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Journal-Law and Economy

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Presentation of the content

In the first article we present, *Analysis of the process of measuring the biological asset through ias 41, in the sugar cane of the "Ayapamba parish"*, by HERRERA-FREIRE, Alex Humberto, ALVARADO-ARMIJOS, Anggie Anabel, ERRAIS-CAMPUZANO, Johnn Jairo and ZAVALA-SANMARTIN, Victoria Stephanie, in the next article we present, *Implementation of a ticket management system for a higher education institution*, by ZACARIAS-JIMENEZ, Jaime David, with adscription in Tecnológico de Estudios Superiores de Cuautitlán Izcalli, in the next article we present, *Policies and reforms to social benefits and their impact on health workers in Mexico*, by MORALES-BENÍTEZ Brenda Ivonne, MORALES-HERNÁNDEZ Ramiro and VILLALOBOS-AGUAYO, Patricia, with adscription in the Universidad Autónoma de Guerrero, in the last article we present, *Diagnosis of occupational safety and health in an automotive glass manufacturing company*, by RODRIGUEZ-HERNÁNDEZ, Nandy Nelly, with adscription in the Instituto Politécnico Nacional.

Content

Article **Journal-Law and Economy**
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Analysis of the process of measuring the biological asset through ias 41, in the sugar cane of the "Ayapamba parish"

Análisis del proceso de medición del activo biológico a través del ias 41, en la caña de azúcar de la "parroquia Ayapamba"

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Abstract

The study carried out whose topic is Analysis of the measurement process of biological assets through international standards in sugarcane in the Ayapamba parish, has allowed us to know that today companies try to be updated according to what is stipulated in the new standards. international, which have generated great impacts on theories, accounting systems and the regulatory framework of financial statements, so that the global process can be carried out and have an efficient organizational process. Taking as a reference the aforementioned, this study focuses on the agricultural sector since in this the processes for obtaining and extracting natural resources are fulfilled. That is why the research objective is to analyze the process of measuring biological assets through international standards in sugarcane,

Biological assets, NIC, Accounting, Agriculture

Resumen

El estudio realizado cuyo tema es Análisis del proceso de medición de los activos biológicos a través de las normas internacionales en la caña de azúcar en la parroquia Ayapamba, nos ha permitido conocer que hoy en día las empresas tratan de actualizarse de acuerdo a lo estipulado en las nuevas normas internacionales, las cuales han generado grandes impactos en las teorías, sistemas contables y el marco normativo de los estados financieros, para que el proceso global se pueda llevar a cabo y tener un proceso organizacional eficiente. Tomando como referencia lo anterior, este estudio se centra en el sector agropecuario ya que en este se cumplen los procesos de obtención y extracción de los recursos naturales. Es por ello que el objetivo de la investigación es analizar el proceso de medición de los activos biológicos a través de normas internacionales en la caña de azúcar,

Activos biológicos, NIC, Contabilidad, Agricultura

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Introduction

Agriculture throughout the life of the human being has taken on greater importance in what corresponds to the world economy, because this activity presents different procedures that occur on earth, which is the place where the raw material is produced, Being able to mention vegetables as an example and thus meet the needs of the human being and contribute to the economy of a country.

That is why, taking into account the aforementioned, the way to measure accounting assets is sought, for which the measurement of biological assets is given, which according to International Standards in relation to IAS 41, where it is proceeded to explain the regulations, procedures and requirements for the asset to belong to this group.

For these reasons, the research work is carried out for an adequate analysis where the measurement of biological assets is deepened through accounting procedures and in this way the incidence that occurs in the presentation of financial statements can be determined. of companies.

It should be noted that agricultural activity is of importance in the Ecuadorian economy, since it has a participation in the GDP with a considerable contribution, for which the development and role that is presented in the country must be analyzed, therefore they must be taken into account to have a good development of said work, the regulations and the development of the work must be applied by globalization, as well as be subject to continuous changes in the different processes, which will allow a better functioning of this activity.

It should be taken into account that agriculture apart from participating in the economy of a country due to production processes, it has also influenced the issue of poverty reduction, guarantees food in the world since it has the capacity perform various functions for economic development.

For these reasons, agriculture is related to the transformation processes to obtain a final product or in other cases to complement them.

Due to these transformations that occur in this activity and due to the contributions that have been made in the world, standards have been implemented to improve accounting processes, in this case biological assets, in the international accounting standards IAS 41, where the analysis can be carried out on the measurement, processes, characteristics and requirements that have to be fulfilled. For all this we proceed to develop the following article, which is structured as follows

Explanation of the sections of the article, it begins with the development, where the main topics of this study are explained, an analysis of the accounting accounts for the measurement of biological assets continues, the applied methodology is continued, the results study and finally the conclusions.

Developing

The Agriculture

Agriculture is the fundamental pillar for the development and coexistence of the human being as it is essential and at the same time complex, it promotes the use of land for agricultural production and the implementation of natural fertilizers in productive development since it helps to supply the needs food of a certain population, being one of the most important tasks that farmers work hard to offer a quality product, to enter a circle of approval related to investors that these are reflected in the financial statements; with prior application of the legal and current accounting bases(Eras Agila & Lalangui Balcáza, 2022).

Agriculture in Latin America

"The pandemic crisis leads us to rethink the future of Latin America," said the World Bank's Vice President for Latin America and the Caribbean, Carlos Felipe Jaramillo. “We need an agricultural sector that can meet the growing food needs of the region and the world at large, while avoiding further damage to the environment. With better policies and new technologies, the region's agri-food systems can make a greater contribution to growth, poverty reduction, and food and nutrition security."

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Agriculture is important to many of the regional economies, accounting for between 5 and 18 percent of GDP in 20 Latin American and Caribbean countries, and an even higher share when considering the broader contribution of all food systems. However, despite a history of success, agriculture in the region is underperforming. Its remarkable achievements, reflected in growing production and higher net exports, came at the cost of significant environmental and health damage. It is particularly important to protect the region's environmental wealth and pay attention to food quality and safety, as well as nutritional security. "Latin America and the Caribbean is the breadbasket and lungs of the world," said Michael Morris, Senior Agriculture Economist at the World Bank and head of the team that wrote the report. "But the challenge is ensuring that he continues to play these roles. Policymakers need to focus on reducing market inefficiencies, building human and institutional capacities, being prepared for catastrophic risks, and taking advantage of emerging opportunities, while contemplating transformative reforms, such as making agrifood systems carbon neutral."

The report outlines twenty proposals that could help unlock the vast potential of agriculture and food systems in the region. Some of these proposals deserve priority attention since their success is assured. Examples of "no regrets" proposals include measures that aim to modernize agrologistics infrastructure (including information and communication technology), improve the training of workers in agricultural and food systems, make agricultural and food systems climate-friendly smart and deepen rural financial markets. Other key proposals are also mentioned to mitigate risks and build resilience in the face of multiple threats ranging from climate change, population pressures, the future of these systems is too important to be left to chance.(Washington, 2020).

In order to have an appreciation of the importance that should be given to the agricultural sector, some Latin American countries that use the land for their agricultural activities are indicated below.

Country	Hectares	Use	Activity
Colombia	50,102,269	39,017,179	livestock
		5,175,846	Agroindustrial
		4,617,116	agricultural
		1,292,128	Other uses
Mexico	24.6 million hectares	21.6 million	They are cultivated
		10.9 million	Cattle raising
		125 thousand ha.	aquaculture
Peru	38.7 million hectares	7´125.007	planted area
		1´983.593	transitory crops
		1,191,000	permanent crops
		778,007	cultivated pastures
Brazil	264 million	62 million	for planting
		30 million	pasture pasture
Ecuador	5.2 million	1.4 million	permanent crops
		822.5 thousand	transitory crops
		2.1 million	cultivated pastures

Table 1 Land use of countries
Source: (Eras Agila & Lalangui Balcáza, 2022)

Agriculture in Ecuador

According to Boza et al.,(2021)26.8% is where there is the highest concentration of employment by the economically active population of Ecuador. There are three aspects that make agriculture a fundamental pillar in the Ecuadorian economy. First, it represents an average of 9% of the country's total GDP.

1. Source of greatest income in the country, followed by trade and oil and mines.

2. the basis of the food sovereignty policy where the State guarantees people self-sufficiency in food permanently.

3. It contributes with a trade surplus to the country's trade balance, and a main source of income for dollars and foreign currency from exports.

The quarterly GDP of this sector registered a variable behavior during the analyzed series and better than the economy as a whole; however, for June 2021 it presented a decrease of 0.7% while the total GDP grew by 2.1% Boza et al., (2021).

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Main crops of Ecuador

In 2018, the country's agricultural work surface reached 5.3 million hectares (ha), with a production of sugarcane (for sugar), bananas, African palm, rice, potatoes and dry hard corn, which exceeds crops of other products(Escalante and others, 2021)

Sugar cane (for sugar), bananas and African palm, along with other permanent crops, recorded a planted area of 1,464,589 ha. Total sugarcane production in metric tons ™ was 7,502,251; Guayas concentrated 87.1% of that production. Los Ríos stood out with 38% of banana crops (a total of 6,505,635 mt); and, in Esmeraldas, the African palm prevailed with 42.7% (2,785,756 mt).

Meanwhile, rice, potatoes and hard corn, transitory crops with a harvest cycle of less than one year, along with others of this type, accounted for 941,280 ha planted.

Rice, one of the products that accompany various dishes of the Ecuadorian diet, had the largest harvest in this category: 1,350,093 mt. While the planted area throughout the country was 301,853 ha, concentrating 72.7% of the production in Guayas.

This information is derived from the latest Surface and Continuous Agricultural Production Survey (ESPAC), in which flower production is reported; roses had the highest production: 3,199 million stems cut in the country.

Regarding the livestock sector, bovine cattle predominated with a total of 4.1 million head, followed by pigs with 1.3 million; sheep, 356 thousand; horse, 193 thousand; mule, 74 thousand; donkey, 47 thousand; and, finally, the goat with 22 thousand.

48.4% of the cattle were registered in the Sierra, while 42.4%, in the Coast. By race, the mestizo prevailed with 1.5 million heads, which represented 37.7%; followed by Creole, with 23.8%.

Regarding the weekly production of chicken eggs, Tungurahua led with 20.7 million units. By region, the Sierra concentrated 85% of the production, the Coast 19% and the Amazon 0.9%. 0.001% corresponds to undefined areas.

Other important data in this survey relate to milk production; a total of 5 million liters are produced daily in the country. Pichincha registered 15.7% of the national total, equivalent to 790,666 liters(Ecuador in figures, 2018).

Short cycles	Long cycles	Foriculture
Rice	Banana	Pink
Corn	Banana	Hypericum
Dad	Sugar cane	Gypsophila
Bean	Cocoa	Carnations
Soy	African palm	Lilies
Gooseberry	Pineapple	Chrysanthemums
Chili pepper	Mango	Chrysanthemums
Rocoto	Blackberry	Aster
Mortiño	Passion fruit	Orchids
Mellocos	Lemon	Alstroemeria
Aromatic plants	Tangerine	Gerberas
Corn	Tangerine	Summer flowers
Parsley	Apple	
Asparagus	Turmeric	
Onion	Avocado	
Ginger	Coffee	

Table 2 Crops from Ecuador
Source: (Ecuador in figures, 2021)

Sugar cane and its process

Sugarcane is characterized by its good capacity to adapt to diversity of soils, climates, topography, fertility and production systems, as well as its great production capacity of green matter (more than 100 t ha year-1) and dry per unit area(Lagos Burbano & Castro Rincón, 2019)

The process to obtain sugar consists of nine steps:

1. Cane cutting.
2. Grinding.
3. Steam generation.
4. Heating.
5. Clarification.
6. Filtration.
7. Evaporation.
8. Drying.
9. Molded.

Figure 1 Sugarcane process, see annex**.**

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In the maturity stage, it is made up of approximately 71.82% moltable stems, 12.58% buds, 8.7% leaves and 6.9% chulquines, which may vary depending on the variety, age and environmental conditions. All this vegetative material is used by cattle, without the risk of losing its nutritional characteristics when it matures, therefore, it constitutes a highly available forage.

According to (International Accounting Standards 41, 2016) has as:

Aim

The objective of this Standard is to prescribe the accounting treatment, financial statement presentation and disclosures in relation to agricultural activity.

Scope

This Standard must be applied for the accounting of the following, whenever it is related to agricultural activity:

a) Biological assets, except bearer plants.

b) Agricultural products at the point of harvest or collection.

c) Government grants covered by paragraphs 34 and 35.

This Standard is not applicable to:

a) Land related to agricultural activity.

b) Bearer plants related to agricultural activity (see ias 16). However, this standard will apply to the products of those producing plants.

c) Government grants related to bearer plants (see ias 20 accounting for government grants and disclosure of government aid).

d) Intangible assets related to agricultural activity (see ias 38 intangible assets).

e) Right-of-use assets that arise from a lease of land related to agricultural activities (see ifrs 16 leases).

This Standard applies to agricultural products, which are the products obtained from the entity's biological assets, but only to the point of harvest or collection. From then on, IAS 2 Inventories or the other Standards related to products are used.

Biological active IAS 41	Agricultural product IAS 41	Result IAS 2
Sheep	Wool	Wool yarn
Trees of a forest plantation	Trees felled	Logs, wood
Dairy cattle	Milk	Cheese
Pigs	Slaughtered beef sausages	Cured hams
Cotton plants, dresses	Harvested cotton	Cotton thread
Sugar cane	Cane cut	Sugar
Tobacco plants	Collected leaves	Cured tobacco
Tea bushes	Collected leaves	Tea
Vineyards	Harvested grapes	Wine
Fruit trees	Harvested fruit	Processed fruit
Oil palms	Harvested fruit	Palm oil
Rubber trees	Collected latex	Rubber products

Table 3 Biological assets according to IAS 41
Source: International Accounting Standard IAS-41

Recognition and measurement

The entity shall recognize a biological asset or an agricultural product when, and only when:

(a) The entity controls the asset as a result of past events.

(b) It is probable that future economic benefits associated with the asset will flow to the entity.

(c) The fair value or cost of the asset can be measured reliably.

Earnings and loses

Gains or losses arising on the initial recognition of a biological asset at fair value less costs to sell and from a change in fair value less costs to sell of a biological asset should be included in net profit or loss for the period in that appear.

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Impossibility of measuring fair value reliably

Presumes that the fair value of a biological asset can be measured reliably. However, that presumption can be rebutted, only at initial recognition, in the case of biological assets for which quoted market prices are not available, and for which alternative measurements have clearly been determined to be unreliable. of fair value.

Government grants

An unconditional government grant, related to a biological asset that is measured at its fair value less costs to sell, will be recognized in profit or loss when, and only when, such a grant becomes receivable.

Information to disclose

The entity shall disclose the total gain or loss arising during the current period from the initial recognition of biological assets and agricultural products, as well as from changes in fair value less costs to sell of biological assets.

IAS 41. Amendment 2016

Previously, it was specified as the accounting regulations that manage the agricultural, livestock, and shrimp sectors from planting to marketing. Therefore, until December 31, 2015, the companies that apply IAS 41 were subjected to the new adjustments as of January 1, 2016, where it is reflected in a general way for all the activities mentioned in IAS 41, therefore, it is You must take into account that there is a diversity of agricultural crops, as well as their cycle that can be short or less than one year and permanent cycle or more than one year, with the aforementioned reflecting the uncertainty and discernment when making the records of the operations , that is, the carrier plants will be considered as property, plant and equipment under IAS 16, due to the fact that their operation is similar to that of manufacturing. However,(Eras Agila and others, 2018).

Plants that produce fruits more than one period	Productive life	Estimated first harvest
Banana	20 years	7 months
Cocoa	40 years	4 years
Coffee	60 years	3 to 4 years
Oil palm	25 years	3 years

Table 4 Examples of producing plants that will be given the treatment of IAS 16
Source: Eras Agila et al., 2018

Biological assets	Farm products	Products resulting from the process after harvest
tobacco plants	collected leaves	cured tobacco
trees of a forest plantation	Trees felled	logs, wood
Fruit trees	harvested fruit	processed fruit
Sugar cane	cane cut	Sugar

Table 5 Examples of biological assets, agricultural products and harvest products
Source: IAS 41 (2019)

Differences (IAS 41 2015 and 2016)

Consequently, the differences by the amendment to IAS 41 in agricultural activity are clearly observed, such as the following:

Scope IAS 41 until December 31, 2015	Amendment to the scope of IAS 41 applicable as of January 1, 2016
Biological assets	Biological assets, but producing plants are no longer considered.
It does not apply to intangible assets related to agricultural activity.	Producer plants related to agricultural activity will be considered under IAS 16; however, IAS 41 will be applied to the products of the producing plants.
It applies to agricultural products, which are products obtained from the company's biological assets, but only up to the point of harvesting or harvesting. When the fruit is separated from the plant, then IAS 2, Stocks, will apply.	Official subsidies related to production plants. Accounting for official subsidies and information to be disclosed about public aid.

Table 6 Differences from IAS 41 between 2015 and 2016
Source: IAS 41, 2004; Amendment to IAS 41, 2014; Eras Agila et al., 2018

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Measurement and fair value of the biological asset

A biological asset will be measured, both at the time of its initial recognition and at the end of the period on which it is reported, at its fair value less costs to sell, as well as, the harvested products will be measured at their fair value less costs of sale at the collection point(Jaramillo and others, 2020).

According to Chávez Cruz et al.,(2022)The measurement of biological assets at fair value excludes qualitative and quantitative conditions of an active market, therefore, when an active market is absent, an expert's opinion is taken to estimate its measurement and this can become subjective.

Due to the aforementioned, organizations in some cases do not apply the fair value method, for the reason that it is difficult for them to obtain a referential value in the market and opt for a measurement at cost.(Carrión Rodríguez and others, 2021).

IAS 41 until December 31, 2015	IAS 41 modified by the amendment and applicable from January 1, 2016
The biological asset will be measured at fair value less cost to sell, from the initial recognition as on the date of each balance sheet. The development of the plantation and the development of its fruits are considered in a single account.	Producer plants through their development to when they are ready for their first production are measured at accumulated cost.
Plantations that produce agricultural products are considered biological assets of an entity, which will be measured at their fair value less costs to sell at the point of harvest or collection. In this case, for the measurement, the development of the plantation and the development of the fruit are considered in a single account.	There are two models: 1) Cost model: consists of considering the cost minus accumulated depreciation, minus the value of the impairment and the changes recognized in results. 2) Revaluation model: It consists of the fair value of each evaluation date, less accumulated depreciation, less the value of impairment, recognized in results, in other comprehensive income, and in the equity account.
At the end of the year or before each harvest, the producing plant and the agricultural producing plant are measured together, considering them in a single account.	At the end of the fiscal year or balance sheet date, agricultural products that are biological assets are measured at sales costs, but separately from the producing plants, that is, in different accounts.
Harvest or gathering of the fruit.	The producing plant is separated and agricultural products are measured at fair value less costs to sell, after harvest IAS 2 is applied.

Table 7 Comparison of recognition and measurement of bearer plants and biological assets of IAS 41 between 2015 and 2016
Source: IASB, 2004; AISB, 2017; Eras Agila et al., 2018

Agricultural accounting

According to Espinoza et al.,(2016)It is a branch of specialized accounting and its accounting record is based within economic units of agricultural companies, therefore,|knowing its structure contributes to establishing tax payments and infrastructure planning for the activity it manages.
According to Lopez(2014)The agricultural accounting adopts two accounting methods that are:

- Simple entry method: It is based on the registration of simple income and expenses, with instructions for its development.
- Double entry method: It is recorded by debits and credits with the structure of a chart of accounts according to the activity carried out.

Therefore, through the results of the agricultural accounting information, it contributes to obtain the costs of agricultural products, that is, with agricultural costs, the accountant is able to account for the production processes and biological transformations in the activity that he performs. the company(Boy and others, 2020).
In addition, the acceptance in the market depends on the adaptability of the crop in a production and correct measurement of the cost of sales in its harvested products.(Caicedo Aldaz and others, 2020).

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Analysis of accounting accounts for measurement of biological assets

According to Elizalde(2019)**,**the accounting record consists of maintaining the chronological order of transactions in a systematic way, therefore, its information processing is extensive, for example, for its inventories there can be three classes: warehouse, existence and exploitation accounts.

Also, at the time of accounting, disbursements must be taken into account when the biological asset is under development and its fair value less estimated costs for its sale must be recognized.(Marrufo Garcia & Cano Morales, 2021).

Date	Accounts	Reference	Should	To have
02-02-20	Biological asset under development		X	
	Banks			X
	P/R Purchase of the biological asset.			

Table 8 Example of an initial recognition
Source: Own elaboration

Class	Assets
Group	Non-Current Assets
Control account Account detail	Biological active Growing crops
Description	Record and control all accumulated costs from the account of short-cycle crops from planting to the point of flowering.
Debits	Credits
Record planting costs Application of agricultural inputs, among other materials, before flowering. Labor used in these crops. Other costs that are necessary for the growth of crops.	Transfer to the account crops in production. Sale of the crop at that stage.

Table 9 Growing crops ledger account
Source: (Eras Agila & Lalangui Balcáza, 2022)

Date	Bill	Should	To have
	Growing crops	xx	
	Inv. Agricultural supplies		xx
	Production payroll		xx
	Banks		xx
	P/R Allocation of inputs, labor and other costs used in growing crops.		

Table 10 Accounting record growing crops
Source: (Eras Agila & Lalangui Balcáza, 2022)

Class	Assets
Group	Non-Current Assets
Control account Account detail	Biological active Crops in production
Description	Record and control all accrued costs from the growing crop account of these short cycle crops from their flowering point to harvest, remembering that it is less than a year. In turn, this accumulation is the cost, therefore, before selling, the final recognition and measurement must be made as stated in IAS 41.
Debits	Credits
Records the costs of the growing crops account. Application of agricultural inputs, among other materials, after flowering until harvest in these crops. Labor used in these crops. Other costs that are necessary for the production of crops, usually services.	Final recognition of this crop, application of IAS 41.

Table 11 Accounting account crops in production
Source: (Eras Agila & Lalangui Balcáza, 2022)

Date	Bill	Should	To have
	Crops in Production	xx	
	Growing crops		xx
	P/R Transfer of costs from the growing crop account to the growing crop.		

Table 12 Accounting record transfer crops
Source: (Eras Agila & Lalangui Balcáza, 2022)

Date	Bill	Should	To have
	Biological asset (fair value)	xx	
	Crops in production (accumulated cost)		xx
	Fair value measurement gain		xx
	P/R Recognition and measurement according to IAS 41.		

Table 13 Accounting record of recognition and measurement according to IAS 41
Source: (Eras Agila & Lalangui Balcáza, 2022)

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Methodology to develop

The methodology used in this paper is documentary or bibliographical and is part of quantitative research, since it contributes to the approach to the research problem thanks to the development of theoretical and historical foundations.

Pineda et al.,(2017)It allows us to glimpse that these methodologies allow discovering what has already been investigated so as not to duplicate the work already carried out by other authors and have their own authorship; witness the contributions, advances and trends developed in a characteristic area of knowledge; know working methods in similar fields; and obtain evidence and conclusions that contribute to ongoing investigations.

The identified sources of information correspond to articles from academic journals, institutional pages of universities, repositories and information centers, theses, conferences and books.

The process began with the search for information from scientific articles in the Utmach database. In the search engines of these data sources, logical connectors were used.

Results

Through the consulted investigations, it can be said that IAS 41 regulates the accounting record and the presentation of the financial statements of companies in the Agricultural sector, giving the guidelines for the valuation of biological assets.

Due to the factors that intervene in agricultural activity, such as climate, soil fertility, planting, growth, harvesting, fattening, which allows for changes in biological assets, they require special handling, different from other assets.

Biological changes are unpredictable due to external factors that are beyond the control of human intervention, therefore the standard allows reflecting the economic benefits not only due to changes in physical prices, but also due to the biological transformation of assets.

The products that are sown, grow, develop and end up in a harvest, that is, they are separated from the agricultural product of the Biological Asset from which it comes or when the vital products of the Biological Asset cease, such is the case that the tree must be cut to obtain the product. At the time of harvest, the company's management must determine the fair value less costs of sales of the biological asset.

Annexes

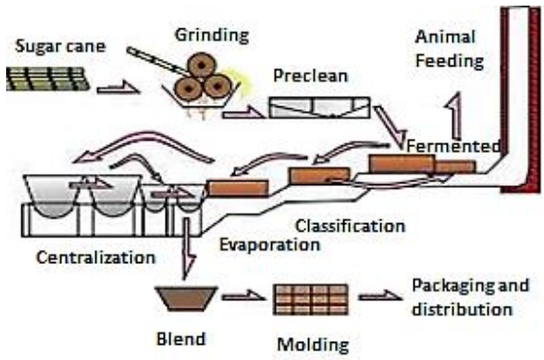

Figure 1 Sugarcane process

Conclusions

It is concluded that implementing IAS 41 in agriculture turns out to have a considerable advance in companies that are dedicated to the production of sugar cane, since thanks to international information standards it allows companies to have an adequate management of the accounting processes, as well as in the presentation of the information, in this way, it will be possible to show the financial reality through which they are going through.

It was evidenced that IAS 41 come to cover the entire issues related to the measurement of biological assets.

While the International Accounting Standard is considered as a tool to measure the organization of information to generate confidence when delivering financial statements and proceed to evaluate the amount of expenses that have been incurred by the company, in this way it is will proceed to make decisions on the valuation of these.

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Biological assets can only be measured at their fair value less cost, allowing entities to choose the measurement that suits them for their financial statements, which is standardized for all sectors, as long as they present fair market values, if applicable. Otherwise, the cost will have to be measured less depreciation and will have to be accounted for under IAS 41 until the sugarcane harvest is reached.

IAS 41 cause a great impact on the structure of the financial statements because they have an independent item of biological assets, where non-current assets are individually accounted for since the products of the agricultural sector must have a specific term. to generate future profit.

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Implementation of a ticket management system for a higher education institution

Implementación de un sistema gestor de tickets para una institución de educación superior

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Abstract

This article intends to implement a ticket management system for a higher education institution and describe its importance today, describe the pillars on which its functionality is based, identify which is the model view controller structure so that the system is not robust, for Finally, analyze the system as a help desk for good communication between user and super user. This help desk system is a technological management process, which is based on a set of technical and human resources that allows supporting different levels of computer users of an entity, adapting to the needs of an institution. The result obtained is that of a help desk system that provides a point of support and communication between the super user of information technologies and the end users to whom the attention is provided. By making use of this tool, daily decision-making intervenes that helps to resolve technological incidents, and thereby prevents the processes of the different areas of the institution from being affected for a long time.

Management system, Help desk, Automation

Resumen

Este articulo pretende implementar un sistema gestor de tickets para una institución de educación superior y describir su importancia en la actualidad, describir los pilares en que se sustenta su funcionalidad, identificar cual es la estructura modelo vista controlador para que el sistema no sea robusto, por último, analizar el sistema como mesa de ayuda para una buena la comunicación entre usuario y super usuario. Este sistema de mesa de ayuda es un proceso de gestión tecnológico, el cual se basa en un conjunto de recursos técnicos y humanos que permite dar soporte a diferentes niveles de usuarios informáticos de una entidad, adaptándose a las necesidades de una institución. El resultado obtenido es el de un sistema de mesa de ayuda que provee un punto de apoyo y comunicación entre el super usuario de tecnologías de la información y los usuarios finales a los que se les brinda la atención. Al hacer uso de esta herramienta interviene el tomar decisiones diarias que ayudan a resolver las incidencias tecnológicas, y con ello evitar que los procesos de las diferentes áreas de la institución se vean afectadas por tiempo prolongado.

Sistema gestor, Mesa de ayuda, Automatización

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Introduction

In this research article you will be able to observe the operation and result of a system capable of managing and organising the requests for telematic services from the different areas of the Tecnológico de Estudios Superiores de Cuautitlán Izcalli by means of a service request ticket generator which has the purpose of operating as a tool for the improvement of the requests made and the follow-up of the same, with the aim of not leaving any request unattended and being able to generate a follow-up report, control and statistical analysis of the main problems that the institution has related to computer systems and information technologies.

State of the art

Starting point (Background)

Over time, web technologies have evolved to the point of having new technology for institutional solutions. Java is currently used for mobile devices.

In 2015 Roberts created a help desk management system with a ticketing objective that helps internal customers. This management system provides solutions to problems through reports that allow us to determine recurring and repetitive events.

In Santa Cruz Atahualpa Robinson Rubén Caqui Tapia, Cesar Martin Polín Montalvo, Michael developed a similar web-based help desk system that saves time and resources for the company.

The Help Desk software or Help Desk system provides a point of support and contact between the IT provider and the end users. In 2016, a mixed research was conducted through a questionnaire survey technique applied to 68 users and the results indicate that, in general, the users of the Help Desk system at CUSUR were satisfied with the service received (Santa Cruz Atahualpa, Caqui Tapia, & Polin Montalvo, 2015).

Current development of the ticketing system

In the institutions problems of misinformation arise in terms of documentation, solution times etc... Faced with this problem in 2018 was raised as collusion a web system for incident management based on the ITIL framework a health company that system handles four modules of registration of requests, requests detail module, module Bank module errors and Dashboard module, in order to provide a solution to the problems already mentioned. (Olivares Villena & Rojas Chilet, 2018)

Trend of ticketing systems

Derived from the health emergency that the world is experiencing, technologies have played an important role in solving problems, in the educational service a Virtual Admission system was implemented at the National Autonomous University of Tayacaja, in order to ensure the continuity of the educational service at the higher level. It was one of the first universities in the country to guarantee the processes; it is a process of continuous improvement. The Help Desk, which provides a point of support and contact between the IT provider and the end users (Chávez Cotera, 2021).

Implementation

In the Tecnológico de Estudios Superiores de Cuautitlán Izcalli, the implementation of a Help Desk is envisioned as in the previous cases, as it is a necessity for continuous improvement with ticket-based reporting modules for good communication between the user and the institution. With the help of new technologies, the implementation of a system that provides a point of support and communication between the IT super user and the end users to whom it provides care is carried out. It helps with daily decisions in order to solve technological incidences.

Methodology to be developed

System design

A Web interface is a graphic system that allows users to access the contents of the Web through the use of graphic elements, which are known by most of the users that access our page. The main objective in the design of a Web interface is that its potential users can access all its contents as quickly and easily as possible.

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Define how the content is presented

In practically all web pages there are elements that are common. Some examples are: the header, the navigation menu, the body or the footer. Knowing the name of each part of a website is essential as it is part of the vocabulary used by developers and designers. The following figure shows the general structure of a web site.

Figure 1 Structure of the system

Platform and interaction mechanisms

XAMPP is a platform-independent, free software server, consisting mainly of the MySQL database, the Apache web server and the interpreters for scripting languages: PHP and Perl.

It allows you to easily install Apache on your own computer, regardless of your operating system (Linux, Windows, MAC or Solaris). And best of all, it's free to use!

XAMPP is a development tool that allows you to test your work (web pages or programming, for example) on your own computer without having to access the internet.

I recommend working directly on the server, if you have a very good internet connection, this may not be your case, or you may be working from somewhere else and it will be very useful.

Modelling (use case diagrams, class diagrams, activity diagrams and ER diagrams).

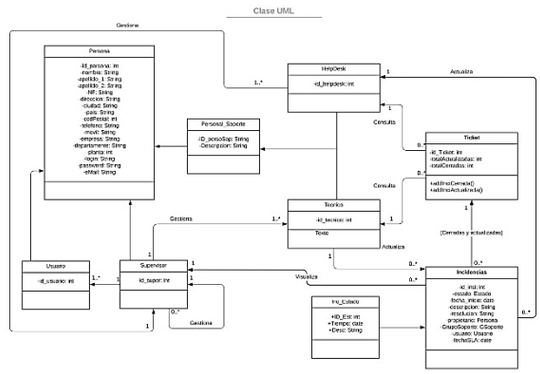

Figure 2 UML diagram

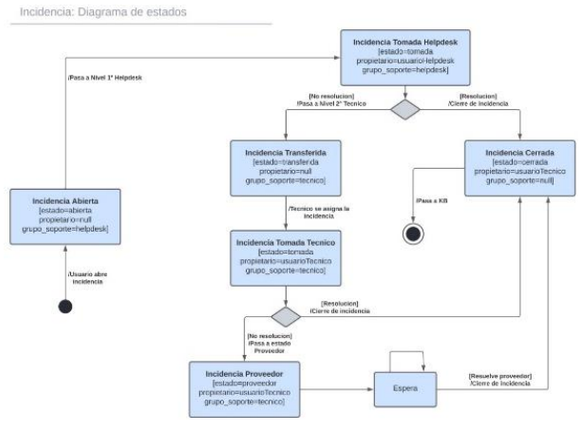

Figure 3 State diagram

Software layout

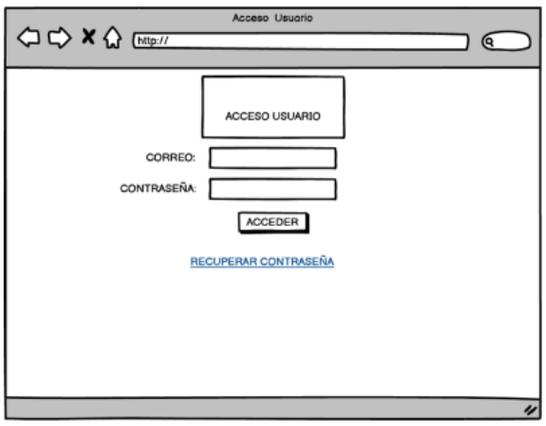

Figure 4 User access

Home user

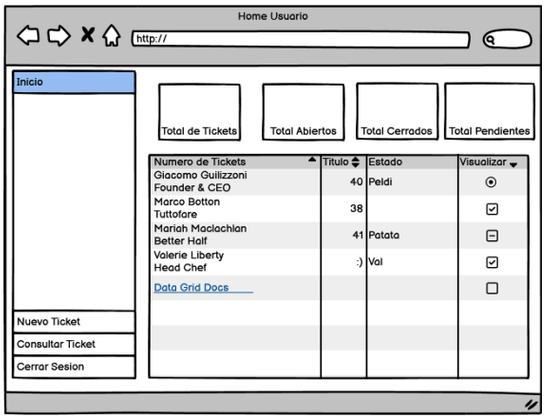

Figure 5 User Home

Illustration 2 User Home Access

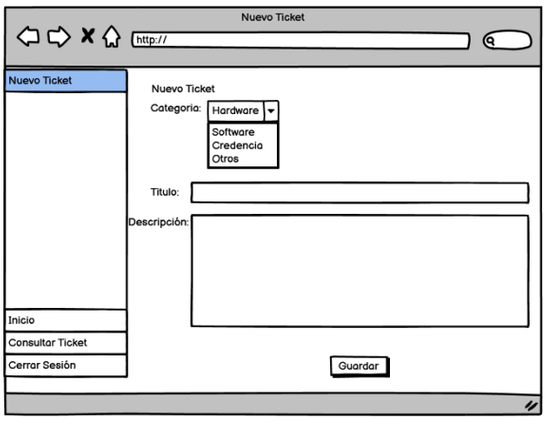

Figure 6 New ticket

Results

User login.

Figure 7 Home

A login is created so that the administrative staff within the institution can enter the system and interact with the different functions that the interface allows them to perform, as well as send their requests so that they can have their computer equipment serviced or repaired.

User registration.

Figure 8 User registration

A form is created to register in case the user is new with all his information, as well as specific data such as his employee number to validate that he is a member of the institution and to provide him with an excellent service.

Ticket registration.

Figure 9 Ticket registration

Requested tickets.

Figure 10 Requested ticket

User Editor.

Figure 11 User details

There is a function to edit users if they have entered their information incorrectly when registering. Super user view where you can find the records of the requested tickets.

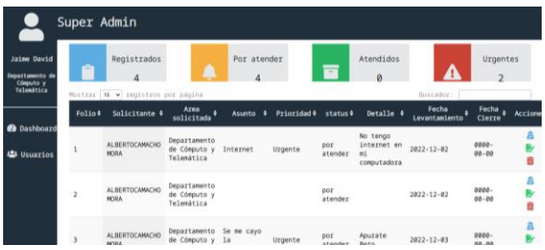

Figure 12 Super admin window

Super user view where the information panel is located.

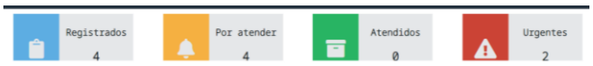

Figure 13 Information panel

The tickets by the super admin can be deleted, edited and viewed, these buttons are located in the column named Actions which is the last box with its purpose is to modify the various tasks if there was an error in the capture of information and can change their priority status.

Conclusions

The interface is not something identical in every institution where some incident request management system is managed, but with some essential features for every type of organisation, the advantage of having the development is that it can be adapted to your needs to other needs, with its own parameters, processes and indicators, it can be configurable to meet the particular requirements in some other technology.

The help desk is an essential service for institutions to carry out technical support operations. Its objective is to resolve requests, problems or complaints immediately, as well as to refer more complex incidents to specialised levels of support.

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Policies and reforms to social benefits and their impact on health workers in Mexico

Políticas y reformas a las prestaciones sociales y su repercusión en trabajadores del sector salud en México

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Abstract

At present, the Mexican worker who is working in the private and / or public initiative formally, has social security which is a protection that is granted to "ensure access to medical assistance and guarantee income security in particular in case of old age, unemployment, illness, disability, work accidents, maternity or loss of breadwinner" (Organización Internacional del Trabajo, 2003), however, Mexican policies have been reforming the social security system, which has led to changes in the retirement regime in both the ISSSTE and the IMSS, so this work reviews and compares the implementation of these reforms for workers.

Regime, Implementation, Reforms, Policies, Reforming initiative

Resumen

En la actualidad el trabajador mexicano que se encuentra laborando en la iniciativa privada y/o pública formalmente, cuenta con seguridad social la cual, es una protección que se concede para “asegurar el acceso a la asistencia médica y garantizar la seguridad del ingreso en particular en caso de vejez, desempleo, enfermedad, invalidez, accidentes del trabajo, maternidad o pérdida del sostén de familia” (Organización Internacional del Trabajo, 2003) , sin embargo las políticas mexicanas han venido reformando el sistema de seguridad social lo que ha conllevado a cambios de regimen de jubilación tanto en el ISSSTE como en el IMSS por lo que en este trabajo únicamente aborda y hace una reseña de estos dos regímenes así como tambien un comparativo de la implementación de estas reformas para los trabajadores.

Régimen, Implementación, Reformas, Políticas, Iniciativas de reforma

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Introduction

Economic neoliberalism

Economic neoliberalism has its origins in the second half of the nineteenth century is based on liberalism, whose main precursor and representative is Adam Smith who firmly believed that each person with economic resource who seeks his own profit contributed to the good fortune of other individuals, with this thought Smith assured that the intervention of the State is not necessary to strengthen the economy of the country, since this was governed by an "invisible hand" where everything had a natural order in terms of the supply and demand of goods and products consumed and offered by individuals, so only the State should promote policies that protected each person in society from the oppression and injustice of another member, maintaining and sustaining public institutions and executing and strengthening infrastructure works (Méndez J. S., 1998).

However, in the capitalist crisis of 1929 known as the Great Depression it carries repercussions and consequences worldwide causing poverty to peasants, workers, professionals and capitalists but also the effects of the fall in prices in America affected industries around the world, in 1936 John Maynard Keynes makes a criticism of Smith's ideas where he argues that States must intervene through policies in order to obtain an economic model that allows levels of income and employment, since one of the primary causes of crises in a country is unemployment, causing the lack of demand for goods and therefore the non-hiring to generate new jobs, for which Government has to interfere in order to support and boost public spending.

On the other hand, the theorist Milton Friedman disapproves of Keynesian's theory (Keynesianism), indicating that governmental power should be limited and decentralized and should only serve as a mediator of the "rules of the game" (conditions and policies), between the capitalist and the people, in addition the author considered that poverty and inequality were part of the economic system.

For Friedman the market provides the individual with the autonomy to obtain the goods and services that are within his reach as long as it does not obstruct the right of others to do the same, however, this does not guarantee that everyone will have the same resources since some will be able to obtain more goods and / or services depending on purchasing power which leads to social inequalities and economic disparities of citizens. (Friedman 1966 Mencionado en Calvento. M. 2006, p 46)

However, he argued that there were precedents that the free market produces less inequality, greater wealth, poverty reduction and less marginalization, he conceived that capitalist territories such as the United States existed less inequality than in those Third World countries.
This current of thought that is opposed to the control of the government in the economy, is called neoliberalism and has been oriented to put in second place social needs such as poverty, marginalization and inequality and to give greater importance to private property and individual freedom; in the eighties Neoliberalism in Latin America is adopted as a form of government in the economic policies of the countries that integrate it.

Economic Policy in Mexico

Between 1940 and 1980, Mexico was characterized by different events that give rise to the current neoliberal economic policy, in principle during this period was determined by the great demand for foreign capital both by foreign direct investments and by external debt, adopting this policy in order to fill deficiencies and be able to obtain resources in order to develop, however, it only caused an external indebtedness going from a debt of 278 million dollars in the period of Manuel Ávila Camacho (1940-1946), to a debt of 125,000 million dollars in the period of Carlos Salinas de Gortari (1988 -1994). (Ortiz 1998).

As a result of the external debt, policies emanating from international banks and the United States through Letters of Intent or Broad Facility Agreements had to be adopted; that Mexico signed with the International Monetary Fund (IMF), where it is obliged to follow its interests, so the government is widely influenced in neoliberal economic policy.

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From the six-year term of Miguel de la Madrid Hurtado (1982 -1988), in Mexico this neoliberal current is more accentuated and continues in the six-year terms of Carlos Salinas de Gortari (1988 – 1994), Ernesto Zedillo (1994 – 2000), Vicente Fox (2000 – 2006), Felipe Calderón (2006 -2012), Peña Nieto (2012 – 2018) and Andrés López Obrador (2018 – currently), however, the model proposed by Friedman is consolidated in Mexico in the Governments of Salinas and Zedillo; Neoliberalist governments are characterized by few public works and unemployment.

This is how the financial crisis of Mexico of 1994 – 1995, caused greater unemployment and an informal economy going from having an unemployment rate of 3.7 in 1994 to 6.2 in 1995 (Inegi), which causes thesalaried population with formal employment during this neoliberal system imposed by the State, to be diminished affecting the quality of life conditions of the inhabitants, Because permanent employment has a direct relationship with Social Security, which not only includes health but also other types of social benefits such as pensions, work risks, maternity among others.

Social Security Background

Social security has its beginnings in the late nineteenth century in Germany during the period of Otto Von Bismark who took on the task of protecting workers by implementing medical insurance, work accidents and disability and old age insurance for what is known as the resources of these social programs for the benefit and to promote welfare in them.

President Roosevelt in 1935 approved the Social Security Act in which it establishes that for there to be security in the worker must have social benefits that help improve conditions for any eventuality regarding health, therefore the economic monetary security of employees must have social security, later in 1941 in the Atlantic Charter is committed to improving working conditions, but the United Kingdom also undertakes to do the same with Winston Churchill who was the Prime Minister in order to have greater justice and social equity.

The United Kingdom publishes the Beveridge Plan in 1942, initiating the birth of the first unified social security system, for its part France is also concerned about the security of its citizens and begins the strategies and efforts to respond to the needs that were demanded, this is how Pierre Laroque through the necessary steps achieves that a national social security system is constituted in the year of 1946.

With regard to Latin America, the first data are available in 1920, where a group of countries made up of Chile, Uruguay, Argentina, Cuba and Brazil that were the ones that had a greater development, implement the social security system but in a gradual and fragmented way and in the forties social security occurs in countries that are influenced by the trends emanating from the International Organization of the Labour (ILO) and the Beveridge report, as was the case in Mexico. (ECLAC 1985).

However, Mexico had already been fighting for better living conditions and well-being and this is reflected in the struggles and social movements undertaken since the Porfiriato 1877 – 1910 and the social and peasant movements that give rise to the Mexican Revolution 1910 -1917, where their demands of the workers were implicit in Article 123 of the Constitution, and we find social security in section XXIX.

But nevertheless, it is during the period of Manuel Ávila Camacho, whereby means of the decree issued on January 19 of 1944 the Mexican Institute of Social Security (IMSS) is created, thus consolidating social security in Mexico, after the creation of this organism gives guidelines for the creation of institutions such as ISSSTE and INFONAVIT to safeguard workers in health benefits for those who are from the public sector and housing.

Thus, at the beginning of the eighties all Latin American countries had only three social security programs (occupational risks, sickness and maternity and old age, disability and survivorship), while family allowance programs only existed in seven countries of the American continent (Brazil, Costa Rica, Argentina, Bolivia, Uruguay, Colombia and Chile); the same happens with the unemployment subsidy that until that year only had it in Argentina, Brazil, Chile, Ecuador and Uruguay (Cepal 1985).

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Programmes	Number of Countries with Social Security Programmes 1922	1932	1942	1952	1962	1972	1982
Occupational risks	10	15	17	20	20	20	20
Sickness and maternity	0	1	7	13	17	18	20
Old age, disability and survivor	0	2	7	12	14	19	20
Family allowances	0	0	0	1	5	6	7
Unemployment	0	0	0	1	3	4	5

Table 1. Evolution of Social Security Programs in Latin America 1922-1982
Source: Consulted and extracted from studies and reports CEPAL 1985 pp. 269

As can be seen in Table 1, Social Security programmes have been gradually adopted in Latin America, where occupational risks are the first to be adopted by all in 1952, but about sickness and maternity and the old-age, disability and supervening programme it was until 1982 when all countries had these benefits. otherwise, it happens with the programs of Unemployment and Family Allowances that still at the beginning of 1982 only 5 and 7 countries had the respectively.

Access to Social Security in Mexico

Social security are elements outlined to the well-being of people for the protection of medical assistance and help to the family, not abandoning the individual when certain circumstances occur such as accidents, illnesses, pregnancies and old age, the deprivation of this, violates the protection of citizens and affects the economic capacity of the person reaching a lack of their standard of living.

According to the International Labour Organization (ILO), it indicates that only 20% of the world's population has decent and adequate coverage in terms of social security, while more than 50% of the inhabitants do not have any social security protection, concentrating largely on informal economies, which constitutes the most important source of employment for women than for women. men.

In Mexico there are different agencies that protect social security within which is the Institute of Social Security Services of State Workers (ISSSTE), Army or Navy, Pemex and the Mexican Institute of Social Security (IMSS); However, for this study only two organizations will be deepened, which are the ISSTE and the IMSS.

1. Mexican Social Security Institute

According to the Social Security Law enacted in 1943 gives rise to the Mexican Institute of Social Security (IMSS), this body is the one that grants health and social security to formal workers of private sector companies, within which they provide care in: accidents at work and occupational and non-professional diseases, maternity, disability, old age and death, as well as involuntary unemployment in old age, which were covered by contributions made between the employer or owner, the worker and the Government.

In 1955, the IMSS extended the protection of persons working in credit institutions and auxiliary insurance and bonding agencies of the Mexican Republic; in 1974, when Constitutional Article 123 was amended, coverage was granted to employees, peasants, non-salaried workers, as well as to other social sectors and their first-level families to provide Mexicans with a basic and essential as is health. In the seventies the recognition of groups that were considered marginalized such as peasants, workers, indigenous people and people in poverty who were not sheltered by the State was sighted, for which in January 1977 the General Coordination of the National Plan for Depressed Areas and Marginalized Groups (COPLAMAR) was created. whose one of the objectives was precisely to promote the allocation of resources to the social classes with greater poverty and need in matters of food, health, education, and housing. (Cordera y Lomelí, 2005: 13)

The social security benefit was designed so that the economically active population (EAP), paid with its production of work, the benefits of disability, old age and death, contributing to the constitution of a social capital, where these contributions the government would be responsible for administering them and seek the appropriate mechanisms in order to ensure that the value of the saved did not lose its purchasing power and increased gradually, However, the government used these resources for current expenditure, which caused the weakening of the pension fund and resulted in a restructuring of the systems by implementing the mechanism of individual accounts.

2. Institute of Security and Services of State Workers

The ISSSTE was created until 1959 when the Law of the Institute of Security and Services of State Workers (ISSSTE) was promulgated, the benefits covered by the ISSSTE at first were that of the social programs maternity, retirement, accidents and occupational and non-professional diseases, disability, old age and death; later it is extended to the right to be able to cover their families to be granted medicines and medical assistance, the establishment of holiday centers as well as shops that would allow access to cheaper products with reasonable prices and access to housing for rent and / or sale and it is until 1972 when the Housing Fund (FOVISSSTE) is created.

With the ISSSTE Act of 1983, benefits are increased, which are: increased protection for the children of beneficiaries up to the age of 25 and for single mothers under 18, as well as the promotion of sports and cultural activities, elderly insurance and services for retirees and pensioners. funeral services. About pensions, the way to calculate them is established where a salary is set that is the one that regulates the calculation for the sum of these, integrating the average of the base salary of the last three years of service.

For 1986, the amendment to the Pension Act amended and went from three years to a single year on the basis of calculation, where the minimum pension must not be less than a general minimum wage in the Federal District, as for female workers, it is decreed that they may retire after 28 years of service, Another reform occurred in 1992 where the 4% quota belonging to pensioners for the Medical Fund was repealed and in 2000 workers were allowed to register their partner.

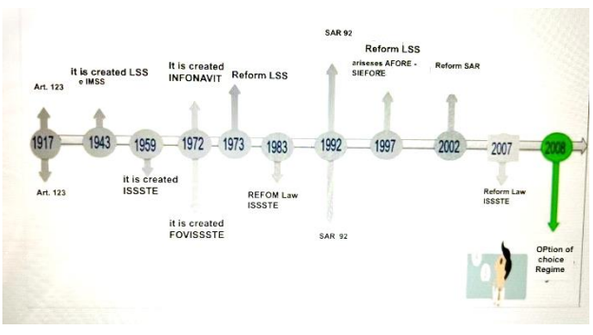

Figure 1 Creation and Reforms of IMSS and ISSSTE
Source: Presentation of Diploma of University Management UAGro 2022

3. Other Social Security Organizations in Mexico

After the birth of the IMSS and ISSSTE institutions, the pension schemes of Petróleos Mexicanos (PEMEX) and the Social Security Institute of the Armed Forces (ISSFAM) were created, which provide specific coverage to the workers of these entities.

Pension reforms

In 1943 the Social Security Law was enacted giving rise to the IMSS, for 1973 a restructuring was made to the pension system of that agency, where the worker will have to contribute 500 weeks and the calculation of his retirement will be based on the number of weeks previously indicated and based on the salary of the last 5 years, however, in 1992 the SAR Retirement Savings System was created, where 2% of the salary was contributed, which went to a bank account together with 5% of the INFONAVIT, the latter being the housing fund. In 1997 there is a reform to the Law of 1973 and the Afores are created giving way to the system of individual capitalization (Figure 2). Regarding the Institute of Social Security and Services for State Workers, it was created in 1959 and by 1983 the ISSSTE Act was published, and like the IMSS, the SAR Retirement Savings System was created in 1992 and the Act was amended in 2007 and the individual accounts system was switched to the system of individual accounts. (Figure 2)

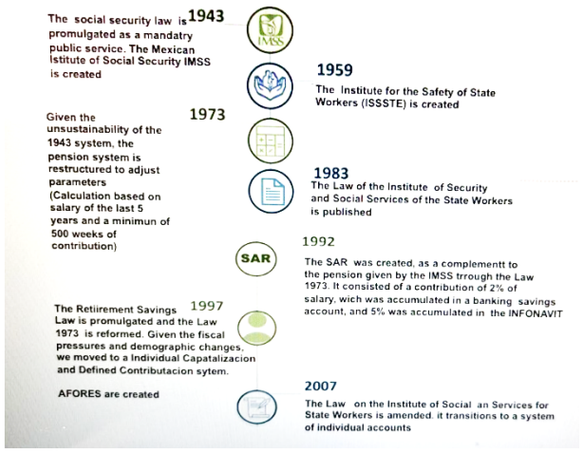

Figure 2 Restructuring of IMSS and ISSSTE Pensions
Source: Presentation of Diploma of University Management UAGro 2022

The reforms of the pension systems were carried out by the IMSS in 1997 and by the ISSSTE in 2007, and one of the changes was the increase in the pensionable age and the number of weeks of contributions, In the 1973 Law (IMSS), a worker could receive a pension at the age of 60 as long as he/she had a minimum of 500 weeks of contributions, but with the new reform, he/she must contribute 1,250 weeks and be at least 65 years old in order to be eligible for a pension. Table 2

With the new pension strategy, far from contributing to the protection of the individual, it can cause insecurity in their old age, because the worker has to make the relevant savings for a dignified retirement, but sometimes they do not have enough capacity to save; according to the National Council for the Evaluation of Social Development Policy (CONEVAL) in Mexico, 48. 8% of the population has an income below the income poverty line, which represents 61.1 million people are in a vulnerable situation (CONEVAL, 2018), resulting in a lack of monetary power to be able to save in their individual accounts and have an old age with a good quality of life.

IMSS				ISSSTE			
Law de 1973		Law de 1997		Law de 1983		Law de 2007	
Weeks quoted	Minimum retirement age (Men)	Weeks quoted	Minimum retirement age (Men)	Years of contributions	Minimum retirement age	Years of contributions	Minimum retirement age
500	60 years	1250	65 years	30 years	Art. 60. whatever your age	30 years	65

Table 2 Comparative of Pensions before and after reforms
Source: Own with data from the Issste Law 2007 and 1983 and the IMSS Law 1973 and 1997.Note: A) The table shows the information to receive pensions at one hundred percent. B) Article 60 of the ISSSTE Law states that "workers with 30 years or more of service and equal time of contribution to the Institute, under the terms of this Law, regardless of their age, are entitled to a retirement pension"

With the IMSS Law of 1973, the pension was paid for life to the worker who only needed to contribute a little less than 10 years and have the required age, the contribution base was the salary of the last 5 years (250 weeks) being the contribution ceiling of 25 times the minimum monthly wage approximately 50,000.00 pesos. However, with the new Law of 1997, there are new reforms such as age and especially the contribution time increasing to a little more than 24 years that is, they almost tripled this requirement, but also the payment is according to the accumulated balance in the individual account, by dividing it by the factor of number of months of life expectancy and in case of not complying with the 1250 weeks quoted to the worker will only be delivered the accumulated in his individual account and he will be responsible for administering it.

One of the last reforms approved for the IMSS Law was carried out on December 9, 2020, where the reduction of weeks to be entitled to the pension was modified, leaving 750 weeks for 2021 and each year 25 weeks will be increased until reaching 1000 weeks in 2031, which will be the requirement. At first the pension system was exercised under the principle of pay-as-you-go system as noted above, that is, active workers financed retired workers, however when the IMSS Law of 1995 was reformed, it was transcendental in the history of Social Security because an individual capitalization system is introduced but also the public pension system is transferred to a private system (Lss 1995, art. 159), which has led to the accumulated pension funds of workers being aimed at producing private wealth and the same happens with ISSSTE pensions.

Neoliberalism and Social Benefits in Mexico

The adoption in Mexico of the Neoliberal Policy originated great changes and transformations, going from a protected economy (based on the Theory of John M. Keynes) to an open economy (Theory of Milton Friedman), that is, from 1929 to 1980 the national markets were protected being the promotion of the internal market and the controlled foreign trade policy however from the eighties in the adoption to the new economic model the markets They are open, market promotion is external, and policy is free trade.

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All these processes influence the social benefits of the population, which causes in some way the weakening of social security, by moving from a security system with a criterion of social solidarity to a security system with the policy of individual savings, thus reducing social support and causing vulnerability in the inhabitants.

Economic policies directly affected the private sector, which caused the closure of state agencies and the liquidation of companies as a result of trade liberalization and competition from abroad, producing the loss of formal jobs; Although the Economically Active Population (EAP) has reduced its average annual growth rate from 1982 onwards, growth in paid employment has been minimal. (Table3).

Period	Economically active population	Paid employed staff
1970 - 1982	3.7	4.1
1983 - 1995	3.5	1.9
1994 - 2010	1.9	1.7

Table 3 EAP and employed personnel Annual Growth Rate
Source: CONAPO and INEGI Taken from Ruiz Nápoles. "Recent Evolution of Employment and Unemployment in Mexico"

To observe the behavior of unemployment in Mexico, data were obtained from two surveys: the Continuous Survey on Occupation (ECSO) and the National Urban Employment Survey (ENEUI), Table 4. Showing an overview of the lack of jobs in Mexico and their behavior.

From the period from 1973 to 1983 only three cities are considered: Mexico, Guadalajara and Monterrey, where the behavior of the unemployment rate was falling until 1982 (a decrease of 3.3 points compared to the year of 1973), after this year there is a significant increase from 4.2 reported in 1982 to 6.8 figure reported in 1983, which denotes a crisis of work for the cities involved this according to the Continuous Survey on Occupation (ECSO), it is to indicate that by the year of 1982 neoliberalism appears in Mexico and although it is true that there were very high rates like that of 1977, these had come down but with the entry of the new economic policy it increases again.

Year	General rate	Year	Tasa general	Year	General rate
1973	7.5	1986	4.3	1999	2.5
1974	7.2	1987	3.9	2000	2.6
1975	7.2	1988	3.6	2001	2.8
1976	6.7	1989	3	2002	3
1977	8.1	1990	2.8	2003	3.4
1978	6.8	1991	2.6	2004	3.9
1979	5.8	1992	2.8	2005	3.6
1980	4.5	1993	3.4	2006	3.6
1981	4.2	1994	3.7	2007	3.7
1982	4.2	1995	6.2	2008	4
1983	6.8	1996	5.5	2009	5.5
1984	5.7	1997	4.1	2010	5.4
1985	4.4	1998	3.6	2011	

Table 4 Unemployment Rate in Mexico
Source: INEGI National Survey of Urban Employment, Inegi Statistics, Historical of Mexico Volume I, INEGI National Survey of Occupation and Employment

The data taken during the period 1984-1997 are from the National Urban Employment Survey (ENEUI), where only 16 cities are considered Mexico, Monterrey, Puebla, Tijuana, Chihuahua, Veracruz, Mérida, Orizaba, Matamoros, San Luis Potosí, Tampico, León, Torreón, Cd. Juárez, Nuevo Laredo and Guadalajara. In this period there are unemployment rates below three percent (1991 – 1992), but they are not maintained, increasing for 1997 to 4.1.

For the first quarter of 1992 the Eneui added 16 more cities, Acapulco, Coatzacoalcos, Durango, Cuernavaca, Zacatecas Culiacán, Hermosillo, Morelia, Oaxaca, Tuxtla Gutiérrez, Saltillo, Tepic, Toluca, Villahermosa, Campeche, and Aguascalientes and in the third quarter of the same year to the cities of Manzanillo and Colima in 1993 incorporates Celaya, Monclova and Querétaro and in 94 Tlaxcala and Irapuato and in 1996 to Cd. del Carmen, Cancun and La Paz

Year	National EAP	Occupied nationwide	Unemployed nationwide	Occupied nationwide	Unemployed nationwide
		Thousands of people		Percentage	
2019	57,625,521	55,683,450	1,942,071	96.6	3.4
2020	53,780,524	51,011,033	2,769,491	94.9	5.1

Table 5 EAP Occupied and Unemployed
Source: National Survey of Occupation and Employment (ENOE). Note: 2019 data correspond to the fourth quarter,*2020 data correspond to the third quarter*

Data from the National Survey of Occupation and Employment (ENOE), indicates that 3.4% of the EAP in 2019 was unemployed, increasing to 5.1% by the third quarter of 2020. (Table 5), however, of the population that is employed at the national level in 2019, 56.2% corresponds to informal employment, while in the third quarter of 2020 it was 54.2% (Figure 1). What externalizes that for 2019 and 2020 of every 10 employed people only four had formal employment and the social benefits of work that entails.

The panorama of these years reflects that less than fifty percent of the population has formal jobs which affects the quality of life of the citizen at the time of retirement or have an age whereby their own conditions cannot be productive and generate the monetary resource to cover the minimum needs such as food, housing and health which leads to situations of vulnerability.

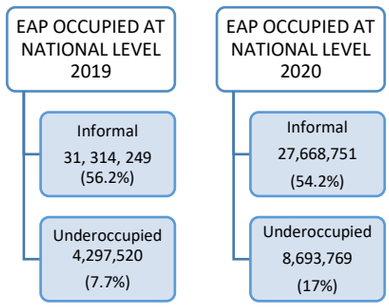

Figure 1 Informal and Underemployed Population in Mexico 2019-2020
Source: Encuesta Nacional de Ocupación y Empleo (ENOE)

The progress of Social Security coverage during the period from 1960 to 1983 shows that for workers in the IMSS, ISSSTE, Electricity, Railways, Pemex, Ministries of Defense and Navy in terms of insurance, it was increasing year after year as shown in Table 6, which in 1960 amounted to 9,721 active and by 1983 was a total of 21,511.

Years	Total Population	Assets	Liabilities	Dependent	Insured a		
					Rurales (COMPLAMAR) b	Total	
						Without COPLAMAR	With COPLAMAR
1960	37,073	9,721	72	2,969	0	6,562	0
1965	43,500	11,564	148	5,953	0	8,807	0
1970	51,176	13,679	287	8,201	0	12,333	0
1975	60,153	16,332	417	15,329	0	21,427	0
1980	69,393	19,423	634	22,028	6,236	30,820	37,050
1981	71,284	20,109	686	24,350	8,614	34,072	42,686
1982	73,188	20,807	752	24,079	9,653	33,743	43,396
1983	75,107	21,511	799	24,248	10,782	34,024	44,806

Years	percentage of Coverage c		PEA	Average annual growth rates				Population burden ratio d
	Total population			Total population	PEA	Policyholders		
	Without COPLAMAR	With COPLAMAR				Assets	Total (without COPLAMAR)	
1960	12.3	0	15.6					0.047
1965	20.2	0	23.4	3.2	3.5	12.2	14.1	0.055
1970	24.1	0	28.1	3.3	3.4	7.3	7	0.075
1975	35.6	0	34.8	3.3	3.6	8.1	11.7	0.073
1980	44.4	53.4	42	2.9	3.5	7.5	7.5	0.078
1981	47.8	59.9	44.9	2.7	3.5	10.8	10.5	0.076
1982	43.1	59.2	42.8	2.7	3.5	-1.4	-1	0.084
1983	45.3	59.7	41.7	2.6	3.4	0.7	0.8	0.089

Table 6 Social Security in Mexico, 1960-1983 (Thousands and percentages)
Sources: Consulted from CEPAL studies and reports 1985

IMSS and ISSSTE affiliation			
Institution	Percentage		
	2013	2017	Difference
IMSS	43.7	36.3	7.4
ISSSTE	6.7	5.6	1.1

Table 7 Affiliation of the Economically Active Population 2013 – 2017
Source: National Employment and Social Security Survey (ENESS) 2013 and 2017

With data provided by the National Survey of Employment and Social Security (ENESS), for 2013 economically active people only 43.7% had IMSS and 6.7% with ISSSTE, that is, only 50.4% of the population had a formal job while for 2017 of the 123.7 million people affiliated in Mexico, 36.3% corresponds to the IMSS, 5.6% to the ISSSTE and 4.3% to another public institution such as the state social security institutes (Issstezac, Issemym, etc.), Sedena, Pemex, Semar and other public sector institutions, which shows that only 46.2% of the population has social benefits, while more than 50% of the economically active population lacks them, but there is a decrease in formal workers by having fewer people affiliated and contributing to these organizations.

As for the poverty index, its development was not optimal because it is increased causing greater needs in the inhabitants, poor quality of life and well-being, according to scholars on the subject (Table 8), agree that in 1981 poverty had a decline, however, it does not manage to continue decreasing and on the contrary, it increases returning to have a small improvement by 1994.

Author	1968	1977	1981	1984	1989	1994	1996	1998	2000
ECLAC	42.5	39.5	36.5	42.5	48	45	52	47	
World Bank	49	34	25	28	36	34	45		
Hernández, Laos y Boltvinik	72.6	58	48.5	58.5	64	67.1	77.3	73.6	68.5
Integrated Poverty Measurement Method*				69.8	73.8	75.8	81.9	80.3	76.9

Table 8 Studies of poverty in Mexico 1968 -2000. Expressed in percentages
Source: ECLAC (several years); World Bank: (World Bank, 2000:52-53); HLB: 1968-1984

The Economic Commission for Latin America and the Caribbean (ECLAC) refers to the fact that, in 1998, poverty affected 47% of the inhabitants, 4.5 more than in 1968; According to Hernández-Laos and Boltvinik in comparison of 1968 with the year 2000 there is a decrease of a little more than 4 points, however, it is not possible to have the improvements that were in 1981, leaving a margin of 20 points which indicates that in the referred year (1981), for this author there were better conditions.

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Period	Poverty	
	Millions of People	Percentage
2008	49.5	44.4
2010	52.8	46.1
2012	53.3	45.5
2014	55.3	46.2
2016	53.4	43.6
2018	52.4	41.9

Table 9 Evolution of Poverty in Mexico. Period 2008 – 2018
Source: CONEVAL

The data obtained by CONEVAL during the period 2008 – 2018 show an evolution without significant relevance of improvement, where more than 50 million inhabitants are in it, indicating social deprivation.

Conclusion

The neoliberal policy applied shows a decrease in social security and thus generates a series of economic, health and especially welfare problems, where the pension system becomes a private system, paid employment is minimal, reducing formal jobs and increasing the informal population.

The affiliations of the workers of the IMSS and ISSSTE institutions have fallen significantly, but also the poverty that had been decreasing is accentuated in 1982 when neoliberalism intensified in Mexico, which caused poverty, inequalities and deprivation in more than fifty percent of the population.

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Diagnosis of occupational safety and health in an automotive glass manufacturing company

Diagnóstico de seguridad e higiene ocupacional en una empresa fabricante de vidrio automotriz

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Abstract

The objective of this study was to carry out a diagnosis of safety and hygiene in the production area of a manufacturing company to identify those factors that are the cause of occupational diseases and accidents, as well as the types of accidents and diseases that workers have suffered. The research is qualitative and was conducted with semi-structured interviews that were applied to 16 workers in the production area and data were obtained that were relevant to know the current situation with the support of the Official Mexican Standards and ISO Standards. The results were that workers have suffered accidents due to glass handling, and also diseases, due to exposure to chemicals and high temperatures. The most influential factors were lack of training and low use of personal protective equipment. It is concluded that the company has a low involvement between boss-employee and does not give continuity to these disciplines, coupled with this, possible actions were considered to pay attention to the factors detected. The study contributes to future researchers continuing with the implementation of actions that companies must carry out so that safety and hygiene is part of their daily activities.

Occupational accident, Illness, Risk factor, Tempered glass, Production

Resumen

El objetivo del presente estudio fue realizar un diagnóstico de seguridad e higiene en el área de producción de una empresa manufacturera para identificar aquellos factores que son causa de las enfermedades y accidentes laborales, así como los tipos de accidentes y enfermedades que han sufrido los trabajadores. La investigación es de tipo cualitativa y se realizó con entrevistas semiestructuradas que se aplicaron a 16 trabajadores del área de producción y se obtuvieron datos que fueron relevantes para conocer la situación actual con apoyo de las Normas Oficiales Mexicanas y Normas ISO. Los resultados fueron que los trabajadores han sufrido accidentes debido al manejo del vidrio, y también enfermedades, debido a la exposición de productos químicos y altas temperaturas. Los factores que más influyeron fueron la falta de capacitación y el poco uso de equipo de protección personal. Se concluye que la empresa tiene un bajo involucramiento entre jefe-empleado y no da continuidad a estas disciplinas, aunado a esto, se consideraron posibles acciones para dar atención a los factores detectados. El estudio contribuye a que futuros investigadores continúen con la implementación de acciones que las empresas deben realizar para que la seguridad e higiene sea parte de sus actividades diarias.

Accidente de trabajo, Enfermedad, Factor de riesgo, Vidrio templado, Producción

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Introduction

Most of the accidents and occupational diseases, as in the present and in the past, are due to the absence of the implementation of occupational safety and health, as well as organizations from different sectors register huge losses and inefficiency, due to the high rate of occupational diseases and injuries (Liu et al., 2020) . Work-related health problems and sick leave due to occupational diseases continue to be a common problem in the European Union. (Astrom et al., 2019) . In Mexico during the year 2016, 516,734 work accidents were registered in route, 12,622 people became ill due to their work activities and 1,408 people died performing their work or as a result of them (STPS, 2017).

Companies have the responsibility to provide the work environment, occupational health and safety of their employees (Astrom et al., 2019). The company where the study was carried out, the main problem is the handling of the raw material (glass) without personal protective equipment and that can cause serious accidents for this reason occupational safety aims to prevent accidents at work where risk factors exist and occupational hygiene is the main tool to eliminate, reduce and control exposure to chemical substances, biological and physical agents, by preventing and avoiding occupational diseases (Carpio et al., 2021).

According to the International Union (2001), it mentions that unsafe practices are the main cause of injuries and illnesses in the workplace and according to Heinrich's theory of accident causation, bad practices represent 88% of accidents. work accidents. According to Yiha & Kumie (2010), worldwide, 2.3 million workers die each year from occupational accidents and diseases and more than 85% of workers do not have access to health and safety services at work (Abat et al., 2019).

The International Labor Organization (ILO) mentions that every year 2.78 million workers die from work accidents and occupational diseases. Deaths and injuries caused by occupational accidents and illnesses cause a large amount of lost resources, since, globally, lost work days are estimated to represent 4% of the world's gross domestic product (GDP) and may increase to 6%. or more in some countries (Palaci et al., 2021).

Safety and hygiene problems do not seem to be a priority in companies, due to the lack of health and safety policies, deficient infrastructure and the insufficient number of personnel responsible for safety. To improve safety and hygiene, it does not mean just providing a safe environment for workers, but educating and training employees to improve their knowledge on safety and hygiene (Liu et al., 2020). The training of workers in their jobs is a fundamental preventive action to identify unsafe or deficient acts and conditions, the work environment and human behavior must be taken into account for prevention (Carpio et al., 2021). This article is important because currently many companies (mainly medium and small) do not implement safety and hygiene in production, which has caused a high number of accidents and illnesses. It is considered to continue with the awareness towards manufacturing companies and the study will set the tone to continue giving importance to implementing safety and hygiene in their workplaces, with the support of the Official Mexican Standards, where variables will be defined that will be relevant to the investigation. Which is of a qualitative type, with the application of interviews with tempered glass production workers, where it was obtained that the variables of use of personal protective equipment, training and lack of commitment are aspects that are not carried out in the company and the variables of educational level, work experience and teamwork are points that the workers and the company have developed effectively. In addition, the most frequent accidents were cuts on the body, hands and arms and burns on the arms and hands. The most frequent diseases such as: poisoning and cold due to temperature changes.

Literature

Diseases (Occupational Diseases , OD) its acronym in English are diseases causally related to work and according to the Occupational Health Law and the Safety Law, occupational disease is any disease caused by exposure to occupational hazards. And according to the Universal Health Insurance and Security Law, occupational disease refers to temporary or permanent conditions of illness, physical or mental handicap, caused by a recurring reason due to the quality of the work performed by the worker or to the working conditions (Sen et al., 2019).

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Vibrations are an occupational risk factor that can cause an occupational disease. In the Nordic countries, Canada and the United States of America, hand-arm vibration disease and its acronym in English (HAVD), means the blood circulation or nerve of the arm, which is characterized by an injury to the joint muscle of the arm, caused by continuous exposures to vibrations that are transmitted by the hand (Liu et al., 2018).

Musculoskeletal risks are also usually a risk factor in occupational accidents, where parts of the body such as the shoulder, elbow, hip, knee, neck or back can be affected (Hulshof et al, 2021) . Musculoskeletal diseases are some of the most important occupational health problems, since they are part of one of the main causes of work absenteeism in both developed and developing countries, a situation that is not alien to Mexico (STPS, 2017).

Another of the occupational hazards that can cause an occupational disease is occupational noise, which is considered the most common worldwide, since it has been reported that around 600 million workers worldwide are exposed to noise from high level, and this is related to hearing loss and also to cardiovascular diseases. Hearing loss can be prevented by using personal protective equipment (Wang et al., 2021).

The next problem that causes occupational diseases, is exposure to chemical products, has caused concern, because according to a study carried out in a Chinese province, this problem has represented more than 70% of the cases of occupational poisoning. Some of the main occupational diseases caused by exposure to solvents, according to this study are; intoxication, poisoning, dermatitis and leukemia (Dong et al., 2020) .

An important point to measure the danger of the environmental conditions to which workers are exposed, are the levels, for example, the noise level, the level of concentration of chemical products, the level of temperature in a certain area, etc. The labor force tends to be, on average, the younger and healthier population than the adult population, since risk can influence them more quickly (Lauenborg et al., 2020).

In the company where the investigation was carried out, in the production area, the most recurrent accidents were derived from contact with sharp or sharp objects, breakage of material agents, scant use of personal protective equipment, slips and falls. Most of those affected are men because they are the ones who represent the industry (Pietilä et al., 2018).

According to research, occupational health and industrial safety in small businesses is a new field and is in development. Due to this and limited resources, small businesses often do not provide health services to their workers. A study conducted in Taiwan showed that only 13% of workers in shopping center companies receive regular health monitoring examinations and 81.3% of workers in large companies do not. Studies also show that workers in small businesses are at greater risk of serious on-the-job injuries (Yang, 2013).

From a study carried out on PYMES in the city of Hermosillo, Sonora, on Safety and Industrial Hygiene, it was shown that small companies do not determine the cost of their goods based on an accident, which indicates that they are not complying with the normativity. Another important fact is that only 46% of small businesses keep a record of the events that occurred at the facilities. It can be noted that SMEs do not comply with the regulations established by the STPS, especially small companies, because they apply a smaller number of safety regulations in the industrial sector (Olguìn et al., 2019).

The prevention of occupational accidents is almost always carried out by observing where they happen, in the workplace. And also It is important to have knowledge of the machinery and equipment used in the activities, since security measures made based on it must be applied (Jabbari et al., 2021).

Work-related injuries and illnesses carry significant economic costs for society, businesses, and families. These can be reduced with the help of prevention activities (Lebeau et al., 2014) . Occupational health has incorporated basic protections to the rights of workers, since the protection of life and mainly the health of workers is an important point of progress and civilization of a country (Chen et al., 2012).

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Methodology

Context of the study

The study is of a qualitative type and the research design that is intended to be carried out in the investigation is a case study, which, most notably, is included in the study by Thomas and Znanieck (1918-1920) that deals with the Polish peasants in Europe and America, however the background for this type of research was most often conducted at the Chicago School of Sociology between the 1920s and 1950s. Stewart (2014) Creswell (2014) refers to case studies as a qualitative design (Harrison et al., 2017) . This type of study will be carried out to obtain data from the production workers of a glass manufacturing company on occupational safety and hygiene. It is a small company dedicated to the manufacture of automotive tempered glass, where the main risky activity is the handling of raw material without personal protective equipment and exposure to chemical products in the screen-printing area, which is the process where it is placed. a border around the piece, according to customer requirements. Considering also that the work environment in the tempering area is risky, due to the high temperatures to which the workers are exposed, it is the process where the piece is placed in an oven to achieve the shape of a windshield or medallion, depending on the case.

Sampling and data collection

The sample is the production area, which is divided into two areas: semi-finished and tempered. The semi-finished area, where the first manufacturing processes of the part are worked on, necessary, before moving on to the tempering process, which is the area where the piece is placed in a kiln to achieve its final shape. The total sample was 16 workers, the majority are machine operators and require the use of personal protective equipment. 16 semi-structured interviews were applied, which are made up of 17 multiple choice questions, starting with general data; name, area and job position. Continuing with the questions regarding age, schooling, experience in the position and seniority in the company and finally the questions regarding what may be the possible risk factors that cause occupational diseases and accidents. All production staff are male, and consequently, gender was not considered in the interviews. It began with the semi-finished area and concluded with the tempering area.

Analysis of data

At the end of the interviews, an analysis of the responses obtained from the workers was carried out, likewise a database was created in Excel with the responses of the semi-structured interviews, which were divided into 4 categories; accidents and risks, occupational diseases, culture and procedures, and safety and hygiene, in order to obtain the current state of the company and identify those factors that affect workers and that are not being addressed by the company studied.

Results

With respect to the semi-structured interviews carried out, the variables of greatest attention were identified, which are a factor of occupational accidents and illnesses, types of accidents and illnesses, and variables of less attention, which are carried out, but should not be stopped. to give continuity. In addition, a description of each one is made, explaining the result and the graphs of each one are shown for a better understanding. Finally, the reference standards of the STPS (Secretary of Labor and Social Welfare) that apply to the variables found are described.

Variables of greatest attention:

Work accidents. Figure 1 shows the percentage of accidents in the production area, where it can be seen that 56.25% have suffered accidents at work and 43.75% have not suffered an accident. The types of occupational accidents that workers have suffered are described in figure 2.

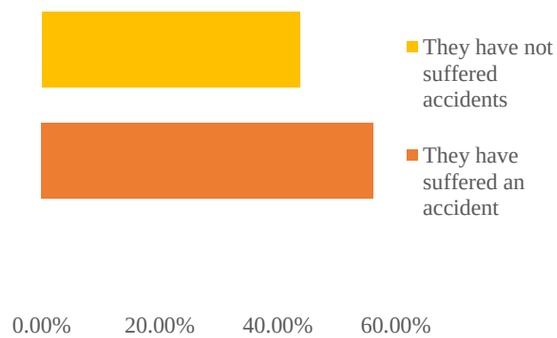

Figure 1 Accident rate in the production area
Source: Own elaboration

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Types of accidents at work. Different types of work accidents were detected, the main accidents were cuts, burns and crushing in the upper extremities and blows in the lower extremities, so that these are caused by the wrong handling of the glass. Each accident is described below, with the results obtained from the total number of workers who, having experienced unwanted situations, are shown in figure 2.

Cuts for raw material handling. In relation to the answers of the participants, 25% of the workers have suffered cuts in their hands, arms and tearing of their clothes, by not using personal protective equipment (ppe). The Semi-finished area is where these accidents mainly occur, due to the activity of handling raw material, which is considered risky, mainly in the first processes; loading and unloading, cutting, and polishing.

Burns. Burns are the most common injuries in the Tempering area, derived from exposure to high temperatures, at the time of tempering the glass, 25% of workers suffer burns on their arms daily.

Foot blows. To temper the glass, the loading of molds is required, the personnel does not use personal protective equipment and consequently 12.50% of the workers have suffered blows to the feet.

Hand crush. In the tempering area, 6.25% of the workers have suffered crushed hands, due to mishandling of the tempering machine or overconfidence.

Types of occupational hazards. Occupational risks are those to which workers are exposed daily at work, if preventive measures are not applied, they can cause unwanted situations. The risks detected are mainly related to glass handling and environmental conditions. Each of these risks is explained below, with the results obtained, shown in Figure 2.

Cracks and breaks in glass sheets. In the loading and unloading area (semi-finished) when handling the glass sheet, it sometimes breaks and opens. 12.50% of the workers suffer from bodily injuries and tearing of their own clothes.

Explosion of the pieces (glass). When the hot pieces come out of the tempering machine, they sometimes explode due to the high temperature and because they have a defect. This has caused injuries to 6.25% of the workers.

Particle projection (glass). At the time of cutting the glass sheet, 12.50% of the workers have suffered injuries to the face and eyes, due to projections of glass particles.

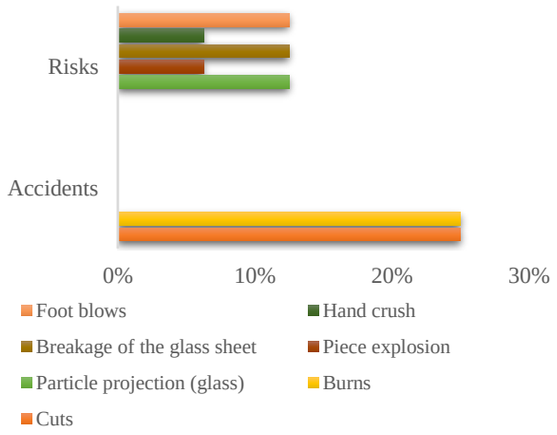

Figure 2 Personnel who have suffered accidents and have been exposed to risks
Source: Own elaboration

Occupational diseases. Occupational diseases always exist in the work environment and consequently 31.25% of workers have become ill due to their work activities, while the rest of the workers, 68.75%, have not suffered from an occupational disease. Figure 3 shows the results obtained from the semi-structured interviews.

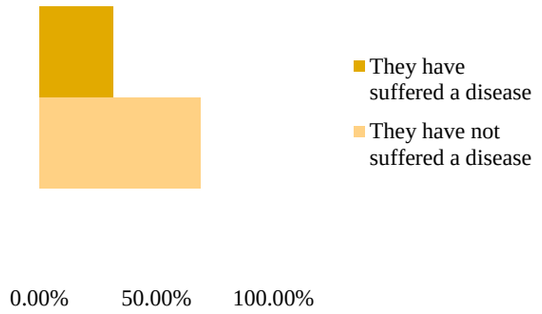

Figure 3 Personnel who have suffered an occupational disease
Source: Own elaboration

Types of occupational diseases. The occupational diseases that were detected are mainly due to exposure to high temperatures in the tempering area, where according to the workers the oven is between 38°C and 40°C, a very high and risky temperature for them. For the manufacturing process, it is required that the piece go through a silk-screen printing, where chemical substances are used and occupational diseases were also detected. Each type of disease is described below, with the results obtained, which are shown in Figure 4.

Respiratory diseases . 40% of the workers have had respiratory problems, due to the change in temperature in the Temperate area, the workers have become ill with the flu, cough and fever. Another cause of respiratory diseases is derived from fiberglass, which is inhaled in the tempering process, where the piece is placed in an oven to achieve the shape of a windshield or medallion, as the case may be.

Loss of sight. Workers exposed to high temperatures are suffering a loss of sight, 20% of the operators indicate that their vision is beginning to fail.

Chemical poisoning. In the screen-printing area, 20% of the operators have been poisoned by inhalation of thinner, due to the handling of dangerous chemical substances.

Skin allergies. Is caused by glass dust generated in the cutting area. 20% of workers have experienced skin allergies.

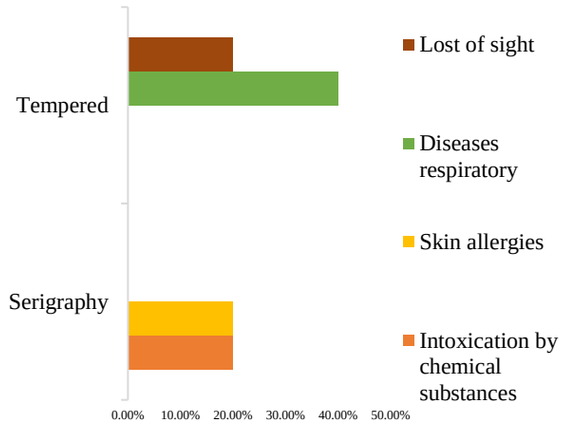

Figure 4 Types of occupational diseases by area
Source: Own elaboration

It is also important to know which area has had more occupational diseases in its workers and is shown in figure 5. Resulting in the tempering area with 60% of diseases and 40% for semi-finished.

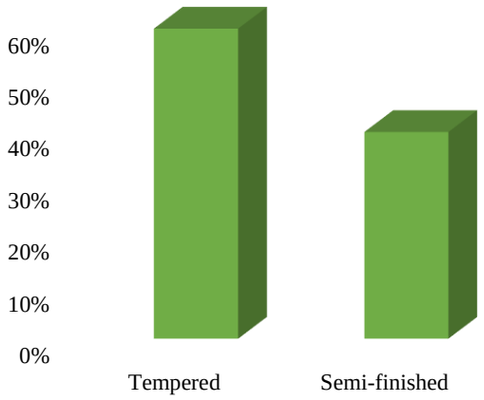

Figure 5 Occupational diseases in the production area.
Source: Own elaboration

Environmental conditions. Two main environmental conditions were detected that are a risk factor for workers, in their daily work activities, if the worker is not adequately protected, they will suffer long-term diseases. Those identified in the production area are described below.

Exposure to dangerous chemicals. In the screen-printing area, dangerous chemicals, solvents and thinner are used . In the quality control area, they use muriatic acid to remove paint spatter after the piece comes out of the oven. And gasoline to clean the cutting table. In 50% of workers are exposed to this type of risk factor.

Exposure to high temperatures. In the tempering area, 50% of the workers are at high temperatures of approx. 40°C and the oven works at temperatures between 500°C and 700°C and changes in temperature cause illness. The following figure 6 shows the percentage of personnel exposed in the production area.

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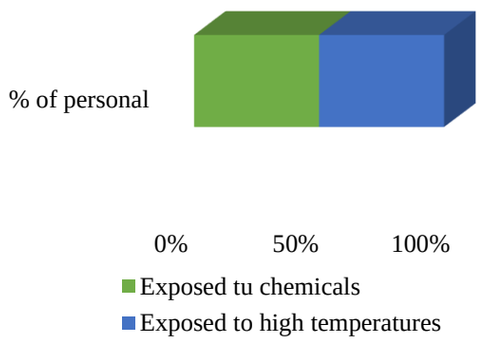

Figure 6 Exposure to environmental conditions
Source: Own elaboration

Use of personal protective equipment. 62.50% of the workers do not use it because they are used to it and because they find it uncomfortable to carry out their activities, or sometimes the bosses do not provide them. The workers in the semi-finished area commented that the personal protective equipment is a hindrance to carry out their activities, since they affirm that this way they carry out their work more quickly, but with the risk of suffering an accident, they live with the risk daily. 37.50% of staff do use it. These data are shown in Figure 7.

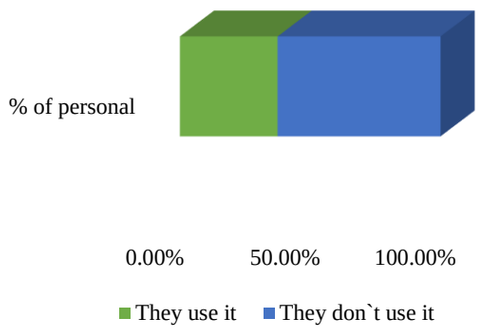

Figure 7 Use of personal protective equipment in the production area
Source: Own elaboration

Lack of training. It greatly influences the behavior of workers and the lack of knowledge of safety and hygiene, resulting in 68.75% of the operators have not received formal training and 31.25% indicated that they did receive training and the majority are supervisory personnel. It is shown in the following figure 8. the data obtained

Figure 8 Training in S&H (Safety and Hygiene) for production personnel
Source: Own elaboration

Safety and Hygiene Procedures. The workers are unaware that there are S&H (Safety and Hygiene) procedures. 43.75% are unaware, 31.25% are aware that they exist and 25% of workers are not sure. The workers who have knowledge are the supervisory personnel and the plant manager, however, they do not disclose it to others. Showing the percentages obtained in the following figure 9.

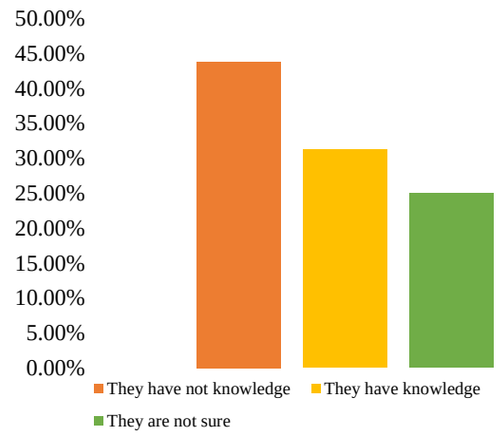

Figure 9 Knowledge of S&H procedures in the production area
Source: Own elaboration

Variables of less attention. The variables that are important to continue with their development but that do not require further attention are the following. These variables are main requirements in all companies for their functions to be executed satisfactorily.

Years of experience. From the semi-structured interviews that were applied, it was detected that most of the employees have enough years of experience in the work area, in this way it is an advantage for the study, because they have the necessary knowledge to carry out their work. 37.50% of employees have experience of up to 1 year, 31.25% have up to 2.5 years in the company, 12.5% have experience ranging from 3 years to 8 years and finally 18.75% have more than 10 years in the company. Figure 10 shows the data generated by the semi-structured interviews applied to the workers of the tempered glass manufacturing company.

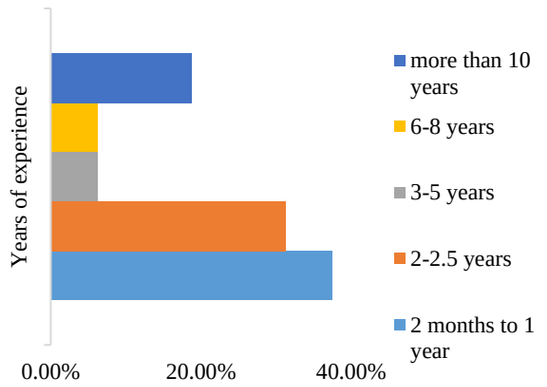

Figure 10 Years of experience of workers in the production area
Source: Own elaboration

Educational level. 62.5% of the workers have a medium educational level (high school), and are the youngest operators in the semi-finished area. The operators with a low educational level are the oldest and are in charge of the area. 12.50% have a degree and among them the plant manager and finally 6.25% have no education. Figure 11 shows the data.

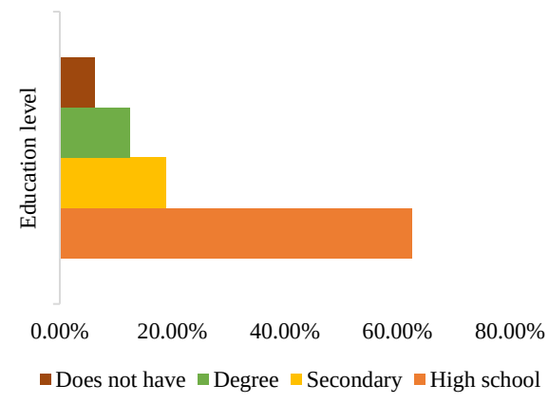

Figure 11 Educational level of workers in the production area
Source: Own elaboration

Age of workers. The age of the employees is an essential factor, because sometimes their responsibility and experience depend on it. In the case of the glass manufacturing company, 50% of the workers are young people between 19 and 30 years of age and are in the semi-finished area. The oldest are those with the most experience and range from 31 to 60 years. The following figure 12 shows the values obtained.

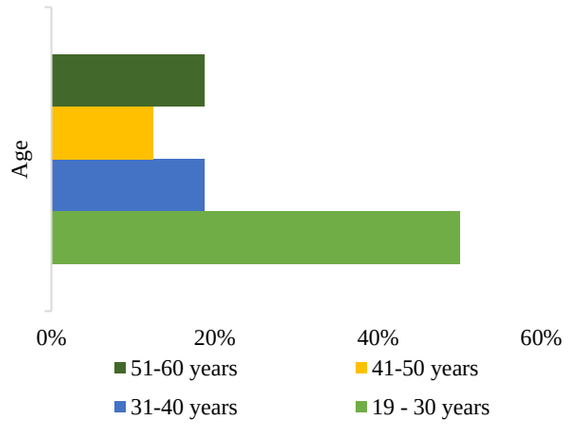

Figure 12. Age of production workers. **Source:** own elaboration

Working hours. The workers have a schedule of 12 hours or more a day, but they feel satisfied with the schedule, since they do not work 3 days a week. 87.5% work from 7am to 8pm from Monday to Thursday. Figure 13 shows the final values obtained.

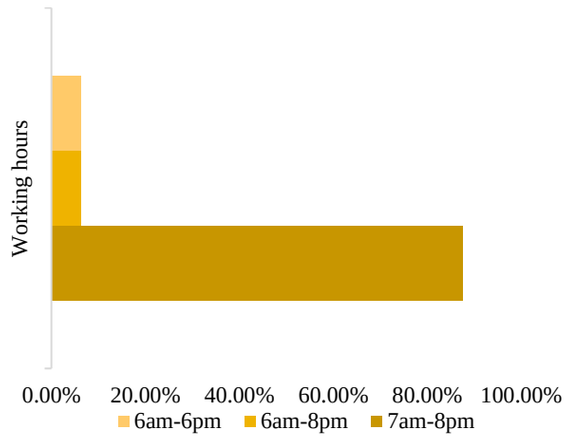

Figure 13 Working hours of production workers
Source: Own elaboration

Official Mexican Standards and Applicable ISO Standards

To comply with safety and hygiene requirements, regulations must be complied with, to achieve a safe environment. The following table 1 shows the applicable regulations according to the diagnosis and the variables detected.

Variable	Reference norm
Cuts on fingers and hands	NOM-006-STPS-2014 (material handling)
occupational diseases	NOM-030-STPS-2009 (preventive health and safety services)
Lack of training	ISO 45001 and 18001 standards (occupational health and safety management systems)
Intoxication due to handling of chemical substances	NOM-005-STPS-1998 (handling of dangerous chemical substances NOM-018-STPS-2015 (risk identification)
Exposure to high temperatures	NOM-015-STPS-2001 (exposure to extreme thermal conditions)
Insufficient use of protective equipment	NOM-017-STPS-2008 (use of personal protective equipment)
Ignorance of procedures	ISO 45001 and 18001 standards (occupational health and safety management systems)

Table 1 Applicable regulations
Source: Own elaboration

Relationship between variables

The variables detected are related to each other to achieve safety and hygiene in the company's production area and the following figure shows how they interrelate as a system with inputs and outputs. Where in "inputs" internal and external requirements are considered as interested parties that are the official Mexican standards and ISO standards. Internally, the company's requirements are considered for operations to function properly, which are the age of the worker, years of experience, educational level and working hours. Within the "processes" the production areas (tempered and semi-finished) were considered, where the study was carried out and there are always occupational risks if safety and hygiene are not continuously implemented. The lack of training and procedures are the basis for the worker to have the necessary knowledge about the preventive measures that must be applied at work and avoid accidents and occupational diseases.

Possible "actions" to be implemented are proposed to pay attention to the detected variables, which it is recommended that the company work together with its external and internal stakeholders, and can use tools such as: root-cause analysis, safety and hygiene audits , health campaigns, that the integration of the safety and hygiene program can be carried out. Finally, in "outputs" what we obtain is the safety of the worker and his well-being.

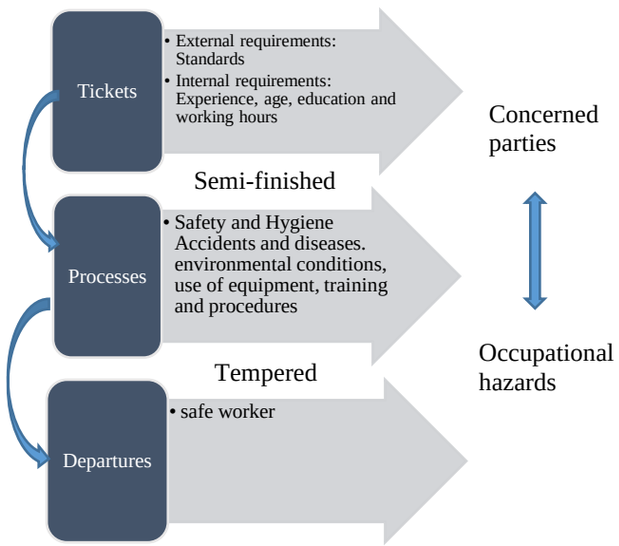

Figure 14 Relationship between variables as a system
Source: Own elaboration

The actions that are recommended to pay attention to the detected variables are the following:

- Apply preventive measures in the production area
- Provide personal protective equipment to workers on a regular basis
- Carry out continuous verifications in the production plant
- Have a medical record of each worker and carry out corresponding medical examinations
- Schedule training meetings on Safety and Hygiene
- Monitor compliance with applicable regulations

Discussion of results

This investigation revealed that the workers of an automotive tempered glass manufacturer do not carry out 100% safety and hygiene practices in their daily activity. This is possibly due to poor safety and hygiene practices and can be attributed to low political, economic, and social commitments. Another reason may be the level of awareness of the bosses or the educational level of the participants. According to a study conducted in Iran and Nigeria, workers with a higher educational level were 6.49 times more likely to apply safety and hygiene practices than respondents with secondary and high school education, as well as professional experience (Abat et al., 2019).

Although the workers have been given instructions on safety measures, such as: use personal protective equipment (ppe), sometimes they lack knowledge about who to consult if they require a replacement of the equipment, or a shortage and by not having that knowledge, can lead to the acceptance of living with that risk, acts or unsafe conditions as part of their daily activities. The Temperate area, where workers are exposed to occupational diseases, are all male, consequently, men have a high burden of occupational diseases because they have a lower perception of risk compared to women (Rikthotso et al., 2021).

According to the European Agency for Safety and Health at Work, good management requires the application of three principles: leadership, participation and commitment on the part of bosses and workers. These three principles are lacking mainly on the part of the bosses, by not training their staff, not disseminating their updated procedures and lack of commitment to provide them with personal protective equipment (Macìas, 2019).

Conclusions

After the study carried out, essential administrative and technical elements of the company under study were identified with the help of the Safety and Hygiene tools (Official Mexican Standards) and ISO Standards, which were necessary for the development of the investigation.

And the main problem addressed was addressed so that the staff can carry out their work activities in safe conditions.

The study left the following contributions:

- Identification of risks in the company, mainly the dangerous activity "handling of tempered glass". For the study it was important to know the risks to which the workers of a glass manufacturer are exposed, since they were made known to the company so that they would be in charge of implementing the necessary prevention measures in the production area. These risks exist in most manufacturers, and it is important that companies carry out a diagnosis to identify them immediately.

- The areas with the highest risk were identified. In all manufacturing companies there are areas of greater risk, according to the sector to which they belong. In this case, areas were identified, which should be paid more attention, in security measures to protect the worker.

- Awareness to bosses that employee training is important to reduce accidents and illnesses. At the end of the study, the diagnosis was made known to the employers of the company to make them aware of the variables detected with the objective of provide an immediate solution.

This research is a support for future researchers to continue with the desire to diagnose companies on Safety and Hygiene issues, and review their compliance with the Official Mexican Standards, since the production area is the place where more accidents and diseases exist. and it is relevant to mention that this study remains open for them to continue with a proposal for a safety and hygiene program or system to find out how to implement the recommended actions

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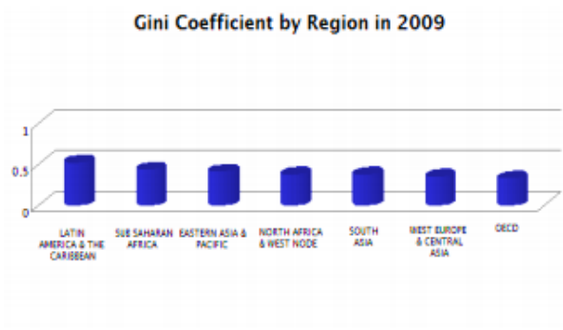

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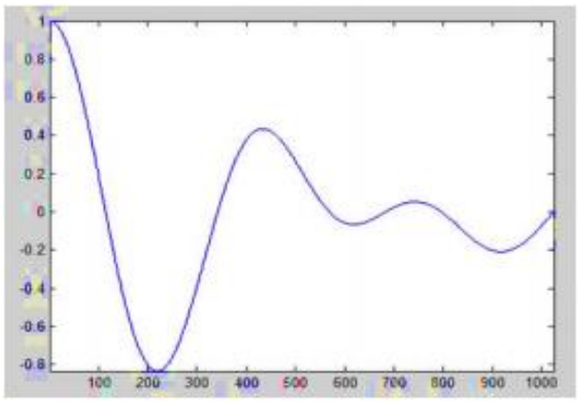

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