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# **RINOE Journal-General Economics**

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## **Presentation of Content**

In a first article we present, *Financial Impact of Covid -19 at the International Level*, by GÓMEZ-BRAVO, María De La Luz, GOMEZ-BRAVO, Jessica Margarita, ANDRADE-OSGUERA-Miguel Ángel and BARCENAS-PUENTE José Luis, with adscription at Universidad Tecnológica del Suroeste de Guanajuato, in the next article we present, *The fair value of the innovation. A proposal for determine it*, by RAMÍREZ-BARAJAS, Alejandro CARMONA-GARCÍA, Nélica and ALMANZA-SERRANO, Ma. Leticia, with adscription in Universidad Tecnológica del Suroeste de Guanajuato, in the next article we present, *Financing to the mexican productive sector in the context of the pandemic by COVID-19*, by LAPA-GUZMÁN, Javier, BALTAZAR-ESCALONA, Juan Carlos and ROSAS-ROJAS, Eduardo, with adscription in Universidad Autónoma del Estado de México, in last article we present, *Risk-return analysis of the investment portfolio of two stocks, under the Markowitz model. Case study: Two multinational companies listed on the Mexican Stock Exchange*, by ALVAREZ-MEDINA, María Trinidad, with adscription at Instituto Tecnológico de Sonora.

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## Financial Impact of Covid -19 at the International Level

### Impacto Financiero por el Covid -19 a Nivel Internacional

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#### Abstract

The research is based on the financial impact at the international level of the measures that were taken to prevent the virus from spreading further, without thinking about the impact that this could generate a drop in consumerism for the commercial sectors. Faced with the impact caused in the first months of this year by the pandemic, markets and businesses presented important challenges that they faced by working as a team to be able to cope with the losses, I know they began to present as the fall in demand for their products and services. The situation that is being experienced so far is generating unexpected pressure on working capital and its liquidity.

#### Resumen

La investigación está basada en el impacto financiero a nivel internacional por las medidas que se tomaron para evitar que el virus se propagara más, sin pensar en el impacto que esto podría generar una baja en el consumismo para los sectores comerciales. Ante el impacto provocado en los primeros meses de este año por la pandemia los mercados y negocios presentaron importantes desafíos que enfrentaron realizando un trabajo en equipo para poder sobrellevar las bajas sé que comenzaron a presentar como la caída de la demanda de sus productos y servicios. La situación que se está viviendo hasta el momento está generando una presión inesperada al capital de trabajo y su liquidez.

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## Introduction

At the international level, the arrival of the virus called Covid-19 was and is of great importance since it is a disease that so far is not well known, Health officials are determining what this virus can cause in humans. On the other hand, Covid-19 is affecting the economy internationally in three different ways 1) directly production 2) causing disruptions in the supply chain 3) financial impact on markets and companies.

The fall in international equity markets when investments are withdrawn causes a great financial impact within the commercial sectors. To such a degree that many companies have been forced to close or even lower the salaries of their employees to 50%, given that the economy in the world fell more than usual, increasing the levels of performance in an untimely manner.

For the international and national markets, it has left millionaire losses in production, raw materials and other aspects within the industrial and commercial market, because the prevention measures that were established led the industrial part to fall several places far below its levels of production.

It is mentioned that more than a third of them are estimating that in order to resume essential operational activities it will take between 6 to 12 months, the financial directors have considered that some companies in order to recover from the financial fall due to the effects of the pandemic could take more than 6 months as previously mentioned that at the national level at the international level a little less because its economic fluidity is a little more liquid.

The year 2020 was the year where the world stopped and that will come to represent the losses of trillions of dollars, taking into account the GDP and the IMF, more than 5% of the GDP in Mexico and 35% in the United States for which it is expected that more than 150 countries are facing an economic contraction.

The lack of the vaccine makes the pandemic very fragile and longer, as it is spreading every day and is leading the economic sector into a difficult phase.

The combination of the factors nature of the pandemic, the phase of the economic sector, and the acceleration to adopt technology made the biggest of the economic blows, and where the economic shock hit the most was in jobs since there is a rise in unemployment internationally since it took off from 3.3% in March for the month of July the rate was at 5.4%

## Framework

At the international level, the effect it caused was an international crisis, companies were advised to take some alternatives to be able to implement new technologies in all their areas.

The WHO declared a pandemic in March of this year when it was affecting all countries and immediately the measures that should be taken to avoid contagion were given, these implemented measures have caused an unprecedented economic crisis.

The IMF mentioned that the pandemic has caused a stagnation in the international economy and a great recession similar to the economic crisis that occurred in 2008, but the OECD mentions that the scenario that is being lived in this year caused the reduction of economic growth international closing with 1.5%. The biggest challenge for all organizations is being able to maintain and reinvent their business models during the pandemic and when it ends.

The means of payment companies such as banks, policyholders and investment funds have been some of the very few companies that their investment funds had growth. Because of the situation that is being experienced internationally.

Internationally, companies have had to intervene in Digital marketing areas in order to increase growth opportunities in their areas and to review business models and keep customers satisfied. Showing the changes made within them to the client. The changes that were made in most of the Companies at the international level affected the client since their products changed in price and some even in quality, they were also affected by the changes since the companies were asked to make their hours longer.

Reduced when their activities were operational, work from home was implemented for those who were administrative with a variable schedule, all this was implemented to be able to take care of the client and them from COVID-19, the bad thing about this implementation is that the salary was lowered d workers because they did not perform their full working hours.

The majority of the company at the international level did not have any insurance or protection against pandemics, this would have been very helpful to avoid falling into the crisis that it is experiencing at the moment.

Insurers in these times of crisis are in very complicated times and are reporting that they will not solve the clauses that speak about higher risk expenses.

At the international level, the pandemic continues to be a great unknown because no one knows for sure that what will happen when it is going to end, phase 3 is being faced, which has been handled as the most critical since at the moment there is the Very high financial impact where customers, employees and owners are holding the organizations by strings so as not to fail and the pandemic does not end, there are countries that are currently beginning their normal life that gives other countries a lot of hope.

2020 is a year full of experiences that has taught all international and national entrepreneurs to know how to value the value proposition and be able to prepare for the future, now is when they value being able to give more attention to their workers and their clients and thus learn from them.

## **Development**

The financial impact at the international level by the Covid -19 was terrible for the economy in a few weeks it had collapsed, the banking institutions were pronouncing an economic crisis in the middle of the year 2020. UNCTAD recognized that the duration of the economic crisis at the international level will depend on three major factors 1) The spread of the virus around the world 2) The time for the vaccine to exist 3) the responsibility on the part of the government and private individuals to to be able to carry out strategies and thus pay off the damage caused to the economy.

They should be proposed as efficiency measures and not only in macroeconomic policy but in a whole series of strategies to be able to reform the economy of companies at the international level.

The OCD has mentioned that the pandemic that is currently being experienced brings with it the third and one of the largest economic and financial crises and derived from this a social crisis.

He considers that the main thing to be able to get out of this economic and financial crisis is to regulate the objective and diagnosis of the aforementioned areas. Because the International Monetary Fund has already mentioned that in this year 2020 one of the worst financial crises that have existed in history at the international level will take place due to the COVID -19 pandemic.

The financial impact at the international level is considered due to the large drop in exports that are made throughout the world, as well as the flight of capital and the decline in tourism. With the lag of shocks, it caused the decline within the economy and unemployment caused the largest of the economic restrictions at the international level.

COVID-19 became more than a month-long issue, but it could be done for years before everything can return to normal within the economy and at a social level.

Within the economic sectors at an international level, one of the most affected has been the automotive, commercial services, the entertainment industry, hotels, professional services, the aerospace industry and some sectors, on the contrary, had a good performance such as electricity, services online, health, insurance, and banks.

A very significant context at the international level is the social discontent at the international level since there is great frustration due to the lack of opportunities and the inequality that is being experienced.

Within the pandemic, poverty and inequality were growing and today 12% of people live in extreme poverty at the international level and every day it rises more.

**Methodology**

It will be Qualitative since data collection without numerical measurement is used to discover or refine research questions in the interpretation process, Qualitative studies can develop questions and hypotheses before, during or after data collection and analysis.

Qualitative data make detailed descriptions of situations, events, people, interactions, observed behaviors and their manifestations. The qualitative approach mainly seeks "dispersion or expansion" of data and information, reflection is the bridge that links the researcher.

The qualitative approach studies the various subjective realities constructed in the research, which vary in their form and content between individuals, groups and cultures, reality does change through observations and data collection, describes and interprets the phenomena through perceptions and meanings produced by the experience of the participants.

The qualitative approach provides depth to the data contextualization of the environment and unique experiences, as well as provides a "fresh, natural and holistic" point of view of the phenomena, as well as flexibility.

The orientation towards description, prediction and explanation is directed towards measurable or observable data. The goal of mixed research is not to replace quantitative and qualitative research, but to utilize the strengths of both types of inquiry by combining them and trying to minimize their potential weaknesses.

Mixed methods represent a set of systematic, empirical and critical research processes and involves the collection and analysis of qualitative and quantitative data, as well as their integration and joint discussion to make inferences as a result of all the information collected and achieve greater understanding. of the phenomenon under study.

They are the systematic integration of qualitative and quantitative methods in a single study to obtain a more complete picture of the phenomenon, these can be combined in such a way that the qualitative and quantitative approaches retain their original structure and procedures.

**Conclusion**

The financial impact that is being experienced in this year 2020 slows the pace of economic growth at the international level due to the COVID -19 pandemic. The digital economy in the field of artificial intelligence was surprised by the pandemic which took it to a lap within its area.

The most complicated thing about the situation we are experiencing lies in the fact that it is the first time that this situation has happened relatively quickly and some had to be carried out and learning had to be managed due to economic shocks. The fact was that many had to face challenges simultaneously.

The uncertainty that we find ourselves due to the rapid appearance of the virus stopping economic growth at the international level, there were no strategies to be able to solve the problems that began to occur, which led to the dismissal of personnel or lower wages up to 30%, unemployment began to grow internationally, debts as well.

To date, there is no end date for this situation that is going through the world, every day there is talk of more infections, of closing the establishments and companies that are the largest sources of employment. No laboratory has a vaccine to help us fight the virus and as long as the situation does not exist, it will be the same or worse economically and socially, people find themselves with many problems that have led them to seek medical help spending the money that do not have. It is expected that the year 2021 will have a good start and thus the economy can be recovered internationally and also the tranquility of the people.

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## The fair value of the innovation. A proposal for determine it

### El valor razonable de la innovación. Una propuesta para su determinación

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#### Abstract

According to the NIF Financial Reporting Standards, fair value represents the exit price that, at the valuation date, would be received for selling an asset or paid for transferring a liability in an orderly transaction between market participants. When there is no accessible exchange value of the operation, an estimate must be made using valuation techniques. In other words, fair value is the price at which a tangible or intangible asset is sold / bought between two economic entities on a voluntary basis. Even if there are complications to determine it, it must be estimated by applying valuation techniques. But what happens when the asset object of fair value is not the subject of a transaction between two economic entities? That is, what happens when the asset is the result of an internal generation process of the economic entity, such as an industrial design on which a patent can be generated? How is fair value determined in this case? This article contains the analysis of the concept of fair value contained in the financial information standards and a proposal for its determination in the case of assets generated internally in economic entities as a result of innovation projects, considering for this purpose the valuation technique of the net present value NPV.

**Fair Value, Innovation, NPV**

#### Resumen

De acuerdo con las Normas de Información Financiera NIF, el valor razonable representa el precio de salida que, a la fecha de valuación, se recibiría por vender un activo o se pagaría por transferir un pasivo en una transacción ordenada entre participantes del mercado. Cuando no se tenga un valor de intercambio accesible de la operación debe realizarse una estimación del mismo mediante técnicas de valuación. En otras palabras, el valor razonable es el precio al que un activo tangible o intangible se vende/compra entre dos entes económicos de manera voluntaria. Mismo, que cuando existen complicaciones para determinarlo, debe estimarse aplicando técnicas de valuación. ¿Pero qué sucede cuando el activo objeto del valor razonable no es materia de una transacción entre dos entes económicos? Es decir, ¿Qué sucede cuando el activo es el resultado de un proceso de generación interna del ente económico como por ejemplo un diseño industrial sobre el cual puede generarse una patente? ¿Cómo se determina el valor razonable en este caso? El presente artículo contiene el análisis del concepto de valor razonable contenido en las normas de información financiera y una propuesta para su determinación para el caso de activos generados internamente en los entes económicos como resultado de proyectos de innovación, considerando para tal efecto la técnica de valuación del valor presente neto VPN.

**Valor razonable, Innovación, VPN**

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**Introduction**

Taking NIF C-8 INTANGIBLE ASSETS as a reference, it is possible to equate the terms intangible assets and innovation. Since the aforementioned standard recognizes as technological intangible assets, technological patents, research and development in progress, computer systems (software) and licenses, computer programs, information systems, non-patented technology, technical knowledge, databases, plant titles, confidential formulas and processes, technical drawings, technical procedure manuals, blueprints, manufacturing process creation, procedures, and production lines. All of them are products resulting from an applied innovation process or also known as innovation project management.

In that order of ideas and without ceasing to take NIF C-8 as a reference, the innovation represented by intangible assets can reach organizations in three ways: 1) by the acquisition of an intangible asset individually, 2) by the acquisition of intangible assets through a business acquisition and 3) by the acquisition of an internally generated intangible asset. For any of the three cases, the value at which the acquired intangible assets must be recorded in the financial statements of the acquiring entity must be determined. For the first case, that of the acquisition of an intangible asset individually, NIF C-8 is very clear regarding the valuation of the asset: "The value of the asset will be the cash and / or cash equivalents paid by the acquired asset". For the second case, the acquisition of an intangible asset through a business acquisition, the valuation will be the "fair value" of the asset that does not exceed the portion of the consideration paid that is attributable to it (using any of the three approaches: cost, market or income). For the third case, that of the acquisition of an internally generated intangible asset, the valuation will be the cost of the expenses made for its development.

The central theme of this article is the analysis of the third option: the acquisition of an intangible asset generated internally by the organization and the design of a proposal to assign a fair value beyond the simple determination of the cost incurred in its development. Recognizing in this way the efforts of organizations in the management of innovation projects and the risk incurred.

**Innovation project management.**

The management of innovation projects within organizations (or internal generation of intangible assets) has become a tool with a high degree of application in the management of innovation at different levels. The internal generation of intangible assets guarantees the solution of specific problems of the organization, taking advantage of the knowledge management of its members and the various resources available to it. However, to date, the valuation of internally generated intangible assets constitutes a dilemma that must be clarified.

On the subject of the valuation of internally generated intangible assets, NIF C-8 is quite clear. In its subsection b) of paragraph 21 it states: "the initial valuation (of an intangible asset) must be at its acquisition cost and this can be reliably determined to comply with the valuation postulate" and in numeral iii) of the same subsection Specifically for internally generated intangible assets, it states: "in the acquisition of an internally generated intangible asset, its cost is the expenses made for its development." From the foregoing, the question arises: Why for the acquisition of an intangible asset individually its valuation corresponds to the total cash or its equivalent paid (which will surely contain a profit margin over the cost of its generation) and for the acquisition of an internally generated intangible asset, its valuation will be the cost of expenditures made for its development without considering a profit margin?

For the purpose of acquiring intangible assets developed internally, not considering in their valuation a profit margin over the cost of their development represents a disincentive for the development of innovation projects within organizations. Due to the foregoing, a valuation method is proposed for the acquisition of intangible assets that considers a profit margin over the cost of their development based on the NPV net present value assessment technique.

### **The cost of an internally developed intangible asset**

In accordance with NIF C-8, if an organization or entity decides to generate an intangible asset internally, it must classify its efforts and corresponding expenditures in two phases or stages: a) the investigation phase; and b) the development phase. In each of these phases, the organization that develops the intangible asset must identify the corresponding costs, since for the intangible asset to be recognized as such, its cost, in addition to other requirements, must be determined "reliably". Now, regarding the costs of the investigation phase, the aforementioned rule in paragraph 53 states that these should be recognized as an expense in the period in which they are accrued.

This is because the nature of the research is such that there is not sufficient certainty that future economic benefits will be obtained as a result of the disbursements made during the research phase, which is very understandable. Regarding the expenditures made during the development phase, the sum of these must be recognized as the intangible asset as long as the entity demonstrates that it meets all the criteria that the standard sets for this purpose. In conclusion, the value at which an internally developed intangible asset must be recorded in the entity's statement of financial position will be the sum of the expenditures made in the development phase of the execution project.

### **The "fair value" of an internally developed intangible asset**

According to NIF C-8 in its paragraph 7, the distinctive elements in the definition of an intangible asset, whether internally generated or acquired are: a) it must be identifiable, b) it must lack physical substance, c) it must provide well-expected future economic benefits, and d) control must be had over said benefits. In that order of ideas, the ability of an internally generated intangible asset to provide well-expected future economic benefits gives it the "right" to assign it a value greater than the mere sum of the costs incurred for its development. This "higher value" over the generation cost of the intangible asset is known as "fair value".

The same as in the glossary of the Financial Reporting Standards, it is defined as the exit price that, at the valuation date, would be received for selling an asset or paid for transferring a liability in an orderly transaction between market participants. Although, the definition contemplates the action of the sale so that the fair value of an asset exists, its absence does not prevent the entity from determining it for informational purposes only. More specifically, the Financial Reporting Standard NIF B-7 DETERMINATION OF FAIR VALUE in paragraph 41.1.2 defines it as a determination based on the market and not a specific value of an asset or a liability for the entity.

The same standard argues that for some assets and liabilities, observable market transactions or market information are available; On the other hand, for other assets and liabilities, they are not (as is the case with any intangible asset generated from an internal innovation project). However, the objective of a fair value determination in both cases is the same: to estimate the exit price at which an orderly transaction to sell the asset or to transfer the liability would be carried out between market participants at the valuation date. under current market conditions (that is, at an exit price at the valuation date from the perspective of a market participant holding the asset or owing the liability). The fair value, therefore, is based on an exchange transaction or an estimate thereof, taking into account the attributes of the item subject to be valued and the current circumstances at the time of its valuation.

Now, starting from the assumption that for internally generated intangible assets with innovative characteristics there will be no market information available to determine their fair value, the question arises how to determine it then. For the purpose of determining the fair value of an intangible asset for which there is no market information available, NIF B-7 states in paragraph 43 that an entity must use the valuation techniques that are appropriate to the circumstances and on which Sufficient inputs are available to determine fair value, maximizing the use of relevant observable inputs and minimizing the use of relevant unobservable inputs. In paragraph 44 of the aforementioned standard, it considers three types of valuation techniques according to its approach: The market approach, the cost approach and the income approach.

The market approach is a valuation technique that uses prices and other relevant information generated by market transactions that involve identical or comparable (ie, similar) assets, liabilities, or a group of assets and liabilities. From the perspective of a market participant seller, replacement cost is the price that it would receive for the asset to be valued, based on the cost of acquisition or construction of a substitute asset of comparable utility to a market participant buyer, adjusted for the obsolescence. This is so because the market participating buyer would not pay more for the asset than the price for which it could replace the service capacity of that asset.

The income approach is a valuation technique that converts future amounts (for example, cash flows or income and expenses) into a single current amount (that is, discounted). When using the income approach, the fair value determination reflects current market expectations of those future amounts. The income approach includes the following examples:

a) present value techniques; b) option pricing models that incorporate present value techniques that reflect both the time value and the intrinsic value of an option; and c) the multi-period surplus earnings method, which is used to determine the fair value of some intangible assets.

### **Present value as a valuation technique and intangible assets.**

According to the Financial Reporting Standard NIF A-6 RECOGNITION AND VALUATION, the present value is the present value of future net cash flows, discounted at an appropriate discount rate, that is expected to generate an item during the normal course of operation of an entity and represents the cost of money over time, which is based on the projection of cash flows derived from the realization of an asset or the settlement of a liability. In accordance with the aforementioned standard, the present value is used to determine the following values:

- a) entity or unit value to be reported;
- b) incremental costs;
- c) effective settlement; and
- d) specific value of an asset or liability for the entity (includes value in use).

However, in determining the present value, two approaches are usually used: (a) expected present value and (b) estimated present value (traditional approach).

The expected present value corresponds to the future cash flows discounted at a rate risk-free and weighted by their respective probability of occurrence; This procedure incorporates, in a range of projected luxuries, the risks associated with possible variations in the amount and periodicity of cash flows. The estimated present value is the amount that is statistically the most appropriate among a range of possible amounts of projected future cash flows; Said selected flow should be discounted at a rate that incorporates the inherent risks.

Regarding the calculation of cash flows, and in accordance with NIF A-6, the following must be considered:

- a) Potential cash inflows from income, arising from the use or realization of the asset or, where appropriate, from the assets that make up a reporting unit or cash-generating unit during the period or periods in which the element will remain in force To evaluate.
- b) The potential cash outflows associated with the cash inflows indicated in the previous paragraph or, in the case of an individual liability, those necessary to settle it.
- c) The difference between the potential cash inflows according to paragraph a) above, less the potential cash outflows directly attributable, according to paragraph b), the future net cash flows that will be reduced or increased, as the case may be. will pay or receive for the realization of assets or liabilities at the end of the estimated horizon.

Regarding the appropriate discount rate, NIF A-6 defines it as that which reflects the market conditions in which the item or item of the financial statements operates, at the time of its evaluation. Additionally, the aforementioned rule establishes that the appropriate discount rate must observe:

- a) The return that investors demand for investments that will generate cash flows of cash in an amount, term and risk profile equivalent to those that the entity expects to obtain from the asset, reporting unit or cash-generating unit, or
- b) The market rate to which the entity has access to settle its liabilities.

To estimate an appropriate discount rate that incorporates risks, the following may be taken into account, among others:

- a) The entity's weighted average cost of capital,
- b) The weighted average cost of capital, where applicable, of the unit to be reported or the cash-generating unit,
- c) The rate at which the entity can finance itself, or
- d) The rate implicit in market transactions carried out with similar assets or liabilities in other projections.

**Proposal for determining the fair value of the product of an internally generated innovation project.**

In order to explain how the fair value of an internally generated intangible asset would be determined using the present value technique, the steps that would be considered for this purpose are described below.

1. Description of the activities of the research stage of the innovation project, ensuring that they comply with the characteristics contemplated in NIF C-8:
  - a. That they are activities aimed at obtaining new knowledge;
  - b. To the search, evaluation and final selection of applications of the research findings or other knowledge;
  - c. In search of alternatives for other materials, tools, products, processes, systems or services; and
  - d. To the formulation, design, evaluation and final selection of possible alternatives for improvements to materials, tools, products, processes, systems or services, new or improved.

2. Determination of the estimated cost for each of the activities of the investigation phase considering for this purpose what is contemplated in NIF C-8:
  - a. those related to the employment of internal and external personnel dedicated to research activity;
  - b. the costs of materials consumed and services received in the research activity;
  - c. the cost of equipment and facilities that have no other alternative use other than in the specific investigation for which they are intended (net of their residual value) and the depreciation of property, plant and equipment to the extent that these assets are used for the activity research;
  - d. indirect costs, other than administrative costs in general, related to the research activity (these costs are allocated on a basis similar to those used to allocate indirect costs to inventories); and
  - e. other costs, such as the amortization of patents and licenses to the extent that these assets are used for research activity.
3. Description of the activities of the development stage of the innovation project, ensuring that they meet the characteristics contemplated in NIF C-8:
  - a. Activities oriented to the design, construction and testing of pre-production models and prototype and model testing;
  - b. To the design and manufacture of tools, templates, molds, dies and dies that involve new technology;
  - c. To the design, construction and operation of a pilot plant that is not of an economically feasible scale for commercial production; and
  - d. To the design, construction and testing of new or improved materials, tools, products, processes, systems or services.
4. Determination of the estimated cost for each of the activities of the development phase considering for this purpose what is contemplated in NIF C-8:
  - a. The costs related to the employment of internal and external personnel dedicated to the development activity;
  - b. the costs of materials and services consumed in the development activity;

- c. the depreciation of property, plant and equipment to the extent that these assets are used for development activity;
- d. costs for indirect expenses, other than administrative expenses of the operation in general, related to the development activity (these costs are assigned on a basis similar to those used to assign costs for indirect expenses to inventories);
- e. when capitalization is appropriate, the comprehensive financing result; and
- f. other costs, such as the amortization of patents and licenses to the extent that these assets are used for development activity.

Up to this step, the cost of the research stage of the innovation project has already been estimated. Same as once the project is executed, it must be recorded as a research expense in the income statement. There is also the estimated cost of the development phase, which, if the project is executed, will be the value at which the intangible asset must be recorded in the statement of financial position.

The steps that are listed below propose the method for determining the fair value of the intangible asset in the event that the entity generating it decides to transfer its property to another between economic.

1. Estimate the entity's cash flows in the event of not developing the intangible asset.
2. Apply the Net Present Value technique to the estimated cash flows, considering for this purpose an "appropriate discount rate" determined according to NIF A-6
3. Estimate the cash flows of the entity in the event of having developed the intangible asset and accounting for the benefits of its use.
4. Apply the Net Present Value technique to the estimated cash flows.
5. Determine the difference between the net present value "without intangible assets" and the present value "with intangible assets"

6. Add to the cost of the development phase of the innovation project the difference determined in numeral 5. The sum of both concepts will result in a reasonable value proposal based on the cost and income approaches considered in NIF B-7.

### Conclusions

The proposal contemplated in this article derives from the analysis of the financial information standards NIF C-8 INTANGIBLE ASSETS, NIF B-7 DETERMINATION OF FAIR VALUE and NIF A-6 RECOGNITION AND VALUATION. The proposal is made to meet the trend of companies and organizations that have gone from the acquisition of innovative products (generally machinery and software), to the internal generation of the same; but that at the time they have made the decision to transfer their property or the rights of its use to other companies or organizations, beyond keeping the innovative product for their use and internal benefit.

At the time of writing this article, the proposal contains guidelines that must be validated by the corresponding authority. However, the proposal can become an incentive for the generation of innovative products within companies and organizations that specifically meet their operational needs. Avoiding in this way the costs associated with a low level of use of the innovation acquired by not adapting to its operational characteristics and processes.

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## Financing to the mexican productive sector in the context of the pandemic by COVID-19

### El financiamiento al sector productivo Mexicano en el contexto de la pandemia por COVID-19

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#### Abstract

The Mexican economy has a fragile and inefficient financing structure for the productive sector; which acquires great relevance in the face of the imminent economic recession that will follow the most critical period of the Covid-19 pandemic. In this paper, the evolution of the different financing channels is analyzed, in order to know, on the one hand, the composition of the financing of companies; and on the other hand, identify the type of company that presents the highest degree of vulnerability and that, therefore, the government should prioritize. For this, a statistical analysis is carried out both of the composition of the financing of the companies; as well as the characteristics of these companies and their relevance in the economic dynamics of the country.

#### Covid-19, Companies, Financing

#### Resumen

La economía mexicana presenta una frágil y poco eficiente estructura de financiamiento al sector productivo; lo que adquiere gran relevancia ante la inminente recesión económica que seguirá al periodo más álgido de la pandemia por Covid-19. En el presente trabajo se analiza la evolución de los distintos canales de financiamiento, para conocer, por un lado, la composición del financiamiento de las empresas; y por el otro, identificar el tipo de empresa que presenta el mayor grado de vulnerabilidad y que, por lo tanto, el gobierno debería priorizar. Para esto, se lleva a cabo un análisis estadístico tanto de la composición del financiamiento de las empresas; como de las características de dichas empresas y su relevancia en la dinámica económica del país.

#### Covid-19, Empresas, Financiamiento

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## 1. Introduction

Mexico is part of the group of emerging economies that decided to adopt the neoliberal growth model during the second half of the eighties; This implied a series of structural reforms, aimed at reversing a long period of zero economic growth and recurrent crises. These reforms focused on expanding the potential market to which the country had access, promoting the efficiency and profitability of state-owned companies, and improving the link between the financial and productive sectors.

The latter implied carrying out a process of financial liberalization, which sought, on the one hand, to make the country an attractive territory for foreign capital and, on the other, to promote an environment of healthy competition in the banking sector. In both cases, the results were unexpected; Regarding the first, although it is true that the flow of capital from abroad was abundant during the first half of the nineties, its relationship with the financial crisis of 1994 is undeniable. And it is that this flow took place in an environment of little regulation, making it impossible to anchor capital to long-term projects and investments, which would reduce their characteristic volatility; which explains his escape during 1994 (Solís, 1997).

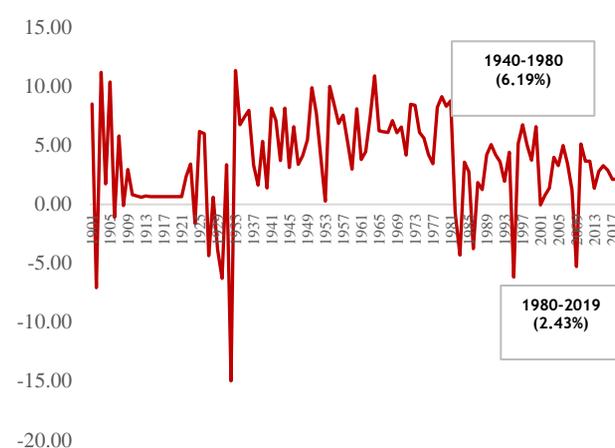
Regarding the second of these objectives, it should be noted that the banking sector underwent a process of reprivatization and later one of foreignization; with which a bank was configured in the power of large financial conglomerates; This has prevented the creation of a true competitive environment within this sector; thus, the evidence on the improvement in the conditions of access to credit is not conclusive (Cervantes, 2010).

And it is in this context that the productive sector will have to face the economic recession derived from the Covid-19 pandemic. In this sense, the actions that the government carries out will be essential to reactivate the country's economy. For example, a program to support non-financial companies is imperative; and for this, those that should be prioritized due to their characteristics must be identified. Next, a statistical analysis of the main characteristics of Mexican companies is carried out, as well as the composition of their financing; with the aim of contributing to the correct design of said program.

## 2. The vulnerability of the Mexican economy

The Mexican economy during the last three decades has been subject to a series of structural reforms that have altered its internal dynamics. Among those that stand out the commercial opening, an abrupt financial liberalization and an accelerated privatization process. Reforms whose objective was to detonate a phase of sustained economic growth and development, under the idea that, by increasing the commercial interaction of the country, it would be possible to access a greater potential market; Similarly, eliminating restrictions on the financial system would promote a better link between it and the productive sector.

However, the results obtained so far are controversial, given that, although the country has a higher rate of trade openness and greater financial depth, its effects on economic growth and development are not conclusive. For example, the recurring recessionary periods that the country has gone through as a result of negative impacts from abroad, show its macroeconomic fragility; In this sense, it is enough to observe the volatility of the growth of the Gross Domestic Product (GDP). Furthermore, as can be seen in graph 1, its growth rate in recent years has been considerably lower than that recorded during the period from 1940 to 1980, which was 6.19% on average..



**Graphic 1** Gross Domestic Product (Growth rate)

Source: Own Elaboration based on INEGI-BIE (2020)

Which to some extent is due to the type of activities that have been prioritized in recent decades; And the fact is that the secondary sector is not only far from being the most important, but it also presents a decreasing trend, since it went from representing 30.18% of GDP in the first quarter of 1980, to 27.6% in the last quarter of 2019.

Contrary to what has happened with the tertiary sector, which went from representing 54.06% to 64.13% during the same period of time; and it must be considered that due to its own characteristics, it generates greater volatility in the economy. On the other hand, the secondary sector and specifically the activities related to manufacturing are the ones that generate the greatest backward and forward linkages; In addition, due to their nature, the investment period they imply is longer, which contributes not only to the stability of the sector but to that of the national economy (González, 2010).

Therefore, it is understandable that it was sought to strengthen this sector by encouraging international trade; that in a first phase it would favor activities with intensive use of labor, but that, in the medium term, due to greater specialization, the added value of Mexican labor would rise and, therefore, the complexity of the exports. This in turn would allow Mexican companies to access new markets, diversifying the destination of their exports and, therefore, reducing the degree of dependence of the country on the US economy.

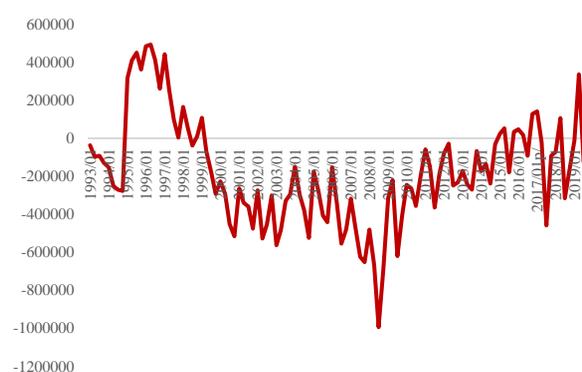
However, the results in this area are not entirely satisfactory, since, according to World Bank data, Mexico's five main trading partners have remained practically unchanged during the last years; in fact, in the case of exports, the US economy went from representing 86.3% of the total in 2014, to 90.1% in 2019; that is to say, the dependency not only was not reduced, but it intensified. Regarding imports, the United States continued to be the main trading partner, representing 50.1% of the total in 2014, and 44.5% in 2019; that is, their participation was reduced. However, in table 1 it can be seen that there is a great distance between Mexico's first and second trading partner, which in no way would be sufficient to argue that the initially proposed diversification process has been carried out.

Imports					
2008		2014		2019	
U.S.	160 414.66	U.S.	206998.79	U.S.	218077.31
China	36 771.73	China	70 232.73	China	88 035.67
Japan	17 259.40	Japan	18 597.61	Japan	19 041.61
Republic of Korea	14 338.92	Republic of Korea	14 597.93	Germany	18 751.15
Germany	13 362.07	Germany	14 588.38	Republic of Korea	18 708.19
Exports					
2008		2014		2019	
U.S.	235 522.73	U.S.	318367.01	U.S.	371043.63
Canada	7 102.35	Canada	10 714.21	Canada	14 319.35
Germany	5 008.15	China	5 964.14	China	7 130.48
Spain	4 232.90	Spain	5 787.56	Germany	7 099.46
Brazil	3 366.87	Brazil	4 739.64	Republic of Korea	4 948.81

**Table 1** Main commercial partners of Mexico (Millions of dollars)

Source: Own Elaboration based on World Bank (2020)

On the other hand, although it is true that the process of commercial opening meant the growth of the potential market for the national productive sector, it also implied the arrival of large foreign companies in search of more accessible productive factors, mainly labor. This explains to some extent the result of the trade balance in recent years; that as seen in Graphic 2; it has generally been deficient; situation that is not the most desirable for an emerging economy such as Mexico.



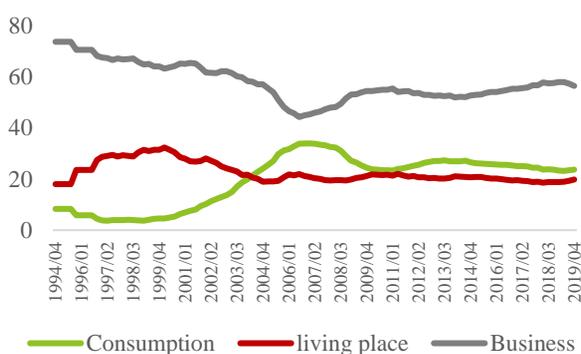
**Graphic 2** Balance of the trade balance (X-M)

Source: Own Elaboration based on INEGI-BIE (2020)

In addition to the trade opening process, a financial liberalization process was carried out, with the same objective: to contribute to the strengthening of the country's industrial fabric. In this case, through a series of effects derived from the development of the financial sector, mainly two; the first, related to the flow of capital from abroad, which would find in Mexico a fertile territory for its investment, and which would promote the development of national companies, which would also have better access to financing conditions; since the second of these effects consisted, on the one hand, in the configuration of a banking sector characterized by healthy competition and capable of assigning credits to the productive sector; and on the other, in the constitution of an inclusive stock market sector, which will represent a true option for the majority of Mexican companies. In this way, it was hoped that the development of the financial sector would generate a knock-on effect on the economy as a whole (Cabrera, 2006). The composition of the financing destined to the non-financial sector of the country is mainly of internal origin; in 1994 it represented 84% of the total, and in 2019, 76.6%. In other words, the participation of external financing has increased, but in a limited way and with a series of peculiarities that will be developed below (Banxico, 2020).

If the composition of financing by lender is analyzed, it is possible to identify that commercial banking continues to be the most important, but its participation has decreased, since it went from representing 63.8% of the total in 1994, to 46.7% in 2019; while development banks went from 5.43% to 4.72%; and for its part, debt issuance went from 2.56% to 5.43%, during the same period. What is contrary to the expected results; Not only due to the reduction in the participation of commercial banks, but in view of this situation, development banks should have been strengthened, but this is not the case, in fact, their participation has been reduced over the years, which limits the government's ability to allocate resources towards strategic activities for the country's economy. In the case of debt issuance, their participation is low, which indicates that few companies have access to this type of financing; what cannot be considered as a positive aspect of the Mexican Financial System (Banxico, 2020).

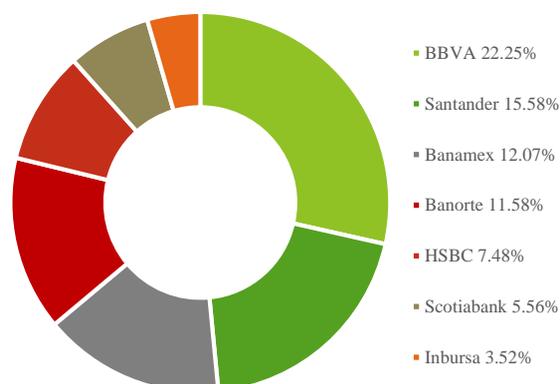
If one considers that the privatization process of commercial banks that began in the mid-1990s had the objective of strengthening their role in financing the productive sector, it is paradoxical that the result has been the opposite. In addition, if the destination of the credit granted by commercial banks is analyzed, it will be observed that although it is true that the credit destined for companies is the most important, it is evident that it has been reduced in recent years, since it went from representing the 73.8% of the total in 1994, to 56.4% in 2019; contrary to what happened with the one destined to the consumer category, which went from 8.31% to 23.71%; while that granted to the housing sector went from 17.99% to 19.81% during the same period of time (see Graphic 3).



**Graphic 3** Composition of financing granted by Commercial Banking

Source: Own Elaboration based on Banco de México (2020)

The foregoing is due to the fact that commercial banks have prioritized consumer credit given the security that it offers, compared to that for companies, which is not only more risky, but also implies a more expensive allocation process; With which a rentier bank has been configured and little interested in the development of the country's industrial fabric (Lapa, 2017). And this behavior is related to its structure, which currently consists of fifty-one banks, but it should be noted that seven concentrate 78% of total assets; of which only two are Mexican (see Graphic 4). This denotes, on the one hand, the success of the foreignization process that began in the 1990s, and on the other, the degree of concentration that commercial banks present. Therefore, it is not possible to argue that healthy competition has been generated within the banking sector, as expected.



**Graphic 4** Total assets of Commercial Banking (percentage of participation)

Source: Own elaboration based on the National Banking and Securities Commission (2020)

For its part, the stock market also presents a series of distortions, responsible for the fact that until now it has not been able to consolidate itself as a true financing option for the majority of Mexican companies. And it is enough to consider that the universe of economic establishments in Mexico is 6.3 million according to the 2019 census; while only 140 companies are listed on the Mexican Stock Exchange (BMV); that, in addition, it presents a high concentration of capitalization in some issuers; According to data from Economática (2019), only six companies that make up the Price and Quotation Index (S & P / BMV IPC) account for 58.6% of the capitalization value of the entire BMV. It should be noted that this situation has intensified in recent years, since from 1998 to 2019, the number of listed companies went from 195 to 140 (BMV, 2020).

Therefore, the evidence is not conclusive on the benefits derived from the different reforms carried out; Since there are some features in the Mexican economy that have deepened in recent years and that explain its fragility and instability; for example: a chronic trade deficit, a marked dependence on the US economy and an inefficient financial sector in terms of financing for most of the country's companies. Therefore, the health pandemic due to Covid-19 will not only imply a series of immediate costs for the Mexican economy; but also in the medium term, that is, during the period of economic recovery, which the Mexican government will have to face with scarce resources and limited room for maneuver; aspects that aggravate the vulnerability of the economy in a post-crisis sense.

### **3. Financing the productive sector**

The reforms carried out since the eighties implied a series of changes for the country's companies, which were abruptly involved in a new context of international competition, which demanded that they be more efficient, improve their profitability, modernize their marketing strategies, increase your productivity; that is, to adapt to a globalized reality. And for this adaptation process it was necessary to have an efficient financing structure that would allow them to make large investments.

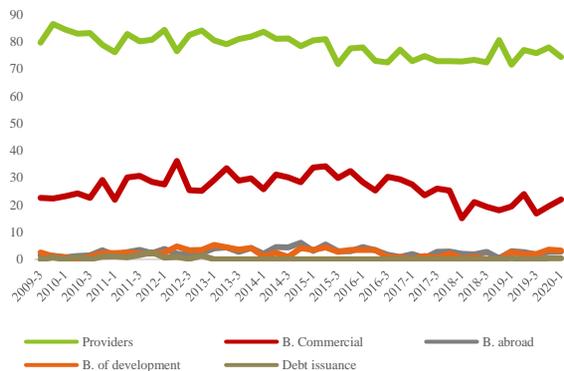
In this sense, the different reforms made to the Mexican Financial System (SFM) during the last decades, had as main objective, to strengthen the relationship between the financial and productive sectors, through improving access to the different credit channels. This, because companies require financing to carry out their operation and investment strategies; and with this, increase its production, expand its presence in the market or take advantage of development opportunities (Saavedra and Hernández, 2008). Therefore, having efficient financing channels acquires great relevance in terms of growth and economic development. Mexico is a country with a sophisticated financial system, with a perfectible regulatory environment, but already established, which has a solvent and profitable banking system. However, a large part of the business sector continues to be excluded from this system. Which generates a series of doubts about said reforms; since they assured that the development of the financial sector would imply that of the productive sector, mainly because they would improve financing channels for companies (Cabrera, 2006).

And it is that according to the results of the Short-term Survey of the Credit Market published by the Bank of Mexico, the percentage of companies that failed to obtain a bank loan went from 72.3% in 2009, to 75.8% in 2019; a situation that is aggravated in the case of SMEs, whose percentage went from 83% to 87.3%; while large companies went from 72.9% to 69%, during the same period of time. In other words, the problem not only lies in the evident exclusion suffered by most companies in Mexico, but that this situation has only improved in the case of large companies.

The foregoing is by no means the desired scenario, and even less so if the reasons why companies did not have access to credit from commercial banks are considered. In the case of SMEs, 54.1% of the companies surveyed in 2019 considered that interest rates were so high that they discouraged any effort to obtain resources through the banking sector. 45.3% pointed out as responsible the scarce willingness of banks to grant credit to the business sector; while 51.5% declared that the conditions of access to bank credit were not ideal; and finally, 53.4% considered the amount demanded as collateral excessive. In the case of large companies, 49.1% consider that interest rates are a limitation to request a bank loan; 40.7% which is the willingness of the banks to grant it; 42.9% point to the conditions of access to said credit; and 47.3% hold the amounts required as collateral liable. Therefore, it is evident that SMEs are the ones that most resent each of the aspects that the survey considers as limiting access to bank credit; which corresponds to the fact that they suffer a greater degree of bank exclusion.

The foregoing allows us to infer that the main source of financing for companies in Mexico is not the traditional credit channels, therefore, the composition of financing for SMEs, as well as for large companies, is analyzed below. Regarding the former, in 2009 79.7% of them used supplier credit, while in the first quarter of 2020, 74.4% did so. For its part, bank credit went from 22.6% to 22% during the same period of time, that is, the percentage of companies that had access to this option remained practically unchanged throughout the last decade. On the other hand, credit from foreign banks went from 1.5% to 2.9%; and that granted by development banks went from 2.5% to 3.2%.

In the case of debt issuance, it should be noted that in 2009 the access that SMEs had to this financing option was null, and during the first quarter of 2020, the percentage was 0.4%, but two quarters ago, the participation was still null (see Graphic 5).

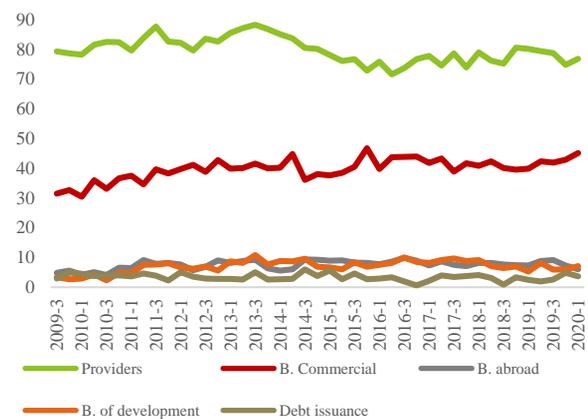


**Graphic 5** Composition of financing to SMEs  
Source: Own Elaboration based on Banco de México (2020)

In the case of large companies, the percentage of those that used supplier credit went from 79.2% in 2009 to 76.8% in the first quarter of 2020; while the reference to credit granted by commercial banks went from 31.5% to 45.1%, and that from development banks went from 3.3% to 7.1% during the same period of time. For its part, the percentage of companies that received resources via foreign banks went from 4.8% in 2009 to 6% in 2020. And finally, the percentage of large companies that obtained financing through the issuance of debt went from 2.9% to 3.6% (see Graphic 6).

Such is the disconnection between the banking sector and SMEs, that 60% of these consider that this aspect does not represent any limitation for their development; and the fact is that, in reality, most of them have not had access to bank credit at any time, so it is logical that said financing option is irrelevant to their existence. However, it is a fact that the diversification of financing sources represents a strength for any company, since it gives it stability and a greater margin of maneuver in accounting terms (Galindo, 2005). Proof of this is that if the destination of the bank credit received by the companies is analyzed; In the first quarter of 2020, 9.6% of SMEs used it to restructure their liabilities, while, in the case of large companies, the percentage was 14.5%.

In addition, being able to diversify their financing allows companies to increase their investment in the medium and long term, which determines their expansion capacity; In this sense, it should be noted that 2.8% of large companies used the bank credit received for foreign trade operations, while in the case of SMEs, this percentage was zero; which denotes another of the characteristics of this type of company, its scarce participation in international trade (Banxico, 2020).



**Graphic 6** Composition of financing to large companies  
Source: Own Elaboration based on Banco de México (2020)

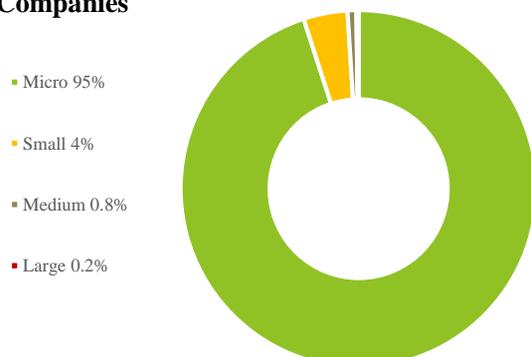
However, financial exclusion and poor access to the international market are only two of the obstacles SMEs face in Mexico; And it is that others could be added, such as the excess of government procedures to operate; high taxes; limited access to technology and tools necessary for its operation; a decreased ability to attract and retain talent; and even the competition of informal businesses (Saavedra and Saavedra, 2014). Which contributes to their greater vulnerability to periods of economic recession, such as the one expected after the most critical phase of the Covid-19 pandemic.

According to the latest economic census data, in Mexico there are 6.3 million formally established companies, of which 95% are micro-businesses; While 4% are small companies, 0.8% correspond to medium-sized economic establishments and finally, 0.2% consist of large companies. This distribution of the Mexican business sector has remained practically unaltered since the 2008 census (INEGI, 2020).

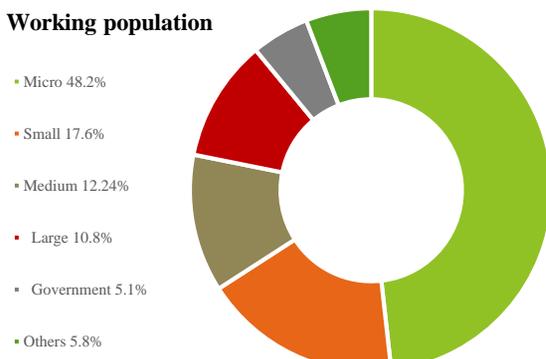
It should be noted that, in Mexico, the main variable used to classify companies by size is the number of people they employ, therefore, a micro-company is one that has up to 10 employees; a small one has up to 50 workers; medium-sized companies with up to 250 and large ones are those that exceed the latter number of employees (Saavedra and Hernández, 2008). So while it is true that a larger company implies a greater generation of formal jobs, if the composition of the employed population in Mexico is analyzed, it will be possible to verify that 48.2% work in micro-businesses; 17.6% in small companies; 12.24% in medium, and only 10.8% in large; This highlights the importance in terms of employment of micro, small and medium-sized enterprises (MIPyMES), which together represent 78.14% of the total employed population in Mexico (INEGI, 2020).

In terms of income, microenterprises generate 14.2% of the total; the small ones, 16.1%; the medians, 21.9%; and the largest, 47.8%. This denotes, on the one hand, the importance in terms of production that large companies have, and on the other, the low level of productivity with which smaller companies operate. And it is that as a whole the MIPyMES represent 52.2% of the income generated; which is actually a percentage quite close to what the larger companies represent by themselves (see Graphic 7).

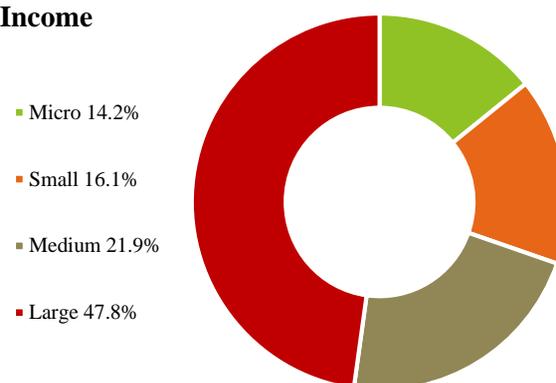
#### Companies



#### Working population



#### Income



**Graphic 7** Main characteristics by company size (2019)  
Source: Own Elaboration based on INEGI (2020)

On the other hand, according to the latest information published by the National Institute of Statistics and Geography (INEGI), large companies have 69.4% of total fixed assets; while the medians represent 13.6%; the small ones, 7.9% and the micro companies, 9.1%. And in terms of remuneration, the participation of micro-businesses is 10.1%; that of small companies, 12.6%; that of the medians is 18.6%; and finally the largest represent 58.7% of the total. These data make it possible to identify operational inequality within the Mexican business sector, and which, without a doubt, constitutes a factor that should be considered in the design and implementation of the economic recovery program.

In addition, it should be noted that MSMEs are the main source of formal employment for the most vulnerable employed population in the country, not only because of the low levels of remuneration offered by these types of companies, but also because of the low survival rates they register. And it is that in the case of companies with up to 2 employees, only 63% survive the first year of activities and only 30% the fifth year. While in the case of companies with up to 10 employees, 80% will survive the first year, but only 52% will survive the fifth year.

The situation improves for companies with up to 50 employees, as 92% will continue to operate after the first year, but only 77% will do so after the fifth year. Regarding medium-sized companies, the survival percentage after the first year is 85% and 66% after the fifth year. And finally, in the case of large companies, 83% will survive the first year and 61% will survive the fifth year (INEGI, 2020).

In this way, smaller companies are not only the most vulnerable, but also present a series of peculiarities that make it difficult to include them in a support program; for example, their limited access to traditional financing channels and the fact that in many cases there is no adequate control of expenses and income, which makes it difficult to obtain any credit; In this sense, it is enough to consider that 40.2% of these companies do not keep an accounting record, which supports the viability of the company (INEGI, 2020).

#### 4. Conclusion

After the most contagious phase of the pandemic by Covid-19, the Mexican government must design and implement an economic recovery program, which, although true, must be comprehensive and, therefore, consider all sectors of the Mexican society; It is a fact that it will represent a dilemma for you about the type of companies on which to focus your attention in the short term. On the one hand, large companies, whose high participation in national income makes them highly relevant for the country's economic growth; and that due to their characteristics not only do they have better financing options, but they also have greater negotiating power with their clients and suppliers; which undoubtedly allows them to better cope with a recessionary period.

And on the other hand, MIPyMES, which despite their peculiarities that make them inefficient, represent the main source of formal work for the majority of the employed population in Mexico; so its relationship with the economic development of the country is evident. And that, although it is true, due to their size, they can adapt more easily to eventual changes, modifying their structure and processes depending on the needs of the moment; it is a fact that they constitute the most vulnerable business sector.

The government in turn has been clear in prioritizing development indicators over economic growth indicators; under the logic of the redistribution of wealth and the generation of opportunities for the majority of the population; Therefore, it is likely that they will opt for an immediate support program for MSMEs; which will actually be the ones that need it the most. However, the aid must not only be welfare, but also developmental.

In other words, the situation should be used to promote a true change in the financing structure for companies in the country; that allows a better link between commercial banks and the country's productive sector; that it encourages development banking to regain its ability to direct resources to strategic sectors; and that it contributes to the stock market sector finally being able to establish itself as a viable financing option for most companies.

In this way, not only will smaller companies be helped in the short term, but traditional credit channels will also be strengthened, which will also imply a series of benefits in the medium term for larger companies. And in the long term, one of the main problems facing the country's productive sector will be addressed, and which, to a certain extent, is responsible for its fragility and, therefore, for the vulnerability of the Mexican economy. In other words, the economic crisis that will undeniably follow the health crisis represents an opportunity to improve one of the aspects of the Mexican economy in which the results of the different structural reforms have not been as expected; and with it, advance in the solution of chronic problems, such as commercial dependence, industrial emptiness and the impoverishment of employment.

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## **Risk-return analysis of the investment portfolio of two stocks, under the Markowitz model. Case study: Two multinational companies listed on the Mexican Stock Exchange**

### **Análisis de riesgo rendimiento de portafolio de inversión de dos acciones, bajo el modelo de Markowitz. Estudio de caso: Dos empresas multinacionales que cotizan en la Bolsa Mexicana de Valores**

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#### **Abstract**

Investment in productive and financial assets are a decision made as an alternative to direct resources to bring greater value and higher performance to an economic entity. The objective of this article is to analyze the return risk of the stocks of two companies listed on the Mexican Stock Exchange (BMV), presenting the case of the companies Grupo Bimbo, SAB de CV, and GRUMA, SAB de CV, both companies listed on the Mexican Stock Exchange, belonging to the industrial sector specifically the food and beverage sub-sector, being the most representative companies of this sector. The return on the portfolio is 0.27256% and the risk is 0.0121862, with an investment of 50% in each of them. The period analyzed was from 2015 to 2018. It is important to base decision-making by considering the risk analysis and performance of financial assets in where you wish to invest, in addition to relying on other analyzes such as fundamental and technical analysis, among others.

#### **Investment portfolio, Risk, Performance**

#### **Resumen**

La inversión en activos productivos y financieros, son decisiones que se presentan como alternativa para canalizar recursos hacia aquella que genere un mayor valor y rendimiento a un ente económico. El objetivo de la presente investigación es analizar el riesgo rendimiento en un portafolio de dos acciones de empresas cotizadas en la Bolsa Mexicana de Valores (BMV), presentando el caso de las empresas Grupo Bimbo, S.A.B de C.V., y GRUMA, S.A.B de C.V., ambas empresas cotizan en la Bolsa Mexicana de Valores, y pertenecen al sector industrial, específicamente al subsector de alimentos y bebidas, siendo ambas empresas las más representativas de ese sector. El rendimiento del portafolio es de .27256% y el riesgo es de .0121862, con una inversión de 50% en cada una de ellas. El periodo analizado fue de 2015 a 2018. Es importante fundamentar la toma de decisiones considerando el análisis del riesgo y rendimiento de los activos financieros en donde se desea invertir, además de apoyarse en otros análisis como el análisis fundamental y técnico entre otros.

#### **Portafolio de inversiones, Riesgo, rendimiento**

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## 1. Introduction

Operation, financing and investment decisions by economic entities require a thorough analysis, due to the use of financial resources. Investment in productive and financial assets are decisions that are presented as an alternative to channel resources towards the one that generates greater value and performance to an economic entity. This decision will depend on the following factors: investment objective, amount of financial resource available, timing, risk profile of the investor and expected return.

The objective of this research is to analyze the return risk in a portfolio of two shares of companies listed on the Mexican Stock Exchange (BMV), presenting the case of the companies Grupo Bimbo, SAB de CV, and GRUMA, SAB de CV, both companies belong to the food and beverages sector and are part of the sample of companies that issue the BMV Price and Quotation Index. The risk and return were determined by applying Harry Markowitz's portfolio theory (1952), calculating the indicators of mean, variance, standard deviation, covariance, correlation and beta of each of the stocks individually, as well as in as a whole, as well as the CPI.

The efficient frontier was determined, assigning investment percentages for each one of the actions and obtaining the investment mix that maximizes yield and minimizes risk. It is of the utmost importance for investors to analyze the risk and return that, based on their risk profile and available financial resources, allow the optimization of their portfolio.

## 2. Theoretical foundation

In selecting an investment portfolio, the mix of financial assets that optimizes risk and return should be considered. For this reason the investor must analyze the degree of risk that he would be willing to assume and the return to be obtained. This work will address the portfolio theory of Markowitz (1952), which describes the process for an investor to allocate a percentage of their resources in financial instruments that allow them to obtain the maximum return at a lower risk.

## Investment portfolios

One of the objectives of investors is to maximize profits by minimizing risk, this is possible, through the construction of investment portfolios, which represent the selection and conjunction of two or more financial assets that are listed on the financial markets - capital, debt, derivatives and currencies-, with the purpose of diversifying and optimizing risk and return. The financial assets that make up the investment portfolio have their own characteristics in terms of term, profitability and risk, compensating each other for profitability and risk (Grajales, 2009; Véliz, Cervantes and Carmona, 2012).

The theory regarding the construction of portfolios is the "modern theory of portfolio selection" by Harry Markowitz (1952), based mainly on diversification, a basic concept for the construction of an optimal investment portfolio that maximizes risk-return. In this sense, Mendizábal, Miera and Zubia (2002) mention that Markowitz developed his model considering the rational behavior of investors, who want profitability - profits - at the lowest risk. Therefore, he assumes the effectiveness of a portfolio, if the return is higher than the investment risk; In this sense, Grajales (2009) mentions in reference to Markowitz that the design of a portfolio seeks to guarantee a certain profitability according to a particular level of risk that the investor is willing to assume.

One of the main characteristics of investment portfolios is diversification, that is, investing in different financial assets in order to maximize profitability and minimize risk. Contreras, Stein and Vecino (2015) refer to the modern portfolio theory as a model for portfolio selection, since it considers diversification, building efficient portfolios or the efficient frontier of assets with more risk. In the same sense, Banda, González and Gómez (2003) refer to the diversification of assets as the strategy to maintain a balanced investment, reducing the risk due to changes in the prices of financial assets-volatility-. The Markowitz model considers the investment in different assets, in order to reduce the variations in profitability and consequently in risk, they also consider that for an efficient portfolio, it is necessary to distribute the risk of the different investment alternatives in the different financial assets that comprise it, trying to ensure returns.

This option of compensating the losses of some assets with the gains of others is known as diversification and is based on the fact that asset prices do not evolve identically (Grajales, 2009).

In relation to the portfolio theory of Markowitz (1952), (Mascareñas, 2018; Ruiz and Sardi, 2013) mention the following assumptions of this theory: 1) The performance of a financial asset or portfolio will be measured by the average return ( $\bar{x}$ ). 2) The risk of the financial assets of a portfolio is measured by the variance ( $\sigma^2$ ) or standard deviation ( $\sigma$ ). 3) The investor will select portfolios with higher profitability and lower risk. On the other hand, Mascareñas (2018) adds that this theory proposes the formation of efficient portfolios, through the search for higher returns at a minimum level of risk.

**Risk - Performance**

As mentioned above, the purpose of investment portfolios through the diversification of financial assets is to reduce risk, which is the probability of suffering damages or losses. Arias, Rave and Castaño (2006) refer that risk is associated with uncertainty, which is not eliminated, however it is possible to manage it, and it is important to design strategies to control and minimize it. On the other hand, they point out that the risk is classified as: 1) Systematic, which is a non-diversifiable risk, which is due to political, economic, fiscal and social factors that affect the global market of a country. This type of risk is beyond the control of the investor. It is the country risk and it is inevitable. 2) Not systematic, it is exclusive to a particular company, it does not depend on economic, political and other factors. It is company risk and it is diversifiable, that is, it can be avoided.

The risk of a security is considered between systematic and unsystematic risk. The market compensates the systematic risk, but not, the unsystematic one. By building a portfolio with several uncorrelated values, it will be eliminated or markedly reduced. The statistical measure used to measure risk in financial markets is the variance  $\sigma^2$  and the standard deviation  $\sigma$  (which is simply the square root of the variance) of the distribution of returns (Cruz, Restrepo and Medina, 2008).

On the other hand, they point out that a portfolio composed of several securities will offer an average return equal to the average of the returns of the assets that compose it. It is extremely important to weigh the average yield of each asset that makes up a portfolio with respect to the percentage of investment in it..

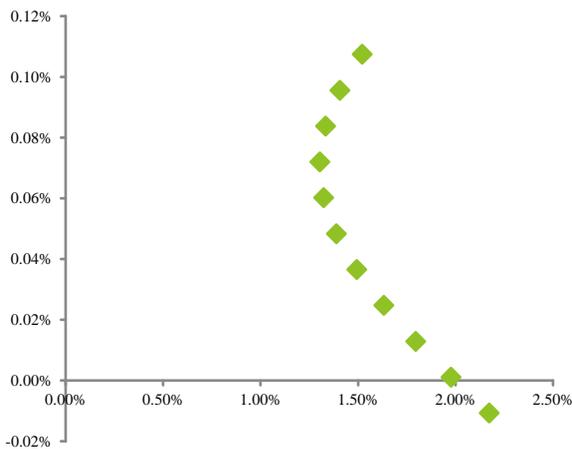
On the other hand, Gomero (2017) mentions that in the construction of equity investment portfolios, it is important to consider the correlation of financial assets in order to measure whether the risk is high to low. The correlation can be from -1 to 1. When the correlation is -1 there is greater risk coverage, because the risk is offset between the assets that make up the portfolio. On the other hand, when the correlation is positive, a greater risk is assumed, the closer it is to 1, the portfolio will have a greater exposure to risk. The perfect correlation is -1, because the risk is neutralized. In addition to the risk measured by the variance and standard deviation of a financial asset individually, in an investment portfolio the variance and standard deviation of the portfolio must be calculated, as well as the covariances and correlation, in table 1 each of these are explained statistical measures and their respective formula.

	Individual	Portfolio
Average performance ( $\bar{x}$ ) The return on the portfolio is the expected weighted sum of each share that makes up the portfolio.	$\bar{X} = (S(x_i)/n)$	$\bar{X}_p = W_i \bar{X}_i + W_j \bar{X}_j$
Variance ( $s^2$ ) The variance measures the risk in quadratic terms of the expected return of the portfolio.	$s^2 = \Sigma((x_i - \bar{x}_j)^2)/n$	$s_p^2 = W_i^2 s_i^2 + W_j^2 s_j^2 + 2 W_i W_j COV_{ij}$
Standard deviation $s$ The standard deviation is the square root of the variance and shows the risk of the portfolio.	$s = \sqrt{(S(x_i - \bar{x}_j)^2)/n}$	$s_p = \sqrt{W_i^2 s_i^2 + W_j^2 s_j^2 + 2 W_i W_j COV_{ij}}$
Covariance (COV) The covariance shows the degree to which the returns on financial assets move together. If the covariance is positive, it means that when one of the assets rises, the other also rises; If, on the contrary, the covariance is negative, it implies that when asset A increases, asset B decreases and vice versa. If the covariance is close to zero, it means that the two assets are independent.	$s^2 = (S(x_i - \bar{x}_j)^2)/n$	$COV_{ij} = \Sigma(x_i - \bar{x}_j)(x_j - \bar{x}_j)/n$
Correlation (CORR) Measures the degree of association between the returns of two assets.	$CORR_{ij} = COV_{ij} / s_i s_j$	
Beta		$b = COV_{im} / s_m^2$

**Table 1** Statistical formulas to calculate risk and return  
Source: *Self Made*

### Efficient frontier

When calculating the individual risk and return of each share, as well as of the portfolio, it is important to determine the efficient frontier, through combinations of different investment percentages for each of the assets that make up the portfolio, thus seeking to maximize the profit for a certain level of risk. When graphing the efficient frontier, the "X" axis represents the risk and "Y" the expected return respectively (Ortiz, Chirinos and Hurtado, 2010; Puerta, 2010).



**Graphic 1** Efficient frontier

Source: *Self Made*

Note: Each of the points of the Efficient Frontier Graphic represents the combination of risk - return at a given percentage share of resources.

### Empirical studies

Cruz, Restrepo and Medina (2008) carried out an investment portfolio made up of six shares of the Colombian market, for this purpose they applied the methodology of Markowitz (1952). The results were as follows: expected return of the portfolio 1.0948417%, with a risk of 1.4797984%, it is observed that the risk of the portfolio is greater than the return, despite the fact that the shares that make up the portfolio show a trend towards profitability. They recommend diversifying the investment in different actions, avoiding concentrating the investment in a single asset, reducing the risk, on the other hand they point out that the efficient frontier presents the most optimal combination of investments.

Gomero, Bazuda and Bazán (2017) mention that the volatility of variable income financial assets makes it necessary to use statistical measures to quantify risk and return for decision making. For this purpose, they applied a statistical model in order to develop high and low risk portfolios, they used historical information of different stocks of different stock indices, showing that through the use of statistical measures, such as: standard deviation and correlation, in addition to determine how stocks behave in the face of changes in the stock market, measured through the Beta of assets. The results of the portfolio were the following: standard deviation of asset .0032 and portfolio .0111 and correlation 1.51 and beta .76. With the application of the statistical model based on Markowitz, they demonstrated the structuring of portfolios with different levels of risk.

### 3. Methodology

The objective of this research is to analyze the return risk in a portfolio of two shares of companies listed on the Mexican Stock Exchange (BMV), presenting the case of the companies Grupo Bimbo, S.A.B de C.V., and GRUMA, S.A.B de C.V. and Subsidiaries, considering the periods 2018, 2017 and 2016.

### Description of the companies

Grupo Bimbo, S.A.B de C.V.

According to Grupo BIMBO SAB de CV, it is the largest Mexican bakery in the world, with 194 plants around the world, with a presence in North America, Latin America, Europe, Asia and Africa. Its main products are box bread, pastries, cookies, English muffins, bagels, salty snacks, confectionery, among others, with more than 100,000 brands and 133,000 employees.

The mission of the company is the following "Delicious and nutritious food in the hands of all", that is why it has more than 3,000,000 points of sale and more than 58,000 routes. The company's shares are listed on the Mexican Stock Exchange under the ticker symbol BIMBO and on the OTC market of the United States of America through ADR level 1 under the ticker BIMBO Y.

GRUMA, S.A.B. de C.V.

GRUMA, S.A.B. de C.V., is one of the largest producers of nixtamalized corn flour and tortillas in the world. Its brands are leaders in most of the markets where it has a presence, with participation in the United States of America, Mexico, Central America, Europe, Asia and Oceania. Series B shares are listed on the BMV trading under the ticker GRUMAB. The analysis period was for the years 2015, 2016, 2017 and 2018. For this purpose, the daily prices of the shares (1003 data) of the companies studied were downloaded from yahoo.finance.com, later the price variations were determined and the yields, with these data average yield, variance and standard deviation were calculated, in order to obtain the yield and individual risk of each action of the companies.

The formation of the investment portfolio was carried out based on the portfolio theory of Harry Markowitz (1952), calculating the return of the portfolio, variance and deviation of the portfolio, as well as covariance and correlation of the actions of GBIMBO (A1) and GRUMA ( A2) and with respect to the price index and quotations of the Mexican Stock Exchange (IPC). In addition, the risk and return were calculated, weighing a participation from 0% to 100% in each of the actions, thus obtaining the efficient frontier and selecting that percentage participation where the risk and return of the portfolio is optimized.

4. Results

Below are the results of individual return risk of the stocks that make up the portfolio and the portfolio itself, measured through expected return, standard deviation, covariance, correlation and beta.

A-1 A-2	BIMBO A GRUMA B		
Assigned proportion	0.5	0.5	
	A1	A2	Market
Expected return	0.008215%	0.048004%	0.000233%
Variance	0.000243	0.000234	0.000075
Standard deviation	0.015582	0.015288	0.008673
Covariance			
Correlation			
BETA	0.829972	0.524526	

Table 2 Individual performance risk of the BIMBO, GRUMA and IPC shares of the BMV

Source: Self Made

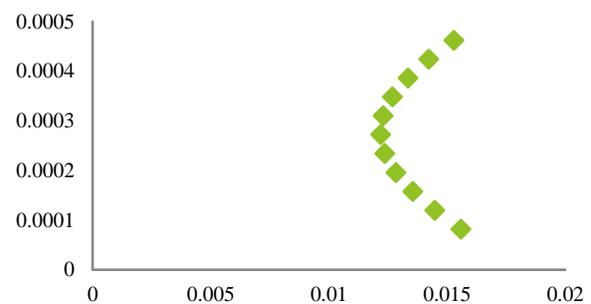
Table 2 shows the expected return, variance, standard deviation and Beta of the shares of Grupo BIMBO and GRUMA individually, as well as the market represented by the Index of Prices and Quotations (IPC) of the Mexican Stock Exchange , for the period 2015-2018. The expected performance for BIMBO; GRUMA and IPC is .008215%, .048004% and .000233% respectively, meanwhile the risk ( $\sigma$ ) is .015582, .015288 and .008673 for BIMBO, GRUMA and IPC. On the other hand the Beta ( $\beta$ ) that measures the behavior of a share's performance with respect to the market is .829972 and .524526 for BIMBO and GRUMA shares respectively, observing that the performance of BIMBO shares is closer to the Stock Market index than GRUMA.

A-1 A-2	BIMBO A GRUMA B		
Assigned proportion	0.5	0.5	
	(A1,A2)	IPC , A1	IPC, A2
Expected return	0.027256%		
Variance	0.000149		
Standard deviation	0.012186		
Covariance	0.000059	.000062	0.000039
Correlation	.246589	0.461944	0.297547

Table 3 Performance risk of the portfolio made up of the shares of BIMBO, GRUMA

Source: Self Made

Table 3 shows the risk and return of Grupo BIMBO and GRUMA's portfolio, generating an expected return of .027256% and a risk of .012186, the correlation of both is .246589, meaning that the returns of both stocks behave in the same direction. With respect to the IPC, the BIMBO share is more correlated with the IPC .4619 in relation to GRUMA .2975.



Graphic 1 Efficient risk and return frontier of Grupo BIMBO and GRUMA's share portfolio

Source: Self Made

In Graphic 1, the efficient frontier is shown, which is made up of the possible combination of the proportion invested in each of the shares that make up the portfolio.

The X axis is represented by risk and the Y axis by performance. The point where the risk-return ratio is optimized is the one corresponding to the investment of 50% in each of the shares of the companies, thus obtaining a return of .027256% and a risk of .0121862.

## 5. Conclusions

The objective of the construction of investment portfolios of financial assets, aims to optimize the risk and return relationship, that is, the point where risk is minimized and returns are maximized in a specific share of resources, using the portfolio theory of Markowitz (1952). For the purposes of this work, a portfolio of two shares was designed, GRUPO BIMBO and GRUMA, both companies are listed on the Mexican Stock Exchange, and belong to the industrial sector, specifically the food and beverage subsector, both companies being the most representative of that sector. During the period analyzed (2015-2018) the portfolio yield is .27256% and the risk is .0121862, with an investment of 50% in each one of them. Grupo BIMBO's share has a higher correlation with the IPC of the Mexican Stock Exchange with respect to GRUMA. It is important to base decision-making by considering the risk and return analysis of the financial assets where you want to invest, in addition to relying on other analyzes such as fundamental and technical analysis among others.

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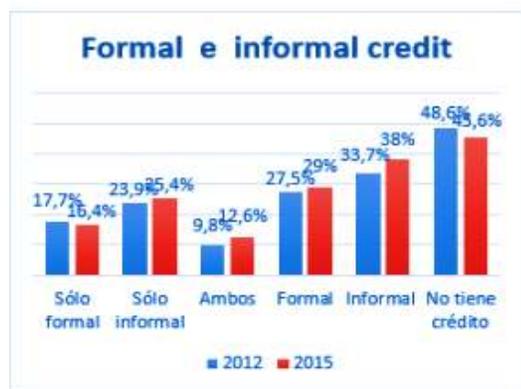
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