run the business, the infrastructure, i.e. the premises and the working tools are also generally in a small area of the home or in some nearby premises and in most cases are restricted areas where they generally do not have sufficient tools, resulting in a very peculiar division of attending to the needs of the business according to the processes and conditions to get ahead to offer and charge for a product or service.

The responsibilities of each individual as well as the rules and policies of the business are diluted as the case may be, as there is no clear notion of how a business should be run and managed. There are several factors that affect the organisational structure such as: communication processes both internally and externally.

From the above it can be inferred that this type of taxpayers does not have the economic capacity to acquire infrastructure, as their income is low, and therefore could not cope with the tax obligations that from 2014, the federal government implemented, within these obligations are to issue electronic tax receipt in XML format, as well as in PDF, submit bimonthly returns, Income Tax (ISR), Value Added Tax (VAT) and Special Tax on Production and Services (IEPS), among others.

Thus, in order for this type of taxpayers to comply with their aforementioned obligations, and others.

It is necessary to have at least an updated computer system to be able to issue tax receipts, not to mention the bimonthly declarations that must be submitted for their income and expenses or purchases. All this overwhelms the "potential taxpayer", since the mere thought that this type of person will be able to carry out this whole range of tax obligations is somewhat difficult, since, as indicated above, they do not have the appropriate infrastructure, the technical or economic capacity, or even the cultural and educational capacity, to make a considerable outlay to be able to comply with their tax obligations. Therefore, if the aim is to incorporate the majority of individuals who are in the informal sector into the formal sector, it is necessary to have friendly schemes, as well as some benefits, but above all, the form of taxation must be practical and simple, since with a high rate of informality, it is urgent to establish ways that are more in line with the real characteristics of our country and of the people we intend to incorporate into the taxpayer base.

Tax evasion

In general terms, tax evasion is the non-payment of the corresponding taxes when carrying out an economic activity. Therefore, when mentioning the informal sector, it is immediately implied that this sector is involved in tax evasion, since the individuals located in this sector are not complying with their tax obligations.

There are some causes, which according to José Tapia Tovar (2006), may be the following:

- a) Imbalance between the tax burden and the economic capacity of the taxpayer. In this aspect, it is considered that there must be a balanced relationship between objectives and desired behaviour of the taxpayer, which allows to evaluate results and determine whether the behaviour was the desired and indicated in the positive norm.

- b) Too burdensome tax system, caused by the multiplicity of taxes or the high rates; c) natural aversion of the taxpayer to part with part of his income, which he would like to keep in its entirety, especially if it has been spent at the time when the tax must be paid; d) distrust in the correctness with which tax funds are administered by the government. This is a reason used especially by opposition political parties, in the sense that public revenues have not served to alleviate the situation of poverty, insecurity, health and other services, and yet today there is more scrutiny of public spending by the legislature, only that there is a lack of publicity of its destination; e) the complexity of tax legislation, in that it gives the possibility of legalising, through forced interpretations, evasion that was not in the spirit of the law to allow. This is a widespread complaint about the complexity of tax laws that require the hiring of experts and the creation of tax departments within the company, dedicated exclusively to integrating the documentation generated by companies into the accounting system; f) one of the most important reasons is the lack of tax awareness in the social environment, due to the lack of adequate and constant tax education to guide and orient future taxpayers on their tax obligations and rights as Mexican citizens".

In the same vein, Mauricio Cano del Valle (2006), states that there are several reasons for the existence of tax evasion, which may be the following: 1) the existence of high transaction costs related to the determination and compliance of tax obligations; 2) a deficient control system; 3) serious problems of corruption and legitimacy within the tax collection system".

As can be seen, the various reasons expressed by these authors are in the same direction, which leads to the assumption that a way, or probable alternative to be able to reduce this problem of tax evasion, would necessarily have to focus on informality, since this is where a large part of the problem lies.

Tax Incorporation Regime

As of 01 January 2014 in Mexico, taxpayers with an annual income of less than two million pesos, with economic activities such as commerce and services (not professional painters, bricklayers, blacksmiths, etc.), may be taxed under the tax regime known as the Tax Incorporation Regime (RIF), which in general terms, may be taxed as follows:

1. They must register with the Federal Register of Taxpayers (RFC).
2. Issue digital tax receipts via internet (CFDI) for their operations, being able to issue simplified receipts (sales notes), as long as at the end of the day, week, month or two-month period, they generate a CFDI for such operations.
3. Register their income and expenses in the SAT portal for each of the two-month periods of the financial year in question.
4. Make the payment of their disbursements related to purchases and investments, by cheque, debit or credit card and that are greater than \$2,000.00.
5. File bimonthly tax returns for the taxes they are obliged to pay, such as ISR, VAT and IEPS.
6. They will be entitled to 100% remission of ISR, VAT and IEPS, when their operations are entirely with the general public, that is, for the first year in which they are taxed under this tax regime.
7. In addition, persons who are in the following situations may not be taxed under this regime, as follows:

a) partners or shareholders; b) taxpayers who carry out activities related to real estate, real estate capital, real estate business or financial activities; c) individuals who obtain income referred to in this chapter by way of commission, mediation, agency, representation, brokerage, consignment and distribution, except in the case of those persons who receive income by way of mediation or commission, and these do not exceed 30% of their total income.

As can be seen, even though the rules for taxation of a person under this tax regime are set out in a general manner, these are conditions that it is very difficult for such taxpayers to meet when they have to register their income and expenditure operations in the SAT tax portal, issue CFDIs, etc., as there are too many conditions that must be met to remain under this tax regime, and many prefer to remain in the informal sector rather than comply with all these tax requirements.

What Héctor Villarreal, director of the Centro de Investigación Económica y Presupuestaria (CIEP) explained in an interview with Dainzú Patiño of *El Financiero* (2015), is that: "even with the reform, tax collection is stagnant, Chile and Peru surpass Mexico in the tax revenue index as a percentage of GDP, increasing by only two tenths in the last four years; specialists agree that the tax reform did not generate representative changes".

In addition, to look in more detail at what has taken place in recent years in terms of growth and tax revenue, he stated the following:

"Federal government revenues reached 16.9 percent as a percentage of Gross Domestic Product (GDP) in 2014, which represents an increase of less than one tenth compared to 2013 and a difference of 1.2 points compared to 2012, when it represented 15.7 per cent of GDP, according to figures from the Ministry of Finance and Public Credit (SHCP), meaning that despite the fact that the economy grew by 1.1 per cent in 2013, the *Ponte al Corriente* programme generated one of the biggest spikes in public finances in recent years, as tax revenues rose from 8.4 to 9.7 per cent of GDP, an increase of 1.3 percentage points compared to 2012. In contrast, in 2014, the year of the tax reform and with double the economic growth, tax revenues barely grew by 0.8 points, from 9.7 per cent of GDP in 2013 to 10.5 per cent of GDP last year. "When you have a regularisation programme, you will see extra revenue, an irregular revenue; that year there were also important collection efforts, there was more revenue, but what they paid was a debt. Consider that this kind of situation happens once and that's it, and this was reflected in the figures as a proportion of GDP".

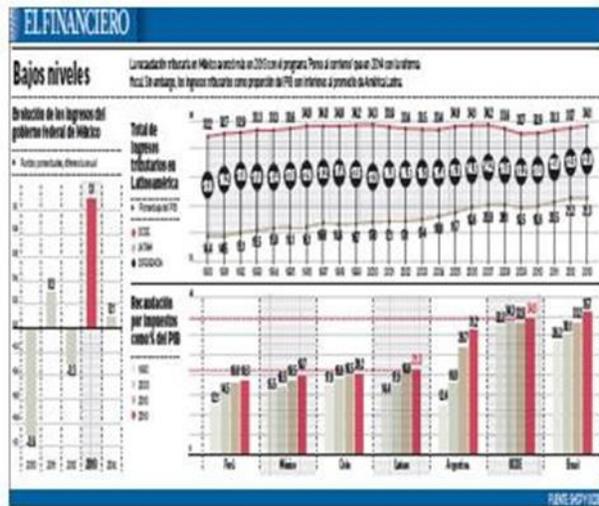


Figure 4 shows Mexico's collection levels in comparison with OECD countries

This figure clearly shows how Mexico is at the bottom in terms of tax collection compared to OECD countries, with an average of 34.1 % vs. GDP for all OECD countries, while our country only reaches 19.7 % vs. GDP.

It is difficult to think that Mexico could have a recovery in terms of tax collection if instead of collecting taxes they are remitted, as in the case of the aforementioned Tax Incorporation Regime, in which only for the first quarter of 2015, according to Paulina Gómez Robles of the newspaper *El Economista* (2015), indicates that the Ministry of Finance and Public Credit (SHCP) reported that the tax incentives for incorporating informal workers into the RIF cost the public treasury 9,271 million pesos, of which 8,008 million were ISR, 1,243 million VAT and only 21 million IEPS.

It should be pointed out that the constitution itself, in article 31, section IV, obliges everyone to contribute to public spending, and not because they are in the informal sector, these people do not use the infrastructure, nor do they receive social security services, education, etc., therefore they should also have to contribute to public spending, This is why the necessary mechanisms should be created to force them to pay, as mentioned above, based on their taxpaying capacity, while respecting their right to the minimum vital income; in other words, even when they have low incomes, they could have a part of this income to pay their taxes, thus strengthening the country's public coffers, instead of depleting them with so many tax exemptions for this and other tax regimes.

The objective of this study is to present a possible alternative solution, so that those people who are in the informal sector can find a way to access legality, for which the appropriate means must be established so that these people can register in the Federal Taxpayers Register of the SAT, and subsequently so that they can determine and pay their taxes in a simple, practical and pleasant way, taking into account the fact that they can pay their taxes in a simple, practical and pleasant way, taking into account the fact that they can pay their taxes in the same way that they pay their taxes in the Federal Taxpayers Register, They should be aware that by carrying out this procedure, they would be complying with their tax obligations, and in addition to this, the country would have better opportunities for growth by receiving greater tax revenues, which are so necessary to strengthen public finances.

Development of the proposed taxation scheme for the micro and small enterprise sector

Based on all this information, which shows the lack of tax collection, or the limited capacity to recover tax revenues, so that the government can fulfil its task, which is to provide what is necessary for citizens to have quality education, road infrastructure in good condition, so that people in the informal sector, and all those with incomes of less than two million pesos, specifically micro and small businesses, can meet their tax obligations in a simple, practical, fair and equitable way, In most cases, this confuses taxpayers and, in the worst cases, scares them away, since they do not have the economic and technical capacity, nor the adequate infrastructure to comply with so many requirements, so they decide to continue in the informal sector, and those who were already captive tend to take refuge in it.

Tax based on contributive capacity and the vital minimum

First of all, as has been stated throughout this study, the proposal for this tax is based on the taxpaying capacity and the vital minimum, since we are talking about people with little income, so it is necessary to establish a mechanism that is more in line with the taxpaying reality of these people. As Marco César García Bueno, et. al. (2008), mentions, "in a first aspect, it seeks to locate the wealth susceptible to taxation.

The legislator is not authorised to establish tax burdens where wealth is not apparent. Thus, the presence of an income, a patrimony or an expenditure index, reveal movements of wealth of the governed, presuming their taxable aptitude".

José Luis Pérez de Ayala (2004) designates the contributive capacity "as the economic aptitude of the subject to bear or be the addressee of taxes. This aptitude depends on two elements: one, the volume of resources that the subject possesses to bear the tax with them; the other, the need he has for such resources".

García Bueno, et. al. (2002) also indicates that "taxpaying capacity is conditioned by a logical requirement, the presence of economic capacity. However, the fact that the subject has an index of economic capacity does not guarantee the birth of his contributive capacity. Its origin does not lie in the power of the State, nor in the exchange of profits between the public and the taxpayer. The contribution is established not at the whim of the legislator but in accordance with the contributory capacity of the subject that guarantees the creation of the normative hypotheses".

In order to have a clearer and simpler idea of what the contributive capacity is, the following is a practical example: a person who receives an income of \$10,000.00 for his economic activities, needs to cover his basic subsistence needs, such as food, clothing, housing, education (these concepts are known as vital minimum, since it is what he must have to cover his basic subsistence needs), which represent in total 8,000.00, the income in this case should be reduced by the amount of the vital minimum and the difference would be \$2,000.00, this being his contributive capacity.

Taxpayer-friendly and practical tax reporting

In any tax system it is mandatory to have a compliance programme that is as simple as possible for those taxpayers with low incomes, and who, due to their low or no educational level, can still fill in the form to pay their taxes.

As stated by Antonio Jiménez González (2014) "the proof of the degree of simplicity of the tax system and of the tax culture of a people is the fact that the taxpayer can or cannot fill out the tax return form for the fiscal year by himself, if for this and for any return the advice of an expert is needed, something or much remains to be done in such a tax system".

Therefore, the proposal would be to generate a tax card for this type of taxpayers, which they can use to go to banks or, if necessary, to the state finance administrations to pay their taxes, and by generating their bimonthly payment, these people would be able to pay their taxes in a practical way.

Likewise, assistance modules can be established in universities with careers related to accounting or taxation, in order to meet two objectives: one is that this type of taxpayers have a more personalised support on the determination and payment of their taxes, and the other is that the students of these universities carry out real practices on this issue.

Structure of the proposal for the micro and small enterprise sector tax

Every tax must comply with various elements such as: subject, object, base, quota or rate and time of payment, in order to be considered in accordance with the constitution.

And therefore it has legal validity, so first of all, we present the structure of what would be the tax on income to the informal sector, which could be included within the Income Tax Law (LISR) according to the following:

Title IV On Individuals

Chapter II On Income from Business and Professional Activities

Section II Tax Regime for the Micro and Small Business Sector

Section II of Chapter II of Title IV of the LISR in force as of 2014 should be repealed.

Subjects of the Tax Regime for the Micro and Small Business Sector

For Dr. Miguel de Jesús Alvarado Esquivel, et al. (2008) "The taxpayer of the material tax obligation or taxpayer is the individual or legal entity on whom the law imposes the tax debt derived from the realisation of the taxable event".

Raúl Rodríguez Lobato (2006) also mentions the following for this term: "It is the person who, in accordance with the law, must satisfy a specific obligation in favour of the Treasury, whether it is their own or that of a third party, or whether it is a substantive or formal tax obligation".

For the purposes of this study, it could be said that the subject of the tax is the individual or legal entity that carries out the events provided for by the law and that consequently generates a specific tax, which must be paid to the State.

Therefore, for this proposal, taxpayers are considered to be those persons who carry out business activities, as well as those who provide non-professional services, and that both activities are strictly with the general public.

These activities may be identified as follows:

- a) Alienation of goods of all kinds, which are acquired by the general public, whether in fixed or semi-fixed locations or on internet sites.
- b) Provision of non-professional services, which are granted to the general public.

Likewise, in order to be subject to this tax, they must not have exceeded the amount of two million pesos in the immediately preceding fiscal year; and in the event of starting activities, it must be considered that they may not exceed said amount in the fiscal year in which they begin.

Purpose of the tax on the micro and small business sector

Another of the elements of the proposed tax is its purpose, for which the idea put forward by the author Rigoberto Zamudio Urbano (2005) is reflected, mentioning the following: "it is the duty of the tax law to define as precisely as possible in all cases, what the corresponding normative hypothesis or generating event of the tax or contribution is".

The second concept of the structure of the tax must fully identify the generating event that will be taxed by the tax regulation and therefore would trigger the cause of the tax, for example in this case it can be mentioned that the generating events of the tax, would be:

- a) The sale of goods to the general public.
- b) The provision of non-professional services to the general public.

Tax base for the micro and small business sector

This other element of the tax, as mentioned by Emilio Margáin Manautou (2008), is made up of the amounts that are taxed according to the assumption of the act carried out, it is also known as the value or amount to which the rate or tariff foreseen by the respective law is applied, so that there is no room for doubt, and thus fix the net amount that must be paid to the Treasury for the act referred to the assumption carried out.

For the proposed tax, the base would be the income received without any deduction, to which the following rate would be applied.

Rate for the micro and small business sector

For Luis Humberto Delgadillo Gutiérrez (2005), there are four types of tariffs: "spillover: when the amount intended to be obtained as tax yield is distributed among the taxpayers, taking into account the tax base or the specific situations foreseen in the law for the impact of the tax; fixed, when the law expresses the exact amount to be paid per tax unit; proportional, when a fixed percentage is established, whatever the value of the base; and progressive, when they increase as the base increases".

For the case of this study, the proposed rate is similar to the one used in the United States of America, which is considered to be a combination of proportional and progressive, since as more income is earned, the percentage per portion of income in the respective range would be applied, as shown in Table 1.

Level	Revenue (\$)	I.S.R. Tax. (%)
1	16,666.67	0.5
2	50,000.00	1.0
3	100,000.00	1.5
4	166,666.67	2.0
5	250,000.00	2.5
6	333,333.33	3.0

Table 1 Rate to be applied to income from the Micro and Small Enterprise Sector.

For a better appreciation see the example of the proposed tax below:

Case study determination of the tax on such income when taxed under this scheme would be as shown in Table 2.

Income up to (\$)	By (X)	I.S.R. rate (%)	I.S.R. to pay (\$)
16,666.67	(X)	0.5	83.33
50,000.00	(X)	1.0	500.00
100,000.00	(X)	1.5	1,500.00
83,333.33	(X)	2.0	1,666.67
55,000.00	(X)	2.5	1,375.00
Total		Total	
\$305,000.00			\$5,125.00

Table 2 Determination of ISR for income of 305,000.00 in the bimonthly period

From the beginning of this study, the idea has been that this tax should be fair and equitable, so that people in the informal sector, as well as those who decide to join this taxation scheme, have the legal certainty that they are fully complying with their tax obligations, and that the tax they are paying is modest. As can be seen, when using this type of scheme, in which the corresponding tax rate is applied to each block of income, in order to avoid a drastic rate jump, i.e. if the rate were applied directly to the income obtained, as in this case, it could be considered that the resulting tax would be as follows: Income \$305,000.00 for the direct rate of 2.5%, the result would be that you would have to pay \$7,625.00, because as this income is located in that rate line, it is the one that would be applied as normally used.

Methodology to be developed

In this study, qualitative methodology was used, this being a descriptive documentary type of research, based on a review of literature, and it is through these means that adequate information was gathered in order to objectively reflect this study.

This is a non-experimental study, as no variables will be manipulated, and only existing facts and events will be narrated.

Acknowledgements

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Conclusions

Based on the above study, it can be concluded that in order to attract more people to the path of formality, it is necessary to establish mechanisms in line with their economic, tax and cultural capacities, so that they feel the confidence and legal certainty that when determining and filing their taxes they do so correctly, with simple, clear and practical schemes that they can carry out themselves, without the need to hire specialists, as this would generate an additional expense to be able to pay their taxes.

By disseminating this information, these taxpayers would begin to be guided so that they have all the elements they need to do to register with the RFC, and as mentioned, one option for this would be to set up assistance or attention modules in universities to guide these people, as well as, together with the tax authorities, to give courses on fiscal civic behaviour, starting in primary education and going through the different educational levels up to university, to raise awareness of the importance of complying with their tax obligations in Mexico.

The proposed scheme aims not only to increase the taxpayer base, but also to increase tax collection, since it is urgent to overcome the difficult economic situation, the country is going through, and what better way than with tax revenues.

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Analysis and interpretation of financial statements under conditions of uncertainty**Análisis e interpretación de estados financieros en condiciones de incertidumbre**

MADRIGAL, Francisco*†, AYALA, Sandra and CHAVEZ, Leonel

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Abstract

Today's world is characterized by dynamic, changing, uncertain economic and financial sense, and it is this dynamic where companies must develop. A very useful financial tool in companies it is the analysis of financial states. Analyze financial statements, means not only apply the various techniques developed in this field, means to interpret the results, activity carried out by experts in finance and the information they generate is used for decision making. This research addresses important areas. Fuzzy sets, as given to uncertainty and complexity in which businesses operate. Financial ratios are used, information obtained this analysis should be performed by experts in the financial area, however this interpretation implies the subjectivity of who plays, their level of education, experience, knowledge of the company, in particular: your worldview, which aims to develop the interpretation by fuzzy numbers.

Financial analysis, Financial ratios, Fuzzy numbers**Resumen**

El mundo actual se caracteriza por ser dinámico, cambiante, incierto en sentido económico y financiero, y es en esta dinámica en donde deben desarrollarse las empresas. Una herramienta financiera muy útil en las empresas lo es el análisis de estados financieros. Analizar estados financieros, significa, no solo aplicar las diversas técnicas desarrolladas en este campo, significa interpretar los resultados obtenidos, actividad que se lleva a cabo por expertos en el área financiera y la información que generan sirve para la toma de decisiones. La presente investigación aborda áreas importantes. Los conjuntos borrosos, como propuesta a la incertidumbre y complejidad en la que se desenvuelven las empresas. Se utilizan las razones financieras, La información obtenida por este análisis debe ser interpretada por expertos en el área financiera, sin embargo esta interpretación lleva implícita la subjetividad de quien interpreta, su nivel de estudios, su experiencia, el conocimiento de la empresa, en concreto: su cosmovisión, por lo que se propone desarrollar la interpretación por medio de números borrosos.

Análisis financiero, Numeros borrosos, Razones financieras

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Introduction

Man has taken as his own the Newtonian message, the orderly and predictable universe; it is assumed that there are laws expressed in mathematical language and we can discover them. From this arises the obsession with control; man believes that the more techniques are developed and implemented, the more control he will have over the world. But with each new technology that is introduced, a greater number of problems are added, and for each of which new procedures and new techniques have to be developed and new technologies invented. Borjón (2002) points out that the theory of complex dynamic systems is not incompatible with chaos theory, as it is itself a sister of complexity, just as social, economic and financial systems, etc. are also complex. The adventure of complexity, as Prigogine (2000), one of its founding fathers, said, has only just begun. And the financial world is and will be particularly attractive to follow. Chaos and complexity are actually much more perfect than our artificial order; we must understand chaos and complexity and not try to create a rigid, inflexible order, closed to interaction with the environment.

Uncertainty and fuzzy sets

The main characteristic of our time is change and with it the uncertainty in which we live; every day there are fewer barriers between countries and the great problems are not only of one country, region or culture. Global warming, water, food and energy shortages, in the field of economics, economic and financial crises are becoming increasingly global and it is in this uncertain world that companies must operate, develop and achieve their objectives.

New knowledge developed within the "hard" sciences, such as fuzzy sets, is emerging as an alternative in the field of organisations as a tool to help them manage under conditions of uncertainty.

Uncertainty has a wide and varied field of influence, for example Caballero Argáez (2008): In the evolution of the world economy in the short, medium and long term, in the relations between neighbouring countries, in the strength of institutions. In our future as a local society in the midst of a globalisation process that seems irreversible.

The fact that the world is becoming increasingly ambiguous and uncertain should not hold us to polarised convictions under the logic of either/or, good and bad, pro or anti. This logic does not help to clarify but to confuse. There is a principle of uncertainty at the very heart of logic. There is no uncertainty in the syllogism; but at the moment of assembly into a system of ideas, there is a principle of uncertainty. Morin (2005)

The uncertainty principle, Asimov (2002) arises with Heisenberg who succeeded in demonstrating that it is impossible to devise some method of determining exactly and simultaneously the position and momentum of an object. The more accurately we determine position, the less accurately we determine momentum, and vice versa. Heisenberg calculated the magnitude of this inaccuracy or uncertainty of these properties and called it the uncertainty principle.

Since ancient times there have been approaches to the nature of the world and its processes.

Sametband (1994) points out in this respect: Emphasis must be placed on the processes of change over time, accepting that in many cases the behaviour of processes cannot be accurately predicted by simple laws that govern behind the phenomena, on the other hand, our complex world is governed by simple laws that we will progressively discover by means of the methods developed by science. The changing environment has led organisations to uncertainty in the environment and therefore, as new knowledge is gained, new variables arise that need to be quantified. How to plan financially in such a changing, dynamic and uncertain world? How to apply financial management models, when the data we have, such as sales prices, variable costs, profits, cash flows, capital costs, etc., are constantly changing? How to measure quality, how to measure the acceptance of products, how to work with incomplete or inaccurate information?

The above questions give possibilities to answer them by means of fuzzy sets and to evaluate the uncertainty of the information. In this respect Borjón (2003) citing Maculan and Poderse (1993) points out:

"True nature, as we should understand it, is acoustic, holistic, holographic and simultaneous, it is incomprehensible to Euclidean mathematics" (p. 118). Also, from the point of view of quantum mechanics Hesita, (2004) points out that not everything can be measured with total precision, but it will be possible to measure precisely what is intended to be found. When analysing a company, it should be under a criterion of systemic, holistic and not only technical thinking.

Fuzzy sets

Fuzzy sets have more and more applications every day, the field of engineering, economics, computing, intelligent systems, among others have benefited from it, the present research tries to find possible applications in companies and through financial management.

Can deterministic chaos move within a certain range, can there therefore be a link between chaos and fuzzy sets? Does the complexity of non-linear business systems give rise to or justify fuzzy logic and fuzzy sets?

Aristotelian logic has served as the basis for the mathematics of normal sets and is based on the principle of the excluded third, a principle which indicates that a proposition can only be true or false, there being no intermediate degree of truth. As a consequence of this principle, in set theory, for a subset A defined on a universe or referential set X, an element of the referential either belongs or does not belong to the said set A. That is, there is no ambiguity about its membership.

Most of the time, classes of objects found in the real world do not have a precisely defined membership criterion. For example, the class 'animals' includes among its members dogs, horses, birds, etc. and clearly excludes objects such as rocks, plants, etc. However, objects such as starfish, bacteria, etc. have an ambiguous status in relation to that class. This same ambiguity appears in the case of the number 10 in relation to the class of real numbers much larger than 1.

Since the beginning of the theory of fuzzy sets Zadeh (1965, 1981), they have been defined as: A collection of objects with membership values between zero: completely excluded and, One complete membership.

MEMBERSHIP values express the degree to which each object is compatible with the distinctive properties or characteristics of the collection. A fuzzy set is characterised by a membership or domain function, space or universe of discourse X, for a unit interval of (0,1).

Here is an example of fuzzy sets: The height of a person is a variable that can be represented in this way. Suppose someone is asked how tall a person must be to be considered short, medium or tall, he will probably answer with a concrete datum, short will be with a height less than 1.60 m. from that height up to 1.80 m. He will be a person of medium height and more than 1.80 m. He will then be a person of tall height. Measuring or quantifying, low, medium or high represents a problem, since you can have answers from different people and each one can have their own appreciation of what low, medium or high means. According to the logic of normal sets, up to a height of 1.60 m a person will be short and a single centimetre, i.e., 1.61 m, means medium height, medium ends at 1.80 m and then suddenly he or she will be tall. The increase of 1 cm means that a height of 1.61 m stops belonging, i.e., stops being a little member of the low set, and starts belonging (membership) to the middle set.

So, successively with the height, we have then a model that is not absolutely sharp but a tendency of decreasing membership in a low set and a tendency of increasing membership in a medium set of the height, and so on from medium to high.

In fuzzy sets, linguistic labels are used. These labels indicate the degree of belonging that an element has to a fuzzy set, in our case you can have not only heights, low, medium, high, but you can also have very low, neither low nor medium or regular height and these linguistic labels is the most common way to express ourselves.

The following graph shows the representation of the fuzzy set height:

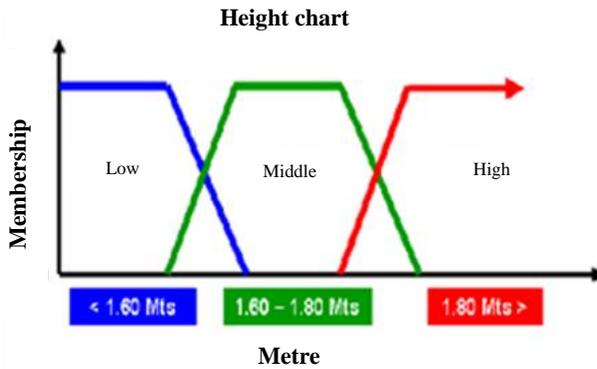


Figure 1 Height with fuzzy numbers

Fuzzy numbers:

Performing operations with fuzzy sets, is carried out by means of fuzzy numbers Casanovas (2003) defines them as: That fuzzy subset that fulfils three properties:

The variables under study take values in the field of real numbers.

The membership function is normal; normality means that at least one value of the variable under study has the maximum level of assumption associated with it, i.e. unity.

The membership function is convex, this means that from the lower end to the value of highest possibility the levels of assumption or possibility increase, or are maintained, but at no time decrease. Similarly, from the maximum possibility value to the upper end, the presumption levels decrease or remain the same, but never increase.

The most commonly used fuzzy numbers are triangular fuzzy numbers (TFN) and trapezoidal fuzzy numbers (TRFN), Lazzari (1997). An NBT is determined by only three real numbers, (the minimum value, the maximum value and the value with the highest level of assumption), b_1, b_2, b_3 such that $b_1 < b_2 < b_3$ and is usually represented $A = (b_1, b_2, b_3)$.

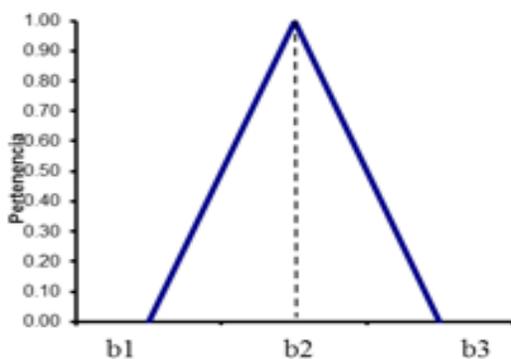


Figure 2 Triangular fuzzy number

Lazzari (1997) also defines. An NBTr is uniquely determined by four real numbers (the minimum value, the maximum value and the highest level of assumption values), b_1, b_2, b_3, b_4 such that $b_1 < b_2 < b_3 < b_4$ and is usually represented $A = (b_1, b_2, b_3, b_4)$. See figure above.

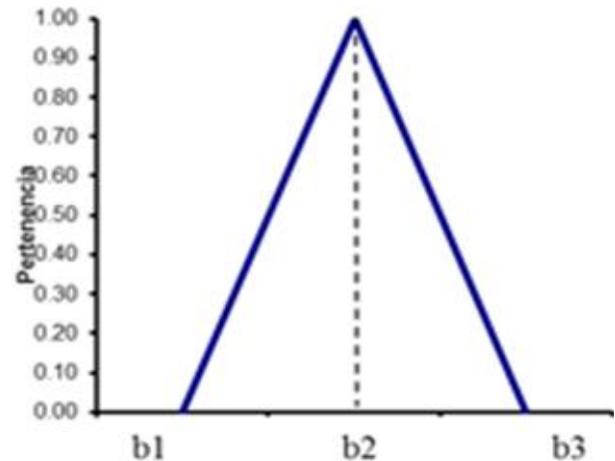


Figure 3 Trapezoidal fuzzy number

Operations with fuzzy numbers

Developing models with uncertain data requires determining the rules of operation with fuzzy numbers, Monserrat (2003).

Operation	Operation
Sum	$(a_1 \alpha, a_2 \alpha, a_3 \alpha) + (b_1 \alpha, b_2 \alpha, b_3 \alpha) = (a_1 \alpha + b_1 \alpha, a_2 \alpha + b_2 \alpha, a_3 \alpha + b_3 \alpha)$
Subtraction	$(a_1 \alpha, a_2 \alpha, a_3 \alpha) - (b_1 \alpha, b_2 \alpha, b_3 \alpha) = (a_1 \alpha - b_3 \alpha, a_2 \alpha - b_2 \alpha, a_3 \alpha - b_1 \alpha)$
Multiplication	$(a_1 \alpha, a_2 \alpha, a_3 \alpha) \cdot (b_1 \alpha, b_2 \alpha, b_3 \alpha) = (a_1 \alpha \cdot b_1 \alpha, a_2 \alpha \cdot b_2 \alpha, a_3 \alpha \cdot b_3 \alpha)$
Division	$(a_1 \alpha, a_2 \alpha, a_3 \alpha) / (b_1 \alpha, b_2 \alpha, b_3 \alpha) = (a_1 \alpha / b_3 \alpha, a_2 \alpha / b_2 \alpha, a_3 \alpha / b_1 \alpha)$
Power	$(a_1 \alpha, a_2 \alpha, a_3 \alpha)^\alpha = (a_1 \alpha)^\alpha (a_2 \alpha)^\alpha (a_3 \alpha)^\alpha$

Table 1 Operations with fuzzy numbers

Where α is the number of cuts or degree of membership that an element can have in the fuzzy sets. From the point of view of quantum mechanics, it is not possible to measure everything with total precision, but you can measure precisely what you want to find.

When analysing a company, it should be under a systemic, holistic and not only deterministic thinking criterion.

Analysis and interpretation of financial statements

The analysis of financial statements is the critical process of assessing the present and past financial position and results of operations of a company, with the objective of establishing the best possible estimates and predictions about future conditions and results. Ortega (2008).

Financial analysis shows to what extent the company is achieving its objectives, pointing out the successes obtained in its management, as well as the deficiencies incurred, serving to make decisions, strengthening the successes and correcting the failures. There are different methods to analyse financial statements such as: Ortega (2008) integral ratios and simple ratios or financial ratios, Gitman (2000).

Financial ratio method

This method consists of finding the relationship between a concept of a financial statement with another concept of the same or different financial statement. Financial ratios are simple measures, which should be used for analysis and study. According to their objective, ratios can be classified, according to Gitman (2000), into four main groups:

Liquidity Ratios

A company's liquidity is judged by its ability to meet its short-term obligations and its ability to convert certain current assets into cash.

Solvency or Debt Ratios

These measure the level and structure of debt contracted by the company and its ability to meet its commitments to third parties.

Activity Ratios

Assets are acquired for use in the company's operations with the intention of generating sales and ultimately profits, Ochoa (1998).

Profitability Ratios.

These are the ratios that measure the overall effectiveness of the company, Weston (1994), in terms of profit generation. These ratios mainly involve.

Interpretation of financial statements

Interpreting the results obtained means decomposing and breaking down the information generated by accounting, through an information transformation technique that converts basic data and information into processed information, useful for decision making regarding the financial activities of the company. Therefore, the Analysis and Interpretation of Financial Statements are very important, as the

Financial Statements are very important, as the information they provide gives a broader view of the company, which improves the quality of decision making. Below is an income statement and a statement of financial position to be analysed by means of the financial ratio technique and to interpret the results obtained.

Comprehensive income statement

Interpretation of financial ratios using fuzzy sets

The application of the formulas is given in conditions of total certainty, since they are based on concrete data, and the application of the fuzzy sets will also result in deterministic values. This information does not incorporate any level of uncertainty, however the interpretation of the results obtained is not given in a unanimous and unique way, but incorporates the knowledge, experience and point of view of the person interpreting the financial analysis, and it is in the interpretation where uncertainty arises, derived from the worldview of the interpreter.

The financial analysis needs to be interpreted by experts to determine the financial situation of the company. The interpretation is carried out by three experts who give their opinion on the results obtained in the different financial ratios using the following endecadary scale.

Endecadary scale for the interpretation of financial ratios.

Casanovas, Fernández (2003 p.23) define expertons as "all expertons result from the aggregation of the opinions of various experts on a variable or phenomenon in question". Similarly, Gil and Tinto (2007) point out that expertons can be the object of operations that can be carried out with fuzzy sets and numbers.

According to Monserrat. (2003), Kaufmann and Gil (1993) the experton results from:

$$a + (b-a) \alpha \tag{1}$$

Where a and b are the limits of the intervals or confidence levels, which for the company are:

- (a) minimum possible value zero (0) and (b) maximum possible value one hundred (100) and α is the experton that results from the experts' opinion.

Following Monserrat. Fernández (2003, p. 24) the experton will be elaborated, starting from the level of presumption of the experts by determining the absolute frequency, and then the normalised frequency and finally the experton is determined from the sum of the normalised frequencies.

This will be done for each financial ratio as follows.

In the same way, we proceeded with each of the financial ratios and with the information obtained the following graph was drawn up.

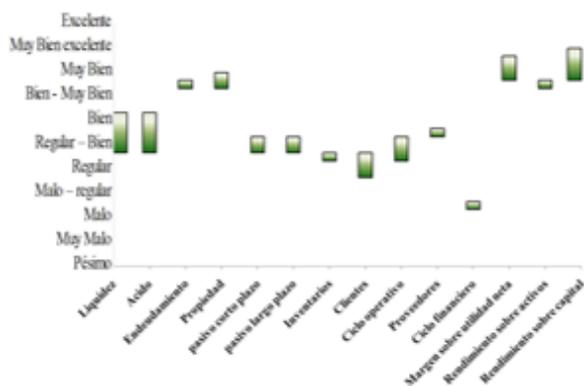


Figure 4 Interpretation of financial ratios as fuzzy numbers

The graphic shows in less technical and clearer language how the company is doing, based on expert opinion. It highlights that there is a very good return for shareholders, as well as a very good return on sales as a proportion of sales, and also a very good return on assets.

As far as indebtedness is concerned, it practically does not exist, since the company has a very good level of ownership, and the indebtedness is mainly with suppliers, who grant long terms in accordance with the company's production. The term to customers is not entirely favourable, because the company's customers have a great bargaining power in their favour.

In terms of liquidity, the company has no problems to cover its short-term commitments, being in good payment conditions.

The chart also shows, like the candlestick analysis, those financial ratios that experts agree on the most in their interpretation.

Smaller bodies, as well as financial ratios where the body is wider, mean a lower degree of agreement.

A "traditional" chart with the results of the financial ratios + is shown below

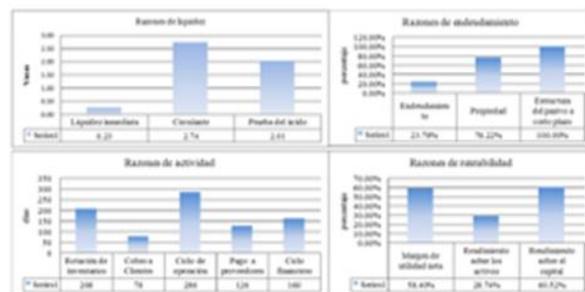


Figure 5 Deterministic financial ratio chart

Comparison of the deterministic and fuzzy results of the financial analysis

Figure 5.- shows graphically the result of the financial ratios, noting that a graph is required for each of the types of ratios, given the different magnitudes in which these ratios are presented: times, percentages, days. These ratios represent the analysis of the financial statements.

Figure 4.- shows the interpretation of financial ratios in the opinion of experts about the financial situation of the company, the basic difference lies in the approach to the understanding of financial indicators for people who are not necessarily experts in the analysis of financial statements.

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General explanation of the subject and explain why it is important.

What is your added value with respect to other techniques?

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Clearly explain the problem to be solved and the central hypothesis.

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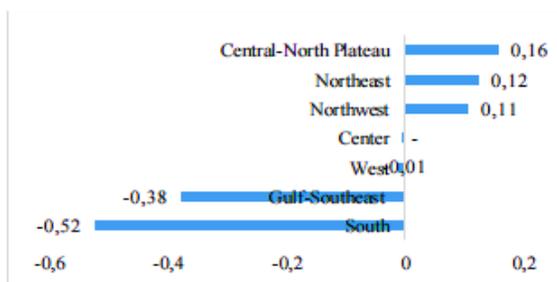
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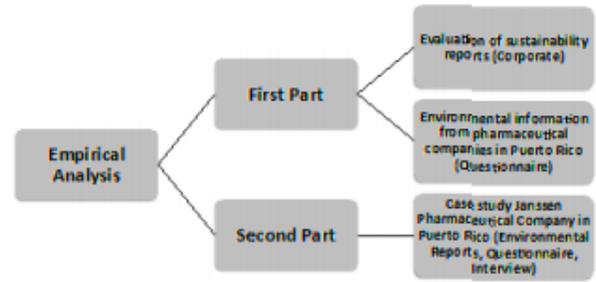


Figure 1 Title and Source (in italics).

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Modality	Activities of the Value Chain
Financial cooperation	The need for financial resources and the difficulty in finding financing
Technological cooperation	The rapidity in the development of the technology and its complexity
Cooperation in production	The fundamental search for acquiring scale and within-reach economies that permit the reduction of production-associated costs and risks
Commercial cooperation	Seek the following objectives: reduce costs and risks in the commercialization process, penetrate new markets, complete the gamma of products offered, procure access to distribution channels, etc.

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Each article shall present separately in **3 folders**: a) Figures, b) Charts and c) Tables in .JPG format, indicating the number and sequential Bold Title.

For the use of equations, noted as follows:

$$Y_{ij} = \alpha + \sum_{h=1}^r \beta_h X_{hij} + u_j + e_{ij} \quad (1)$$

They must be editable and number aligned on the right side.

Methodology

Develop give the meaning of the variables in linear writing and important is the comparison of the used criteria.

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The results shall be by section of the article.

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