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Presentation of Content

In a first article we present, *Effect of the minimum wage on employment and the poor population in Mexico, 1980-2019*, by GODÍNEZ-MONTOYA, Lucila, FIGUEROA-HERNÁNDEZ, Esther and PÉREZ-SOTO, Francisco, with adscription in the Universidad Autónoma del Estado de México and Universidad Autónoma Chapingo, as a second article we present, *Resistant personality and coping strategies in Mexican World Cup and Olympic athletes in a pandemic*, by PONCE-CARBAJAL, Nancy, LÓPEZ-WALLE, Jeanette M. and MÉNDEZ-SÁNCHEZ, María del Pilar, with adscription in the Universidad Autónoma de Nuevo León and Universidad Nacional Autónoma de México, as the third article we present, *Environmental auditing, the evaluation process an analysis of its standards*, by REYES-ALTAMIRANO, Rigoberto, MEDINA-CELIS, Laura Margarita, MEDINA-CELIS, Gabriela and GARAY-REYES, Ana Paola, with adscription in the Universidad de Guadalajara, as fourth article we present, *Blended learning experience of networks and telecommunications through a SPOC Course*, by OTERO-ESCOBAR, Alma Delia, with adscription in the Universidad Veracruzana.

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Effect of the minimum wage on employment and the poor population in Mexico, 1980-2019

Efecto del salario mínimo sobre el empleo y la población pobre en México, 1980-2019

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Abstract

This research seeks to contribute to the discussion and empirical evidence of the effects of the minimum wage on the main socio-economic factors. The objective was to determine how the behavior of the minimum wage has influenced formal employment and the population in poverty in Mexico, from 1980 to 2019. Two linear regression models were estimated, using the ordinary least squares method. From his estimation, a negative relationship was found between the minimum wage and the two dependent variables: formal employment, as well as with the population in wealth poverty.

Minimum wage, Formal employment, Population in poverty

Resumen

La presente investigación busca contribuir a la discusión y evidencia empírica de los efectos del salario mínimo sobre los principales factores socioeconómicos. El objetivo consistió en determinar cómo el comportamiento del salario mínimo ha influido sobre el empleo formal y la población en pobreza en México, en el periodo 1980 a 2019. Se estimaron dos modelos de regresión lineal, mediante el método de mínimos cuadrados ordinarios. A partir de su estimación se encontró una relación negativa entre el salario mínimo y las dos variables dependientes: el empleo formal, así como con la población en pobreza de patrimonio.

Salario mínimo, Empleo formal, Población en pobreza

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Introduction

Since its creation, the minimum wage has been an issue of great importance in all countries, as mentioned by Arango, et. to the. (2008), this is a labor law dating from 1890, derived from the maritime strike in New Zealand, according to the authors, “this was the culmination of the efforts of the unions to secure legal status and obtain the protection of a mandatory minimum wage and better employment conditions”. (p. 211)

Reyes (2011), indicates that at the level of international regulations, the first initiative on setting minimum wages was in 1928, through Convention 26 of the International Labor Organization (ILO), followed by conventions 99 and 131. Derived from this, was that, during the first half of the twentieth century, in different countries legislation began to emerge in this regard, the objective of which was that the setting of a minimum wage allowed “to protect the lowest-income workers, establishing an effective and dignified wage floor”. (p. 6)

According to the same author, the establishment of the minimum wage in Mexico dates back to those years as a result of the Mexican Revolution, “among their achievements, workers had the incorporation of a minimum wage into their national constitution, in order to prevent it from falling. below the minimum necessary to satisfy their needs and those of their family”. (p. 5); And as in Latin American countries, in Mexico, the legislation on this matter had the “social objective of reducing poverty and inequality through significant increases to the minimum wage”. (p. 6)

However, as Moreno, et al. (2014), since the middle of the last century and up to the present, the behavior of the real minimum wage has gone through different stages, which are due to the performance of the Mexican economy.

According to Reyes (2011), “during the years of industrialization via import substitution, wages in Mexico had moments of decline and recovery. In the post-war era... the minimum wage lost half of its purchasing power”. (p. 7)

Subsequently, in the period from 1950 to 1976, there was an upward trend, in these years the real minimum wage quadrupled and the economic situation of the country allowed the real Gross Domestic Product (GDP) to grow at an average annual rate of 6.0% and low inflation (Reyes, 2011; Moreno, et al., 2014); According to Escobar (2014), it was in 1977 when it reached its highest point; however, according to Moreno, et al. (2014), as of this year "their nominal adjustments lagged slightly behind inflation." (p. 81)

From 1977 to 1982, according to Escobar (2014), it presented a slight decrease of 1.3% per year, and in the following 10 years, from 1982 to 1992, it was the most critical period in the country regarding this type of salary, since presented its worst fall being 6.3%, which accumulated a drop of 63.6%. From 1992 to 1995 as well as from 1995 to 2003, the decline was slightly less, 2.0 and 2.5% per year respectively. In general, Moreno, et. to the. (2014), indicate that from 1980 to 1995, the minimum wage lost 66.0% of its purchasing power.

In this context, Munguía (2019), states that from the eighties, Mexico based its economy on the export sector and foreign direct investment (FDI), however, the development of the country's industry was not achieved and due to the On the contrary, a simple packaging model with little added value and poorly paid jobs was chosen, which implied keeping the minimum wage below inflation, that is, that average wages did not grow, these actions being an open policy of the Government, since three decades ago.

Finally, Escobar (2014) mentions that from 2003 to 2014, the minimum wage maintained a constant behavior and, as stated by Munguía (2019), this was due to the stabilization policy, which implied that wages remained stagnant, since companies in Mexico granted salary increases, equivalent to the increase in the minimum wage. In addition, Escobar (2014), states that according to the National Council for the Evaluation of Social Development Policy (CONEVAL), at least between 2005 and 2014, the minimum wage was not enough to cover the essential needs of individuals in urban areas, much less when considering the whole family, so the fall in the minimum wage, especially since the eighties, translates into an increase in poverty and inequality in Mexico.

Within the aforementioned period, according to Moreno, et. to the. (2014), perhaps the situation more:

The dramatic impact of Mexico's deteriorating minimum wage is manifested when compared with the level of the per capita poverty line. In 2011, Mexico was the only country in the region in which the minimum wage was lower than this line; a ratio of 0.66, well below the rest of the region. (p. 84)

Therefore, according to the same authors, the minimum wage, "in real terms has deteriorated sharply for decades." (p. 80)

Furthermore, as Reyes (2011) puts it, in some countries including Mexico, the institution in charge of setting minimum wages is the National Minimum Wage Commission (CONASAMI), however, "corporatism and lack of of an independent unionism that represents the interests of the workers in CONASAMI ... have given rise to the precariousness of work and wages that millions of Mexicans live today". (p. 7)

Due to this, Munguía (2019) indicates that the initial objective for which this salary was established is not being met, therefore, in 2014, various organizations and institutions raised the need for an increase in it. In 2016, the wage policy went from being a "measure to contain inflation to a policy of wage recovery". (p. 10), which continues to date; however, the current government has the objective of a faster recovery of the minimum wage so that it reaches at least the family welfare line.

For the ILO (2007), "wages are a complex issue because they represent an essential part of employers' labor costs and the main source of income for workers." (p. 1), which is why the salary level and the mechanisms used to set them have important repercussions, both at the level of the economy and society; These wage setting mechanisms are timely in the decisions made by companies and workers (microeconomics field), as well as at the macroeconomic level (inflation, employment, productivity and consumption).

Based on the above, this research seeks to contribute to the discussion and empirical evidence of the effects of the minimum wage on the main socioeconomic factors; Therefore, the objective of this paper was to determine how the behavior of the minimum wage has influenced two of the main socioeconomic variables in Mexico: formal employment and the population in poverty of wealth, from 1980 to 2019. Given that both the evidence Theoretical as well as empirical does not show a consensus between the results obtained, it is that in this investigation the sign that is expected to be obtained with respect to the parameters of the independent variables is not specified.

Theoretical aspects

The minimum wage has been and continues to be a controversial issue and widely discussed in the economic literature, which is why, according to Arango, et. to the. (2008), there is no consensus on "the effects of the minimum wage on such fundamental issues as employment, the formation of human capital and the well-being of the population." (p. 213); while Del Carpio & Pabón (2015) add that, "the effect of the minimum wage on the labor market and productivity is ambiguous from a theoretical and empirical point of view". (p. 3); since an increase in the minimum wage can have positive and negative repercussions both at the employment level, and in general on other economic and social variables (Campos, et al., 2017; Jiménez, 2018).

Theoretical aspects of the minimum wage on formal employment

As already mentioned, the vast majority of studies on the minimum wage analyze its impact on employment levels, both in developed and developing countries. But the question to answer is, what would be the effect of an increase in the minimum wage on employment?

In this regard, Miranda (2018) indicates that from the point of view of economic theory, the impact generated by the minimum wage policy "on employment depends on the type of market in which companies compete to hire workers. In a competitive market, the minimum wage could generate unemployment". (p. 3)

In this sense, Del Carpio & Pabón (2015), point out that:

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In this case, the magnitude of the reduction in employment will depend on the elasticity of labor demand. However, there are other alternative market models that would explain why in the face of increases in the minimum wage it is possible to expect increases in labor demand. In a monopsony labor market, employers would be in a position to impose a lower wage than they would pay in a competitive market. Therefore, the introduction of a minimum wage obliges employers to pay a higher wage than they offer in a one-time market. If the minimum wage is set above the monopsony wage, but below the perfect competition wage, it is possible to increase the level of employment. (p. 6)

Theoretical aspects of the minimum wage on poverty

Apart from employment, Arango, et al. (2008), mention that another of the important objectives of the minimum wage policy has been "to increase the income of poor families that have some of their members in the labor force." (p. 222); that is, as mentioned above, the minimum wage not only has effects on employment, but also on labor income, poverty and well-being.

According to Lustig & McLeod (1995), an important question to consider is: What is the impact of increases in the minimum wage on poverty? (p. 111)

As with the effects on employment, there is also no consensus on the effects of the minimum wage on poverty. According to Gindling (2018), increasing this type of salary in developing countries can have two opposite effects: increase or reduce poverty, which depend on the characteristics of the labor market.

In this regard, Lustig & McLeod (1995) state that the standard model establishes that:

The impact on poverty must be negative, that is, a higher minimum wage results in higher poverty rates ... because a higher minimum wage would result in a reduction of employment in the formal sector, increasing the supply of informal labor and putting pressure on, in this way, their wages down. (p. 110)

However, even if an increase in the minimum wage produces the standard increase in formal sector unemployment, under certain assumptions, an increase in the minimum wage can, in fact, increase the wage of informal sector workers ... if one allows individuals who lose their job in the formal sector choose between moving to the informal sector or waiting their turn for a job in the formal sector, the impact of wages in the informal sector will depend on the relative size of the elasticity of demand for employment in the formal sector. If it is inelastic enough, then there will be an increase in the informal sector wage and total unemployment. Depending on the net effect, that is, on whether the wage effect predominates over the unemployment effect, poverty can also decrease. (Lustig & McLeod, 1995, p. 114)

The same authors also point out that:

In developing countries their labor markets are characterized by the presence of an informal sector ... In the developing world there is scattered evidence which seems to indicate that the majority of the poor are in the informal sector and that the majority of workers in the sector informal are poor. (p. 113)

Gindling (2018) adds that this decrease in poverty may be insignificant, since this type of wages in developing countries is for workers in the formal sector, who in number are few in relation to the number of workers in the informal.

Also, according to Lustig & McLeod (1995):

The workers who benefit directly from increases in the minimum wage are not usually the poorest ... in the developing world most of the poor work in the informal sector where the possibility of being poor is higher. (p. 110)

Thus, if minimum wage legislation does not cover a large group of informal workers, higher minimum wages are unlikely to reduce poverty; if the workers affected by the minimum wage are secondary workers in the family, higher minimum wages will not reduce poverty; And if higher minimum wages cause workers to lose jobs in the formal sector, they are unlikely to reduce poverty. (Gindling, 2018, p. 1)

Empirical evidence of the effect of the minimum wage on formal employment and poverty

Considering the definition of minimum wage, which is established in the Magna Carta, Reyes (2011) points out that, "the minimum wage must be sufficient to satisfy the normal needs of a head of the family in the material, social and cultural order, and to provide compulsory education for children". (p. 6)

Given its importance, Jiménez (2018) indicates that the role that has been assigned to it, as well as the discussion and research on its economic and social effects have been widely addressed; So the first studies that emerged on the subject focused on analyzing the impact of the minimum wage on employment and inequality; In this sense, Del Carpio & Pabón (2015) state that although the empirical evidence of the effects of the minimum wage, especially in the labor market, has been generated mainly in developed countries, more studies of this type have recently emerged focused on the developing countries. However, according to the same authors, these investigations are not limited only to the effects of the minimum wage on income and employment, since, according to the observed empirical evidence, while in some countries the minimum wage is used as a policy instrument to reduce poverty and inequality, in others, it is done to improve labor productivity or correct inefficiencies in the labor market.

As in the case of the theoretical aspects, regarding the empirical evidence there is also no consensus about the effect that an increase in the minimum wage causes on employment, poverty and other socioeconomic factors.

According to Miranda (2018), despite the existence of a significant number of empirical studies on the minimum wage in the last 25 years, there is no consensus on the effects it causes on employment, so part of this The explanation lies in the fact that "the results are associated with the type of methodology applied, the databases available, the type of worker considered affected, the industry where they work and the institutional characteristics of the country." (p. 3)

Which is why the empirical evidence of the relationship between minimum wage and employment shows conflicting results; for which two major stages can be distinguished:

As Miranda (2018) expresses, the first is the one recorded at the beginning of the 90s, in which the investigations coincided in the sense that the effects of the minimum wage on employment were negative, according to the It is established by the neoclassical theory of perfect competition in the labor market; the common denominator of these studies was that they used cross-sectional data or time series; however, these methodologies were criticized. In this regard, Brown, et. to the. (1982), cited by Arango, et al. (2008), carried out a "survey of the evidence and the conclusions of different analyzes made for the United States", finding that "increases in the minimum wage tend to reduce employment, especially of the young population". (p. 213-214)

A second stage is recorded from the first half of the 90s, where Card & Krueger (1994), cited by Arango, et al. (2008), conducted pioneering studies and compared the levels of employment in fast food restaurants in New Jersey and Pennsylvania before and after the increase in the minimum wage that occurred in New Jersey in 1992, the result of which was that "the increase in the minimum wage Not only did it not negatively affect employment in this place, but on the contrary it increased ". (p. 214)

In this regard, Campos, et al. (2017), add that, according to the studies carried out, "the effects that an increase in the minimum wage could have on employment... show that when the initial level of the minimum wage is relatively low, a modest increase does not have negative effects on the job". (p. 207)

Likewise, as expressed by Arcidiácono (2015), if there is any decrease in employment, it turns out to be of low economic significance.

However, the empirical evidence already presented refers to developed countries, which have very different socioeconomic characteristics from those of developing countries. Therefore, according to Miranda (2018), the empirical evidence previously explained for developed countries can hardly be applied to emerging countries. In this sense, the impact that the minimum wage has on the labor market will depend, among others, "on the percentage that the minimum wage represents with respect to the wages of the economy, the number of workers covered, respect for the law, the institutional characteristics of each economy and the existence of informal markets". (p. 7)

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In the case of developing countries, when analyzing the minimum wage-employment relationship, it is important to take into account that one of the characteristics that occurs in these types of countries is the high rate of informality, and this may imply that “before increases in the minimum wage, individuals who were previously employed in the formal sector become unemployed”. (Arcidiácono, 2015, p. 5)

According to the same author, neither at the level of developing countries is there a consensus regarding the results obtained from the minimum wage-employment relationship; Since despite the fact that many of them show empirical evidence in favor of the negative effect of the minimum wage on employment, these effects tend to be of little economic significance. On the other hand, there is also empirical evidence in favor of positive results of the minimum wage on employment.

On the other hand, just as there are conflicting results regarding the empirical evidence of the effects of the minimum wage on employment, the same happens in the case of the effect that the minimum wage has on poverty.

According to Lustig & McLeod (1995), studies conducted for developing countries are unclear, as some have found that:

Minimum wage legislation hurts jobs and the poor while others find the opposite. Some studies are based on econometric analysis while others observe the behavior pattern of the variables for specific periods of time ... various studies that use some form of regression analysis to investigate the relationship between the minimum wage and the wages of the unskilled sector or informal and between minimum wage and employment. Some of these studies find a positive relationship between the minimum wage and the average wage of the unskilled or the income of the self-employed. Others find that the sign of the relationship between the minimum wage and the wages of skilled workers varies between countries and that the relationship between the minimum wage and the wages of unskilled workers is weak. (p. 115)

Here is some of the research linking the minimum wage to employment and poverty in developing countries.

Campos, et al. (2017), developed a study, where:

They analyzed the effects of the increase in the minimum wage on wages and employment in Mexico. For which the minimum wage is standardized in two areas of the country at the end of 2012. Using data from the National Survey of Occupation and Employment (ENOE), a cross-sectional econometric analysis and a panel analysis were carried out at the individual level. The results of the first indicated that, on average, the hourly wage of workers in zone B increased between 1.6 and 2.6% and, in the case of salaried workers, between 1.8 and 3.3%. Panel analysis produced similar results; And although the cross-sectional analysis does not reveal an impact in terms of employment, the panel data indicated that the probability of being an informal (formal) worker decreased (increased) among those affected by the wage increase. (p. 205)

Kaplan & Pérez (2006), analyzed:

The effect of minimum wages on labor income in Mexico. With data panels from the National Urban Employment Survey (ENEU), as well as information from the Mexican Institute of Social Security (IMSS), it was found that changes in the real minimum wage present a positive effect on the change in labor income for all wage groups, this effect being weaker in the case of workers who earn several times the amount of the minimum wage. (p. 139)

Hernández & Lasso (2003), investigated:

The effects of the legal minimum wage (SML) on employment in Colombia, in a function of labor demand, taking into account the substitution effect and the income effect induced by the increase in the minimum wage ... for the period 1984-2000, based on in the quarterly information of the Household Surveys. One of the main conclusions of the study is that the net effect of the SML on employment is positive, both for the population covered and for the population not covered by it, when the substitution effect and the income effect are considered together. On the other hand, it is shown that the demand for labor is determined by the economic cycle rather than by changes in the prices of production factors. (p. 117)

Lustig & McLeod (1995), analyzed:

The relationship between minimum wage and poverty in developing countries. The analysis is carried out for a cross-section of countries, through regression of changes in poverty rates with respect to changes in the minimum wage and other variables that could affect poverty levels. The results show that the minimum wage and poverty are inversely related; that is, an increase in the real minimum wage is accompanied by a reduction in poverty. (p. 109)

Materials and methods

In this section, the variables used are described, and the econometric models used are presented..

Description of the variables

The following variables were used in the present study:

Dependent variables

Among the dependent variables used in the research are: formal employment (EmpFormal_t) and the population in wealth poverty (Pobrezat_t).

The variable EmpFormal_t, refers to the population employed in the formal sector. It was decided to analyze the relationship between the minimum wage and formal employment; because the minimum wage directly affects employees in the formal sector. The information for this variable was obtained from the Macroeconomic Analysis Center (CAMACRO), for the period 1980 to 2019.

The second dependent variable is [Poverty]_t, that is, population in wealth poverty, which refers to:

The insufficiency of disposable income to acquire the food basket and to make the necessary expenses in health, education, clothing, housing and transportation, even if all the disposable income in the home were used exclusively for the acquisition of these goods and services. (CONEVAL, s / f).

For this research, the population in poverty of patrimony was used, as it is considered the closest to the concept of minimum wage, established in article 23 of the Political Constitution, as mentioned previously.

The information for the poverty variable, as well as its analysis corresponds to the period 1992 to 2019, which was obtained from CAMACRO and CONEVAL.

Independent variable

The independent variable was the real minimum wage at 2018 prices (Salmint). This was calculated by deflating the nominal minimum wage with the national consumer price index (INPC), base for the second half of 2018. The nominal minimum wage is released by CONASAMI.

Econometric models

To determine the influence of the minimum wage on formal employment and the population in poverty of wealth in Mexico, the following models were used, whose structural form was the following:

$$EmpFormal_t = \alpha_0 + \alpha_1 Salmin_t + \mu_i \quad (1)$$

$$Pobrezat_t = \beta_0 + \beta_1 Salmin_t + \varepsilon_i \quad (2)$$

Where:

$\alpha_0, \dots, \alpha_n; \beta_0, \dots, \beta_n$, are the parameters to be estimated for each of the equations: μ_i and ε_i , are the error terms that are introduced in the models and that are distributed independently and identically with zero mean and constant variance; t , is the annual periodicity of the data (from 1980 to 2019); Salmint, is the real minimum wage (at constant 2018 prices); EmpFormal_t, is the population employed in the formal sector (number of people); Pobrezat_t, is the population in poverty of heritage (number of people).

To estimate the coefficients or parameters of each of the explanatory variables, the Statistical Analysis System (SAS) package was used, using the Ordinary Least Squares (OLS) method.

Results and discussion

This section presents the statistical and economic results.

Statistic analysis

The statistical analysis in both models was based on the coefficient of determination (R^2), the value of the F-calculated (F_c), and the t-student for each of the estimators from the analysis of variance. To test the statistical significance of the fitted regression equations, the following sets of hypotheses were considered, $H_0: \alpha_1 = \alpha_2 = \dots = \alpha_n = 0$ vs $H_a: \alpha_1 = \alpha_2 = \dots = \alpha_n \neq 0$; $H_0: \beta_1 = \beta_2 = \dots = \beta_n = 0$ vs $H_a: \beta_1 = \beta_2 = \dots = \beta_n \neq 0$.

Dependent variable Independent variables	
Equation 1	
<i>EmpFormal_t</i>	<i>Salmin_t</i>
Coefficient	-35919
t _c	-3.88
P-value	0.0004
R ² = 28.41 F-value = 15.08 Prob > F = 0.0004	
Equation 2	
<i>Poverty_t</i>	<i>Salmin_t</i>
Coefficiente	-115673
t _c	-7.06
P-value	<0.0001
R ² = 57.37 F-value = 49.79 Prob > F = <.0001	

Table 1 Analysis of variance

Source: Own elaboration with the results of the statistical package SAS

The results of the analysis of variance are shown in table 1. The EmpFormalt and Pobrezat models revealed that the global test for each of them was significant, since the $F_c = 15.08$ and 49.79 was greater than the F_t , $0.5 (1, 38) = 4.098$ respectively, with a significance level of 5.0% ($\alpha = 0.05$), so that in each of the models the null hypothesis (H_0) is rejected in favor of the alternative hypothesis (H_a), which indicates that at least one of the parameters estimated by the regression will be different from zero. According to the R^2 statistic, the EmpFormalt and Pobrezat variables were explained by 28.41 and 57.37% respectively by the minimum wage (Salmint).

With respect to the individual test, the independent variable in the two models was significant; since as can be seen in the same table 1, the real minimum wage (Salmint) corresponding to equations 1 and 2 presented a $|t_c| = -3.88$ and -7.06 for EmpFormalt and Pobrezat respectively, which was higher in each case than $t_{t, 0.05 (38)} = 2.02$, so the null hypothesis is rejected in favor of the alternative, this implies that, the Estimated parameters of the independent variables were different from zero.

Furthermore, as the same table shows, the p-value of each of the independent variables included in the equations was lower than the significance level (0.05), with a confidence level of 95.0%.

Economic analysis

The estimated models for formal employment and the population in poverty of heritage (EmpFormalt and La Pobrezat), were the following:

$$\widehat{EmpFormal} = 19992333 - 35919 Salmin \quad (3)$$

$$\widehat{Pobreza} = 64490320 - 115673 Salmin \quad (4)$$

As commented in previous sections, there is no consensus regarding the effect caused by the increase in the minimum wage on formal employment and the level of poverty, neither from a theoretical nor an empirical point of view, this, both at the level of developed countries as well as the level of poverty. developing, as this effect can be both positive and negative; Due to this, in the case of this investigation, the expected sign for the parameters α_1 and β_1 is not specified. However, in the case of the present investigation, the results obtained, which contribute to the empirical evidence of this type of study, were the following:

The estimation of equation 1, yielded a value of $\alpha_1 = -35919 < 0$ (equation 3); which indicates a negative relationship between the real minimum wage and formal employment.

On the other hand, the estimation of equation 2, resulted in a value of $\beta_1 = -115673 < 0$ (equation 4), said estimated value refers to an inverse relationship between the minimum wage and the population in poverty of patrimony (Poverty); that is, by increasing the minimum wage, the population in poverty of wealth in Mexico decreases.

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Conclusions

According to the statistical and economic results obtained in the present investigation, the following is concluded:

The empirical evidence of the relationship between the minimum wage and employment, according to Del Carpio & Pabón (2015), indicates that, "much of the literature identifies aggregate effects such as reductions in formal employment... especially when the level of The minimum wage that is established is very high". (p. 7); which does not correspond to the historical context of developing countries, since as the same author mentions, "in the majority of studies for Mexico it is found that increases in minimum wages have not generated losses in the general level of employment due to the low minimum wage levels". (p. 5); In addition to this, other research suggests that "the effects of this policy on employment can be null and even positive in situations in which companies exercise some degree of monopsonic power in the labor market." (p. 8)

However, in the estimated equation 3 of this research, the value of the parameter α_1 was negative, which indicates that, for the study period, when the real minimum wage increases, formal employment in Mexico decreases. However, despite this negative relationship, if we go back to the statistical results despite the fact that both the global test and the individual test for the independent variable (which in this case was the minimum wage) were significant, it can be seen that the minimum wage explains a very low percentage of formal employment (EmpFormal), since it presents an R2 value of 20.71%; So these results suggest that the small increases in the real minimum wage in Mexico throughout the study period have caused a negligible negative effect on employment; Therefore, in accordance with what was mentioned by Del Carpio & Pabón (2015), "moderate increases in the minimum wage do not necessarily generate significant job losses". (p. 7), which was what resulted in this research, therefore, the result obtained is consistent, given the characteristics of developing countries such as Mexico.

As in the relationship between minimum wage and formal employment, in the case of its effects on poverty, there is no consensus regarding its theoretical or empirical evidence, since the results obtained by the different studies have been both positive as negatives.

For the case of this research, the results of the estimated equation 4 show an inverse relationship between the minimum wage and the population in wealth poverty ($\beta_1 < 0$), that is, by increasing the real minimum wage, poverty decreases of patrimony; However, despite the fact that both the global test of the model and the individual test were significant, the R2 statistic indicated that the real minimum wage in Mexico explains a low percentage of the decrease in the population facing this type of poverty (R2 = 58.75%). Therefore, these results suggest that the inverse relationship between minimum wage and poverty is not very significant.

In this sense, according to the literature on the subject in developing countries such as Mexico, as mentioned by Lustig & McLeod (1995):

The workers who benefit directly from increases in the minimum wage are often not the poorest in the country. In the developing world most of the poor work in the informal sector where the possibility of being poor is highest. (p. 110)

That is why, according to the same authors, an increase in the minimum wage does not significantly affect the reduction of poverty figures; Added to this, as the authors themselves mention, "even if it can be shown that the existence of the minimum wage reduces poverty, this may not be the most efficient way to achieve this objective." (p. 111)

Due to the above, and as has been mentioned in some way, in general in developing countries and specifically in Mexico, the minimum wage has not met the objective for which it was created. As mentioned by Moreno, et. to the. (2014):

Since the late eighties, the minimum wage has been at the bottom of the wage distribution, which suggests that the minimum wage has ceased to be an axis of wage gravity in the Mexican economy ... given that its value continued to decline in terms real, by 2000 it had completely ceased to be binding. (p. 86)

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Resistant personality and coping strategies in Mexican World Cup and Olympic athletes in a pandemic

Personalidad resistente y estrategias de afrontamiento en deportistas mexicanos mundialistas y olímpicos en pandemia

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Abstract

The objective is to identify the existence of the relationship between the Resistant Personality (PR) variables and the variables of the Approach to Coping in Sport (DAA) construct. The sample was 21 selected Mexican national athletes of world and Olympic level currently retired; the age of the participants ranges between 23 and 64 years (M = 38.43, SD = 10.01), of which 11 are men (52.4%) and 10 women (47.6%). The athletes answered two instruments, the first is Resistant Personality in Central American and Caribbean Athletes and the second is the Approach to Coping in Sport Questionnaire. The methodology, empirical associative, simple correlation and cross-sectional. Descriptive analyzes, reliability and Spearman correlations were performed with SPSS 25. The results showed an internal consistency greater than .70 in most of the variables and the correlations of the Resistant Personality, Challenge variables, were positively related and significantly with the variables of Approach to coping in the Sport of Emotional Calm and Risk Behaviors. In conclusion, high-performance athletes use the skills learned in sport as coping strategies in the face of challenges with emotional control and push themselves to the maximum to achieve their goals.

Sport, Stress, Challenge

Resumen

El objetivo es identificar la existencia de la relación entre las variables de la Personalidad Resistente (PR) y las variables del constructo de Aproximación al Afrontamiento en el Deporte (AAD). La muestra fueron 21 deportistas seleccionados nacionales mexicanos de nivel mundial y olímpico actualmente retirados, la edad de los participantes oscila entre los 23 y 64 años (M = 38.43, DT = 10.01), de los cuales 11 son hombres (52.4%) y 10 mujeres (47.6%). Los atletas contestaron dos instrumentos el primero es de Personalidad Resistente en Deportistas Centroamericanos y del Caribe y el segundo es el Cuestionario de Aproximación al Afrontamiento en el Deporte. La metodología, empírica asociativa, de correlación simple y de corte transversal. Se realizaron análisis descriptivos, de fiabilidad y correlaciones de Spearman con SPSS 25. Los resultados, mostraron una consistencia interna mayor a .70 en la mayoría de las variables y las correlaciones de las variables de la Personalidad Resistente, el Desafío, se relacionó positiva y significativamente con las variables de Aproximación al afrontamiento en el Deporte de Calma Emocional y Conductas de Riesgo. En conclusión, los deportistas de alto rendimiento utilizan las habilidades aprendidas en el deporte como estrategias de afrontamiento ante los desafíos con control emocional y se exigen al máximo para conseguir sus objetivos.

Deporte, Estrés, Desafío

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Introduction

Sport contributes to personal development and offers an important contribution to improving the quality of life of society in general (Romero, García-Mas and Brustad, 2009) and, in turn, high-performance sport inspires the great masses to start a physical activity and sport as a systematic activity reflecting a healthier community (Bauman, Bellew, and Craig, 2014). The Resistant Personality (Jaenes, Godoy, and Román, 2008; 2009) as well as the coping strategies (Carrasco et al, 2010) are skills that athletes must develop since they provide tools for control, overcoming adversity and control of stress due to the various competencies to which they have participated (Márquez, 2004).

The Resistant Personality is a concept referred to the capacity of resistance to the stress of the people and the way in which the people with a high resistant personality, usually take the difficulties in opportunities of personal development. Initially, this instrument was created by Salvatore Maddi and Suzanne Kobasa (Maddi, 2002), among the scholars of this concept in that period, it raised curiosity since stress was only exhausting some people, and on the contrary, it empowers others, so some made them better, Kobasa, Maddi and Puccetti published (1982) a study of how exercise serves as a buffer between stress and illness. Finally, they created the Hardiness Institute in 1984 in California (Khoshaba, and Maddi, 1999) as a place for the specific study of this phenomenon.

Coping strategies are useful problem-solving tools in difficult situations and in this research the Approach to Coping in Sport was used, which is a concept promoted by various researchers (Kim, 1999; Kim, Duda and Ntoumanis, 2003; Márquez, 2006).

Márquez (2006) defines this concept as the various responses that arise in stressful situations, which are used in order to control and / or neutralize the situation. Therefore, the strategies would be the different psychological resources that everyone presents to deal with situations that are considered stressful. However, the use of these does not guarantee success, but rather they serve to avoid or reduce conflicts in people or athletes (Macías, Madariaga, Valle and Zambrano, 2013).

Both concepts have been little studied in the area of sport, in the case of the Resistant Personality, it has been studied in countries such as Spain () and Mexico (), and in the case of the Approach to Coping in sport in countries like Chile () and Spain () and no studies have been found that relate both concepts, much less at this sporting level, such as World Cup and Olympic athletes.

The objective of this study is to identify the existence of a relationship between the Resistant Personality variables and the variables of the Approach to Coping in Sport construct, in the context of a COVID-19 pandemic.

Description of the method

The design of this research is empirical associative, simple correlation and cross-sectional (Ato, López-García, & Benavente, 2013), in this research 21 selected Mexican national athletes of world and Olympic level participated currently retired, the age of the participants ranged from 23 to 64 years old ($M = 38.43$, $SD = 10.01$), of which 11 were men (52.4%) and 10 were women (47.6%)

For this study, tools were used, the first assessment instrument is the resistant personality with the Resistant Personality questionnaire in Central American and Caribbean Athletes (PRDCC; Ponce, 2017; Ponce-Carbajal et al. 2015); This questionnaire is made up of 18 items, and has three variables: commitment, control, and challenge of 6 items each. This questionnaire in other investigations has been used as a global RP, it has been described as a unifactorial concept (Kobasa, 1979; Kobasa, Maddi and Kahn, 1982), and also in a trifactorial way (Jaenes, Godoy-Izquierdo and Román, 2008), usually in both cases the properties are adequate ($\alpha > 0.7$) so it is used in both ways. The response scale is of the Likert type from 0 to 3 where 0 is "totally disagree" and 3 is "totally agree".

The second instrument is the Approach to Coping in Sport Questionnaire (ACSQ-1), this questionnaire has been developed by Kim and Duda (1997) and was translated into Spanish by Kim, Duda, Tomás and Balaguer (2003).

This questionnaire is made up of 5 variables, Emotional Calm (7), Active planning / cognitive restructuring (6), Mental withdrawal (6), Risk behaviors (4), and Search for social support (5), through 28 items, with 5-point Likert format, where 1 takes the value of “never” and 5 the value of “always”. This scale has evidence of validity based on the internal structure of the test and its relationship with other variables, as well as adequate levels of reliability ($\alpha > 0.7$) (Kim, Duda & Ntoumanis, 2003).

The Procedure consisted of creating a battery of digital tests in google forms, and this was sent through various social networks due to the COVID-19 pandemic, in order to collect responses with the support of trainers from various sports. The coaches were informed about the importance of sending the form to an athlete of a very high sporting level such as World Cup players and who had participated in the Olympic Games, so they supported us by sending the tool to various athletes who met the requirements and to athletes prior informed consent, that the responses were completely anonymous and voluntary and that they could be withdrawn from the study at any time.

The statistical analyzes performed were descriptive, mean frequencies, standard deviation and normality of the data by means of kolmogórov-smirnov, reliability of Cronbach's alpha (α) and bivariate correlations with Spearman's correlation coefficients, with the statistical package Statistical Package for the Social Sciences (SPSS) version 25.

Results

Table 1 describes the frequencies of the participants' sports.

Sport	Frequency	Valid percentage
Athletics	2	9.5
Box	1	4.8
Cycling	1	4.8
Dived	3	14.3
Gymnastics	1	4.8
Weightlifting	5	23.8
Judo	1	4.8
Karate	1	4.8
Modern pentathlon	1	4.8
Taekwondo	1	4.8
Volleyball	4	19.0
N	21	100.0

Table 1 Sports frequencies of participating athletes

In the evidence shown after the analyzes regarding the verification of the internal consistency of the unifactorial and trifactorial resistant personality, it is verified with values above α of .70 and in the case of approach to coping in sport only in the Risk behaviors variable has a moderately acceptable value of α of .50, the rest meet the reliability values, see Table 2.

Variable	Alpha
Control	0.70
Commitment	0.78
Challenge	0.86
Prglobal	0.90
Emotional calm	0.83
Cognitive restructuring	0.83
Mental return	0.71
Risk behaviors	0.50
Search for social support	0.80

Table 2 Reliability of the variables of the Resilient Personality and Approach to Coping with Sport questionnaires

The results found in the Spearman correlations showed that of the resistant personality variables there are positive and significant relationships in the challenge variable, with emotional calm of $r = .499$ ($p < .05$) and challenge with risk behaviors of $r = .470$ ($p < .05$).

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Conclusions

The action of overcoming the various challenges to which athletes and society in general are subjected, especially in this time of pandemic, athletes used as a strategy the control of emotions and made use of all their skills developed through Past experiences, which, although they were great challenges, allowed us to learn skills that allowed us to emotionally overcome stress and adapt to new and superior conditions.

World-class athletes have great resistance to stress, control of their emotions, commitment and taste for challenges, which they apply in their current life and help them with the various situations that arise, solving problems in a better way, for therefore, sport helps the development of skills and strategies to cope with life in general.

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Environmental auditing, the evaluation process an analysis of its standards

Auditoría medioambiental, el proceso de evaluación un análisis de sus normas

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Abstract

The analysis of the provisions of the Voluntary Environmental Compliance Process or the National Environmental Audit Program that companies may execute for their performance, as provided in the General Law of Ecological Equilibrium and Environmental Protection, its Regulations on environmental auditing, as well as other provisions and measures of the authorities and various recommendations to protect the environment. It begins with the Magna Carta, empowering the legislator to create laws to monitor resources and the federal, state and municipal governments in the scope of their competencies, to protect the environment, preserve and restore the ecological balance; with a legal, systematic and documentary analysis, this descriptive research examines the legal, regulatory, auditing, technical and accounting requirements to execute the evaluation procedure of actions for continuous improvement. The guarantee that the State must provide for the human right to enjoy the benefits of a healthy environment, its sustainability and the national development of the country with economic growth, independence, political, social and cultural democracy, and to conserve the natural environment with responsibility and social commitment, recommending the implementation of good and best practices in business management, must belong to everyone, it is mandatory.

Voluntary environmental compliance process, National environmental audit program, International standards on auditing and international financial reporting standards

Resumen

El análisis a las disposiciones del Proceso de Cumplimiento Ambiental Voluntario o del Programa Nacional de Auditoría Ambiental que pueden ejecutar las empresas para su desempeño, previsto en la Ley General del Equilibrio Ecológico y la Protección al Ambiente, su Reglamento en materia de auditoría ambiental, así como otras disposiciones y medidas de las autoridades y recomendaciones diversas para cuidar el medio ambiente. Se inicia con la Carta Magna, facultando al legislador a crear leyes para vigilar los recursos y a los gobiernos federal, estatal y municipal en el ámbito de sus competencias, para proteger al ambiente, preservar y restaurar el equilibrio ecológico; con un análisis jurídico, sistemático y documental esta investigación de tipo descriptivo examina los requisitos legales, los normativos, de auditoría, técnicos, y de contabilidad para ejecutar el procedimiento evaluador de acciones para la mejora continua. La garantía que el Estado debe brindar del derecho humano para gozar de los beneficios de un ambiente sano, su sostenibilidad y el desarrollo nacional del país con crecimiento económico, independencia, democracia política, social y cultural, y conservar el medio natural con responsabilidad y compromiso social, recomendando implementar buenas y mejores prácticas en la gestión empresarial, debe ser de todos, es obligatorio.

Proceso de cumplimiento ambiental voluntario, Programa Nacional de auditoría ambiental, Normas Internacionales de Auditoría y Normas Internacionales de Información Financiera

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Introduction

Accounting provides and contributes with its accounting processes of control, evaluation to environmental management and information to its users, also through the application of Environmental Auditing is aimed, among other objectives to: obtain the recognition and disclosure of the negative environmental effects on the economic entities and the environment of the company and its stakeholders; the separate identification of costs and revenues allocated to specific environmental control plans and programs.

The adoption of actions to create initiatives to avoid and mitigate negative environmental effects; to develop ways to measure and report the results of these plans and programs to fulfill internal and external purposes; to establish new financial and non-financial accounting, information and control systems to take advantage of the environmental benefits of decisions, focusing on environmental protection measures and evaluating the natural capital resources involved in the production process.

The exercise and systematic application of environmental auditing has the fundamental objective of providing reliable information on the quantitative and qualitative results of the administration of financial, human and material resources and support services assigned for environmental control; the information is required for preventive and corrective decision making in the environmental control route to make its actions known to society and in general to all its stakeholders.

As a hypothesis, it is considered that when the businessman is committed to a responsible management of his organization, he obtains better results than when there are countless rules at his disposal that he does not know or does not comply with. The big problem is that there is no generalized disposition to efficiently control the use of resources and waste generated on a daily basis.

Similarly, in order to frame the management of accountants and auditors, accounting and auditing as disciplines in favour of efficiency in the management of resources and environmental care, there are legal standards and international agreements, firstly, and institutional ones in second place, among them the Mexican Official Standards (MOS), the International Financial Reporting Standards (IFRS) and the International Standards on Auditing (ISA), for their order of application, and finally those referring to best practices that ensure environmental preservation. In addition, from the actions of the responsibility that fall on the different interested parties (stakeholders) must be reported with transparency considering the rules that the International Accounting Standards (IAS) now applicable IFRS, ISA and MOS establish, and the requirements that they meet, or fail to meet according to the Voluntary Environmental Compliance Process (VECP), the National Environmental Audit Program (NEAP) or also the Environmental Leadership Program for Competitiveness.

Legal Framework

In the context of Mexico, environmental policy has a history of barely three decades, despite the fact that Article 27 of the 1917 Constitution laid the foundations for its development by conditioning the use of natural resources to the nation's interest. The environmental audit, among other ordinances, is found in article 25, paragraph seven of the Political Constitution of the United Mexican States (PCUMS), which regulates the care of the environment by regulating the use of productive resources by the social and private sectors.

Article 73, section XXIX-G, PCUMS, empowers the legislator to issue laws that establish the concurrence of the federal, state and municipal governments, within the scope of their respective competencies, in matters of environmental protection and preservation and restoration of the ecological balance.

The central axis of environmental regulation is the right to a healthy environment established in article 4 of the PCUMS, which according to Rodríguez (2008),¹ "implies the sustainable, moderate use, with a focus on protection and conservation, of all the constituent elements of the habitat of mankind, including the flora and fauna and the collateral conditions for its realization.

The international legal instruments, which were taken into account as the American Convention on Human Rights (ACHR), and the International Covenant on Economic, Social and Cultural Rights (ICESCR), A (XXI), of December 16, 1966, with entry into force on January 3, 1976, according to Article 27),² as well as the Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social, and Cultural Rights.³ Without disregarding the following international treaties applicable to environmental matters, such as the Convention on Biological Diversity (1992), the Stockholm Declaration or the United Nations Conference on the Environment (1972): Convention on Biological Diversity (1992), Stockholm Declaration or the United Nations Conference on the Environment (1972).

In 1988, the General Law of Ecological Balance and Environmental Protection (GLEBEP) was enacted, which, together with the regulations on Environmental Impact, Hazardous Waste, Prevention and Control of Air Pollution, Prevention and Control of General Pollution by Motor Vehicles circulating in Mexico City and the municipalities of its metropolitan area, and against pollution caused by noise emissions, introduced new elements on control, safety and social participation.

Rio Declaration on Environment and Development (1992), Agenda 21: Action Program for Sustainable Development. Rio Declaration on Environment and Development. Declaration of Principles. Final text of the Agreement signed by governments at the United Nations Conference on Environment and Development, June 1992, in Rio de Janeiro, Brazil.

The main objective of the National Environmental Auditing Program (NEAP) is for organizations that join it to protect the environment to achieve environmental certification. The GLEBEP (arts. 38 and 38 BIS) establishes the voluntary process of environmental self-regulation, in which the producer, company or organization decides to undergo the audit, which basically consists of carrying out a methodological review of its operations with respect to pollution and the risk it generates, analyses full compliance with environmental regulations, international parameters and applicable good operating and engineering practices, to identify preventive and corrective measures needed to protect the environment. In the GLEBEP in charge of the Ministry of Environment and Natural Resources (SEMARNAT for its acronym in Spanish) and the Federal Attorney General's Office for Environmental Protection (PROFEPA for its acronym in Spanish), the authority designated to enforce the constitutional prerogatives to care for and preserve the environment in harmony with the international treaties subscribed and with the resolutions of the magistrates, established to safeguard through the supervision of the PROFEPA, what is regulated by articles 160 to 175 of the mentioned law that describe the procedure of the environmental audit to the entities of the productive, private and social sectors of the country.

¹ Environmental Defense Guide. Building the strategy for litigating cases before the Inter-American human rights system. January 2008. Interamerican Association for Environmental Defense, page 48. Retrieved at: <https://www.corteidh.or.cr/tablas/24756.pdf>

² The ICESCR was approved by the Chamber of Senators of the Congress of the Union by decree dated December 18, 1980, published in the Official Gazette of the Federation (DOF) dated January 9, 1981. The Mexican State joined by means of an instrument of accession dated March 2, 1981, signed by the President of the United Mexican States (EUM), deposited with the General Secretariat of the United Nations on March 23, 1981. The ICESCR was promulgated and published, for its due observance, by decree of the President of the EUM, dated March 30, 1981, published in the DOF dated May 12, 1981.

³ Protocol of San Salvador. Signed by Mexico on November 17, 1988, approved by the Senate on November 12, 1995 and published in the DOF on September 1, 1998.

This is mainly directed to activities that interact with the environment, such as: companies of any size and branch, both public and private; educational centers; municipalities; environmental management units; hotels and hospitals. Article 36 of the General Law of Ecological Balance and Environmental Protection states that the Mexican Official Standards on environmental matters will be issued by SEMARNAT to guarantee the sustainability of economic activities and the sustainable use of natural resources.

Article 37 bis of the GLEBEP also establishes that such standards are mandatory in Mexico, such as the MOS: for water (18); for measuring concentrations (8); on fixed source emissions (15); on mobile source emissions (12); on waste (20); on flora and fauna protection (20); on soil (10); on noise pollution (4); on environmental impact (14); on methodology (2); on sludge and biosolids (20) and in preparation with other secretariats (7). A total of 150 MOS.

The PROFEPA, until 2012, has worked in the following three areas: regulation (legal, administrative, scientific and technical), evaluation (environmental impact, risk and damage identification) and execution (Coordinating Auditor and industrial sector). And it marks for the development of the environmental audit, the following stages:

- Audit plan.
- Field visit.
- Report delivery.
- Post-audit.
- Certification.

And, if applicable, the corresponding endorsement (Art. 10 RLGEPA for its acronym in Spanish).

The Federal Environmental Liability Law that regulates environmental liability, arises from damages caused to the environment, as well as the repair and compensation of such damages when it is enforceable through federal judicial processes provided by art. 17 constitutional, alternative dispute resolution mechanisms, administrative procedures and those corresponding to the commission of crimes against the environment and environmental management (Congress of the Union, 2013).

In terms of numbers, in the case of environmental care in Mexico, while degradation (due to soil, air or water pollution) increased fourfold; environmental protection expenses (those that mitigate the negative effects of ecological degradation) barely represented, in 2017, 13% of the total costs accounted for; for every peso added to the product by economic growth, at best, two pesos are generated by environmental costs -and this considering only those that have been able to be expressed in monetary terms.

Institutional regulatory framework (MOS and MXS)

The MOS that can be considered to carry out the environmental audit to the entities that decide to do it voluntarily, or with a visit order to verify the environmental legal dispositions spread through the Official Gazette of the Federation; and it also enunciates some MXS, both with legal basis in art. 3 sections X and XI of the Federal Law on Metrology and Normalization (FLMN), it defines and establishes its characteristics;⁴ the rules to be applied are, among others, the following:

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MOS	MXS
Technical regulation issued by the competent agencies, which establishes rules, specifications, attributes, guidelines, characteristics or prescriptions applicable to a product, process, facility, system, activity, service or method of production or operation, as well as those related to terminology, symbology, packaging, marking or labeling and refer to their compliance or application based on Article 46, Federal Metrology and Standardization Law.	It is prepared by a national standardization body, or by the Ministry of Economy (SE) under the terms of Article 51-A of the LFMN, which provides for common and repeated use rules, specifications, attributes, test methods, guidelines, characteristics or prescriptions applicable to a product, process, facility, system, activity, service or method of production or operation, and those relating to terminology, symbology, packaging, marking or labeling
The following are mandatory	They are voluntary and can be national, regional or local.
If the causes for issuance no longer exist, the competent agencies, at their own initiative or at the request of the National Standards Commission, the SE or the members of the National Standards Consultative Committee may modify or cancel the NOM without following the procedure for its preparation and review every five years.	Their review and updating will follow the same procedure as for their preparation, and they must be reviewed every five years.

Comparison of MOS VS MXS, its concept and characteristics Source: Article3 fractions X and XI FLMN, adapted from IDC online.

Water MOS	
Mexican Official Standard “NOM-003-CONAGUA-1996”, Requirements during the construction of water extraction wells to prevent contamination of aquifers	“NOM-015-CONAGUA-2007”, Artificial infiltration of water into aquifers - Characteristics and specifications of works and water
“NOM-143-SEMARNAT-2003”, Establishing the environmental specifications for the management of congenital water associated with hydrocarbons	“NOM-011-CONAGUA-2000”, Conservation of water resources- Establishing the specifications and method for determining the average annual availability of national waters
Flora and Fauna MOS	
“NOM-131-SEMARNAT-2010”, Establishes guidelines and specifications for the development of whale watching activities, related to their protection and conservation	“NOM-022-SEMARNAT-2003”, Establishing the specifications for the preservation, conservation, sustainable use and restoration of coastal wetlands in mangrove area
“NOM-126-SEMARNAT-2000”, Establishing the specifications for the performance of scientific collection activities of biological material of species of wild flora and fauna and other biological resources in the national territory	“NOM-059-SEMARNAT-2010”, Environmental protection-Mexican native species of wild flora and fauna-Categories of risk and specifications for their inclusion, exclusion or change-List of species at risk.
Environmental Impact MOS and MXS	
“NOM-120-SEMARNAT-2020”, which establishes the environmental protection specifications for direct mining exploration activities in agricultural, livestock or wasteland areas and in areas with dry and temperate climates where xerophytic scrub, tropical deciduous forest, coniferous or oak forests develop	“NOM-002-SAG-BIO/SEMARNAT-2017”, which establishes the characteristics and requirements to be contained in the evaluation studies of the possible risks that the experimental release of genetically modified organisms could cause to the environment and biological diversity, as well as to animal, plant and aquaculture health
“NOM-150-SEMARNAT-2017”, Which establishes the technical specifications for environmental protection to be observed in construction activities and preliminary evaluation of geothermal wells for exploration, located in agricultural, livestock and wasteland areas, outside protected natural areas and forest land	“NOM-010-ASEA-2016”, Compressed Natural Gas. Minimum safety requirements for Refueling Terminals and Unloading Terminals for Transportable Storage Modules and Motor Vehicle Refueling Stations
“NOM-EM-002-ASEA-2016”, Establishing test methods and parameters for the operation, maintenance and efficiency of gasoline vapor recovery systems at gasoline retail service stations for emission control	“NMX-AA-119-SCFI-2020”. Establishing the requirements and sustainable performance criteria for the design, construction and operation of tourist marinas
MOS and MXS on Noise	
“NOM-081-SEMARNAT-1994”, which establishes the maximum permissible noise emission limits for stationary sources and their measurement method.	“NMX-AA-062-1979” acústica - determinación de los niveles de ruido ambiental

MXS on Waste	
“NMX-AA-041-SCFI-2006”. Solid wastes - determination of flammability - test method	“NMX-R-019-SCFI-2011”. Harmonized system for classification and communication of hazards of chemicals.

Table 1 MOS and MXS for performing environmental audits

Source: Own elaboration based on NOM and NMX queries. <https://www.semarnat.gob.mx/gobmx/biblioteca/nom.html>

The NMX are in some cases a reflection of the provisions established by the international standards of the International Standardization Organization (ISO), adapted by the Mexican Institute for Standardization and Certification (IMNC), in this particular case the 14000 series, on how to establish Environmental Management Systems (EMS) for example, ISO 14010 defines environmental auditing as a systematic and documented verification process that consists of obtaining and objectively evaluating audit evidence to determine whether the activities, incidents, conditions and EMS specified, or information on these issues, comply with the audit criteria and communicating the results of the process to the client.

It is a tool that facilitates sustained compliance with environmental legislation and the reduction of environmental risk, which should include environmental impacts and social perception of risk; and as a tool that paves and makes feasible the way towards quality schemes, excellence and continuous improvement of the environmental performance of the productive or service organizations in question. Hence the Regulation (RLGEPAAA) that in its art. 3 section IV, in Mexico the environmental audit is defined as the:

Methodological examination of a company's processes with respect to pollution and environmental risk, compliance with applicable regulations, international parameters and good operating and engineering practices, including Self-Regulation processes to determine its Environmental Performance based on the requirements established in the Terms of Reference, and if applicable, the preventive and corrective measures necessary to protect the environment; while section V deals with Self-Regulation: Voluntary process through which, respecting the legislation and regulations in force that apply to it, the company establishes a set of activities and adopts complementary or stricter standards, through which the Environmental Performance is improved and greater achievements are obtained in terms of environmental protection, whose evaluation may be carried out through the Environmental Audit (Presidency of the Republic, 2014).

The certification of companies, and not only comply with the laws; through ISO 14000 standards, for example, or the EMAS Regulation, for the case of the European Community, bring benefits, reduction in costs, the prestige that society recognizes, the commitment of all personnel involved in the organization, and above all a continuous improvement. Consumers are looking for companies to comply with the requirement of environmental certification, and these, in turn, strive to prevent pollution and purchase from suppliers that comply with ISO 14001 environmental criteria. (Muñoz, 2020)

ISO 14001	Environmental management systems. Requirements with guidance for use.
ISO 14002	Guidelines for the use of ISO 14001.
ISO 14004	Environmental management systems.
ISO 14006	Environmental management systems. Guidelines for the incorporation of ecodesign
ISO 14011	Guide for audits of quality or environmental management systems
ISO 14012	Requirements to be met by an environmental auditor
ISO 14020	Ecolabels and Environmental Declarations - General Principles
ISO 14021	Ecological labels and environmental declarations and Self-declarations - General Principles (Type II ecological labeling)
ISO 14024	Ecological labels and environmental declarations. Type I ecological labeling. General principles and procedures
ISO 14025	Environmental labels and declarations. Type III environmental declarations. Principles and procedures.
ISO 14031	Environmental management. Environmental performance evaluation. Guidelines

ISO/TR 14032	Environmental Management - Examples of Environmental Performance Assessment (ERA)
ISO 14033	Environmental Management - Quantitative Environmental Information - Guidelines and Examples
ISO 14040	Environmental management - Life cycle assessment - Reference framework
ISO 14041	Definition of objective and scope and inventory analysis
ISO 14042	Impact assessment of the life cycle
ISO 14043	Lifecycle Interpretation
ISO 14044	Environmental management systems. Guidelines for the incorporation of ecodesign
ISO 14046	Environmental management - Vocabulary
ISO/TR 14047	Environmental management - Life cycle impact assessment. Examples of application of ISO 14042
ISO/TS 14048	Environmental management - Vocabulary
ISO/TR 14049	Environmental management - Life cycle assessment. Examples of the application of ISO 14041 to the definition of objective and scope and inventory analysis.
ISO 14050	Environmental management - Vocabulary
ISO 14062	Environmental management - Integration of environmental aspects in product design and development.
ISO 14063	Environmental communication. Guidelines and examples
ISO 14064-1	Greenhouse gases. Part 1: Specification with guidance, at the organization level, for the quantification and reporting of greenhouse gas emissions and removals.
ISO 14064-2	Greenhouse gases. Part 2: Specification with guidance, at the project level, for the quantification, monitoring and reporting of greenhouse gas emission reductions or enhancements in removals.
ISO 14064-3	Greenhouse gases. Part 3: Specification with guidance for the validation and verification of greenhouse gas declarations.
ISO 14065	Greenhouse gases. Requirements for bodies performing greenhouse gas validation and verification, for use in accreditation or other forms of recognition.
ISO 14097	Greenhouse gas management and related activities: the framework, which includes principles and requirements for assessing and reporting climate change-related investments and financial activities, helps financiers to assess and report on their actions and see the real value of their contribution to climate objectives.
ISO/DIS 14100	Guidance on environmental criteria for projects, assets and activities to support the development of green finance.

Table 2. ISO 14000 family standards

Source: Own elaboration with ISO data (2021)

A complete environmental management supported by the different existing norms, or by the installation of new technologies, associated to the acquisition of environmental assets, producing less pollution, higher productivity and a better image of the company's products in society (Muñoz, 2020), are of transcendence and it is plausible to look for alternatives and good practices to try to reduce the excessive consumption of non-renewable resources and pollution. Mexico still needs to consider updating its commercial, accounting and tax provisions on environmental issues, as this is so far only a topic that remains in the discourse of many.

International Accounting Standards-International Financial Reporting Standards (IAS-IFRS) and International Auditing Standards (IAS's)

The International Accounting Standard Board (IASB) in "IAS -16 Property, Plant and Equipment", establishes that environmental assets should be catalogued as those that are acquired for security or environmental reasons and, although they do not provide future economic benefits, they are necessary to obtain the rest of the assets. In Mexico, the Mexican Institute of Public Accountants (IMCP) has worked on the preparation of standards based on international standards that the Mexican Financial Reporting Standards Board (CINIF) now adapts to the national scope, of which the IMCP is a part, together with the country's accounting associations and professionals that apply harmonized standards.

Regarding environmental liabilities, IAS 16 and its equivalent in Mexico, Financial Reporting Standards "FRS C-6", include a cost component. "FRS C-18 refers to the initial estimate of the costs of dismantling or removing the item", as well as the rehabilitation of the site on which it is located, when they constitute obligations incurred by the entity as a result of using the item during a period for purposes other than the production of inventories at that time. The provision to restore environmental damage is capitalized at the carrying amount of the asset to which it relates from the time the entity is obliged to carry out the restoration, unless it must be taken to profit or loss because there is no removal of the component, property or plant. (CINIF, 2021: 1084-1085)

In accordance with IAS-16, not only the initial estimate of dismantling costs, but also the removal of the asset and reestablishment of its location are considered to be part of the initial cost of property, plant and equipment, and NIF-C6 in line item 44.2.3.1 indicates this (CINIF, 2021). While in the interpretation IFRIC 1. "Changes in existing liabilities, for decommissioning, restoration and similar", states that it affects changes in the valuation of any existing liabilities for decommissioning, restoration or similar that have been recognized, as part of the cost of a tangible fixed asset, with IAS-16, and as a liability, with IAS-37. (IASB, 2018)

"FRS C-9 Provisions, Contingencies and Commitments", comprises requirements on how to recognize a provision and notes the obligations associated with the retirement of components, property, plant and equipment. In addition, provisions should be recognized only for obligations arising from past events, whose existence is independent of the entity's future actions or operations, such as fines for damage to the environment or repair costs required by law, since they merit an outflow of economic resources, regardless of the future actions carried out by the entity to prevent damage. "FRS C-18 provides additional criteria for recognizing the obligations associated with the retirement of components and the effect of changes in their valuation". (CINIF, 2021: 1085)

In line with this, the interpretation "IFRIC (for its acronym in Spanish) 5 Rights for participation in funds for decommissioning, restoration and environmental rehabilitation" is also requiring insurers to have control over risks based on forecasts and estimates in the entities, hence the importance of attending to stakeholders and their valuation, presentation and disclosure requirements on which IFRS guide us.

There is a marked correlation between accounting audits and environmental audits, the first arise as an internal need of the company's management and then acquires a mandatory, periodic and objective character, being performed by external and independent companies; although voluntary, for now, the European Community is encouraging its implementation with mandatory character; since, shareholders prefer to lean towards those socially and environmentally responsible companies, with which performing environmental audits to obtain certification under ISO standards can be a competitive advantage for entities wishing to attract investors. (Padin, 2017)

Environmental auditing, according to the EPA (Environmental Protection Agency) is defined as "systematic, documented, periodic and objective examination, by regulated entities, of operations and practices related to compliance with environmental requirements". The pre-established criteria are of an environmental nature and the EPA circumscribes its field of application to "regulated entities", that is, organizations whose activities may cause some form of environmental impact, subject to governmental control, it is the tool used to verify whether the system for environmental purposes is working properly.

With regard to environmental auditing, the United Nations Environment Program (UNEP) promotes environmental governance that must be ensured at the national, regional and global levels to address globally agreed environmental priorities, UNEP promotes the progressive development and implementation of environmental law as a response to the international community's environmental challenges and to strengthen and implement legal frameworks; Multilateral Environmental Agreements (MEAs) and facilitate interrelationships and synergies, respecting the legal autonomy of the agreements and the decisions taken by governing groups, implementing the practice of environmental audits that promote improved environmental management of member states.

The International Federation of Accountants (IFAC) develops the transparent and high quality international standards used by professional accountants as an essential pillar of the global financial architecture, and among its data is that 91 percent have adopted IFRS for all or most public interest entities, 84 percent have established quality review and assurance systems, 79 percent have adopted ISAs for their statutory audits, 61 percent have fully adopted the Code of Ethics for accountants, 36 percent have partially adopted, and 55 percent have made progress in adopting International Public Sector Accounting Standards (IPSAS).

IAS's in environmental matters are those that contain the basic principles, essential technical knowledge and guidelines related to the audit of financial statements of any entity. The International Auditing Practices Committee aims to provide guidelines of general applicability to all audits of small entities and to assist the auditor in exercising professional judgment in the application of IAS's, which are considered the quality requirements for the performance of professional auditing work, and constitute in most countries the obligatory support of the activities conducted by certified public accountants and specialists.

IAS's are adopted because their quality, legitimacy and impact are assured through active and purposeful consultation and a strong public-private partnership that emphasizes the public interest. IFAC has 173 member organizations and the 130 jurisdictions in which IFAC operates have greater collaboration in monitoring adoption trends and more communication and coordination among accounting stakeholders. Among the standards most closely related to environmental auditing are the following as listed in Table 3.

ISA 200. Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with ISAs
ISA 210. Agreeing the Terms of the Audit Engagement
ISA 220. Quality Assurance for the Audit of Financial Statements
ISA 230. Audit Documentation B
The Auditor's Responsibility for the Audit of Financial Statements with Respect to Fraud ISA 250.
Consideration of Laws and Regulations in the Audit of Financial Statements ISA 260.
ISA 260. Communication with Those Charged with Governance of the Entity
Communicating Deficiencies in Internal Control to Those Charged with Governance and Management.

Identifying and Assessing the Risks of Material Misstatement through Knowledge of the Entity and its Environment ISA 320.
ISA 320. Materiality in Planning and Performing an Audit
ISA 330. The Auditor's Responses to Assessed Risks
ISA 501. Audit Evidence - Specific Considerations for Certain Areas ISA 530.
ISA 530. Audit Sampling
ISA 570. Going Concern
ISA 620. Use of the Work of an Auditor's Expert
Forming the Auditor's Opinion and Issuing the Auditor's Report on the Financial Statements ISA 706.
Emphasis of Matter and Other Matter Paragraphs in an Independent Auditor's Report ISA 706.
ISA 200. Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with ISAs
ISA 210. Agreeing the Terms of the Audit Engagement
ISA 220. Quality Assurance for the Audit of Financial Statements
ISA 230. Audit Documentation B
The Auditor's Responsibility for the Audit of Financial Statements with Respect to Fraud ISA 250.
Consideration of Laws and Regulations in the Audit of Financial Statements ISA 260.
ISA 260. Communication with Those Charged with Governance of the Entity
Communicating Deficiencies in Internal Control to Those Charged with Governance and Management.
Identifying and Assessing the Risks of Material Misstatement through Knowledge of the Entity and its Environment ISA 320.
ISA 320. Materiality in Planning and Performing an Audit
ISA 330. The Auditor's Responses to Assessed Risks
ISA 501. Audit Evidence - Specific Considerations for Certain Areas ISA 530.
ISA 530. Audit Sampling
ISA 570. Going Concern

Table 3 International Auditing Standards for the environment

Source: Own elaboration with data from (IMCP, 2019)

Environmental audits on a voluntary basis

In Mexico, the SEMARNAT with the NEAP contemplates an ordered series of activities necessary to promote the accomplishment of environmental audits, that in its program of voluntary character can adhere the productive organizations that wish it to help to guarantee the effective fulfillment of the legislation, to improve the efficiency of its production processes, its environmental performance and its competitiveness and to become the base to approach the sustainable development, among its premises to achieve it, is the added value of being a voluntary mechanism of self-regulation that leads those involved to implement a culture of social responsibility.

The regulatory scheme of the voluntary environmental audit is found in "NMX-AA-162-SCF1-2012, Environmental Auditing" - Methodology to perform Audits and Diagnostics, Environmental and Verifications of Compliance with the Action Plan - Determination of the Environmental Performance Level of a Company - Evaluation of the Performance of Environmental Auditors" and "NMX-AA-163-SCFI-2012, Environmental Audit - Procedure and Requirements to prepare an Environmental Performance Report for Companies", regulating the Audit Plan and the intervention of the environmental auditor.

We also consider Article 24 of the Treaty between Mexico, the United States and Canada (T-MEC), in its points 24.4 Enforcement of environmental laws, 24.13 by which Mexico, Canada and the United States of North America have committed to promote corporate social responsibility and responsible business conduct, "through voluntary practices" of the referred responsibility as well as 24.14: Voluntary Mechanisms to Improve Environmental Performance, which are also taken into account to prepare this study.

In the same way that the NEAP, the VECP is in place at the state level, so that companies that are responsible for generating environmentally friendly alternatives, without ceasing production, can self-regulate in environmental matters, with the authority providing support to those who show interest in moving forward and achieving economic benefits: reduction of operating costs by saving energy, water and by the use of process and general services waste, in addition to being able to carry in the products or services offered by the certified company, environmental benefits: to reduce the environmental impact of production processes (less emissions, less waste and better management, less environmental risks) and social benefits: options for sustainably responsible consumers, generating an exemplary model of environmentally responsible companies.

The T-MEC agreements seek to respond to the mismatch between the availability of natural resources and their use, creating a regulated economic system compatible with the objectives of international trade and environmental conservation, maximizing both to the maximum extent possible.

The coordinating auditor, in order to perform an environmental audit, must count on the multidisciplinary participation of professionals specialized in water, air, noise, soil and subsoil pollution, hazardous and non-hazardous materials and wastes, at risk, and response to environmental emergencies, natural resources and environmental legislation. The phases to be followed include the application, the process, the action plan, the verification and the certification that guarantees the relevance of actions and compliance with regulations.

The organization that voluntarily decides to undergo an environmental audit must select an accredited environmental auditor. Companies during this process must assume the costs incurred during their permanence in it, derived from the hiring of the required auditor, compliance with action plans and maintenance of environmental performance. The terms of reference for the performance of audits indicated in art. 8 of the Regulation of the General Law of Ecological Balance and Environmental Protection on Environmental Auditing (RLGEEPA) describe:

A.- Planning (Item 5.1)

Where the working documents to be used by the audit team should be prepared.

B.- Execution (Item 5.2.)

Which includes a kick-off meeting to introduce the audit team to the company.

C.- Conduct of field work (Item 5.2.2.)

Where "each specialist verifies and collects the information of the audited matters according to the proposed scope and the areas and processes of the company previously defined in the physical and operational scope".

D.- Closing meeting (Numeral 5.2.3)

The purpose of this meeting is: to deliver by the audit team, the result of the verification.

E.- Elaboration of the report (Item 5.2.4)

Which represents the delivery of the environmental diagnosis or verification of compliance with the action plan carried out.

On the other hand, regarding the procedure to carry out the environmental audit in voluntary matters, according to "NMX-AA-163-SCFI-2012, it contains a Normative Appendix that regulates the elaboration of an environmental performance report" in which the following issues, among others, must be included:

A.1. Basic diagnosis

A.2. Chapter I Company's General Information

A.3. Chapter II Situation of the certified facility

A.4. Chapter III Environmental management or administration system A.5.

A.5. Chapter IV Environmental performance indicators

A.6. Photographic and documentary annex.

With the evaluation methodology that Article 8 of the RLGEPA for its acronym in Spanish, in its fraction I, details the steps to be followed by "NMX-162-SCFI-2012 where the following areas, among others, are verified: Air and Noise, Water, Soil and subsoil, Waste, Energy, Natural Resources, Wildlife, Forest Resources, Environmental Risk, Environmental Management and Environmental Emergencies", likewise as indicated in fraction II of the same article and "NMX-163-SCFI-2012 which describes the performance in the audit review" (Presidency of the Republic, 2014).

The objective of these MXS is to provide companies with the precise processes for the implementation of an environmental management system, the standards stipulated by ISO-14000 do not set environmental goals for the prevention of pollution, nor are they involved in environmental performance at a global level, organization, and the effects or externalities derived from them on the environment.

SEMARNAT has the "Clean Industry" certificate, which is the first commercial instrument that may become very popular and widely accepted. PROFEPA, through its Environmental Audit Office, promotes and carries out audits to encourage companies to protect the environment in a comprehensive manner, beyond legislation, and authorizes certified companies to use the logo in their marketing programs and to encourage consumers to purchase products manufactured by industries that follow environmentally friendly practices in their production processes.

Public recognition of compliance with national and international regulations, and good operating and engineering practices that guarantee a certain level of performance and environmental protection, is a boost to green markets or to the chaining of suppliers, representative for businessmen, but not for the population to relate certified establishments with the products offered in the market manufactured with processes that take environmental care into account, a situation that reduces the strength of the certificate for the company's decision to enter or not into the audit program, on the basis of direct commercial benefits, unlike ISO-14000.

It is important to consider that this certificate is granted only for compliance with the action plan, which may or may not include other types of performance activities or environmental information such as corporate reporting and continuous improvement programs. PROFEPA's results include the data shown in Table 4 below.

With the evaluation methodology that Article 8 of the RLGEPA in its fraction I, details the steps to be followed by "NMX-162-SCFI-2012" where the following areas, among others, are verified: Air and Noise, Water, Soil and subsoil, Waste, Energy, Natural Resources, Wildlife, Forest Resources, Environmental Risk, Environmental Management and Environmental Emergencies, likewise as indicated in fraction II of the same article and "NMX-163-SCFI-2012" which describes the performance in the audit review (Presidency of the Republic, 2014).

The objective of these MXS is to provide companies with the precise processes for the implementation of an environmental management system, the standards stipulated by ISO-14000 do not set environmental goals for the prevention of pollution, nor are they involved in environmental performance at a global level, they establish tools and systems focused on production processes within a company or organization, and on the effects or externalities that derive from these to the environment, Table 2 refers to the standards most used by auditors.

SEMARNAT has the "Clean Industry" certificate, it is the first commercial instrument effort that can have great strength and acceptance. PROFEPA, through the Environmental Audit Office, promotes and conducts audits to encourage the business decision to protect the environment comprehensively beyond the legislation and authorizes certified companies to use the logo in their programs of marketing, and instilling in consumers the habit of acquiring products manufactured by industries that observe environmental care practices in their production processes.

Public recognition of compliance with national and international regulations, and good operating and engineering practices that guarantee a certain level of performance and environmental protection, is a boost to green markets or the chain of suppliers, representative for businessmen, but not for the population to relate the certified establishments with the products offered in the market manufactured with processes that take care of the environment into account, a situation that reduces the strength of the certificate for the decision-making of the company to enter the program or not audit, based on direct business benefits, contrary to ISO – 14000.

It is important to consider that this certificate is awarded only for compliance with the action plan, which may or may not include other types of performance activities or environmental information such as corporate reporting and continuous improvement programs, among its results PROFEPA shows in the web data that appears in table 4 below.

Participant enterprises	3,697
Valid Certificates (two years from notification)	1,666
Clean Industry	790
Environmental quality	821
Tourist Environmental Quality	63
Certificates Issued in 2021	692
Certificate Applications in 2021	866

Table 4. Data on the companies that are part of the National Environmental Audit Program

Source: Taken from PROFEPA as of September 2021

The LGEEPA in its art. 22 deals with financial environmental incentives are credits, bonds, civil liability insurance, funds and trusts, when their objectives are aimed at the preservation, protection, restoration or sustainable use of natural resources and the environment, as well as the financing of programs, projects, studies, scientific research, technological development and innovation for the preservation of the ecological balance and protection of the environment. One of the main green funds in Mexico is the Mexican Carbon Fund (FOMECAR), which supports technically and financially the development of clean development mechanisms (CDM3) projects in Mexico.

Market environmental incentives: These are the concessions, authorizations, licenses and permits that correspond to pre-established volumes of pollutant emissions in the air, water or soil, or that establish the limits of use of natural resources, or of construction in natural areas protected areas or in areas whose preservation and protection is considered relevant from an environmental point of view.

Unlike tax and financial incentives, these incentives persuade behavior to stop and artificially put green businesses on an equal footing. For example, the NOMs that establish water pollution limits oblige all companies to implement actions to avoid exceeding those limits. Thus, the stricter the regulation, the greater protection and care for the environment is guaranteed.

While fiscal and market environmental incentives are found in federal and local legislation, financial environmental incentives are implemented as public policies that depend on the federal and state public administration.

This is important for the implementation of those specific incentives. The way in which they are designed persuades to implement certain actions in favor of the environment through fiscal and financial incentives. Likewise, market incentives, by setting a limit on polluting emissions, oblige all businesses in a specific market to take certain measures.

Other programs

The focus of the program is to develop self-management capacities in companies, to review in detail their operational and administrative activities, so that they, by themselves, find alternative solutions to the excessive and unnecessary use of materials, supplies, water and energy, among others; which are translated into the generation of waste, discharges and emissions that result from an inefficient operation with repercussions on the environment, such is the objective of the Environmental Leadership Program for Competitiveness (ELPC).

The operation of the ELPC is carried out with the participation of non-profit civil associations and institutions of higher education, scientific or technological research with the capacity to link with companies in the country, which transmit the method for the identification and evaluation of opportunities to companies, providing technical assistance and support in environmental matters. This constitutes one more option for companies to integrate with an action that always tends to continuous improvement.

Results

The audits in their different modalities or names in accordance with standards or in accordance with the law or regulation, are the starting point for an evaluation of the performance of organizations that voluntarily submit to inspection not only their results or processes, but even the structure and all the internal control that is invested in it, from human resources, equipment, materials and how much is measurable.

The standards contain the minimum parameters against which the performance, effectiveness or scope of companies must be compared when they decide to exceed the established expectations and intend to continue advancing in a process that leads them to exceed their goals or to be able to meet the demands that are established in standards.

Being the accounting and financial statements that result from daily operations those that have been subject to financial or fiscal audits more frequently and supported by the NIF and ISA, they provide us with specific guidelines for the review that help so that the environment in companies is more and better managed.

Recent reports from the National Institute of Statistics and Geography, INEGI for its acronym in Spanish, (2020), indicate the total costs for depletion and environmental degradation, which are equivalent to 4.6 percent of the national Gross Domestic Product. During 2020, the Ecological Net Domestic Product 4 presented its lowest percentage with respect to the country's GDP with 75.7 percent. Emissions to the air are the item with the highest environmental cost with 611,235 million pesos followed by the costs of soil degradation, urban solid waste, depletion due to hydrocarbon extraction, the depletion of groundwater, water pollution and the costs of depletion of forest resources (INEGI, 2020).

According to statistics from the Ministry of Finance and Public Credit, from January to April 2021, spending on environmental protection, destined for infrastructure works to promote, manage and protect the environment and pollution, decreased to 201 million pesos (MDP), representing a drop compared to 2020 whose investment spending was 406 million pesos and in 2019 of 1,975 million pesos. Analysts agree that these cuts to public spending, as well as in health, arose from the uncertainty of the recovery of the economy in the midst of the COVID-19 pandemic (Saldívar, 2021).

During the Budget Erosion Table of Mexican Environmental Policy: evidence, arguments and challenges, within the activities of the International Mining Book Fair in February 2021 in Mexico City, Eduardo Vega, director of the Faculty of Economics (FE) of the National Autonomous University of Mexico, indicated that in 2008 the Ministry of the Environment and Natural Resources allocated 2 percent of public spending. By 2021, that percentage decreased to 0.7 percent. These resources have not only diminished, but most of it goes to water and on average only 25 percent of the budget goes to other environmental issues; Without considering that there is not a considerable participation of the private sector, which is why it is considered a priority to increase resources in this area (Lugo, 2021).

As part of the work of the "FIL de Minería", Veronique Deli, coordinator of Continuing Education of the FE, released information on a declining budget for the National Water Commission. Within the work of the Budget Erosion Roundtable, it was mentioned that, in 2016, 1.2 percent of the federal budget was allocated to environmental protection. Mexico, like other countries that are part of the Organization for Economic Cooperation and Development, allocated 1.6 percent. Cesáreo Gámez, Economist and Professor of the School of Economics at the Universidad Autónoma de Nuevo León, emphasizes the importance of addressing the recommendations made in international agreements by both citizens and all economic agents to solve these problems.

Conclusions

The legal precepts indicate that they can be accompanied by a series of regulatory provisions on minimums and maximums in different areas such as those established by the MOS and MXS so that depending on the matter being reviewed can be supported with such provisions with the IAS and FRS in order to see implemented good practices for the improvement that in optimal conditions enable the auditees to observe the respect and maintenance of the healthy environment and the public interest intact for the health of the population and its due and timely information of environmental reports, action plans, financial statements and sustainability reports for all stakeholders.

To this should be added, the provisions of regional and international agreements that maintain the conditions established by the countries, applicable to people and not only to companies observing the best practices within a win-win philosophy, just auditing entities with national and state programs is not enough, the inclusion of good business management practices and observance of voluntary standards that protect natural resources and their permanence for future generations should be encouraged.

In addition to having implemented an important series of controls on the risks assumed by economic entities in their operations, transactions and events that occur from internal control systems that take forecasts and estimates in the entities that impact the environment, Hence the importance of meeting the requirements of the stakeholders and the need for the company to account for its performance in accordance with the laws and international accounting and auditing standards so that the valuation, presentation and disclosure are the basis on which it is reviewed by auditors to provide certainty of business performance to stakeholders.

The current situation requires that all individuals, companies and organizations of society work for the common good, due to the inability of government actions that fail to reduce the existing gaps and inequity that manifests the population, the unsustainable use of resources and increased pollution are a major task to be solved, we must become aware and act to provide a solution.

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Blended learning experience of networks and telecommunications through a SPOC Course

Experiencia de aprendizaje mezclado de redes y telecomunicaciones a través de un Curso SPOC

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Abstract

This research reports the results of student-centered learning of the educational experience of networks and telecommunications that is taught at the Universidad Veracruzana implemented through a SPOC (Small Private OnLine Course) taking advantage of for this the benefits of blended learning. The general behavior of online learning was analyzed in the performance of the students. This work is practical and provides guidance for the analysis of learning and individualized teaching in small study groups. A challenge in virtual learning is to provide personalized teaching in a large class with quality and effectively according to the needs of each student. Blended learning is an opportunity to offer personalized instruction through the SPOC. The goal is to identify the learning outcomes when implementing personalized teaching in blended learning. The contents, activities and assessments represent a mixed learning scenario, the data representing the learning behavior of the students was collected and used to measure their performance. The results show that students' online behavior can measure their performance and performance.

SPOC, Blended and individual learning, Performance

Resumen

En esta investigación se reportan los resultados de aprendizaje centrado en el estudiante de la experiencia educativa de redes y telecomunicaciones que se imparte en la Universidad Veracruzana implementado a través de un SPOC (Small Private OnLine Course - "curso privado online para grupos pequeños") aprovechando para ello las bondades del aprendizaje mezclado. Se analizó el comportamiento general de aprendizaje en línea en el desempeño de los estudiantes. Este trabajo es práctico y proporciona orientación para el análisis del aprendizaje y la enseñanza individualizada en grupos de estudio reducidos. Un reto en el aprendizaje virtual es brindar una enseñanza personalizada en una clase numerosa con calidad y de manera eficaz de acuerdo con las necesidades de cada estudiante. El aprendizaje mezclado es una oportunidad para ofrecer la enseñanza personalizada a través del SPOC. El objetivo es identificar los resultados de aprendizaje al implementar la enseñanza personalizada en el aprendizaje mezclado. Los contenidos, actividades y evaluaciones representan un escenario de aprendizaje mezclado, los datos que representan el comportamiento de aprendizaje de los estudiantes se recopilaron y utilizaron para medir su desempeño. Los resultados muestran que el comportamiento en línea de los estudiantes puede medir su desempeño y su rendimiento.

SPOC, Aprendizaje mezclado e individual, Desempeño

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Introduction

In Mexico until before March 2021, traditional higher education, also known as face-to-face, was the main form of teaching where the main provider of information and knowledge was the teacher and the role of the student was as a receiver, as a result of confinement by the COVID-19 Coronavirus pandemic resorted to emergency remote teaching, leading to numerous changes in the learning scheme for students but accentuating the inactive role of students.

Technology went from being an option to a necessity, becoming a determining factor in student learning, which is why there are opportunities for the advancement and development of new teaching schemes. The traditional teaching method is increasingly difficult to adapt to the development of the new age, and its quality is difficult to guarantee. University students from the August - February 2021 period identify themselves as digital natives who have grown up in the digital age and practically next to the Internet, so that traditional teaching for them is not visualized without the use of information and communication technologies.

Internet users in Mexico reached 84.1 million in 2020, which is equivalent to 72% of the population (INEGI, 2020). In this sense, the Internet has become very accessible for them to access information and knowledge (INEGI b, 2020). On the other hand, access to sources of knowledge is very wide and within the reach of students, allowing them to have a great variety of educational resources, so the teacher is no longer the only one who provides knowledge and courses that are not enriched. properly they can cause students to lose interest and consequently decrease their performance and learning.

According to Ortiz (2021), the mobile phone has been the main means to carry out educational activities such as accessing educational platforms, browsing social networks, watching short videos, using email, making video calls, among others, becoming the basic equipment of the students.

However, excessive use of the mobile phone has turned students into phubbers in the classroom, affecting their attention and learning in class Mendoza, J., Pody, B. Lee, S. Kim, M. and McDonough, I. (2018). Therefore, a mediation between technology and learning must be sought.

In addition, serving large groups of students poses difficulties in trying to provide individualized instruction and could even have negative effects on student academic performance. Sobrados (2016), Monks (2011).

Small Group Private Online Course (SPOC) launches an educational revolution in classroom teaching. The SPOC is intended for small group instruction and is widely used to impart professional knowledge. Prego (2020).

Some practices with SPOC that have achieved good results are Serna, A. Garrido, C., Herrero, D. (2018) who made a comparison of two groups of university students who carry out two learning experiences, developed in very different learning contexts, one online through a SPOC course inserted in a Bachelor's course and another face-to-face obtaining favorable results, Fernández, Pérez del Río, Guillén & Gabarda (2021), analyzed the evaluation models and instruments that are implemented in the SPOC. On the other hand, Mailhes, V., Almada, N., Raspa, J. (2018) investigated and deepened about the different aspects of academic literacy in English and in particular of the abstracts through SPOC courses, finding as a finding that English literacy is encouraged.

In recent years, SPOC has also been popular in blended learning, Ziebarth & Hoppe (2014), Cepeda (2017). Therefore, SPOCs are seen as an opportunity for teachers to explore personalized teaching when groups are small between 20 and 30 students.

It is pertinent to identify the appropriate dynamics to achieve learning through the recording of the behavior of the students during the course, for example the time dedicated to study and the grades of the tasks, activities, quizzes, etc. for later analysis through diagrams generated on the SPOC platform. The research question seeks to identify what is the relationship between these data and student performance?

In this research, a SPOC course was designed for the educational experience of networks and telecommunications that was taught in virtual mode to explore the performance behavior of students.

Based on blended learning, student performance was measured by integrating activities and assessments, including video review, reading technical reference manuals, testing, peer review, information search, which were integrated on the SPOC platform. A correlational analysis was used to analyze the impact of online behavior on student performance.

Through the measurement of the performance of the students in an SPOC, it is intended to pay for personalized learning, allowing the integration of all the learning activities distributed throughout the course for their subsequent analysis through educational data mining.

By using learning behavior through the SPOC to identify student performance and provide personalized instruction, providing an example for the design of virtual learning.

Literature review

The behavior analysis of academic performance in virtual learning environments is considered a key element. For this, the literature that supports this study is presented. In the case of SPOC courses in particular, there are few studies in this regard.

The evaluation of the capacity of linear regression and logistic regression in the prediction of performance and academic success / failure has been analyzed, starting from variables such as attendance and participation in class (García, Alvarado & Jiménez, 2000)

Castrillón, Sarache & Ruiz-Herrera (2020), predicted the academic performance of higher education students, based on various influencing factors using artificial intelligence techniques, designing an algorithm that allows its measurement for the benefit of learning.

According to Rojas & González (2009), student performance is often quantified by final grade, through partial evaluations and participation during the course, among others.

The interactions of students with the SPOC can be identified through the number of accesses, number of clicks, views of the videos, publications and participations made, as well as the results of the online quizzes are considered predictors of academic performance.

Based on related works, this research mainly used correlational analysis to analyze the performance of students and the elements that support their learning.

Figure 1 shows the map of blended learning activities carried out through the SPOC.

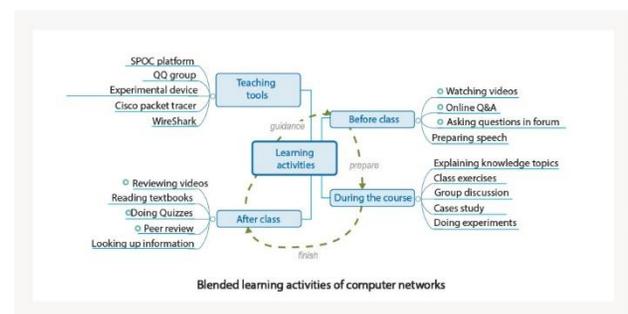


Figure 1 Blended Learning Activities at the SPOC

Context of blended learning in the SPOC

The design and implementation of blended learning for understanding the work environment is presented.

A. Blended learning design

For the design of the SPOC, edmodo v4 was used as a platform that was adapted in such a way that it allowed the inclusion of SPOC resources to student-centered teaching, allowing progress at the student's own pace and implementing blended learning through synchronous sessions with collaborative work through teams.

In order to verify the deep alignment of online and offline learning, a variety of online and offline activities were designed. These activities include self-paced learning, such as watching videos, taking quizzes, and collaborative learning, such as peer review and group discussion. The online learning activities were carried out on the SPOC platform. The other activities were mainly offline activities and were carried out through the flipped classroom. Before class, students learned mainly on the SPOC platform.

They can preview the course in advance by watching videos, answering questions and answers in the videos, or discussing with their classmates on the forum. They have the freedom to choose when and where to explore the online course.

Class activities were driven primarily by the flipped classroom. Through the SPOC, key and difficult elements of knowledge were presented according to the learning situations of the students and the use of the EMINUS platform was incorporated to carry out a random list, case studies and control of instructions.

The SPOC focused on students giving privileges to generate peer-to-peer discussions with teachers and classmates, do exercises or send comments on screen through the teams and eminus platform. Online and offline learning was seamlessly connected and blended through synchronous classroom teaching.

The after-school learning activities were designed to help students digest what they had learned. The quizzes, the peer review tasks corresponding to each teaching content unit were implemented in the SPOC platform. The partial evaluations are randomly generated by the SPOC platform. The students had two opportunities to complete the partial evaluation according to their own decision. After school activities, students were able to review videos, work with simulators such as WireShark, Packet tracer, and command testers available all the time, read technical reference manuals, or consult other suggested materials through the SPOC.

B. Implementation and data collection

The SPOC course on Networks and Telecommunications was implemented in August 2021 with students of the Bachelor's Degree in Administrative Computer Systems who were studying the 5th period, access was granted through login and password only to those students enrolled in the course, the blended learning according to the elements already described. The course contains seventeen theoretical knowledge of didactic content. The videos and the course material were published in advance by the professor on the SPOC platform. The course consisted of 24 students. The students were exposed to blended learning for the first time.

To test the reliability of the online learning data, a delivery schedule of the activities was established. In the empirical study and experiments, the reliability of the data will be verified.

Throughout the semester, the SPOC platform recorded online learning data for the teacher. For the feasibility of the study, some general behaviors were considered such as: Activity Reports, labs and quizzes, Basic exam of network connectivity and communications, exam of ethernet concepts, exam of IP addressing, exam of network applications communications, exam of creation and security of a small network, Final exam and the evidence portfolio report, on the other hand, learning activities outside of SPOC were not considered predictors. At the end of the semester, the students took a final exam and submitted a portfolio of evidence, all of which were considered to measure their performance.

Analysis of data

This section examines whether the common online behavior in Table 1 can be used to predict student performance. Correlation was used to explore the relationship between online behavior and student performance.

A. Data pre-processing

The original data of the behavior of the students in the SPOC platform was previously processed before its analysis.

B. Student performance

SPSS statistical software was used to measure to identify the correlations between the behavior in each activity performed and the performance of the students. Table 1 presents a summary of the data registered through the eminus platform.

VARIABLES									
1	2	3	4	5	6	7	8	9	10
QyL	1Ex	2Ex	3Ex	4Ex	5	2.5	25	10	95.42
35.42	5	5	5	5	0	0	0	0	15.06
8.06	2	0	5	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
34.02	2	5	0	5	2.5	0.8	22	10	81.32
13.68	5	5	5	0	2.5	2.5	0	0	33.68
17.62	5	5	5	4	2.5	2.5	25	10	76.62
15.08	5	5	0	0	0	0	0	0	25.08
13.94	5	5	4	0	2.5	2	25	8	65.44
0	0	0	0	0	0	0	0	0	0
35	3	5	5	5	2.5	2.5	25	9	92
0.26	0	0	0	0	0	0	0	0	0.26
27.1	5	5	5	5	0	2.5	25	8	82.6
25.96	5	5	5	5	2.5	2.5	25	10	85.96
38.18	5	5	5	5	2.5	2.5	25	10	98.18
38.44	5	5	4	5	1.5	2.5	25	8	94.44
37.92	5	5	5	5	2.5	2.5	25	10	97.92
5.2	0	0	0	0	0	0	0	0	5.2
12.38	2	5	3	0	2.5	2	0	0	26.88
18.38	5	5	5	5	2.5	0	25	10	75.88
35.06	5	5	3	5	2.5	2.5	25	10	93.06
15.34	5	5	0	0	2.5	0	0	0	27.84
27.92	0	5	0	5	2.5	2.5	25	0	67.92
38.8	5	5	4	5	2.5	2.5	25	10	97.8
22.98	5	5	4	4	0	2.5	25	8	76.48

Table 1 Concentrated data to analyze

Results

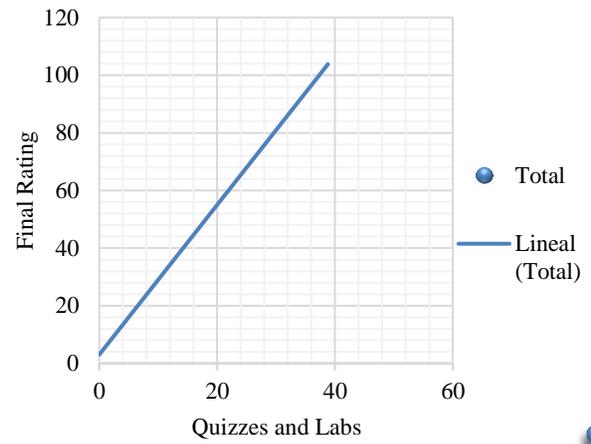
In this section some of the main results found are presented.

Correlation analysis: Pearson's coefficient describes the correlation between the total performance of the course and the elements of the SPOC, in Table 2 it can be observed.

Activities	Correlation coefficient	Interpretation
Quiz and Labs	0.94	The variables are closely related
1 st Exam	0.67	The variables have a medium strength of association
2 nd Exam	0.78	The variables have a medium to large strength of association
3 rd Exam	0.64	The variables have a medium strength of association
4 th Exam	0.92	The variables are closely related
5 th Exam	0.63	The variables have a medium strength of association
6 th Exam	0.78	The variables have a medium to large strength of association
Final exam	0.95	The variables are closely related
Briefcase	0.91	Variables have strong association strength

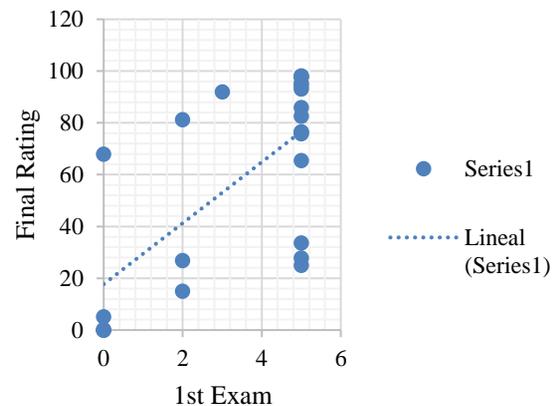
Table 2 Correlation of analysis variables

From the data analysis it turned out that the completion of quizzes and laboratories is closely related to student learning, reaching a very significant correlation of 0.94. With which it is confirmed that the online activities carried out through the SPOC and in a blended learning environment are identified as main in the student's learning, allowing them to access the study material at any time in addition to having various materials and above all having feedback through both synchronous and asynchronous virtual forums as shown in Graph 1.



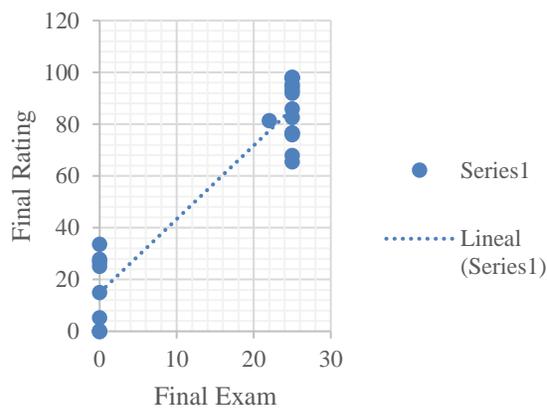
Graphic 1 Correlation between quizzes and labs and course performance

On the other hand, when analyzing the partial evaluations, it was identified that at the beginning of the course the correlation was positive but weak, an adaptation to the SPOC course materials can be interpreted, since in the subsequent partial exams the correlation was increasing (0.64, 0.67, 0.78, 0.92), an example of this is presented in graphic 2.



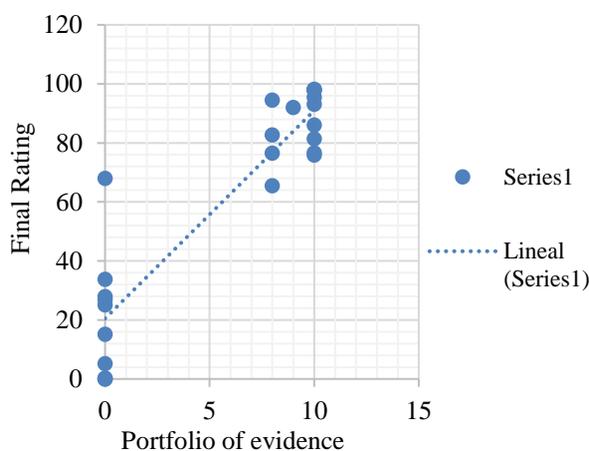
Graphic 2 Correlation between 1st midterm exam and course performance

On the other hand, the exam at the end of the course shows a close correlation (0.98), which represents a total adaptation of the students to the SPOC course, in addition to contributing significantly to their performance. Graph 3 presents this information.



Graphic 3 Correlation between final exam and course performance

As a review mechanism, at the end of the course the students delivered a final portfolio of performance evidence, Graphic 4 shows a positive and very close correlation of 0.91.



Graphic 4 Correlation between portfolio and course performance

Conclusions

In this research, blended learning was designed and implemented through a SPOC course during one semester for the educational experience of networks and telecommunications to explore the performance of the students and the personalized attention received through various techniques and tools hosted on the platform. of the course. It is concluded that the online learning data that involves part of the blended learning learning activities can be used to improve student performance, and the characteristics related to the tasks during the development of the same were considered as main for a good overall student performance.

Correlation analysis provides important factors for the implementation of SPOC courses and allows teachers to learn about the point-to-point relationships between applied tasks and student performance, as well as a proposal to provide personalized attention in virtual teaching.

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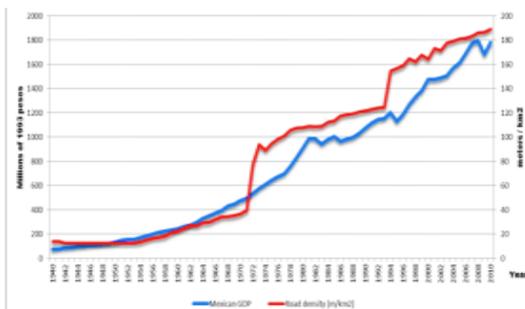
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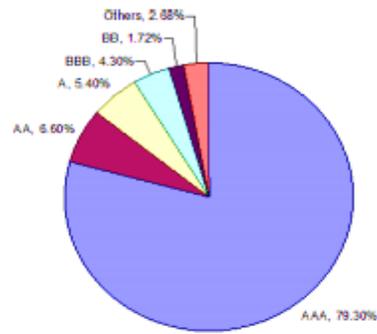


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