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In the first article we present, *Design of comprehensive communication strategies for MSMEs in the face of the COVID-19 pandemic: carnicería Ariel Córdoba case, Ver.*, by ANTONIO-VIDAÑA, Paula Rosalinda, HERNÁNDEZ-PERALTA, Alejandro de Jesús, MARTÍNEZ-NAVARRETE, Daniel and OLVERA-JIMÉNEZ, Carlos Alejandro, with adscription in the Universidad Tecnológica del Centro de Veracruz, as the next article we present, *The impact of COVID-19 and after the pandemic on the competitiveness of micro, small and medium-sized companies in Mexico post COVID-19*, by SERRANO-TORRES, Ma. Guadalupe, QUEZADA-FLORES Ma. De la Luz, GONZALEZ-ARREDONDO, Liliana and MARQUEZ-DE ANDA, Camilo, with adscription in the SERRANO-TORRES, Ma. Guadalupe, QUEZADA-FLORES Ma. De la Luz, GONZALEZ-ARREDONDO, Liliana and MARQUEZ-DE ANDA, Camilo, with adscription in the Universidad Tecnológica de León, as the next article we present, *Administrative process of food business in San Juan del Rio, Qro. During COVID-19*, by CORTÉS-ÁLVAREZ, Yolanda, CORTES-ÁLVAREZ, Alfredo, GONZÁLEZ-NERI, Rafael Albertti and QUEZADA-MORENO, Maribel, with adscription in the Universidad Autónoma de Querétaro, as last article we present, *Development and results of micro and small business in Mexico and Nayarit, from the training of microentrepreneurs*, by GARCIA GONZÁLEZ, Frasin, NAVARRO TELLEZ, María del Carmen, ALTAMIRANO ROLDÁN, Glafira Eugenia and MALDONADO CAMACHO, Enoc, with adscription in the Universidad Tecnológica de la Costa and Universidad Autónoma de Nayarit.

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## Set up gamer for gameplay streamer in Mexico, required investment and growth during the 2019 pandemic

## Set up gamer para streamer de gameplay en México, inversión requerida y crecimiento durante la pandemia 2019

GONZALEZ-REYNA, Gregorio Daniel†, PÉREZ-BRAVO, Julia\* and CAMACHO-MOTA, Sandra Adriana

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### Abstract

This article sets out by way of introduction the existing problem that gives rise to the research, the background and the objective, being this: To inform how Gameplay Streaming has become a way to generate income and the impact it has during the 2020 - 2021 pandemic in Mexico, knowing the resources and initial investment needed to install a Set up gamer and become a content creator in one or more of the different Streaming platforms; The type of documentary research with explanatory and descriptive qualitative design was used; as a theoretical framework, the topics involved in the research are briefly described, thus arriving at the results which highlight the initial investment required of a Streamer to install the set up and be able to perform Gameplay Streaming. Finding that various authors agree with the results found and concluding that this phenomenon has had an exponential growth during the years of pandemic, so it is a hobby that becomes an attractive and innovative way as a source of income, resulting in the basic investment in the assembly of the Set-up gamer not very expensive.

### Resumen

En el presente artículo se plantea a manera de introducción el problema existente que da origen a la investigación, los antecedentes y el objetivo, siendo éste: informar cómo los Streaming de Gameplay se han convertido en una forma de generar ingresos y el impacto que tiene durante la pandemia 2020 – 2021 en México, conociendo los recursos e inversión inicial que se necesitan para instalar un Set up gamer y convertirse en un creador de contenido en una o varias de las diferentes plataformas de Streaming; se utilizó el tipo de investigación documental con diseño cualitativo explicativo y descriptivo; como enmarcamiento teórico se describen brevemente los tópicos involucrados en la investigación, llegando así a los resultados donde resaltan la inversión inicial requerida de un Streamer para instalar el set up y poder realizar Streaming de Gameplay. Encontrándose que diversos autores concuerdan con los resultados encontrados y concluyendo que este fenómeno ha tenido un crecimiento exponencial durante los años de pandemia por lo que resulta una afición que se convierte en una forma atractiva e innovadora como fuente de ingresos, resultando la inversión básica en el montaje del Set up gamer no muy costosa.

**Set up gamer, Gameplay streamer, Pandemic**

**Set up Gamer, Gameplay streamer, Pandemia**

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## Introduction

The world is in a fifth digital revolution, that is, with the invention of a 5G network, smartphones have greater storage capacity, screen quality and a much higher resolution, which allows to observe greater detail, in addition to the intelligent use they maintain; this leads to the common and traditional use as it is, sending messages, making calls as well as browsing social networks, video games are added, since in today's society they are linked in terms of cultural consumption and social dynamics.

It is no longer common to get video games on traditional consoles with Digital Versatile Disc or Compact Disc (DVD or CD) or play them in the "set machines" to have several video games, currently the same use of smartphones, tablets and Personal Computer (PC) have allowed the gaming industry has grown exponentially, bringing with it not only to keep the player in contact with the outside world through integrated social networks, it has gone beyond communication, contributing to the entertainment industry.

As background, it is important to mention the relationship that exists with Gameplay Streaming in a society that is in contact all the time surfing an Internet network, although before the pandemic Youtube along with Facebook had been the main platforms for live streaming entertainment, its success was based on those people who watched traditional television ended up migrating to these platforms thus giving them an additional value for the growth of the same, This added value brought with it the interest of several Streamers, mainly Americans and Spaniards in making small clips of video game games that they uploaded to their own channels and people could watch them, from the beginning it was only the clip with background music and it evolved in this way, until the Streamers narrated those events that marked the video game, in addition to integrating some images and other additional effects to make it more striking, thus emerging the term Gameplay.

The years of the Covid 19 pandemic were a watershed between the before and after of Gameplay Streaming, which allowed Streaming platforms such as Youtube Gaming, Facebook Gaming or Twitch Gaming to increase their audiences.

Therefore, the objective of this research is to compile documentary information on history, conceptualisations of the topics Streamer and Gameplay and Set up gamer, informing how Gameplay Streaming has become a way to generate income and the impact it has during the pandemic in Mexico, knowing the resources and initial investment needed to install a Set up gamer to become a content creator in one or more of the different Streaming platforms.

## Research method

The type of research used was documentary, with a qualitative approach, descriptive in scope and deductive in method, using documentary techniques.

## The Context

Since Mizak first used the word Streamers back in 1920, its meaning has gone through many stages and the media in which it performs; being defined by Aller (2020) as the online retransmission of audiovisual content in which different themes can be seen according to the streamer or content creator.

Streaming was created with the aim of generating entertainment for a defined group of people or a general public with similar tastes where live broadcasts, streaming, streaming, streaming, continuous reading, continuous broadcasting or continuous downloading of a digital distribution of multimedia content in real time can be followed. The word refers to a continuous stream that flows without interruption, where the audio or video broadcast is attached via a network either via satellite, internet or television and radio signals.

As such a Streaming can be of two forms, those pre-recorded video or audio broadcasts or a Streaming where it is broadcasting live. Avila (2019) already mentions that Streaming allows to broadcast over the internet all this series of events or content live and direct through a website or mobile such as:

- Event Production Companies.
- TV Channels and Radio Stations.
- Event Organisers.

- Audiovisual producers.
- Marketing and Communications Offices.
- Streamers and Broadcast Professionals.
- Freelancers.

Gaming is no longer a kid's game Arteaga (2020). As time goes by and people are more assiduous in using digital devices as part of their entertainment, Gaming has gained greater presence as an alternative within the vast universe of leisure options, and which is no longer linked to the youngest, so the market for channels is not only expanding, but also to an economically active sector that is willing to invest in order to succeed. Video games and their biography of decades, anecdotes, as well as their constant changes, without fear of being wrong, is still being written, and being such a large segment, with so many years, it has evolved to venture into other aspects that now characterise its scope and ability to diversify; a clear example are eSports, live broadcasts (Streamers) and multiplatforms to play.

The year 2021 marks more than a year since the health crisis hit the country; while for some industries this meant their eventual demise, for others such as gaming, it was the beginning of an unprecedented journey at a pace that, along the way, picked up endless opportunities to turn them into businesses whose scope is yet to be defined.

Internationally, Gameplay Streaming has been popularised by the first content creators that appeared on YouTube, in Spanish speaking countries the Spanish were the first to publish short video streams of short video clips uploaded to their channel, as such there is no first date of the first Gameplay video as some Youtubers of the time deleted or put in private such videos. Poor (2018) says that the most popular Streaming content is video whether it is short video clips or full-length movies, the best way to watch them is to use a Streaming service. YouTube is the most popular source of video, people watch around 5 billion videos on YouTube every day. And 300 hours of new content is uploaded to the site every minute.

Streaming for interactive video games is also one of the most popular and most watched games internationally. While you used to be able to buy a game on physical media and play it or install it on your game console or PC using a disc, now physical games have moved on from downloading. Now you can stream games and choose games from a vast library. You can purchase a title or pay a subscription to access an extensive range of games to play on your PC, tablet or smartphone; as long as you have an internet connection.

Poor (2018) mentions that the pandemic has also influenced the development of Gameplay Streaming as sales of video games increased from the beginning of the pandemic, because consumers knew that they would require these types of distractions for themselves and their children. This allowed Ubisoft, being one of the most well-known video game creators, to reach historic sales figures in the third quarter of 2020, for more than €1 billion, representing an increase of 119% compared to the year of 2019. And the slowdown in revenues for the industry is not expected to begin until well into 2022, but surely by then many will be quite attached to a game. Likewise, sales in 2021 are expected to be down on last year, but not back to their pre-pandemic numbers: 21% more gamers are still expected than there were before Covid-19, never mind that a large percentage of the population is vaccinated and able to leave the house. Just looking at the figures between "gamers" (who play 5-15 hours a week) and "serious gamers" (who live in the glory of playing 20+ hours a week) the study found a 30% increase in this activity over the past year. In short: not only are people starting to play more, but also more people are playing. That translates into more than \$180 billion in sales by 2020.

## Findings

Findings from the desk research

### *Brief history of Gameplay Streaming*

The first patent that used the word Streaming was in the 1920s, when the company Muzak developed a continuous music platform for businesses. But when did streaming really start, before it came to live internet streaming, as it is known, it had to go through a series of stages: internet radio streaming, television streaming, music streaming platforms and live or recorded video streaming platforms.

GONZALEZ-REYNA, Gregorio Daniel, PÉREZ-BRAVO, Julia and CAMACHO-MOTA, Sandra Adriana. Set up gamer for gameplay streamer in Mexico, required investment and growth during the 2019 pandemic. Journal-Microeconomics. 2022

The BLOG CWS (2016) page mentions that internet radio stations were undoubtedly the first Streaming boom, as they did not need so much speed to tune in to the audio fluently, it was logical to think that their metamorphosis was towards video, when the first real time transmissions came out, they were only seen by 2 or 3 people, as there was no capacity to make it scalable, and they were events of maximum 4 hours.

De Freitas (2021) agrees with BLOG GLOG CWS (2016), but he says in his article that hardly anyone remembers it, but radio was the first streaming medium created towards the end of the 19th century, mainly for military purposes. The technology evolved into a user-oriented interface, which reigned in homes for many decades. Around 1920, US Major General George Owen Squier patented a system for transmitting and distributing signals over power lines to provide music to listeners without using a radio, allowing control over who would consume the service.

Avila, (2019), mentions that radio stations in the 1990s, which at the time did not require exorbitant speed to transmit audio and make it available to their audience. But part of the story begins on June 24, 1993, when the band Severe Tire Damage is the first band to stream live to the internet via radio, it was so successful worldwide that even the 45-year-old vocalist Steve Rubin himself with a PhD in computer science said "we're better at writing code than songs". The advantage for the internet radio station is that it can reach a large target audience that, for various reasons (such as the limited territorial reach of the radio signal), were unaware of a station elsewhere, but it should be clarified that not only AM and FM radio stations broadcast over the internet, since in recent years the number of radio stations that broadcast exclusively over the internet has grown exponentially, as there are now mobile devices where the radio is embedded, including the radio station on 90. 9 FM in Querétaro, which has a pop format known as 91 DAT, the number one in hits, has created an advertisement within its advertising station saying: "We all have radio included from your mobile we are global".

On the other hand, internet television streaming, that is, some digital platforms that allow high resolution video playback, some for free, others for a fee, have been the main source for the creation of different television programmes such as: cartoons, soap operas, series, music events among others, even traditional digital television as such no longer generates as much impact as internet television as new browsing platforms have been generated where by paying a subscription you have access to films, sports and series. The LUMEN website, De Freitas (2021) mentions that television, which was consecrated in the 1950s as one of the most important technological and cultural advances of the 20th century. But its story, undoubtedly, can only be told because Streaming existed. The evolution of streaming has accompanied technological advances in the world, such as the advent of the internet, and has come to depend on a connection to play multimedia titles and live broadcasts. Services grew at a rapid pace around the world and the pandemic added further speed to this trajectory.

So far, traditional television has become obsolete, not to mention that digital television and internet companies such as IZZI, Sky, Más Tv, Netflix, HBO, Telmex, Fibra TV, among others, have acquired the rights to some movies so that traditional television cannot broadcast them and therefore users cannot enjoy new content unless they purchase a monthly or annual subscription to some platform, but there are also websites where you can watch some movies or series for free.

As we have seen, streaming radio and television have generated a great impact at the time of their creation and for several years, but at the same time they have been evolving and creating new platforms to enjoy these entertainment services. Music has undoubtedly served as a distraction, motivation and entertainment since its inception. Radio stations, CDs and DVDs have been responsible for disseminating music at regional, federal, national and international levels. However, digital devices have evolved allowing for new applications and platforms to stream music. Applications such as Spotify, Amazon Music, Apple Music, Deezer and others have influenced the development of online music streaming.

But it is live video streaming that has revolutionised entertainment. Streaming through time (2021) mentions the evolution that has marked video streaming:

- 2001 The IP photo system.
- 2002 Live broadcasts
- 2007 Birth of livestream and ustream.
- 2008 Live broadcasts.
- 2010 Grouping of live broadcasts.
- 2011 Streaming on the Internet.
- 2012 Vortex is born.
- 2013 Live broadcasts.
- 2014 Youtbe open live arrives.
- 2015 Adapt with services (donations, sponsorships, advertising, channel memberships etc).

### *Gameplay Streaming*

Currently when we talk about Streaming it is related to live videos mainly of video games that are made on the platforms of Youtube Gaming, Facebook Gaming and Twitch as they are the most used and internationally known platforms but to understand the definition of Gameplay Streaming is necessary first to know What is Streaming? and What is Gameplay?, for this research is conducted by quoting several authors of some internet pages finding the following definitions:

Garcia, (2013), mentions traditional Streaming: As a process that consists of the delivery of one or more multiplexed media to a client in real time, using a network with a certain bandwidth (which does not necessarily have to be large). In the streaming process there is no file that is downloaded to the client's computer, but the media is played as it is being received, and in turn the media is received at the appropriate speed for playback, for which each streaming has a standard audio and video synchronised process, where the service requests from the clients can be handled using the RTSP protocol (Real Time Streaming Protocol).

This protocol is in charge of controlling the Stream of multimedia content in two directions, so that users can ask the server to do things like rewind the content, skip to the next chapter, rewind the video, pause it, among other options.

However, the features mentioned in the definition being from 2013 to the present day platforms have had to evolve towards better quality video and allowing users to have the opportunity to enjoy these updates for a better audio-visual experience, content that they observe thus giving an improvement in their playback, I mean talking about a video played on the computer or phone, before you had to calculate with your finger or mouse to rewind or forward the video, it was really frustrating as it always went back or forward more than desired, now there is the possibility, by tapping the screen twice, to go back or forward only in seconds. But how does streaming really work? It can be said that it is just the same video playback uploaded to a limited or unlimited global network where it can be watched by different users at the time of their choice, where the owners make the video available for the purpose of transmitting information, entertainment or communication. But on the other hand we have two different definitions:

Aller (2020). He defines Streaming as the online broadcasting of audiovisual content, which can be viewed on many subjects. On the other hand, there are streamers, who are the people who broadcast content. Likewise, references to them as content creators can be seen.

In the same way Garcia (2013) gives the concept of Streaming as any media content, whether live or recorded, that can be enjoyed on computers and mobile devices via the internet and in real time such as podcasts, webcasts, movies, TV shows and music videos, are common types of Streaming content.

But in truth, streaming should not be seen simply as a video or as a way of sharing what content creators do, but rather as any audio or video playback that can be considered as streaming, whether recorded, pre-recorded or live from a device that is connected to a network, however, each of them is categorised into different types.

Poor (2018) mentions 3 types of Streaming on the internet:

- Live Streaming: live streaming is a type of en Streaming in which live audio or video is transmitted over the internet. Media is streamed while being recorded, allowing viewers to watch or listen to it in real time.
- Streaming music: The most popular streaming content is video. Whether it is short video clips or full-length films, the best way to watch them is to use a streaming service.
- Streaming games and applications: You used to be able to buy a game on a physical medium and play it or install it on your game console or PC, nowadays you can buy a title or pay a subscription to access a wide range of games. You can play on PC, tablet or smartphone; as long as you have an internet connection.

There are indeed multiple sub-types of Streamings that are born out of each of the types mentioned, i.e., some are educational, entertainment, information, tutorials, fun facts, learning, video games, concerts, challenges, music, etc. That can only be recorded and uploaded or live where content creators can not only focus on one type of Streaming, this will depend on each of them, but some or most of them are made more than one in one, combining different types of Streaming in a single transmission.

Similarly, Garcia (2013) mentions that live streaming is the transmission of an event over the Internet as it happens. Award shows, sports, boxing matches, video games and one-off special events are the most popular types of live streaming, with the variety of topics constantly increasing. Social media platforms and others stream everything from celebrity events, promotions and life streaming to user-to-user streaming. You can do live streaming on any compatible smartphone, tablet, computer or gaming console with a relatively fast internet connection.

So, Streaming can be defined as a real-time transmission where video, audio and text of a live or pre-recorded video is transmitted and uploaded to a platform that allows the playback of the Stream with audio and video synchronised of some programs such as video games, events, promotions, educational videos, etc., which can be viewed or Streamings from any electronic device that has access to an internet network, being manipulated in the way that the user likes using a protocol of RTSP (Real Time Streaming Protocol).

On the other hand, regarding the definition of Gameplay, although all video game designers and players have this concept deeply rooted in their vocabulary, in reality there is no clear or formal definition that says what this concept means, it can be said that, a player normally when talking about "Gameplay" is synonymous with experience or the fact of seeing a player pass the game, so for the player the Gameplay is what gives life and meaning to the game, which allows you to have an experience within it and the most important thing about it is the sound and graphics of the game.

Definitive (2020) defines it from an etymological point of view, and states that this concept comes from the English words Game (game) and Play (play) and that at first it referred only to the gameplay or game mechanics, however, it has become popular to use this term to refer to videos in which you see how people play video games.

As you can see, Gameplay is an internationally known word associated with a content creator playing their favourite or trending game, making sense of the game, commenting on some curious fact about the game, such as their experience within the game in general, like its graphics, the audio, the quality of the game itself and even the interaction between the console and the action that is taking place within the game. On the other hand, it is not only based on their experience or their opinions expressed through a video but also on the way they narrate or comment on the actions that are carried out talking about their life, an anecdote or with those people who see it (better known as a community of users), but this will also depend on the game as there are linear games, free world and history, as each of them can limit them and may not be entirely fun.



On the other hand, Affiliate Researcher (2017), Crea the concept of Let's Play is a term used to refer to a content generated by users, who record a video of the game (Game Playthrough) generally adding comments, criticisms or reactions about the best and worst features, but this is not essential.

Gameplay can be defined as a live or video created by a Streamer transmitting the story or gameplay of a video game to a group of people, giving a general experience of it, making opinions of the game itself as it is:

Audio: The voices of the characters, the environmental sound effects (such as footsteps, opening doors, breaking things...), the ambient music (it must be taken into account that there are videogames with complete soundtracks, etc.).

- Graphic elements: Essentially the designs of the characters and the world in which the story takes place. But you can also include in this part the images of loading screens, the video game covers, and the cinematics (which sometimes look like you are watching a movie in the middle of the game.
- Literary elements: The game's plot and script, which rival those of the best Hollywood movies.
- Computer programs: Although most videogame development nowadays is done using third-party software, it is still a very important element, as without it the characters would not be able to move.

Now that the definitions of Streaming and Gameplay are known, it can be said that Gameplays form a massive source of entertainment where millions of people are pending on different platforms waiting for their favourite players to share their games live or publish them in the form of video, calling the name of Gameplay Streaming, however, there are some definitions by some authors:

Victorio (2021) defines Gaming Live Streaming (GLS) as a live broadcast where people stream content related to live video game play. These individuals, called Streamers, can spend hours broadcasting content that is watched by thousands of netizens, who interact with each other and form communities.

Affiliate Researcher, (2017), mentions that it is a term used to refer to a content generated by users, who record a video of the game (Gameplay) generally adding comments, criticisms or reactions about the best and worst features.

Thus the concept of Gameplay Streaming can be created: It is a live or audio - video synchronised entertainment performed by a content creator (Streamer or Youtuber) using an electronic device connected to an internet network such as a CPU - monitor (computer), smartphones, tablets, consoles etc., transmitting on different existing platforms video game games individually or a group of friends expressing comments, opinions and establishing conversations that may or may not see with the game, being able to perform games, contests, competitive within a global network interacting with different users in real time.

#### *Types of Gameplay Streamings*

The styles of Gameplay Streamings can vary depending on the Streamer, as some are explanatory, others try to explain the Gamesense that are the strategies and some tricks that can be used within the same game, i.e. for those users that take the game to another level, some others show matches in competitive games called e-sports, some are divided according to the chapters that the game itself has, thus giving each episode in a video or a Streaming, others are extensive videos whose proposal involves a continuous recording from start to finish of the game with the aim of "winning" or "passing it", and others try to pass the game in the shortest time possible. It all depends on the Streamer or content creator as there are several possibilities within the same Streaming and the variety that can combine the different games or stories of this giving different possibilities and not focus on a single routine.

On the other hand, the Streamings that originate the live videos once the transmission is finished, the video is available on their channels in the form of video (on demand) which is practically uploading the same Streaming so that the same or other users can enjoy the same Gameplay.

However, they can also be directly editions or compilations of the game, subjected to an editing process giving it a personal touch to make it more dynamic, to make it look at a high quality and even insert some images to make it look better and turn it into a more attractive and related content with the particular style of each Streamer or content creator.

The platforms Youtube Gaming, Twitch Gaming and Facebook Gaming which are the main international platforms where you can make these Streamings you can see a huge amount of Gameplays that exist and the different things that can happen in each of them as the essence of the Gameplay is that each of the Streamer gives his touch of personality to narrate or how to play and this makes it different even though they are the same game as they look from different perspectives.

Definitive (2020) extracts the following classification depending on the use given to the game when recording it and uploading it to a platform:

- Guide/tutorial: Very common in role-playing games (RPGs) and in games where the story is very important. These Gameplays are those in which you can see how the player goes through the game and shows his strategies.
- Randomised" gameplay: Very common in open world or sandbox games. The player simply records himself playing, without any specific objective, just facing whatever appears at that moment and doing whatever he wants.
- Competitive: Mostly in fighting games, shooters or strategy games. They are those in which the player is seen facing rivals.
- Casteo or commentary: Within the competitive Gameplays, videos in which the development of the game is commented on stand out. People who know the mechanics of the game well comment on how others compete.

- Creative: These are those in which the player takes advantage of the environment offered by the game to create their own story, thus trying to create their own audiovisual work. It is also common in sandbox games due to the freedom provided by the game.

#### *Gameplay impact during the pandemic in Mexico*

The news on the eSports Orange (2020) website mentions that as containment policies begin to relax around the world, streaming platforms continue to take stock of a historic few weeks. The quarantine has boosted the consumption of many online activities, including online gaming and live streaming. Portals such as Twitch have experienced months of media explosion. Not only have video gamers flocked to the platform, but the number of new streamers in different categories has grown unprecedentedly. Millions of anonymous users have been joined by major organisations and celebrities such as musicians and athletes, making platforms such as Twitch a major player in entertainment.

The domestic lock-in practised in almost every country has led the internet to break historical traffic records. A few days ago, the director general of AEVI, José María Moreno, confirmed in an interview that digital video game activity had increased by 52% during the first week of the state of alarm in Spain alone. On the other hand, the online services of many video games are part of this increase in data flow. The massive downloading of updates in games such as Fortnite even led to crashes in countries such as Italy, where traffic increased by up to 70%. The same happened in other countries where networks were not prepared for the sudden increase in traffic. In Mexico, the Xbox Live service was suspended for a few hours during the first weekend of the lockdown. These were just the first signs of the many milestones and records that began to be broken in the days that followed.

But the reality is that the platform that generated the most impact was the Amazon-owned purple platform better known as Twitch, which has been one of the biggest beneficiaries of the quarantine against the pandemic. In just a few days, Twitch saw an almost 100% increase with an average of 2.2 million viewers.

The following weeks of March were a milestone not only in hours watched (+37% at the end of the month), but also in live hours (+26.1%) and number of new streamers (29.3%) according to e-sports Charts data. The biggest increase was in English content, although there was an unprecedented increase in the consumption of streams in other languages such as Spanish, French, Portuguese, Russian, Polish and especially Italian, with a 75% increase in hours watched in that language.

Similarly Cabrer (2020) in his article analysis: "The impact of twitch during the pandemic", agrees with eSports Orange (2020) that the capacity with which Twitch has attracted popular characters such as Agüero, Courtois or Neymar during the confinement has dragged in new followers who have taken advantage of this situation to get to know their idols more closely. This platform has been evolving in such a way that the Twitch experience now transcends video games, which has benefited large corporations such as the Premier League, La Liga, NBA or Sony, who have taken advantage of the pull to create events that have benefited to increase the peaks of visualisations.

As can be seen only in the first months of the beginning of the confinement radically changed the transit that was carried out in the different Streaming platforms, however, not only with the emergence of new Streamers if not with the appearance of famous on the platforms as Kun Aguero of Argentina or the Chicharito of Mexico, has had a really important impact, to tell the truth the platforms to be international where there are different content creators can be seen that there is a variety of nationality within the community that exists. But for Mexico this has been no different, it has also generated a great impact on its economy and families.

Garduño (2021). He reports that in the midst of the Covid-19 pandemic, 67% of Mexicans have opted to watch series and films through streaming platforms, followed by 66% who preferred videos in applications such as Youtube and TikTok, while 42% chose video games, according to a study by Deloitte. On the other hand, the Covid-19 pandemic marked a trend among Mexican consumers to purchase smartphones by 17%, with 15% opting for television, 14% for laptops, 12% for video game consoles and 11% for tablets.

On the other hand, Fernández (2021) in the newspaper El Sol de Toluca mentions that the streaming platform is one of the technologies that have positioned themselves favourably in the midst of the Covid-19 pandemic, however, 66% of Mexicans are not willing to pay more than 300 pesos a month, so they accept watching short ads in series and films for free. In December 2020, the streaming service reported a nine-fold growth since its introduction in the Mexican market in June 2020. A survey conducted also revealed that nine out of 10 Mexicans used an entertainment Streaming platform in the last year to watch series or movies, however, due to the quarantine caused by Covid-19, 83% of respondents revealed that they have Streamed 2.8 hours more per day on average than in 2019. Ríos (2021) in his article published in the newspaper El Sol de Toluca mentions that the pandemic brought with it an addiction to video games among children, adolescents and young people. In some cases, it is not just a pastime, but has become a disorder with physical and emotional health effects. Playing through digital platforms via mobile devices, Nintendo and PlayStation consoles have been the recurrent forms of access.

Similarly, the specialist in psychiatry Nelly Capetillo said that addiction to video games has negative consequences in the short and medium term, not only because of the loss of social and even family relationships, it can generate high stress just because of the worry of not being able to play, just as an alcoholic becomes restless when he cannot drink or when a smoker cannot smoke.

In conclusion, it can be said that Gameplay Streaming has been a very important factor for the world economy, especially for content creators and platform owners. Its impact in Mexico during the pandemic due to covid-19 has not been as demanded as in other countries, but there has been an impact both on the servers of some games and on the platforms as quality is demanded; on the other hand, Mexican streaming is not as popular as Spanish streaming which has a greater demand of users and followers, although the Mexican population has followed the Spanish platforms and has consumed their content, they have also searched for their famous content creators who have made themselves known or have made collaborations with others of great recognition.

On the other hand, it is not only about the consumption of watching Gameplay but also the impact on children and teenagers of wanting to play the game that their favourite streamers play, which has generated an increase in sales of electronics such as smartphones and consoles.

### *Set up gamer*

Although we have already mentioned what is the Gamer and Gameplay Streaming, a content creator can not make these transmissions without having a Set up gamer, but for this it is also necessary to know its concept, so for those people who are immersed in the world of Gaming or are attracted by it, the concept of Set up gamer will not have any complications in identifying its meaning, the concept of Set up gamer will not have any complication in identifying its meaning, which can be said broadly that it is that room decorated with neon lights and bright colours that identify a gamer, however, some definitions of different authors are shown below:

Lumingo (2021) is a virtual page where you can acquire the necessary technological tools to install a Set up gamer. It mentions that a gamer set-up refers to the hardware configuration of a gamer's computer. In other words, it includes the parts that are used to achieve the most immersive and realistic gaming experience possible. So, when talking about a proper gamer set up, one has to consider everything that is needed for a gaming room. The consoles, the PC Gamer, the controllers, the Gamer headset, the keyboard, the table, the Gamer chair, among other accessories needed to improve the image, the sound and the virtual interaction. In that sense, the clearest meaning of Set up gamer is the arrangement of a number of elements specifically for gaming within a room, as well as the furniture necessary for this.

It can be observed that to be able to immerse oneself in a video game 100%, comfort is fundamental, deriving all those accessories and furniture necessary to be able to play, although the fact of having a PC, a console with headphones and even a Smartphone is already enjoyable the fact of being playing with the sound and graphics supported by the device, now imagining that you can go further into the game with additional accessories and a good installation of hardware and software, allowing the sound, graphics, rendering go beyond the limits, for example, today even consoles like Xbox and PlayStation in their controls have taken for shooting games or mobility of damage, and not only has vibration control, but even interacts with the actions that are carried within the same game.

Benlloch (2019) mentions that the word set up comes to mean arrangement and configuration. This meaning, applied to the Gamer world, refers to the configuration of the gamer's computer hardware. This configuration includes all the pieces that the gamer needs to have a good gaming experience: the gaming mats, the keyboard, the mouse, the graphics card, the RAM card or the hard drive, to give some of the most representative examples of gaming peripherals.

In fact, there are gamers who go a step further and even arrange all these pieces in a room strictly designed for playing video games. There are many gamers who add LEDs to their gaming set up, to make the experience much more immersive.

The Set up can be defined as a set of electronic equipment and complementary accessories within a room or space set with a type of neon lighting, and a configuration in the devices suitable for enjoying a Gameplay.

### *Initial investment in Mexican pesos to install a gamer set-up*

To install a gamer set up in Mexico it can be said that it is relatively cheap, and can be installed in periods, for this we made a table of some basic accessories and market prices in October 2021:

Accessories	Price in Mexican pesos
CPU) Xtreme PC Gamer Geforce GTX 1050 Ryzen 5 16GB SSD 480GB 144Hz Monitor	\$ 22,899.00
Monitor Curved, Black (Black High Glossy), 23.5	\$ 3,849.00
Combo Wired Rainbow LED Backlit USB Keyboard and Mouse Combo	\$ 799.00
Wireless RGB Headset with Gaming Microphone	\$ 3,399.00
HyperX QuadCast - USB Condenser Microphone for Gaming and Streaming	\$ 2,899.00
Cgc600 Reclining Gamer Chair	\$ 4,199.00
Logitech - C920s - Full HD 1080p Webcam with Shutter Cover	\$ 2,199.00
Gamer Desk Vertuo 120, Home Office Desk	\$ 2,139.00
L-Shaped Corner Desk	\$ 2,839.00
Wardrobe Cubes	\$ 1,153.00
Accessories, (USB, CABLE, CHARGERS, INTERNET, ETC)	\$ 3,000.00
	\$ 49,374.00

**Table 1** Initial investment to install a Set up gamer  
*Source: Own elaboration based on prices compared in Mercado Libre and Amazon 2021*

It can be seen in the table the prices a total of forty-nine thousand three hundred and seventy-four Mexican pesos to be able to install a basic gamer set up, it is worth mentioning that the purchasing power of the real labour income per capita had an increase of 2.9% between the first quarter 2021 and the second quarter 2021, going from \$1,827.39 to \$1,879.53 according to the CONEVAL page (2021) so to be able to acquire the money it is necessary to save around twenty-seven quarters if the statistics of the last update are followed.

Summary of the results

Throughout the research it was possible to observe several issues that lead to meet the objective of the research, including the evolution of Streaming until reaching the Gameplay Streaming, as well as a compendium of definitions to derive the own of the topics Streaming, Gameplay and Set up gamer; It was also found that although this hobby business was already known and popular before the pandemic, during the pandemic it had an exponential growth in audience by 118% on the Twitch Gaming platform, 117% on Youtube Gaming and Facebook Gaming although it had a low audience growth during the year 2020; in turn also grew in new Streamers or content creators in each of the different platforms especially on Twitch. It can be seen that both children and adults enjoy this entertainment in the same way.

Now well, after the investigation of costs for the investment, it is found that it is relatively inexpensive for a young Mexican entrepreneur to be able to install a basic gamer Set up at home to be able to make Streamings, being able to reach up to \$50,000.00 fifty thousand Mexican pesos; although it was also suggested that they can be made from a Smartphone connected to an Internet network which would be much more economical.

Discussion

In Mexico it is difficult to locate research conducted on Set up gamer, but on the internet you can find various blogs and videos about it, as well as research from other countries, however, in 2019 is located the research of Tetlamatzí who provides knowledge about the brand Yeyian which is dedicated to produce and market accessories and peripherals for the installation of PC Gamer.

Penalva (2019) agrees with the authors of this research by stating that it is relatively low investment in the assembly for a basic gamer set up, which can go from 500 euros and can reach up to 4500, likewise provides a specialized buying guide of necessary resources, however, the aforementioned research is for Europe.

Rodríguez de Luis (2021) provides information on how to set up a gaming set up, showing how to install a comfortable and functional space.

Robles (2020) marketing manager of CyberPower Mexico, says that the gaming market in Mexico is diverse and broad and that its market reached 72.3 million users by the end of 2020, so it has generated an important niche to invest. The truth is that it is such a good investment to install a gamer set up and to perform live or recorded streaming, to the extent that development banking companies such as BBVA Bancomer suggest investing in video games and eSports.

## Conclusions

Following the documentary research and the analysis of the information obtained, it can be concluded that Gameplay Streaming is currently so popular at an international level that its influence during the incorporation of new users on the different platforms during the COVID-19 pandemic has generated income for the platforms themselves, the international and national video game creators and especially for the Streamers, due to the arrival of users with the aim of finding entertainment; On the other hand, the arrival of the new Gameplay Streamers has added profits to those producers of technology related to the Streamers, which creates a chain and a regional, national, international and global monetary mobilisation, which generates that the Gaming industry takes a major economic force by being exempt from taxation; Therefore, although it is an expense, this is not very high, being one of the findings of this research with which various authors cited agree, coupled with the fact that it is highly profitable, so it is advisable to invest in resources to generate a Gameplay Streamer, which, as a business, will take time to generate audience and get sponsors, but the creator of Gameplay Streamer can get to be favoured in the future by the income generated.

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**Processing and export strategies of small coffee producers in Oaxaca**

**Estrategias de transformación y exportación de pequeños productores de café de Oaxaca**

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**Abstract**

Given the need to scale up small producers in the coffee value network, the case of the National Union of Oaxacan Agricultural Workers (UNTAO) SPR, from RL, is presented as a link in the chain to incorporate small coffee producers. Oaxaca in the specialty coffee marketing segment in international markets. Through qualitative research and statistical analysis of coffee samples from three groups of producers from Oaxaca and one from Chiapas, the strategies of small organized producers to escalate to the specialty coffee export link are identified. It was found that the value added in the local industrialization contributes to the integration of small producers in the export of specialty coffees in the international market,

**Resumen**

Ante la necesidad de escalamiento de los pequeños productores en la red de valor de café, se presenta el caso de la Unión Nacional de Trabajadores Agrícolas Oaxaqueños (UNTAO) S.P.R., de R.L., como un eslabón de la cadena para incorporar a los pequeños productores de Oaxaca en el segmento de comercialización de café de especialidad en los mercados internacionales. A través de investigación cualitativa y análisis estadístico de muestras de café de tres grupos de productores de Oaxaca y uno de Chiapas, se identifican las estrategias de los pequeños productores organizados para escalar al eslabón de exportación de cafés de especialidad. Se encontró que el valor agregado en la industrialización local coadyuva a la integración de pequeños productores en la exportación de cafés de especialidad en el mercado internacional, siendo un actor estratégico en la apertura de nuevos nichos de mercados para los pequeños productores.

**Strategies, Value chain, Agricultural, Export**

**Estrategias, Cadena de valor, Agropecuario, Exportar**

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## Introduction

Derived from the demand for more sustainable management of agricultural production chains and natural resources (Gomez, et.al., 2022), four segments can be classified in the global coffee marketing network: a) cherry coffee marketing, with the participation of farms, small producers and local and international companies that have wet processing facilities in producing regions (González, et. al. 2019); b) commercialization of parchment coffee, carried out locally with intermediaries (Morales, 2019), involving peasant organizations, producers, cooperatives, buyers for its transformation, collection centers, importers and roasters; c) commercialization of green or gold coffee, with the participation of collection centers and mills, importers and national and international roasters, cafeterias and/or coffee bars and; d) roasted and ground coffee where the final customer is the consumer of a cup, for preparation in a coffee pot, pot or some other method.

Green coffee is par excellence the commodity market for exporting coffee from producing countries to large consumers, despite the fact that other business models have emerged for the export of roasted and ground coffee and coffee by-products.

The high demand for green coffee beans (Quintero, et. al. 2013) due to the advantages of transportation, storage, conservation of attributes and distribution, have led to the formation of different market niches in the green coffee segment: conventional (commodities), with a price referenced by the New York (Arabic) and London (robusta) stock exchanges; coffees that have certification systems, voluntary marketing schemes and specialty coffee markets, where "consumers have a growing interest in having information regarding the origin of coffee" (Olmos, 2019, p.09).

According to reports on sustainability initiatives of the International Coffee Organization (ICO, 2022), among the main international certification programs are: 1) Organic product certification, based on the low use of chemicals that can affect the soil and the environment, for which the volume of production per producer decreases compared to a conventional scheme and this needs to be paid; 2) Fair trade certification, in which the working conditions of the producers are promoted, the work of minors is prohibited and the degradation of their ecosystems is avoided (ibid); 3) Rainforest Alliance Certification, which promotes a sustainable production system where "farmers can control costs, acquire greater efficiency and improve crop quality" (ibid); 4) Smithsonian Migratory Bird Center (SMBC) "bird-friendly" certification that promotes shade-grown coffee; and 5) Utz Certification, which has an "online track and trace system that tracks UTZ CERTIFIED coffee throughout the chain, from farmer to roaster" (ibid).

These sustainable systems mostly consider environmental, economic and social aspects, as well as economic transparency in each of the links in the value chain (Padilla, 2016); However, the process to achieve certification implies "the participation of other instances to achieve it, including a third-party certifying agency that guarantees compliance with the standards that have been defined, which entails a cost" (Delgado & Akaki, 2011, p.94). Sustainable or certified coffees "meet two criteria: environmental protection and social justice" (Giovannucci, 2001, Apud Perea, 2010).

There is also the niche market for specialty green coffee without organic or sustainable production certificates, which promises to be a scheme with a differential without the need to assume transaction costs for small producers of production certificates; However, due to the proportion of consumption and the demand for specialty coffees worldwide compared to conventional coffee, there is still a long way to go before small producers manage to place all their coffee in the quality exportable coffee segment.

Specialty coffee refers to the recognition of its origin and its traceability from cultivation to packaging in grain pro bags for export.

Specialty coffee is "one that meets certain characteristics: the highest quality, a particular flavor and cultivation in specific geographic microclimates following rigorously established standards" (Castro et. al. 2004, p. 62). Specialty coffees follow a rigorous quality control process from their cultivation, production, harvesting, transformation, roasting, grinding and packaging.

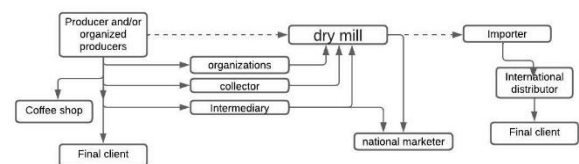
The commercialization of specialty coffee refers to a coffee free of almonds with primary defects and a number of secondary ones, with an adequate percentage of humidity, with an accepted appearance in its presentation in gold coffee and with a cup score that exceeds 80 points according to criteria of the Specialty Coffee Association SCA (Specialty Coffee Association), with the best coffee attributes such as cleanliness, sweetness, acidity, body, flavor, residual flavor, balance and overall impression (Gamboa, Mosquera & Paz, 2015).

In marketing, the points to negotiate prices consider two criteria: conventional coffees aligned to the New York market prices and differentiated coffees above 84.5 cup points at the request of buyers. Specialty coffees may have some or no certification, depending on the purchase contracts.

Depending on the level of production, sellers can analyze business strategies to ensure better benefits, being able to market with or without certifications, based on quality and attributes.

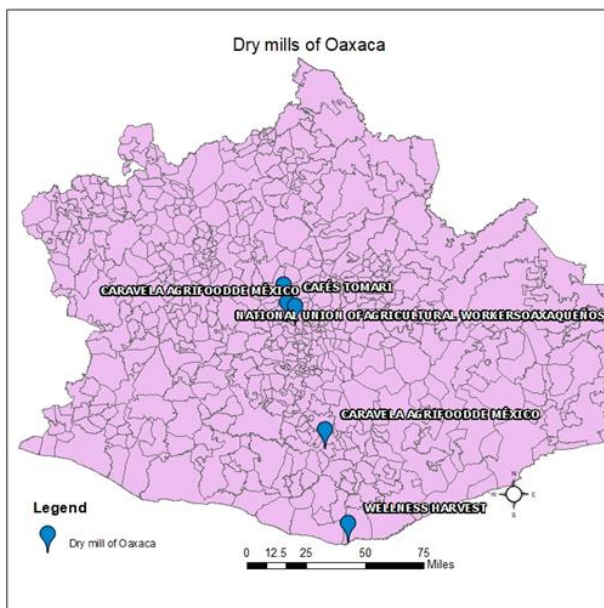
In Mexico there are 12 producing states, but the ones with the highest volume are Chiapas, Veracruz and Oaxaca with more than 80% of the total production, "in the 2017 cycle, Chiapas harvested one million 317 thousand 11 60-kilo bags of green coffee, in Veracruz, one million 29 thousand 219 60-kilo bags of gold coffee were obtained, in Oaxaca 438 thousand 130 60-kilo bags of green coffee were produced" (CEDRESSA, 2018, p. 2) positioning the country as the eleventh producer worldwide.

The quality of Mexican coffee is recognized worldwide for its attributes, so much so that "51.95% of national production is destined for domestic consumption and the rest for exports" (Secretary of Agriculture, Livestock, Rural Development, Fisheries and Food, 2016, p.04) having the United States as the main consumer, for which common codes have been created for the export of green coffee, which aim at the incorporation of new marketing schemes in the export process, becoming an opportunity so that small producers can reach direct markets both nationally and internationally and thereby eliminate some intermediaries and economic and social gaps (Torres, 2022) between the actors in the chain.



**Figure 1** Coffee marketing scheme in Mexico. Fountain Source: Elaboration based on Gereffi, 1994, Velázquez, 2016, Humphrey and Sturgeon, 2005

In Oaxaca there are three main green coffee exporters that promote different strategies to provide continuity in the value chain until reaching the international market. Some of these are the commercialization of conventional coffee in volume, such are the cases of: Agroindustrias Unidas de México (AMSA), Café California, Triunfo Verde and Isman Orgánico. Likewise, there are industrializers and local collection centers with certificates for organic transformation and with export permits that are inserted in the niches of coffees with organic or specialty certifications, among them are: exporter National Union of Agricultural Workers (UNTAO) SPR de RL, Yeni Navan SPR de RL collection center, two Agroalimentos Caravela de México SA de CV collection centers and the Cafés Tomari SA de CV collection center



**Figure 2** Coffee processors and exporters in the city of Oaxaca

Source: Prepared by the SADER Directory of Processors, Collection Centers and Coffee Industrializers (2022)

The case of UNTAO stands out because it is a local company, with origins in the organization processes of small producers in Oaxaca who have sought, through different forms of organization with the State (Farjat & Lozada, 2022) and the market, to insert themselves into the global coffee chain, so it is extremely important to know the strategies that small producers and small local companies dedicated to the transformation of coffee are using to add value and achieve sustainability in the first links of the chain (Bravo, 2019), which allows them to have a margin in the price negotiation against the different market segments.

### Methodology and techniques for the generation of information

The methodological process was of a mixed qualitative-quantitative type, supported by the application of instruments (Hernández, Fernández & Baptista, 2010) such as the in-depth interview, participant observation and analysis of reception, processing, export and pricing records. The interaction networks (Castellanos et. al. 2001) of the UNTAO with other local organizations, with groups of organized producers and with independent producers, as well as the export strategies of specialty coffees are identified.

The in-depth interviews were applied to those responsible for strategic areas of the solidarity company: a) General Manager; b) Responsible for receiving coffee; c) Head of mortar train operations; d) Green coffee storage manager and e) Taster.

The results describe the marketing and export strategy according to the in-depth interviews carried out, the value network identified according to observation records of the processing that is followed in the dry benefit and transformation of parchment coffee to green coffee; to later make a comparison of the results of physical analysis in the performance factor and export percentage. Finally, the opportunities and limitations for export are identified considering the availability of coffee received and the fixing of the price of exportable green coffee.

### Analysis unit

The National Union of Oaxacan Agricultural Workers (UNTAO) SPR de RL was legally founded on April 29, 2009; However, it has its history in cooperative societies of small coffee producers in the Sierra Sur, Costa and Mixteca region of Oaxaca that had organic certificates in coffee production (Contreras, personal communication, May 6, 2020), which after more than After three years of organizational work, they created the Union of Organizations and Processors of Organic Coffee of Oaxaca (UNOPCAFE) SPR de RL, acquiring in 2009 a warehouse and mortar train in the facilities of the Industrial Park and Maquiladora "Oaxaca 2000" in Magdalena Apasco, Etla, with the main objective that small producers, through the union of cooperatives, become involved in the next link in the production chain, which is the dry mill with quality control and the commercialization of organic coffee until it reaches exportation, monitoring the destination of the coffee. grain; However, due to organizational issues, due to agreement, the high transaction costs and the lack of financing for the purchase of coffee and maintenance of the infrastructure and operating expenses, UNOPCAFE disintegrated in 2012 and the National Union of Agricultural Workers (UNTAO) SPR de RL with the support of a peasant organization for the financial rescue of the solidarity company; without losing the objective of linking small producers with differentiated coffee markets.

It was thus that until 2015 the institutional and operational framework of UNTAO was consolidated, where standards were defined for the realization of the dry mill, the commercialization of green coffee and for the expansion of services such as the export of lots and microlots, service of roasted, ground and packaged, according to the needs of the client portfolio.

In order to carry out the commercialization of specialty green coffee, they had to guarantee the quality of the dry mill, which consists of a process of coffee for eight moments in the industrialization: reception and physical analysis, pre-cleaning, threshing, cleaning, classification, classification by color, stored and bagged (Morales, 2022. P.60).

In 2016, UNTAO established alliances and strategic relationships with importers, national and international distributors of specialty green coffee, internal and external relations with small groups of organized state producers, in order to know the coffees that were produced in each one of the regions of the state of Oaxaca, establishing relations of collaboration, coordination, integration or price negotiation.

Since 2017, UNTAO has positioned itself as a center for the reception and cupping of samples and a reception center for batches and micro-lots to carry out dry milling and export to organized groups and national and international companies, ensuring the traceability of the coffee from the plot to the export and prevailing good practices in the dry benefit of coffee. In the 2016-2017 harvest, two 17-ton containers of specialty coffee from the Sierra Sur, Cañada, Sierra Norte and Mixteca regions were exported, with more than 84 points in cup, with an average price of 2.3 USD/lb., compared to an average price of futures markets on the New York Stock Exchange of 1.4 USD/lb

Harvest	Maximum	Minimum	Difference	Average USD/100lb	Average price USD/lb FOB	%var.
2016-2017	176.00	113	63	140.14	1.4	-12.17
2017-2018	141.35	95.45	45.90	119.21	1.19	-23.45
2018-2019	125.50	83.65	39.15	101.15	1.01	-4.59
2019-2020	138.40	92.2	46.20	110.63	1.1	11.54
2020-2021	215.20	102.15	113.05	148.59	1.48	57.3
2021-2022	260.45	167.75	92.70	221.14	2.21	-8.14

**Table 1** Historical future coffee data, harvest 2016-2017, 2017-2018, 2018-2019, 2019-2020 and 2020-2021  
*Source: Prepared with information retrieved from <https://mx.investing.com/currencies/usd-mxn-historical-data>. The month of September is taken as a comparative reference for the new harvest cycle*

In the 2017-2018 harvest, there were good expectations for the coffee cycle; however, the stock market benchmarks fell to 1.19 USD/lb in the green at FOB (Table 1), even so the portfolio was expanded to import clients and distributors with social responsibility approaches, who shared the way of thinking with the company to achieve the sustainability of production and improve the quality of life of the producer, directly linking the producers and ensuring the traceability of the product. A sale price of 2.5 USD/lb was achieved, compared to 1.19 USD/lb in the futures market, which entailed a payment of between 60 to 70 pesos per kg of parchment coffee.

For the 2018-2019 harvest, the stock market benchmarks fell even further to a minimum of 83.65 USD/lb (Table 1), but UNTAO maintained its average harvest price, allowing the expansion of linkage and purchasing relationships with organized producers. from the municipalities of San Juan Ozolotepec, San Agustín Loxicha, San Marcial Ozolotepec and Santo Domingo Tejomulco, obtaining contracts at an average price of 2.7 USD/lb.

In the 2019-2020 harvest, UNTAO managed to negotiate the conservation of its prices; However, due to the pandemic, the volume of product placement in the world market decreased due to the closure of borders and the confinement of the main consumers of Mexican specialty coffees.

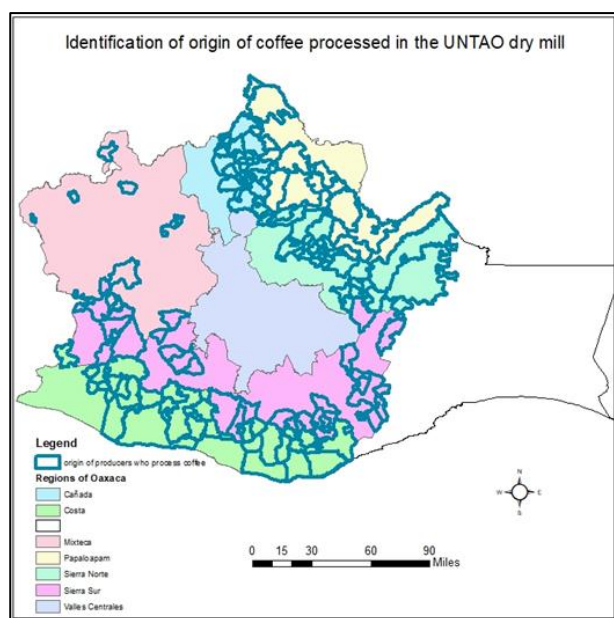
For the 2020-2021 harvest, the effects of the pandemic, confinement and increased home office continued, which contributed to the reactivation of the world coffee market, for which UNTAO managed a price between 2.5 and 3 USD/lb.

For the 2021-2022 harvest, transaction costs increased, especially shipping costs from the port of Veracruz to destination international ports, by up to 700% (Safelik, 2021), turning into a container crisis and therefore an increase in price. The futures market increased to 2.21 USD/lb (Table 1) and UNTAO increased its sales transactions up to 3.9 USD/lb, translating the payment to the producer of between 90 to 105 pesos per kg of parchment coffee.

In the global integration process (Gereffi, 1994), UNTAO functionally joins the dry mill and export link and ensures strategic alliances that do not devalue export prices and payments to producers; but rather that they are agreed under cup quality standards and with the alliances it is ensured that in the future the price paid to the producers is maintained and is not devalued so drastically due to the fall of the New York stock market, but rather that the price agree for cup quality and reduce the risks of high speculation and price volatility in futures markets.

With this, the declared purpose of UNTAO is "to contribute to the development of coffee producers in the rural communities of the entity, integrating into the production, processing and marketing processes, with an active, responsible, honest and transparent participation, promoting a sustainable development of the coffee-producing communities of Oaxaca" (Contreras, personal communication, 2020).

UNTAO currently provides services according to the storage, processing, selection, and export needs of 20 social organizations and organized producer groups, strengthening the transformation processes of approximately 3,000 small producers in the Sierra Sur, Costa, Mixteca, and Sierra Juárez regions. and Cañada (Figure 3).



**Figure 3** Identification of origin of coffee processed in the UNTAO dry mill

Source: Elaboration with information from UNTAO

## Results

### Marketing strategies to enter the global coffee market

In the case of the industrializer UNTAO, four major strategies were identified to enter the global coffee market:

The first refers to the quality analysis of samples by lot and microlot, where physical and sensory measurement are essential for the identification of defects and for the detection of organoleptic qualities in the cup of specialty coffees "including aroma, acidity, the bitterness, the body, the flavor and the overall impression of the drink. The quality of the coffee is measured by its intensity and balance." (Door, 1999, p.97).

In the physical measurement, the yield and export factor is obtained, for which subsamples of 300 grams are taken and the humidity measurement is carried out with a digital meter (hydrometer) in order to recognize if the humidity percentage is accepted when found in a range between 10% and 12%.

To carry out the yield factor analysis (amount in kilograms required to obtain a 70-kilogram bag of exportable green coffee), the general yield formula is used:

$$\text{Overall performance} = \frac{AL}{Ppm} \times 70 \quad (1)$$

$AL$  = clean almond

$Ppm$  = Parchment sample weight (300 g).

$$\text{Performance factor} = \frac{(Ppm \times 70)}{AS} = Fr\% \quad (2)$$

In the export percentage, a relationship is established between the weight of the healthy almond and the weight of the parchment coffee sample, multiplying the result by 100.

$$\% \text{ export} = \frac{As}{Ppm} \times 100 \quad (3)$$

$Ppm$  = Weight of parchment sample (300 g).

The acceptable range of yield of exportable coffee must be above 68%, since it is indicated that for every 100 kg. of parchment coffee, 68 or more kg are obtained. of green coffee



The protocol carried out at UNTAO to detect a coffee free of defects and with properties and attributes of good flavor, aroma, color (Castro et. to the. Op. Cit.), it is taken into account that the analysis is carried out in a laboratory that ensures "that environmental conditions do not affect the results or compromise the required quality of the measurements made" (Funéz, 2010, p. 05) and are followed procedures for sample control and storage.

In the analysis of three coffee batches (Sierra Norte de Oaxaca batch, Chiapas batch, Sierra Sur - Candelaria Loxicha batch, Sierra Sur San Pedro el Alto batch) the results of yield and export percentage were strategic to negotiate. the price of coffee

The Sierra Sur/San Pedro el Alto batch was washed with a total volume of 5747.2 kg, with acceptable parchment moisture <12.5%, with a good yellow color, free of foreign matter, which in its transformation to green brown It had a yield factor (fr) of 90.3, which indicates that 90.3 kg of parchment coffee is needed to obtain an exportable bag of 69 kg, an export percentage of 77% of the lot and a cup quality of 84.5 points. The microlot of Sierra Sur/Candelaria Loxicha, was a honeyed process with a volume of 429 kg with a humidity of 14.4%, yellow color, sweet and sour smell and trunk, with a fr of 95.4 for which 95.4 kg of parchment coffee are needed to obtain a 69 kg bag and therefore a lower export factor than the lot of Sierra Sur/San Pedro el Alto, but with a cup quality of 85.5 points.

Region/Municipality	Sierra Sur/Candelaria Loxicha	Sierra Sur / San Pedro el Alto	Chiapas	Sierra Norte
Process type:	Honey	Washed	Washed	Washed
Kg parchment coffee:	429kg	5747.2kg	2822.8kg	7592.3 kg
Parchment moisture:	14.4%	12.20%	12.50%	12.80%
Smell:	bittersweet , trunk, Wood	dry greenish	Dried	Dried
Color:	good yellowish	good yellow	Yellow with brown and white	yellow with white
Free of:	Free of stick, stone, foreign matter.	Free of foreign matter.	Excess cherry peel.	Clean with cherry peel

Clean almond:	235g	251.2	249.6	251.6
healthy almond	220g	232.4	188.2g	223.8
Green brown moisture:	12.1g%	10.80%	10.50%	12.80%
Sieve 14 or below:	11g	13.4g	40.8g	twenty
Defects:	4g	4.6g	26g	8
Fr:	95.4	90.3	111.58	93.8
% export:	73%	77%	63%	74%
Expected sacks:	4.5 bags	64 bags	25.2 bags	81.4
primary defects	Zero defects.	Zero defects.	Zero defects.	Zero defects.
secondary defects	Two minor flaws.	(3 split or bitten was 16 grains). A partial sour 3 grains. Hence 0 averanados 1 grain and hence 0 shell 2 grains).	3 secondary defects (3 cut 17 grains and zero partial sournes 2 grains and zero shells 2 grains)	6 secondary defects: (4 cut, 23 grains, 2 partial blacks 8 grains, zero shells three grains)
cup quality	85.5	84.5	84	84

**Table 2** Comparison of different coffees from Oaxaca and Chiapas  
*Source: Own elaboration with subsamples of four origins*

The lot of Sierra Norte was a washed process of 7592.3 kg, with parchment humidity of 12.80%, white yellow color, with six secondary defects and 94.8 kg are needed for a 59 kg bag. The export percentage was 74% and the cup quality 84 points.

On the other hand, the Chiapas coffee lot was 2822.8 kg, with a humidity of 12.5, with a humidity of 12.5%, yellow with brown and white color, with excess cherry peel and three secondary defects. The fr of 111 that indicates that more than 20 kg of parchment coffee is required for an exportable sack compared to coffee from San Pedro el Alto.

Regarding secondary defects, coffee from Sierra Sur - Candelaria Loxicha has the lowest number of secondary defects followed by coffee from Sierra Sur - San Pedro el Alto.

The coffee that comes from the Sierra Sur Costa region, is a coffee that with good management in the crop and in the wet and dry benefit, presents scores higher than 84.5 points in cup, so being well organized and having a good benefit humid, it is very feasible for producers to join up to the third link of commercialization via export and negotiate prices of specialty coffees with differentials of more than 10% with respect to conventional coffees.

Another strategy to scale up small producers in the value chain is the presentation of export services, with the following services available at UNTAO: a) Volume export of a coffee container with a capacity of 250 bags by sea; b) Exportation of small quantities or fewer bags by land; and c) Export in a consolidated process where small producers are incorporated into other containers (but subject to waiting times) from coffee organizations or requests from importers.

The third strategy is the creation of a mix of coffee profiles and coffee zones, which is supported by the results of coffee sample cuppings.

And as a fourth strategy, good practices in coffee processing (dry benefit), storage and export logistics of green coffee are ensured.

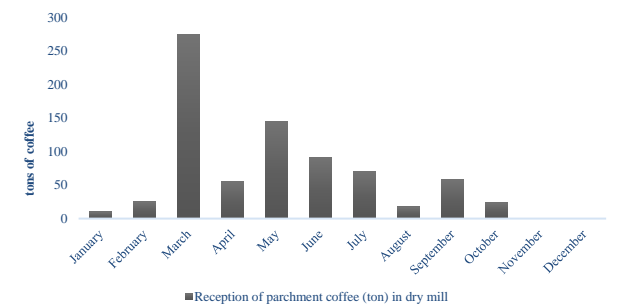
### Oaxaca coffee export experiences

Small organized producers and some independent producers from Sierra Sur/San Pedro el Alto, Sierra Sur/Candelaria Loxicha and Sierra Norte have been able to export their coffee to the international market, especially to the United States, Canada, Germany and Australia, for which which was a necessary condition to have met at least 84 points in the cup, according to the contracts agreed with importers and roasters.

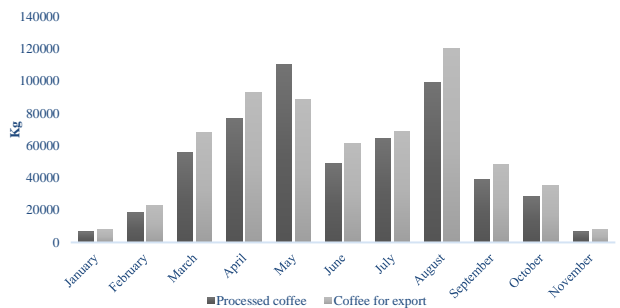
In general, the maximum link up to which small producers in Oaxaca venture is until commercialization for export. The producers come to follow their coffee to the port of Veracruz and the destination countries, but later, they no longer know places of consumption of their product.

In the 2019-2020 production cycle, UNTAO received 970 tons of parchment coffee for physical analysis, with the period from March to July being the period with the highest receipt of entries, of which 65% went through the threshing and selection process in the mortar train, which is equivalent to 630 tons of parchment coffee.

To obtain green coffee with standards above 84 points in the cup, hard work was done in the processing of dry benefit from March to September, 88% obtained for export or commercialization, so there was a 12% loss of husk and damaged grains.



**Graphic 1** Reception of parchment coffee (ton) in dry mill  
Source: UNTAO databases



**Graphic 2** Processed coffee for export per month (2020) in UNTAO  
Source: UNTAO databases

The UNTAO prices compared to the prices on the New York Stock Exchange in the 2018-2019 and 2019-2020 cycles, in their conversion to pesos were historically as follows:

Year	Average USD/lb	Average dollar exchange rate	pounds in 1 kg	FOB price X KG \$	UNTAO price FOB X KG \$
2016-2017	1.33	18.90	2.2046	55.54	s/d
2017-2018	1.12	19.24	2.2046	47.54	s/d
2018-2019	1.03	19.35	2.2046	44.25	2.65
2019-2020	1.12	21.58	2.2046	53.37	2.65-3.0
2020-2021	s/d	s/d	s/d	s/d	2.65-3.5

Note. Price per kg of green coffee, in bags and placed in port

**Table 3** NY stock prices  
Source: Own elaboration with databases from UNTAO (2022) and Specialty coffee (2018, 2019 and 2020)

According to data from the New York Stock Exchange, FOB contracts, prices were between \$44 and \$55 pesos from 2018 to 2020, which is a low and unprofitable price due to the costs involved in producing, processing, and exporting the grain. ; while the UNTAO achieved prices with ranges between 115 pesos/kg and 125 pesos/kg, which is why many producers in Oaxaca have chosen to organize themselves and look for options to improve the quality of the coffee and the standards in price negotiations.

One of these options is the market segment with certifications such as organic certification, Fairtrade certification, Rainforest certification or UTZ, which establish differentials based on the price quoted on the New York Stock Exchange and the other market segment is coffee. of specialty, evaluated in microlots.

Year	Average USD/lb	Average UNTA O USB/lb	Average dollar exchange rate	pounds in 1 kg	FOB price X KG \$
2017-2018	2.80	s/d	19.24	2.2046	118.76621
2018-2019	2.65	2.65	19.35	2.2046	113.04638
2019-2020	2.60	2.65-3.0	21.58	2.2046	123.6957

Note. Price per kg of green coffee, bagged and placed in port. \* Average prices obtained from the 2020 Specialty Coffee Transaction Guide

**Table 4** Special coffee prices  
*Source: Prepared with data from Specialty coffee (2020) and UNTAO (2021)*

One of the circumstances in favor of producers is that the high potential of Oaxacan coffee is well known nationally and internationally, as producers from different regions and municipalities of the entity are awarded prizes and distinctions for excellence and quality. of the coffee. The most important factors to achieve a good score in the cup are the agroecological conditions, the good handling of the coffee in the production stage, in the transformation of wet and dry processing, as well as in the attributes achieved in the tasting of samples, especially clean cup and good acidity.

For Oaxacan coffee buyers, a quality coffee is one that has a yield for export greater than 70% of parchment coffee; a humidity percentage between 11% and 12%, zero primary defects and less than five secondary defects. While, to be considered a specialty coffee, it is necessary to go through the cupping process and obtain a score above 84.5 points, in addition to meeting the above requirements.

Another important aspect is that more than 90% of coffee producers are small-scale, even due to the drop in production they only reach a level of self-sufficiency. According to the interviews carried out with a sample of producer clients who request the services of UNTAO, they have harvested surfaces from 0.5 hectares to 5 hectares, so they have to collect coffee from their region, differentiating between small producers so as not to lose traceability, but also to reduce transport costs and dry benefit.

In addition, the drop in green coffee prices and the socioeconomic conditions of their places of origin limit their interaction with other actors that participate in the chain to add value to coffee products and by-products, which has led them to organize in small groups of producers at the municipal level, to affiliate with state coffee organizations and to depend up to 25% on intermediation at the community level.

According to data from the General Manager of the UNTAO dry coffee mill, of the total production in the state, approximately 80% of the production goes through the chain of classification and threshing by special machines to be marketed depending on the needs. market; the rest is sold in the national or local market under the presentation of roasted or ground coffee.

Conclusions

Faced with a cycle of disadvantaged situations (Farjat & Lozada, 2022) in marketing and due to the onslaught of market forces and aromatic prices, small coffee producers in Oaxaca continue to fight and organize to create strategies to climb the value chain and achieve sustainability and social well-being (ONU, 1987).

Producers "are the first link in a wealth generation chain of which, however, they keep only a fraction" (Villanueva, 2022, p.3). More than 80% of coffee producers sell their coffee in parchment(González, et. al., 2019) in Oaxaca in one or two sales with intermediaries, depending on the price offers and the immediate need for resources to pay food and production debts.



Parchment coffee commonly reaches large transnational companies, importers, distributors to be transformed and marketed in the large ground and roasted business, as well as for sale in cups in national and international self-service stores, where most of the profit remain in the last links of the chain.

Therefore, through local organizational experiences in the different coffee-producing regions of the State of Oaxaca (Sierra Norte, Sierra Sur, Costa, Mixteca, Istmo and Cañada), actions have been promoted to reach at least the link of Green marketing in the export market.

The fundamental role of the local coffee transformation industry in linking small producers with international buyers was identified, contributing to the elimination of intermediaries in the global value chain, organizing micro-lots originating by municipality or organization of specialty coffees.

Among the strategies identified to achieve the scaling up of small producers in Oaxaca, the importance stands out for small producers to know the yield factor of parchment coffee in its transformation to green coffee and the quality of their coffee, in order to have more elements in the price negotiation.

The second strategy consists of venturing into the specialty coffee segment for the differentials that can be obtained with respect to conventional coffees.

The third strategy consists of generating alliances to export small volumes and be able to reach the doors of the international roaster.

The fourth strategy is to recognize the importance of added value in the transformation of parchment coffee to green coffee, good practices in the creation of new profiles and storage in green coffee export logistics.

The production and commercialization of coffee "requires options that give it greater added value to generate employment or income" (López, et.al, 2022, p. 101), the problem in the export of Oaxacan coffee lies in the fact that not all producers do not get involved, nor do they know the process to add value from the industrialization stage, which excludes them from knowing what the quality of their coffee is, as well as having the possibility of negotiating the price with customers for direct consumption or after sales, beyond the defects that can be seen with the naked eye and the prices that are handled and updated on the New York Stock Exchange. In addition to this, at the state level there is no information on the efficiency of the global value chain and the distribution of benefits among the different actors.

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**Tax issues that matter for microentrepreneurs in Mexico**

**Asuntos fiscales que importan para los microempresarios en México**

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**Abstract**

The situation of the environment of microenterprises in Mexico and in the south of Tamaulipas is presented. A field investigation was carried out with 64 microentrepreneurs in the area to find out their updating in the management of ICTs and their training needs. The goal is to make a proposal that supports microbusinesses for the benefit of the family economy and its community. The main findings show that 74% have a family business, 29% have a miscellaneous business, and 70% always or almost always plan their work. The maximum educational level: 41% higher education, and 39% high school. 41% use ICT for business processes, although only 29% to promote it. 44% are trained and 56% request training. A training proposal on tax issues is included to support its regularization, which comprises optional legal entities, current tax regimes and some of their obligations, the digital media used and the characteristics of the CFDI, to conclude with the differences in obligations. taxes according to the volume of their sales.

**Microenterprises, Tax regimes, Entities, Obligations**

**Resumen**

Se presenta la situación del entorno de las microempresas en México y en el sur de Tamaulipas. Se realizó una investigación de campo con 64 microempresarios de la zona para conocer su actualización en el manejo de las Tic y sus necesidades de capacitación. El objetivo final es realizar una propuesta que apoye a los micronegocios en beneficio de la economía familiar y de su comunidad. Los principales hallazgos muestran que 74% tienen una empresa familiar, 29% tiene una miscelánea, y 70% planifica siempre o casi siempre su trabajo. El nivel educativo máximo: 41% educación superior, y 39% bachillerato. 41% utilizan las Tic para los procesos del negocio, aunque solamente 29% para promoverlo. 44% se capacitan y 56% solicitan capacitación. Se incluye una propuesta de capacitación en temas fiscales para apoyar su regularización, que comprende las personas jurídicas opcionales, los regímenes fiscales vigentes y algunas de sus obligaciones, los medios digitales utilizados y en particular las características del CFDI, para concluir con las diferencias en obligaciones fiscales de acuerdo con el volumen de sus ventas.

**Microempresarios, Regímenes fiscales, Entidades, Obligaciones**

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## Introduction

The general population requires information to make the most appropriate decisions for their needs. Business owners or managers can perform better and make their work more efficient if they have tools to organize their activities.

In Mexico, the Ministry of Economy has categorized companies according to their size, which includes the number of employed persons and the amount of their annual sales, but also by their economic activity, associated with the North American Industrial Classification System 2013 (Dini & Stumpo, 2020).

This stratification is used by the INEGI - National Institute of Statistics and Geography- of Mexico in its instruments such as the National Survey on Productivity and Competitiveness of Micro, Small and Medium Enterprises called ENAPROCE, and the economic censuses. According to the indicators, microenterprises have between 0 and 10 employed people, and up to four million pesos in annual sales (INEGI, 2021).

The sectors of economic activity stratified by INEGI are: manufacturing, commerce, private non-financial services - such as information in the mass media, real estate services and rental of goods, professional and corporate services, business support, waste management, remediation services, educational services, health and social assistance services, cultural and sports recreation services, temporary accommodation services and restaurants, and other services except government activities- and other economic activities -related to fishing and aquaculture, transportation, construction and financial services (*idem*).

The 2019 economic census in Mexico showed that micro, small and medium-sized establishments (MSMEs) represented 93.6% of the total economic units in the private and parastatal sector and employed 43.3% of the staff (*loc. cit.*). Of this universe, 97.5% are micro-businesses, while small businesses represent 2.4% of the total and medium-sized ones 0.1%.

If the economic activity of MSMEs is considered, 46.4% of the total corresponded to commerce, 40.6% to private non-financial services, 12.4% to manufacturing, and 0.6% to other economic activities (*loc. cit.*).

As can be seen, commercial activity is preponderant in microenterprises, especially because it is an accessible alternative for almost any type of person, including socioeconomic level.

In the state of Tamaulipas, 2.27% of the MSMEs establishments in the country are located, with 2.34% of the employed personnel throughout the country, during 2018 (*ibidem*). Tamaulipas occupies the 10th place, of the 32 states, in the Gross Domestic Product per capita of the country, with \$190,954, and in its growth.

While, the state of Tamaulipas is in the 14th position of the average income of full-time workers with \$7,859, and in the 13th position of people with income below the welfare line with 0.99% of the employed population. ; however, it is located in position number 8 with 28%, in terms of people with incomes higher than the state average with respect to the employed population.

Tamaulipas state ranks 25th in the country with 2% of the economically active population receiving job training (IMCO, 2021a). A position that is not consistent with the importance of its GDP within the country.

In particular, the metropolitan area of Tampico, Ciudad Madero and Altamira, Tamaulipas, together with the Veracruz municipalities of Panuco and Pueblo Viejo, have a population located in the range of 500 thousand to one million inhabitants, it is in position 14 of 25 of the 2021 Urban Competitiveness Index of the Mexican Institute for Competitiveness (IMCO, 2021b).

This economic zone in the south of Tamaulipas is in position 19 of the 69 analyzed, in terms of people below the well-being line of the economically active population -PEA- with 13.5%; the monthly wage for full-time workers is \$7,941, ranking 34th, but above the state average (*ibidem*).

Likewise, this metropolitan area of southern Tamaulipas and Northern Veracruz municipalities presents 47.5% of its population employed in informal labor conditions, which is why it is in position 42 of the 69 analyzed; while 22.5% of the employed population has no income, which brings the area to position 27 out of 69 (IMCO, 2021b).

Regarding technological access, 93.3% of households have mobile telephone lines - position 28 of 69- but only 36.3% of households have a computer and internet -position 40 of 69 (*idem*).

The foregoing allows us to visualize a dynamic, heterogeneous, but competitive area, since in some areas it is in a medium-high position and very few elements are in a low circumstance, such as the gender gap in the labor force and wage inequality in the same sense - which is why it occupies positions 60 and 64, respectively, out of 69 (*ibidem*). In this context, retail trade is one of the most common activities in this geographical area of southern Tamaulipas.

The objective of this work is to identify the training requirements of micro-entrepreneurs in this southern area of Tamaulipas and to make a training proposal on basic tax matters. It is proposed to design a broader program that offers this sector of the economy an accessible administrative training alternative to boost its activity.

This proposal has a social benefit on the sector of microentrepreneurs located in the urban area of southern Tamaulipas. Assist in the development and improvement of management practices in their businesses, which would result in greater economic benefits for them, their families, and the community in general in the region.

This document presents the context in which the work was carried out, both nationally and regionally. Next, the methodology of the field research carried out to obtain the information is described. In the following section you can read the main findings that are associated with the theme that is presented. Subsequently, the basic content of the training that will be carried out with the microentrepreneurs is stated, and at the end some of the conclusions that come from what is presented.

**Taxes in Mexico**

The ideology of taxes in Mexico has endless nuances, among which stands out the collective fear on the part of society of the Tax Administration Service -SAT-, the highest tax authority responsible for tax collection in Mexico, a machine that has been perfecting since its founding in 1995.

Popular beliefs about taxes in Mexico revolve around these phrases: *The first year of your business you do not pay taxes; That's why all in cash; If I don't sign up, the SAT doesn't know I exist; and do not give an invoice, so you pay less taxes.* These comments are derived from ignorance of the law and the refusal to pay taxes, which contributes to the low growth of microenterprises and, in the worst scenario, to their failure.

It is essential for everyone, and for those microentrepreneurs, to know terms such as tax discrepancy, to know that there is an Anti-Money Laundering Law, as well as to be aware of the collaboration agreements between banking institutions and the SAT, to promote a tax culture in Mexico.

For example, article 31, section IV, of the Political Constitution of the United Mexican States establishes, as an obligation of Mexicans, to contribute to public expenses (Chamber of Deputies, 2021). According to tax experts from the Organization for Economic Cooperation and Development, the Economic Commission for Latin America, and the Caribbean, as well as the Inter-American Development Bank, in 2021 tax evasion in Mexico reached a total of 1.4 trillion pesos, which represents 4% of the country's Gross Domestic Product (Morales, 2021). Although other sources claim that it is 6% of GDP (Forbes Staff, 2021).

In Mexico, an employee can pay up to 35% of Income Tax, commercial companies 30%, and other taxpayers whose tax regimes are as varied as their activities. Most of them are individuals usually known as Micro, Small and Medium Enterprises -MSMEs- with tax rates ranging from 1% to 30% of their income.

MSMEs, mainly, have difficulties in meeting their tax obligations. One of the situations they face is the lack of advice, coupled with the constant changes in legislation, as can be seen since 1998.

Mexican small taxpayers seem to have to modify their regime every 10 years, since when reviewing the changes in the last decades they started in the Small Taxpayers Regime. However, by 2013 they were automatically changed to the Fiscal Incorporation Regime by the authority (Senate of the Republic, 2014), and again in 2022 to what is now known as the Simplified Trust Regime (SAT, 2022). Each of these changes made the obligations to be fulfilled more and more hardening.

Another part of the success of businesses are the employees, who provide their services in a subordinate manner in an exchange of work for remuneration and which is usually accompanied by certain benefits, among which social security stands out. Which is part of the obligation of the entrepreneur.

### Methodology

This work began with the application of a questionnaire designed and validated to identify the profile of microentrepreneurs in the southern zone of Tamaulipas, which includes the municipalities of Tampico, Ciudad Madero, and Altamira. The population includes retail trade establishments, which have 0 to 5 employed persons.

From this universe, the lines of business that did not imply risks to the personal safety of the applicators, as well as the safe areas, were selected. The application began electronically, then by telephone and finally, in most cases, the microentrepreneurs had to be personally interviewed. The application period was three months from 2021, still in the period of the Covid-19 pandemic. Responses were obtained from 64 people.

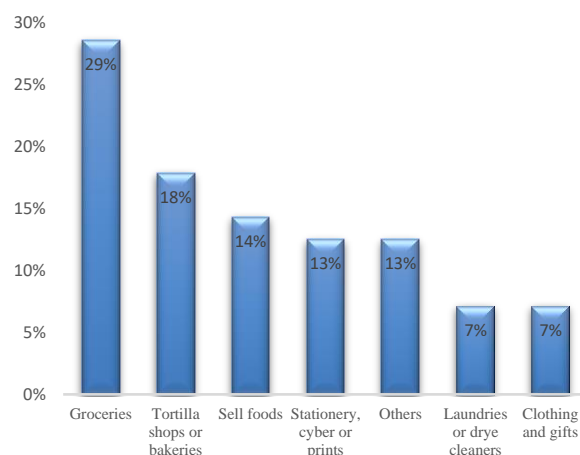
The Survey on competitiveness strategies for microbusinesses of Meléndez and Sotalero (*apud* Alonso Olivares, 2020) was used as a base instrument, which was adequately validated to apply it in the context to be investigated. The semantics and scope of the instrument were reviewed by a panel of five experts. After making the recommended modifications, it was captured in the *Google Forms* application to continue the process. Subsequently, it was applied to five micro-entrepreneurs who do not belong to the chosen sample, to validate the interpretation and receive comments.

Indicators were included in this instrument to recognize the competitiveness strategy of microentrepreneurs, as well as their training needs. From which the proposal presented in this document has been raised.

### Findings

The sample surveyed is made up of 54% women and 45% men. 55% stated that they were married, and 74% stated that their business is family. The highest educational level of microentrepreneurs: 41% undergraduate or postgraduate, 39% high school or truncated career, 17% secondary and 2% primary.

The line of microbusinesses was very diverse, as shown in Graph 1. The most frequent: 29% grocery stores, 18% tortilla shops or bakeries, 14% places that sell food, 13% stationery stores or computer services and printing, 7% from laundries or dry cleaners and another 7% from clothing and gifts. The 13% of others include candy stores, glass stores, aesthetics, or sales of plants.



**Graphic 1** Line of microbusinesses

Source: Own elaboration

Of all the microentrepreneurs surveyed, 70% always or almost always plan their activities. 44% had received training for themselves or their employees, while 56% requested training for the business.

Regarding the use of ICT information and communication technologies, 41% of micro-entrepreneurs use them for some part of their processes -the sale itself, contact with customers and suppliers, billing, competition review, among others. others- either with technological equipment, email, social networks, or with applications for various uses. While the internet is used by 29% for business promotion, even empirically with their social networks such as *Facebook* and *WhatsApp*.

Therefore, it is not surprising that when asked about specific training needs, digital advertising strategies were the most frequent.

Finally, it must be said that matters related to the tax situation were not properly included in the questionnaires, to avoid refusal to answer questions about the business. Perhaps including the informality of some of them, which then becomes a very delicate subject.

Conversely, in the open questions and in subsequent surveys it has been confirmed that the fiscal situation is an issue that worries the vast majority and is reason enough to include it in the training proposal.

### Proposal

To meet the need for information, training, and advice for microentrepreneurs in Mexico, in their tax obligations, a basic proposal was generated, aimed mainly at those who are in the process of starting their business, and for those who do not have it regularized. altogether.

This proposal is organized as follows: 1) it identifies what type of people are the ones that must pay taxes, 2) it is oriented on the tax regime that corresponds to them according to their activities, and 3) it is oriented on their tax obligations according to the above.

Due to the natural aversion to the issue of tax burdens, it is important to highlight that to work with micro-entrepreneurs, colloquial language should be used that allows easy understanding, regardless of their level of education.

### Legal person

It is necessary to define the way in which commercial actions are carried out or are going to be carried out. This decision is essential because of the consequences it has on tax treatment, so it should not be taken lightly. In this sense, the microentrepreneur would have to decide to do it based on two alternatives:

- A. Natural person. Individual, member of a community with rights and obligations, determined by a legal system (SAT, s.f.).
- B. Moral person. Group of natural persons who come together for the realization of a collective purpose. They are entities created by law, they do not have a material or bodily reality, however, the law grants them legal capacity to have rights and obligations (*idem*) once their constitutive act has been registered in the Public Registry of Commerce and their Acts are performed through a legal representative.

In addition to the above, it is essential to specify the fiscal domicile in which the commercial acts are carried out, as well as the commercial assets with which it is counted. For a natural person it is difficult to separate these two elements of the commercial and the personal.

In the case of the legal person, it is possible to protect the personal patrimony of the microentrepreneurs, by they will only respond for the patrimony contributed by the members of the legal person or shareholders. The fiscal domicile will be that of the moral person and does not expose the domicile of the partners.

Regarding legal persons, the General Law of Mercantile Companies recognizes seven types of companies, which must be formalized before a notary public and constituted with two or more partners. The foregoing except for the Simplified Stock Company -SAS- which is constituted with one or more natural persons through the website of the Ministry of Economy (2022).



*Tax Regime*

Below is a brief description of the main tax regimes in force in Mexico in 2022. About them, it should be considered that a natural person can carry out more than two activities, as is the case of people who have a salaried job, but also have a business. any other type.

It is important that the natural person separates his personal expenses from the expenses of the enterprise, since in each of these activities annual declarations are presented independently, such as those of Income Tax -ISR- and Value Added Tax -VAT.

- A. Wages and salaries. Employees are people hired by one or more employers, known as employers, who assign them a series of activities during their workday, pay them a periodic amount of money, and grant them certain benefits. The ISR rate is progressive according to income until it reaches 35%. If the employee has another type of income, the tax must be calculated separately.
- B. Assimilated and salaries. They are natural persons who provide professional services to a company on a sporadic or temporary basis, for which reason they do not receive the legal benefits. The ISR rate is like the previous case.
- C. Fees. People who provide services in a professional manner while being independent from companies, for which it is necessary to have a professional title. The ISR rate is 10% and is retained by the contracting party, as well as two thirds of the total VAT, its maximum ISR rate is 35%.
- D. Business activities. People who carry out commercial, industrial, agricultural, motor transport, fishing, livestock, or forestry activities. The maximum ISR rate is 35%.
- E. Leasing of real estate. People who obtain income from renting or renting real estate of the commercial type or houseroom. The ISR rate is 35% maximum.

- F. Simplified Trust Regime or RESICO. Natural person whose annual income does not exceed 3.5 million pesos and perform one or more of the activities. This regime is focused on MSMEs and its ISR rate varies from 1% to 2.5% of total income, but deductions are not considered. The moral person can also be taxed under this regime, if it is constituted solely by natural persons, whose total income does not exceed the amount of 35 million pesos and performs one or more of the activities. Its ISR rate is 30% and deductions are authorized.
- G. Digital Platforms. Natural person with business activity that disposes of goods, provides services, or grants the temporary use or enjoyment of goods through the internet, through technological platforms (SAT, 2021). Provides the option of definitive ISR payments that are retained by the electronic application itself or made personally.

*Digital media for tax purposes*

The extensive use of technology led to a digital change for tax activities. The SAT improved its service in 2004 with the use of the Advanced Electronic Signature -FIEL- for users. With it, most of the procedures are carried out virtually and face-to-face appointments are avoided in the service modules that imply time and more personnel (PRODECON, 2020). But other resources that are used as means for the operation of the tax system were also enabled. The main ones are described below.

- A. FIEL. Tool that allows you to generate electronic or digital signatures that have the same validity as a handwritten signature. When the procedure to obtain it is carried out, people are given two digital files with .key and .cer endings in a storage device.
- B. Tax mailbox. It is the means of digital contact by which direct communication is maintained between the taxpayer and the authority.
- C. Digital Seal Certificate. Digital file issued by the SAT that contains all the data of the taxpayer -individual or legal entity- and is used to prepare digital tax receipts over the Internet, called CFDI.

*CFDI*

CFDIs are vouchers of various types required for the development of guaranteed economic activities, which allows to give certainty about those who do not issue invoices (SAT, 2017). According to the size of the business, the CFDI that must be prepared are:

- A. Proof of income. They are issued for the income that taxpayers obtain by any means of payment and are generally known as invoices.
- B. Proof of discharge. It covers the outflow of money from the company such as returns, bonuses and discounts, which are considered as credit notes for accounting purposes.
- C. Proof of transfer. Formerly known as a transport letter, it is a document where every one of the merchandises that is going to be transported is declared. If they do not have them, the merchandise can be considered as contraband.
- D. Payroll stub. It is used as proof or receipt of payment for the purposes of labor legislation and as proof of deduction of the expense made as an employer.
- E. Receipt of payment receipt. It is prepared when the payment of the CFDI of income is received, issued as payment in installments or deferred.
- B. More than \$15,000. Banks have the obligation to report to the SAT, in accordance with the Federal Law for the Prevention and Identification of Operations with Resources of Illicit Origin. Therefore, the SAT will have the power to determine tax credits.
- C. Up to \$291,000. This is the maximum amount for a natural person to remain RESICO.
- D. More than \$291,000 In this case, electronic accounting must be carried out, the Informative Statements of Operations with Third Parties, and, as they usually have employees, they must also comply with labor obligations. These fiscal and state obligations include: the payment of worker-employer social security contributions -Mexican Institute of Social Security, IMSS, and the Institute of the National Fund for Workers' Housing, INFONAVIT-, payroll tax, integer withholdings of ISR of salaries, CFDI of payrolls, among others.

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**Conclusions**

Microbusinesses occupy a wide spectrum of the economy of Mexico and many countries. The characteristics of the microentrepreneurs and their competencies in administrative, technological, and fiscal aspects are very important to strengthen the smallest links in the production chains.

In this sense, in this work a proposal has been made to update and train people in charge of Mexican micro-enterprises on the fiscal issues that they must consider. Decision-making by microentrepreneurs will then be carried out with greater certainty and their growth will be consistent with the professionalization of their activities. Here an effort has been made to collaborate with it.

*Monthly Sales Volume*

The success of a company is due in large part to sales, which is why it is important to identify and set the value of the merchandise and services that are offered. It should be considered that all income must be invoiced in a good administration, regardless of tax issues.

This measurement allows to determine if the business is profitable. A classification is made according to the monthly income of the micro-businesses:

- A. Up to \$15,000. In this case, the banks do not have the obligation to report to the SAT, this does not exempt them from paying taxes.

Above all, given the level of informality in Mexico and the efforts of the SAT to regularize it, it is important that the strategy should also be supported by public higher education institutions or by professional organizations in their social work.

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**Implementation of the ML-UPAEP methodology to predict the susceptibility of job automation in Mexico**

**Implementación de la metodología ML-UPAEP para predecir la susceptibilidad de automatización de los empleos en México**

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**Abstract**

Objectives - The objective of this research concerns the development of a methodology to collect, process, and analyze data regarding the existing scenarios at the national level of the automation of labor occupations in Mexico due to the inclusion of some technological solution.

Methodology - Through the review and analysis of the literature available through the various databases, current knowledge of the situation in the short, medium, and long term is generated in the risk that people present of being replaced by carrying out some routine work activity and not cognitive.

Contribution - Generate knowledge and a challenge for other researchers focused on knowing the susceptibility of the automation of work occupations in various contexts of a political, economic, cultural, educational, age, and salary nature of people who perform some work activity.

**Inclusion, Susceptibility, Methodology automation, Job computerizability, Occupations, Technological unemployment**

**Resumen**

Objetivos – El objetivo de esta investigación concierne al desarrollo de una metodología, que permita recopilar, procesar y analizar datos referentes a los escenarios existentes a nivel nacional de la automatización de las ocupaciones laborales en México debido a la inclusión de alguna solución tecnológica.

Metodología – Mediante la revisión y análisis de la literatura disponible a través de las diversas bases de datos, se genera un conocimiento actual de la situación a corto, mediano y largo plazo en el riesgo que las personas presentan de ser reemplazadas por realizar alguna actividad laboral rutinaria y no cognitiva.

Contribución – Generar conocimiento y un desafío para los demás investigadores, enfocados en conocer la susceptibilidad de la automatización de las ocupaciones laborales en diversos contextos de índole político, económico, cultural, educativo, edad y salarial de las personas que desempeñan alguna actividad laboral.

**Inclusión, Susceptibilidad, Automatización de metodologías, Informatización del trabajo, Ocupaciones, Desempleo tecnológico**

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## Introduction

The generational technological changes accompanied by strategies according to the needs of a society, a country, an organization, or simply a government and the dependence of these and people towards Information and Communication Technologies, show that several optimized activities of any the labor sector, using infrastructure and software applied in specific processes, but the continuity of professions or people at risk due to the computerization of jobs.

The term computerization was described in the research work carried out by Frey & Osborne (2013), its motivation was to be able to estimate the probability of computerization in 702 professions in the United States labor market through the implementation of Machine Learning techniques and a proposed methodology by them, allowing them to determine the work activities at risk of disappearing or the replacement of the people who perform them due to the automation of cognitive and manual tasks; as well as the routine or non-routine ones, predicting that 47% of the jobs presented a high risk of being computerized within the next ten years.

The World Economic Forum (WEF, 2020) revealed the trends of the organizations in its recent report, the majority (43%) plan to carry out the reduction of their staff by 6.4% of their total workforce due to technological implementations that will be carried out to distribute workloads between people and machines, reflecting a total of 85 million workers who will be replaced by smart technology in 2025. However, there is the possibility for people to be integrated into new functions, that is, they will be able to occupy positions or responsibilities with a higher level of difficulty in areas for solving problems that currently a machine or a robot can hardly perform. The activities that will be developed mainly by some type of technology within companies in 2025 are: information and data processing, technical and complex activities; as well as those work that involves a physical and manual effort, leaving greater participation in coordinating, developing, managing, advising, reasoning, making decisions, communicating, and interacting with people.

The inclusion of technologies in various edges of the labor markets worldwide is more common today, companies have chosen for several years to use technological solutions for the best use and optimization of their processes, an example of this has to do with the use of cloud computing, machine learning algorithms, the use of robots accompanied by implementations with Artificial Intelligence. In this research we show the studies that have been carried out in the world, to measure the susceptibility to the computerization of jobs or activities through the following questions:

- Q1: How susceptible are labor occupations to technological automation in Mexico?
- Q2: Do cognitive occupations present a greater risk of being technologically automated than routine occupations?
- Q3: Is there any relationship between economic level, educational level, and age for a labor occupation to present a greater risk of being technologically automated?

The research is organized as follows: first, the experiences in various countries are described, specifying the impacts of computerization on the labor market. Subsequently, a vision of labor automation in Mexico is presented. Finally, challenges in the workplace due to technological inclusions within organizations are specified.

The objective of this research is to analyze the main scientific contributions published on the computerization of jobs or activities in Mexico.

### **The labor situation in Mexico**

The 2030 Agenda for Sustainable Development of the United Nations integrates 17 Sustainable Development Goals to transform the financial, economic, and political systems of societies. The recent report on the Sustainable Development Goals reflects that before the global Pandemic - COVID-19- there was a lag in the commitments established for the year 2030, even a worrying figure was published concerning the projection of approximately 71 million people who during 2020 would be in extreme poverty. Goal 8: "Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all", reflected an adverse effect in the workplace for those who work informally, on their account, day laborers and vulnerable sectors in the face of atypical circumstances such as the Pandemic that affected Mexico at the beginning of 2020.

According to the Organization for Economic Cooperation and Development (OCDE), in its objective to coordinate the economic and social policies of its member countries; in which Mexico was included since May 18, 1994, in its 2019 economic study Mexico had one of the lowest levels of PIB (Gross Domestic Product, for its description in english) within the OCDE, due to a low growth rate resulting from the poor labor productivity.

The Bank of Mexico in its quarterly report (January - March 2021), refers to a slight improvement in the Mexican labor market despite the negative scenario between the end of 2020 and the beginning of 2021, that is, the Economically Active Population grew approximately two million people. Tertiary activities showed a decline in January 2021; Furthermore, regardless of the reactivation in the third month of the year, they continued to be below that registered in February with 1.9%.

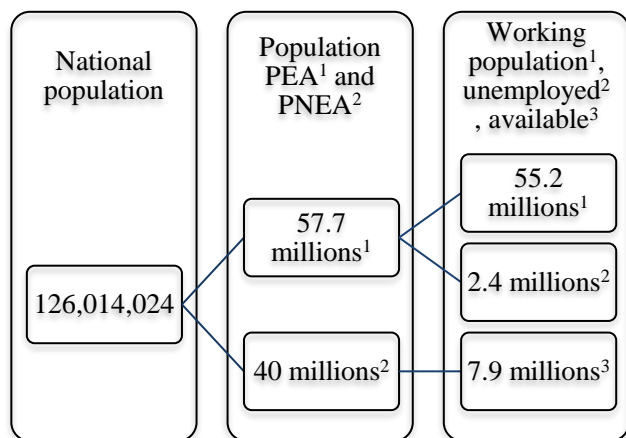
In addition, the labor market in Mexico suffered significant deterioration, as shown in the Banco de Mexico report (BANXICO, 2021) published with figures for the first quarter of 2021. The document shows the month of November of the previous year as the starting point. However, there was an improvement regardless of the national context experienced due to COVID-19.

The month of April 2021 registered a significant increase in the Economically Active Population with two million people, showing a recovery in comparison with the same month of the previous year, proof of this was the reduction in the percentage of the Non-Economically Active Population with 61.5% (12.3 million people).

According to the OCDE economic study (2019), Mexico will present an economic growth of approximately 5% by 2021 and a lower expectation for the year 2022 of 3.2%, this mainly due to the aftermath of the Pandemic that for one year affects us globally and that in a particular way in our context implies that poverty, inequality and the gender gap have a greater negative impact due to COVID-19; In addition, vaccination processes in the population to mitigate contagions will allow generating certainty in the economic sectors; as well as for those who are dedicated to formal activities and mainly for informal work.

According to the National Survey of Occupation and Employment (ENOE, 2021), for the second quarter of 2021 the National Institute of Statistics and Geography (INEGI) reported an increase of 10.7 million in the Economically Active Population, however, in a negative consequence of the Pandemic in April of the same year, the Non-Economically Active Population grew due to the 12 million people who sadly lost their jobs.

The information presented during August 2021 in the ENOE (2021), reflects the estimates concerning the occupation and unemployment of the Economically Active Population (see Figure 1) considering now from 15 years of age, appreciating the size and composition of the Population Economically Active and Non-Economically Active Population.



**Figure 1** Workforce at the national level  
 Source: National Survey of Occupation and Employment (ENOEn), 2021. p.9

We appreciate that 45.8% of the population is currently an Economically Active Population and 31.7% does not have any occupation within the age range of 15 years and over; Therefore, a fundamental part of the research work has to do with estimating how many professionals per sector are at risk of losing their jobs due to the computerization of the processes and activities they carry out, quantifying the impact on the inclusion of technologies in Mexico.

The WEF (2020), reported that Mexico had a 26.9% vulnerability for jobs, in addition, the unemployment rate had a change between the years from 2019 to 2020, reflecting 2.7% and 3.3% (Q2) respectively. The adoption of technology according to the surveyed companies, indicated that the main solutions to be included in their organizations were the processing of text, images, and speech; as well as the internet of things, cloud computing, and the analysis of large volumes of data through Big Data with a percentage of 91%, in addition, electronic and digital commerce (86%), AI solutions (82%), computer and cryptographic security processes (78%), virtual reality (64%) and robots (60%) were part of their strategies and technological solutions.

### Literature review

We can more frequently see the existence of robots performing routine activities; however, the great challenge will be that the digital and computational part accompanied by Artificial Intelligence can interact cognitively with people, that is, even that robots can feel emotions like a human being.

Hernández & Destinobles (2019) defined technology as that which does not generate a healthy way of living for people, on the other hand, Elliott (2018) in his work highlighted the importance of improving Artificial Intelligence techniques in computers, it's The study determined that there are differences between people and computers when it is necessary to carry out highly complex activities, to be more specific, those jobs that require a rational understanding in which only people can perform and, even more so when they have an of educational preparation superior to the elementary.

The literature allows us to visualize the panorama concerning the computerization of the activities that people previously carried out, it does not mean that they will necessarily lose their jobs “automation does not necessarily lead to job losses, even in the affected industry. When major industries are automated, their employment often increases rather than decreases” (Bessen, 2019, p.591; Jahn, 2017).

In this sense, Sako (2020) refers to the tasks that people perform within an organization, differentiating them from jobs, stating that routine activities involve automation to a greater degree compared to jobs that require a resolution capacity than robots do not have, therefore, jobs are not computerized (p.26). For this reason, Man & Man (2019) alluded that workers should invest in themselves, looking for training options to raise their problem-solving skills, acquiring new knowledge, cognitive and creative skills, using technological tools that allow them to obtain greater competitiveness within the organization and mitigate a replacement scenario due to the computerization of its activities, this coming from the AI that has more frequently taken on the routine tasks previously performed by people (Krakovsky, 2018; Nicholas & Sacco, 2018; Cummins, Yamashita, Millar & Sahoo, 2019; Shackleton, 2020; Aboal, López, Maurizio & Queraltó, 2021).



It is important to highlight what was pointed out by Clarke (2019), its publication emphasizes the creation of the first international standard focused on Artificial Intelligence that has been accepted by all OECD member countries, showing a clear example of the benefits that in the future we will see for the inclusion of advanced technologies in societies, and that is undoubtedly associated with political and regulatory issues, unavoidable for their application in the labor sectors, denoting a maturity of the technologies and announcing to people that they are effective, reliable and that they reduce costs of operation.

**The labor market and computerization**

The work carried out by Frey & Osborne (2013) considered 702 occupations that were evaluated to indicate the degree of risk to be computerized, through their proposed methodology, the implementation of a Gaussian method algorithm, and a classification of occupations using information from O \* NET (The Occupational Information Network, for its acronym in English) belonging to the Department of Labor of the United States of America (the USA, for its acronym in English), considered the possibility of visualizing an increase in the risk of jobs to be computerized including variables such as salaries and people's educational level.

Their conclusions showed that 47% of jobs in the USA are categorized as high risk to be computerized in the short, medium, or long term, in addition, they ratified that people with basic educational levels and a low economic perception significantly influence be revealed by some technological implementation or otherwise hinted at, are technologically displaced (Cebreros, Heffner-Rodríguez, Livas & Puggioni, 2020; Brandes, & Wattenhofer, 2016; Rodríguez, 2019) as has been happening over several decades and, for a few years increasing due to the technological ecosystems that have supplied the ideal conditions to potentiate the use of Artificial Intelligence solutions in various work environments.

Even Donald Trump -contender to the US presidency- in an international context statement, asserted that the decrease in jobs (approximately 7 million workers) in the North American industry had to do with various actions that Mexico and China were taking, However, it was the result of the technological innovations that the various factories had been carrying out to optimize production times (Wiseman, 2017), providing better service to the end customer.

In Mexico, Ghys, Cools, Acedo, & Wright (2021) outlined the future that our country would have with the inclusion of disruptive technologies, based on new technologies and advances in research that large organizations carry out, allows us to tell with an ideal ecosystem to promote and enhance the latest generation technological solutions. In this sense, the authors alluded through the survey carried out by the Boston Consulting Group that Mexico considered investing in technology for the automation of industrial processes through several companies, which would imply a representative decrease in the number of hired personnel and an increase in productivity.

Through Banco de México (BANXICO), the feasibility of an activity being technically computerized was considered, according to Cebreros, Heffner-Rodríguez, Livas, & Puggioni (2020), the formal labor market presents an important risk (57%) of suffering some type of technological automation, only, it is important to note that the previous percentage does not consider the informal work environment and if it is included it would lead us to a risk scenario of 65% of all jobs nationwide, to be technologically feasible to optimize according to the estimates made by Cebreros *et al.* (2020), who assert that age and educational level with certain characteristics influence to increase the probability of computerization of occupations, evidencing a concern of government organizations and private entities regarding the inclusion of technological solutions in the economy of Mexico and what this will represent for people who carry out activities in the formal and informal sectors of our work context.

Previously, Ramos & Carrasco (2019) had carried out a prospective investigation to visualize the future of jobs in the state of Nuevo León in Mexico, related to technological inclusions in Industry 4.0. Their methodological procedure was based on the application of the Delphi method, in addition, it allowed them to propose the elaboration of a policy that would add to the initiative of the Specialization Program in Industry 4.0 (PEI4.0), to reduce the negative effects on the workers as a result of computerization in the processes they carried out, offering them professional alternatives to improve their horizons in the educational aspect and experience within organizations, favoring their permanence by assigning new responsibilities that involve more complicated tasks.

The results are interesting, on the one hand, they indicate that the susceptibility for people to lose their jobs is higher than 50% due to the penetration of robots in their work areas; however, they also point out that there is a probability above 75% for the creation of new jobs, in which workers could develop skills that help them to adapt in less time to their new responsibilities by the year 2030.

In addition, we cannot ignore the concern generated by the fear of technological inclusion within industries, which specifically links a panorama of job dissatisfaction in people - who lack cognitive skills - due to the probability of being dispossessed. of their work tasks by robotization (Schwabe & Castellacci, 2020), for example, Doménech, García, Montañez & Neut (2018) asserted that 36% of the jobs in the industrial sector in Spain will be candidates for automation, likewise, Choi Mendizábal & Calero (2018), through an analysis that allowed them to have an overview of the progress in the Spanish labor market corresponding to a period from 2006 to 2016, using the National Institute of Statistics as the main provider of statistical data, through of a survey carried out belonging to the Innovation of Companies, indicated that the relationship in the decrease of jobs with greater demand in tasks that involved aspects of technological innovation, it was contrasted with those activities in which the people who carried them out had a superior profile in labor and academic skills.

It is important to bear in mind what was suggested by Reséndiz-Prado, Torres-Mansur & Placeres-Salinas (2020), given the new technological requirements, the presence of people with cognitive and problem-solving skills; as well as various IT capabilities, will facilitate their permanence in new tasks regardless of acceleration to renew and improve processes within the organization. Rodríguez, Castro & Tijerina (2020), carrying out an analogous study in the state of Oaxaca; considered the cognitive and non-routine work activities of women, assessing the effects caused on them by the use of technological tools, exposing an increase in the participation of women in jobs that involve non-routine cognitive actions, underlining that participation is the result of the insertion of the technology used in the work; as well as the educational level and salary they have.

Minian & Monroy (2018), predecessors of the works to estimate the risk in activities and jobs to be computerized in Mexico, used the first study published by Frey & Osborne (2013), assessing 63% as feasible for the jobs to be automated because of the implementation of some technology in the manufacturing sector, projecting that 64.5% of the activities would exhibit a high risk of susceptibility to being computerized. The risks associated with some technological implementations are in a holistic context, that is, even in the educational environment they can occur, for example, Dandalt (2021) outlined a scenario in which education would be using robots something not studied by other researchers, consequently, due to current technological advances in a long term get to be reality.

Undoubtedly, work activities have gradually experienced some type of automation, even in professional services (Sampson, 2021), which were usually carried out by people specialized in certain areas of knowledge. An antecedent, a different effect is observed in customer service where through technological resources the tasks that people performed now are through automated telephone means or IVR (Interactive Voice Response, for its acronym in English), the use of bots conversational by integrating AI and specifying common questions that customers ask, organized in tools to establish conversation flows, make people feel served in a timely and efficient manner.

Sampson (2021), used the data of 996 jobs contained in O\*Net, identifying those that correspond to professional services, to later group them by areas, years of experience, and the academic level necessary to carry out the activities. Their conclusions were achieved by the implementation of structural equation modeling or SEM (Structural Equation Modeling, for its name in English), stating that most people dedicated to simple tasks with a high academic level, began the search for more complex tasks. complex and creative -difficult to be computerized (Coupe, 2019)- according to their abilities.

Cheng, Pien, Kubo & Cheng (2020) considered the classification methodology established by Frey & Osborne (2013), which allowed them to generate 38 groups according to the occupations identified in the Standard Occupational Classification of the Taiwan Ministry of Labor. The results showed that the labor sectors most susceptible to being computerized involve low-level tasks, that is, vehicle operators and people hired in the construction field, who showed a decrease in the quality of their health compared to the activities that require a higher educational level and without risk to be automated.

Ghimire, Skinner & Carnathan (2020) distinguished the professional profiles of people and their educational levels in Atlanta, showing that an elementary school education added to the income they can receive for their work activity and, even more, if the remuneration The economic situation is low, it enhances the probability that they will be relieved of their tasks due to technological automation. Furthermore, Ghimire *et al.* (2020) pointed out the correlation between the above variables and the geographic area of origin of the people, for example, the Latino population presented a high risk of losing their jobs due to technological insertion, additionally, the probability was greater if they had an academic preparation within the same geographical area in which some people carry out the same activities, only with a higher professional profile.

Sarfati (2020) stated that “social, economic differences; as well as the age, sex and remuneration of the working population increase the risks associated with a change in technology or the existence of the digital divide” (p.169). It highlights a concern about these circumstances and how they affect workers emotionally, expressing on the one hand the need for an improvement in the bidirectional relationship between workers and employers, in addition to the development of new skills that allow them to perform more complex activities, it is that is, those where technological implementations are below human capacity (Doménech, García Montañez & Neut, 2018).

Rani & Grimshaw (2019) agree with Sarfati (2020), referring to the fact that social inequalities and technological changes increase the negative effects derived from the automation of work activities, for which workers, on the one hand, lack professional experience. -mainly they are young- and with a mid-level academic training, affirming that in the face of technological advances it is important to have regulatory frameworks and adequate support in the transition towards them, to guarantee that there is progress in the organization, optimizing productivity due to the new job opportunities for people.

Franks (2016) defined new technologies and specifically those related to AI as catalysts, due to the use of tools that will optimize the tasks of people making their hiring unnecessary, for example, "when a robot can read a set of accounts, analyze a million emails or phone records, write annual reports, why hire a lawyer, investigator or accountant?" (p.19). The foregoing conclusively expressed the future vision that the professions or work activities would experience at the same time as the people involved in an organizational automation process.

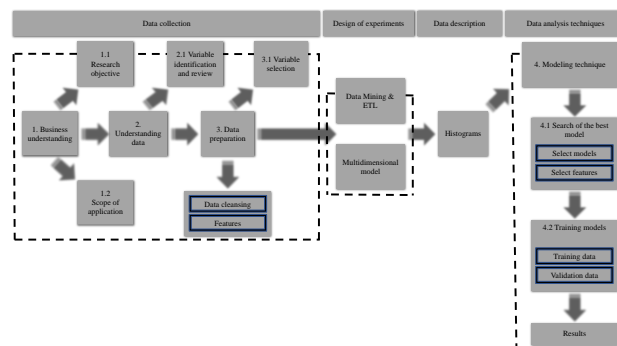
Organizations, companies, and various industries will notice great challenges due to the automation of activities and/or jobs, as Kim & Scheller-Wolf (2019) expressed in their work establishing a concept called an axiological challenge. Part of his approach puts on the table the question that organizational leaders, businessmen, investors, and other actors at the top of the labor pyramid should ask themselves before implementing a technological solution, trying to mitigate the negative effects on people as a result of a bad decision in the business model imputing ethical issues that are harmful to society and their future work, which is why, for some workers, their situation is the same before computerization of their activities (Chomanski, 2019); however, there will be a need in a worse context to receive the savings generated for your unemployment.

The generation of new jobs is a real and current need, according to Abeliasky, Algar, Bloom & Prettnner (2020) approximately 50.1 million employees will be at risk of losing their jobs due to the use of robots within the industry in a decade and, 340 million worldwide because of any type of computerization in the same period.

### Method ML-UPAEP

Estimating the probability of automation of labor occupations in Mexico by the inclusion of technological solutions entails locating the ideal sources of information in the labor, economic, educational, and technological fields, as well as asserting the feasibility of systematization by using tools and techniques of Data Science and Mining to collect, model and analyze the data at the national level in a holistic manner through the ML-UPAEP methodology.

The universe of the population used to forecast the susceptibility to automation of labor occupations in Mexico is delimited according to the Economically Active Population, in this sense, the proposed methodology (see Figure 2) considers a geographical, economic, and educational context, as well as the characteristics of the workers, making use of techniques and tools in science and data mining to classify and forecast in an objective and reliable way the level of automation of labor occupations in Mexico.



**Figure 2** Data mining and modeling processes implicit in the ML-UPAEP methodology

Source: Own elaboration and adaptation according to the reviewed literature, 2022

ML-UPAEP has nationwide application, through the collection and preparation of data, the selection, training, evaluation, and adjustment of parameters through a Machine Learning model to make predictions that show the scenario of labor automation in Mexico.

The **data collection** integrates an *understanding of the business* that identifies the objective of the research and its scope of application, i.e., what moment of automation in labor occupations does Mexico have when using open access data that governmental agencies have.

In addition, it is essential to *understand the data* because it involves the identification and review of important variables related to the objective of the research.

Subsequently, there must be a *preparation of the data* that makes it easier to choose the variables that provide important elements to satisfy the research, thus strengthening the Machine Learning algorithms.

The **design of experiments** considers ETL (Extraction, Transformation, and Loading) techniques. Subsequently, a **description of the data** is made, i.e., the sources identified, the number of records in each database, the implicit variables, the type of file, and the source of origin, to mention some requirements that allow visualizing the content of the variables selected for the development of the research, preferably in histogram-type graphs.

According to the methodology scheme presented, it is important, after the stages described so far, to include a **modeling technique** that facilitates the identification of the Machine Learning models required to meet the needs established in the research and subsequently evaluate the results obtained.

## Methodology

A literature review involves a series of procedures embodied in their proposed methodology, that is, applying filters and generating lists of documents, downloading the articles, generating a database with relevant data of each document, graphically present the information of the articles, group substantive elements and the development of maps with the structures of each document.

The method used is highly relevant for empirical studies and the construction of the theory, databases such as IEEE, SPRINGER, EBSCO, SCIENCE DIRECT, SCOPUS, DIALNET and JSTORE were used.

A total of 113 articles were analyzed, of which 46 fulfilled the historical part of the field of study referring to the automation of work occupations due to the inclusion of some emerging technology within organizations and/or countries. In addition, different boolean combinations AND, OR, and truncation \* were applied for the filtering of relevant information? helping to collect specific information.

The search was carried out in a period from 2018 to 2021 mainly, however, knowledge trigger articles were used from years ago considering the following combinations of keywords: technological automation, technological unemployment, computerization of work occupations, and automation of work occupations.

## Results

The evidence in the works has shown that the use of the methodology of Frey & Osborne (2013), simultaneously with the classification of O\*NET occupations, facilitates the homologation of the data that is held locally in each government and allows to have a comparable global picture (47% of jobs in the United States by Frey & Osborne, 2013; 9% of jobs in the United States by Arntz, Gregory & Zierahn, 2016; 65% of jobs in Mexico by Cebreros *et al.*, 2020; 50% of jobs in Mexico by Ramos & Carrasco, 2019; 36% of jobs in Spain by Doménech *et al.*, 2018; 64.5% of jobs in Mexico by Minian & Monroy, 2018; 25% of jobs in Singapore by Fuei, 2017; 35.7% of jobs in Finland by Pajarinen & Rouvinen, 2014; 57% of jobs in the United States by Sungki & Shell, 2018; 69% of jobs in Ecuador by Méndez-Mantuano *et al.*, 2019; 44.8% of jobs in Russia by Zemtsov, 2020) of the susceptibility in the activities data to be computerized.

Particularly in the labor context in Mexico, according to the data collected, processed and analyzed through the ML-UPAEP methodology, professionals and technicians have a greater presence of labor occupations in Mexico with 28.3%, civil servants, directors and managers (16.3%), industrial machinery operators, assemblers, chauffeurs and transport drivers (11.8%), craft workers and workers in elementary and support activities both with 11%, workers in personal services and security (7.9%), workers in agricultural, livestock, forestry, hunting and fishing activities (5.5%), auxiliary workers in administrative activities (5.1%) and traders, sales clerks and sales agents (3%).

The Economically Active Population represented by the state shown the center of the country and the west concentrate most of the labor force (Mexico with 13.70%, Mexico City with 8.02%, and Jalisco with 6.95%).

## Conclusions

Current times inevitably lead to interacting with some technological implementation, even for several decades there have been disruptive technological changes that have benefited countries, societies, and people themselves by applying new knowledge.

The activities that will be developed mainly by some type of technology within companies in the year 2025 are: information and data processing, technical and complex activities; as well as the labor ones that involve a physical and manual effort, leaving greater participation in coordinating, developing, managing, advising, reasoning, making decisions, communicating, and interacting with people.

The Industrial sector will carry out implementations of technology in cloud computing, internet of things and connected devices, electronic and digital commerce, big data analytics, robots (industrial automation, drones, etc.), artificial intelligence (machine learning and neural networks), 3D and 4D printing and modeling, as well as processes in cryptography and cybersecurity.

Industry 5.0 (I5.0) has people as the main executor of the processes, in addition to the use of cutting-edge technologies (Artificial Intelligence, Machine Learning, Business Intelligence, Deep Learning, Data Science or Big Data) that facilitate the collaboration of robots in tasks, something contrary to what happens with I4.0 where people are displaced from routine activities. Consequently, with I5.0, people are the backbone in the processes, working collaboratively with robots, to achieve better use of resources within companies, generating a common good.

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Instructions for Scientific, Technological and Innovation Publication

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Introduction

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

What is your added value with respect to other techniques?

Clearly focus each of its features

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

Explanation of sections Article.

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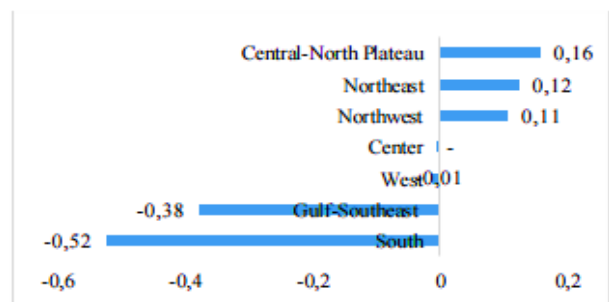
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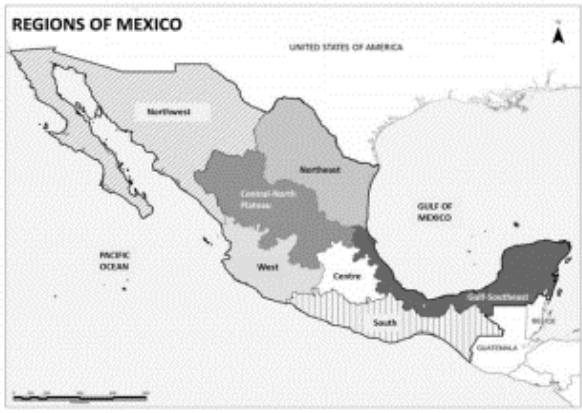


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REGION	STATE	Participation (%) on Gross		
		Surface	Population	Production
1. Northwest.	Baja California; Chihuahua; Sonora; Baja California Sur; Sinaloa.	32.1%	11.1%	13.1%
	2. Northeast.	15.1%	9.3%	15.6%
3.Center North Plateau.	Coahuila; Nuevo León; Tamaulipas. Aguascalientes; Durango;	15.1%	10.9%	9.2%
	Guanajuato; San Luis Potosí; Zacatecas.	8.7%	11.9%	10.2%
4. West.	Colima; Jalisco; Michoacán;	5.1%	33.7%	34.8%
	Nayarit. Distrito Federal; Hidalgo; México; Morelos; Puebla; Querétaro;	11.8%	10.0%	4.7%
5. Center.	Tlaxcala.	12.1%	12.4%	13.0%
	Chiapas; Guerrero; Oaxaca.			
6. South.	Campeche;			
7. Southeast Gulf.	Quintana Roo;			
	Tabasco; Veracruz; Yucatán.			
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For the use of equations, noted as follows:

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

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

Methodology

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

Results

The results shall be by section of the article.

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### **Annexes**

Tables and adequate sources thanks to indicate if they were funded by any institution, University or company.

### **Conclusions**

Explain clearly the results and possibilities of improvement.

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