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CIENCIAS SOCIALES, HUMANIDADES Y ARTES

Entre la incertidumbre y la oportunidad: Empresas en tiempos de la Covid-19 en Veracruz y Oaxaca, México

Between uncertainty and opportunity: Companies in times of Covid-19 in Veracruz and Oaxaca, Mexico

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García, H., Bracamonte, Á., y Arvizu, S. (En prensa), Salario Digno en una zona agroexportadora del noroeste de México: El caso del poblado Miguel Alemán en la costa de Hermosillo, Sonora.

García, H., Lara, F., y Gomis, R. (En prensa), Decisiones de las empresas de las empresas frente a la contingencia: reacciones ante la incertidumbre y acciones de resiliencia. En Francisco Lara, Jorge Carrillo y Redi Gomis (coords.) "Perspectivas regionales del impacto del COVID-19 sobre las empresas: crisis, adaptación y resiliencia". Centro de Investigación en Alimento y Desarrollo (CIAD).

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Bracamonte, Á., García, H., y Gomis, R. (2021). Ciencias sociales en acción: respuestas ante del COVID-19 desde el Norte de México. Recuperado de file:///C:/Users/Dell%20Inspiron/Downloads/7758.pdf

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Resumen:

Objetivo: identificar las reacciones organizacionales y tecnológicas de las empresas de Veracruz y Oaxaca ante la crisis generada por la COVID-19.
Diseño metodológico: el enfoque de este estudio es cuantitativo y transversal. La recopilación de la información se realizó en dos fases: mayo y septiembre del 2020. En la primera fase se obtuvo información de 154 empresas, mientras que en la segunda participaron 178. Los instrumentos se diseñaron para recopilar información sobre los impactos de la pandemia sobre el funcionamiento de las empresas; las medidas que están tomando para sobrevivir a la crisis; la naturaleza de los apoyos gubernamentales y las condiciones para el posible retorno a una "nueva normalidad". Esta muestra de 154 y 178 empresas tiene una validez estadística con un nivel de confianza del 95% y un margen de error del 7.88% y 6% en la fase 1 y 2.
Resultados: al inicio de la pandemia, solo una tercera parte de las empresas de los municipios de Veracruz, Boca del Río y Tuxtepec habían registrado afectaciones. En contraste con los municipios fronterizos del norte de México.
Limitaciones de investigación: a pesar de la amplia distribución virtual del instrumento, las altas tasas de rechazo pudieron haber afectado la representatividad del estudio.
Hallazgos: se muestra que la incertidumbre producida por la pandemia ha generado nuevas oportunidades de negocio para aquellas empresas capaces de combinar el ajuste interno de sus costos, la búsqueda de nuevos modelos de negocio; con mayor uso de tecnologías digitales y mayores márgenes de inventario.

Palabras clave: oportunidades, crisis, empresas, incertidumbre, Covid-19, México.

Abstract:

Purpose: To identify organizational and technological reactions of companies in the Mexican states of Oaxaca and Veracruz with regards to the COVID-19 crisis.
Methodological design: This is a quantitative and cross-sectional study. The information was collected in two phases: May and September, 2020. The survey was answered by 154 companies in the first phase and 178 in the second. The instruments were designed to collect information on the impact the pandemic had on companies' operation: the measures adopted to survive the crisis, the government "support" they received, and the conditions for a possible return to the "new normal." The sample of 154 and 178 companies has statistical validity with a confidence level of 95% and a margin of error of 7.88% and 6%, in phase 1 and 2, respectively.
Results: At the beginning of the pandemic, only a third of the companies from Veracruz, Boca del Río and Tuxtepec registered major affectations, unlike the border cities of the northern states of Mexico.
Research limitations: Despite the design of an extensive promotion campaign, high rates of rejection could have affected the representativeness of the study.
Findings: The results show that uncertainty resulting from the pandemic has generated new business opportunities for those companies capable of combining the internal adjustment of their costs and the search of new business models with greater use of digital technologies and higher inventory margins.

Keywords: opportunities, crisis, companies, uncertainty, Covid-19, Mexico.

Introduction

The states of Veracruz and Oaxaca have been among the most affected entities by the economic crisis generated by Covid-19. In the first year of the pandemic, Veracruz lost more than 42,000 jobs, which has represented a higher decrease rate than the national average (-4.36% vs -3.21%, respectively). In this same period, the loss in Oaxaca reached 8,000 jobs (-3.49%). This job loss corresponded to a negative annual variation in both entities: Veracruz had a decrease of -8.2%, and Oaxaca of -5.8%.

In terms of employment, the greatest losses occurred between March and May 2020. When the figure reached 42,000 jobs and 8,000 jobs in Veracruz and Oaxaca, respectively. The uncertainty generated by

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"not knowing when the contingency would end" and the structural conditions of the economy in Veracruz, generated a "shy" recovery between October and November. The situation was then reversed at the beginning of 2021. In Oaxaca, the situation could have been even more worrisome, since labor informality rate is 80.5 (compared to 56,1, at the national level). It implies that people draw their income from activities related to trade, tourism, transportation, restaurants, hotels, and mining, without the guarantee of job stability (Moyado and Acosta, 2020).

The questions prompting this article are: what are companies doing to survive the crisis generated by Covid-19? How have businesses reacted to the uncertainty created by the pandemic? In addition, what organizational and technological benefits have companies obtained during the crisis? To answer these questions, information from the work field (phases I and II) carried out by the Inter-institutional Research Group (GIDI) will be used, in addition to the IMSS databases of the Veracruz-Boca del Río area, and Tuxtepec, Oaxaca.[1]

This article integrates this introduction and three more sections. The first one presents the main economic indicators before and during the pandemic for the states of Veracruz and Oaxaca in general, focusing on the municipalities of Veracruz, Boca del Río, and Tuxtepec, Oaxaca. The objective of this section is to show an analysis of the economic situation before the social distancing measures to contain Covid-19, in addition to glimpsing some of the effects generated in its socioeconomic indicators. Given the suspension of face-to-face activities during the pandemic, the research focused on the mentioned municipalities due to: *1)* their economic and population relevance, and, *2)* access to the members of the main business organizations, linked to institutional relations with the article autors.

The second section shows a literature review. Their objective is to show the hypothesis related to the principal studies in the field. After that, the main results of the GIDI survey applied in the area studied during May (first stage) and September 2020 (second stage) are presented.

The data describes the economic impacts of the pandemic on companies from Veracruz-Boca del Río, and Tuxtepec, Oaxaca. The presentation is made in the following order: *a)* the methodology followed during the virtual fieldwork to capture information from the companies, *b)* the sample characteristics are presented according to their municipal representativeness, company size, and sector membership; *c)* an analysis of the problems that companies have experienced is developed from an impact index construction, which was formulated to express to what extent companies have been affected according to the sector, size and location, and *d)* the results that describe how companies have responded to pandemic challenges. Finally, conclusions are presented, and the opportunities created by the pandemic for building resilience capacities in companies from Veracruz and Oaxaca are pointed out.

Veracruz and Oaxaca main economic indicators

The state of Veracruz de Ignacio de la Llave has the fourth largest population in the country. According to the 2020 Mexican Population and Housing Census, about 8 630 000 people live in this entity, with a higher proportion of women (52%). Of its total population, 62% live in urban areas, and the rest in rural areas. The economic participation rate of its population, aged 12 or over is 59.2%, is one of the lowest in Mexico (National Institute of Statistics, Geography, and Informatics, INEGI, 2020a). In the last ten years, there has been a process that led to the concentration of both population and economic activities in a few municipalities. As of 2020, the eleven largest municipalities in the state, including Veracruz, Coatzacoalcos and Boca del Río, concentrated more than half of the population.

Oaxac has one of the highest degrees and indexes of social backwardness in Mexico (2 539 013). Located in the southeast of the country with 570 municipalities, whose socioeconomic conditions make its population extraordinarily vulnerable (Moyado, 2020). San Juan Bautista Tuxtepec, with almost 160 000 inhabitants, is the second most populous municipality in the state of Oaxaca. This state, with just over 4 100 000

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inhabitants, ranks tenth among the most populous states in Mexico (INEGI, 2020b). With a higher proportion of women (52%), the majority of its inhabitants live in rural areas (51%) and the economic participation rate of the population aged 12 and over is 56.8%.

According to the 2019 Economic Census, in terms of economic units (EU), the state of Veracruz ranks fifth nationally with 278 230 and Oaxaca ranks eighth with almost 220 000 (INEGI, 2019). In both states, retail trade concentrated the largest number of eu (44% in Veracruz and 39.7% in Oaxaca). It has been observed that there are 3.6 eu in Veracruz, 2 in Coatzacoalcos, and 1.1 in Tuxtepec, for each eu in Boca del Río. Of the total employed personnel, each eu employed an average of 4 individuals in Coatzacoalcos, 4.5 individuals in Veracruz, 6.2 in Boca del Río, and 5 in Tuxtepec, Oaxaca (DataMexico, 2021a).

In 2019, the majority of the Economically Active Population (EAP) in Veracruz was working in the tertiary sector (above 65%); while less than 28% carried out activities in the secondary sector (State Committee for Statistical and Geographical Information of Veracruz, ceieg, 2021). In that year, the occupation of most workers in the state of Oaxaca was in: agricultural activities, especially the cultivation of corn and beans; although this activity is more predominant in small towns. According to Miguel, Martínez and García (2022), the larger the cities in Oaxaca, the greater their economic diversification.

In the first quarter of 2021, the labor participation rate was 60.3% in Oaxaca and 52.7% in Veracruz, which implied a decrease of 1.13 and 0.48 percentage points, respectively, compared to the previous quarter; and a decrease of 0.14 and 2.66 percentage points compared to the same period of the previous year. Regarding the formal monthly average salary, Oaxaca maintained an upward trend for a year starting in the third quarter of 2019, going from $5 450 to $6 350. However, the last quarter of 2020 registered a decrease of 12% to rebound again during the first quarter of 2021 and reach the levels it had at the end of 2019. The same behavior happened with the formal monthly average salary in Veracruz, with an increase from 37% from the third quarter of 2019 to the third quarter of 2020, going from $4 510 to $6 230, dropping to 8% at the end of 2020 and rebounding by the same percentage during the first quarter of 2021 (DataMexico, 2021b).

As for the bulk of economic activities in Veracruz, these are concentrated in just three municipalities (out of 212 that make up the state), where more than two-thirds take place: Minatitlán (16.1%), Port of Veracruz (14 %), and Coatzacoalcos (11.4%), Boca del Río ranks seventh with 3.8%. The strategic sectors for this entity are metalworking, agro-industrial, chemical, biochemical, mining, tourism, oil, gas and petrochemical. For the future, the expectations are logistics, medical services, ports, renewable energies, construction products, and automotive suppliers (Confederation of National Chambers of Commerce, Services and Tourism, Concanaco-Servytur, 2018). It is worth mentioning that, according to cepal, the port of Veracruz through which 21 533 910 tons of merchandise were mobilized during 2020, had a 9.8% reduction in its container port activity in the January-May 2020 period compared to the same period in 2019 (Economic Commission for Latin America and the Caribbean [CEPAL], 2020).

Prior to the pandemic, the state of Veracruz ranked fifth among the entities that contributed the most to the National Gross Domestic Product [GDP] (INEGI, 2020c). In 2019, even though the annual GDP in Mexico had decreased by 0.1% annually (first negative variation since 2009); Veracruz increased by 1.1% in its quarterly indicator of state economic activity (ITAEE). According to Rosales (2020), at the end of 2019, this behavior was due to negative variations in manufacturing (2.0%), construction (4.3%), and mining, mostly oil (6.8%); although it was offset by increases in commerce (4.0%), agriculture (2.6%) and electricity generation (1.7%). A year later, the January-December 2020 accumulated itaee in the state decreased 8.2%, reflecting the decrease in secondary activities by 12.1% and in tertiary activities by 7.3%. Meanwhile, the primaries evolved by 4.3% (INEGI, 2021a).

According to the State Economic Recovery Indicator developed by the Mexican Institute of Competitiveness, as of the third quarter of 2020, the states of Veracruz and Oaxaca had shown a medium level of recovery, which implies economic recovery above the pre-Covid level but below the expected growth. According to this indicator, Veracruz and Oaxaca had a level of economic activity of 7 and 9 percentage

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points, respectively at that time, below what would have been observed without Covid (Mexican Institute for Competitiveness [IMCO], 2021).

At the end of 2019, Oaxaca's economy had registered a 3.3% decrease in its annual GDP, a result that was mainly owed to a 13.6% drop in its secondary activities. A 1.6% reduction in its primary sector, and weak growth, barely 0.1% in the tertiary sector. However, as of the fourth quarter of 2020, it had registered a 4.5% growth compared to the same period of the previous year, placing itself as the entity with the greatest progress in this indicator according to inegi's quarterly indicator of the state economic activity. Regarding the groups of economic activities in the state, the variations with the greatest increase are the primary sector, with 11.5%; while the distribution and consumption of goods economic activities increased by 33.6% (Badillo, 2021). The construction sector growth stands out, with an annual variation of 239.7% in its production, thanks to triple-digit increases in building works (245.6%) and transportation and urbanization (536.5%). These two sections grouped 96.4% of the total value (Rosales, 2021).

At the end of 2019, Veracruz exported 1.6% of the national total, an amount equivalent to $6 697 248 dollars; being the chemical industry (23.8%), the basic metal industries (18.5%), the extraction of oil and gas and the food industry (both with values of 16.7%); the most important export activities (Veracruz State ′s Government, 2020). In 2020, the state's exports were $5 352 788 dollars, an amount 20% lower than that registered in 2019. However, as of the first quarter of 2021, Veracruz exports began an upward trend, registering in the second quarter of the year an increase of 19% compared to the previous quarter.

Exports in Oaxaca registered a 9.8% drop during 2020 compared to the amount exported in 2019 ($712 575 dollars). However, similarly to Veracruz, exports in Oaxaca began a growth trend in the first quarter of 2021 and for the second quarter of the year, the increase exceeded 80% compared to the fourth quarter of 2020 (INEGI, 2021b).

Industrial activity, according to the monthly indicator of this sector (February 2021), would have registered a decrease of 14.2%, which meant that Veracruz ranked fourth among the entities with the greatest impact (Zepeda, 2021). Although it is estimated that the state's economy could reach 4.5% growth in 2021, it is expected that it will not be until 2023 that the before 2020 levels could be reached (Soldevilla, 2020).

According to the state's official website, as of October 7, 2021, 118 785 positive cases were confirmed in the state and 13 846 deaths were registered by Covid19 (Veracruz State ′s Government, 2021). In Oaxaca, the number of confirmed cases was 77 957 and 5 224 deaths, were registered on the same date.

Literature review

Covid-19 had an unprecedented impact on society, the economy, and the environment (Bapuji *et al*., 2020; Bansal, 2020). It represented a health crisis, sensitively perceived by every citizen because it threatens human health (Jankelová and Misun, 2021), but at the same time, it caused a deep economic crisis with long-term consequences (Bodziany *et al.*, 2021; Baker *et al*., 2020).

The strong measures implemented by governments to avoid the spread of Covid-19 threatened the survival of firms across all sectors and industries at a global scale (McKee and Stuckler, 2020; Jasso, 2021), and not knowing when the contingency was going to end, made the dealing with the crisis more complicated (Wenzel, Stanske and Lieberman, 2020). As never seen before, enterprises all over the world saw themselves with employees in lockdown, with major supply chain issues at a global scale, and in some cases, with interdictions to operate, especially when businesses had physical interactions with customers (Pinzaru, Zbuchea, and Anghel, 2020). For organizations, these uncertainties are the most difficult to manage because there are few in-depth studies on the subject and the information available is scarce, partial, and contradictory (Boiral *et al*., 2021).

The World Bank researched the short-term impact of the Covid-19 crisis on over 100 000 businesses in 51 countries. The results show that the crisis had a severe impact on business, manifested as a widespread

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sharp drop in sales (on average by 49% year-on-year), employment decrease, rather through decreased hiring intensity than through layoffs, and financial restrictions affecting mainly smaller businesses (Paunovic and Aničić, 2021).

The Covid-19 pandemic trigger an inordinate effect on small and medium companies that generally struggle with profitability and liquidity given their limited internal resources (Ciasullo, Montera and Douglas, 2022). Despite this, small and medium enterprises are also more flexible owing to their private ownership structure and relatively flat hierarchical organization, all of which help them to sustain their ability to be innovative (Juergensen, Guimón and Narula, 2020). In Israel, Harel (2021) looked at the impact of the pandemic on the revenues of small businesses operating in industrial sectors. The findings show that, despite Covid-19, the revenues of the majority of small businesses in the industrial sector were not adversely affected by the pandemic, and most of them did not change or adjust their business activities.

In México, as in the rest of the world, measures adopted to slow down the contagion affected economic activity (Molina, Zuñiga and Díaz, 2020; Clavellina and Domínguez, 2020) and the problem worsened by the uncertain evolution of the pandemic (Sarmiento, Martinez y Mazario, 2020). However, the effect was not the same among country states (Cruz-Melendez and Aguillon, 2022) and varied depending on the size and sector of the companies (Borboa *et al,* 2021). Small businesses faced a higher probability of experiencing income losses (Belitski *et al.,* 2021) as well as companies linked to tourism and services activities (Stumpo, 2021).

The impact of the Covid-19 crisis on Mexican economic activity, in general, could be described in three phases. The first one, in the first trimester of 2020, derived from the closure of several countries and the corresponding cancellation of flights with a huge negative shock in those entities oriented to tourist activities, such as Quintana Roo and Baja California Sur. In the second phase, the economic activity in the country slowed down significantly because of the decision to suspend all those activities considered non-essential. This decision affected several manufacturing and service sectors. The third phase is defined as a reopening process, that is slower and more gradual than originally anticipated and with an uncertain duration (Esquivel, 2020).

Faced with the economic and health problem, the government of the state of Oaxaca launched an Incentives and Support Program for the Economic Stability of Oaxaca (PPO, 2020) that included an investment of 1 270 million pesos to overcome the contingency stage of Covid-19. The program aimed to support 5 200 companies, as well as preserve nearly 20 thousand direct jobs (De la Vega *et al*., 2020). In Veracruz, the government presented the State Agreement for Employment, to generate labor certainty. It aimed to link businesses, encouraging supply and demand, as well as to grant loans to micro-entrepreneurs, without interest rates (Patiño and Cruz, 2020).

To complement the understanding of the impact of a crisis, it is worth describing the nature of crisis management and to considering how business managers handle crises in practice. Crisis management is said to involve shaping perceptions and experiences by interacting with stakeholders to prevent, resolve and learn from crises (Fasth, Elliot and Styhre, 2021).

Crisis management is related to change management (Siuta-Tokarska, 2021). It is the management of the strategies, structures, technologies, and procedures to adapt the company to future changes in the environment (Dzwigol *et al*., 2019).

Before Covid-19, the companies' change management system was mainly associated with the identification of fluctuations in the economic situation of the consumer market, changes in consumer needs and preferences, the influence of the state on trade processes and to develop effective measures to adapt business entities to existing conditions to prevent a decrease in business activity (Lord *et al.,* 2017). According to Cortez and Jonhston (2020) during the Covid-19 crisis, companies had to manage a crisis in a more complicated situation than a traditional crisis. While other crises occurred at specific places and times, the Covid-19 crisis combine a global effect with an unknown time frame.

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Wenzel, Stanske, and Lieberman (2020) classified the responses to the crisis into four different strategies: retrenchment, persevering, innovating, and exit. The four strategies have an associated cost-benefit and are viable according the term. Retrenchment refers to cost-cutting that potentially reduces the scope of a firm's business activities and may help firms survive a crisis in the short term. Persevering is carried out with debt financing and the consumption of available slack resources. It could be a viable strategic response to a crisis in the medium term. Innovating refers to conducting strategic renewal in response to the crisis. An important response to crisis for sustaining firm survival in the long term. Exit refers to the discontinuation of a firm's business activities. An exit is not necessarily a manifestation of business failure per se, and it is not necessarily the last resort when the other strategic responses to crisis fail.

Considering the literature about the impact of the Covid-19 crisis, the following hypotheses arise:

H1. Companies in Veracruz and Oaxaca had different affectations according to their activity sector, subsector, and size.

H2. Companies in Veracruz and Oaxaca implemented strategies to manage the uncertainty derived from the Covid-19 crisis.

H3. Companies in Veracruz and Oaxaca obtained organizational benefits as a result of the management of the covid-19 crisis.

Methodology

To capture the impact of Covid-19 on the economies of Tuxtepec in the state of Oaxaca and Veracruz and Boca del Río in the state of Veracruz, a two-stage research process was designed. It describes what happened to Veracruz companies at two points in time. The first stage (May 2020) consisted of an online survey application in order to measure the immediate impacts after the partial or total closure of operations in companies and the application of sanitary control measures to reduce contagion. In the second stage (September 2020), a new online survey was applied to assess the impact that some of the containment and reactivation measures were having, as well as to measure the recovery process in companies. The first instrument consisted of a review and adaptation for Mexico, of the questionnaire, carried out at the end of March 2020 by the Regional Chamber of Commerce of San Diego, California in the USA, with an equivalent purpose. While the second was designed by the GIDI.

Both questionnaires include eight questions to characterize the participating companies; twelve questions to identify the impacts, the way companies react to uncertainty, and some possible organizational benefits derived from the implemented measures. One question associated with the support that the companies themselves identify as necessary was also included and, finally, the request for particular data from the companies and those who respond.

The research on the impact of the Covid-19 pandemic on companies was raised in three initial stages: Stage 1- Focused on the immediate impacts at the start of the pandemic (April-May 2020), Stage 2- Adaptation to the prospects of an extension of the effects of the pandemic (October 2020), and, Stage 3- Transformation under the considerations of a new reality (March, 2021). The study used a platform for online surveys, among the contact networks of gidi members and Cristobal Colon University from Veracruz. The research also sought a sectoral approach for the specific case of companies related to information and communication technologies (ICTS) in stage 1, in collaboration with the National Network of Software and Information Technology Clusters (MX-Ti). (De los Santos and Covarrubias, 2022). This article only mentions stages 1 and 2 of the research carried out by gidi in the municipalities of interest of Veracruz and Oaxaca.

In the case of the cities studied in the research: Tuxtepec in Oaxaca and Veracruz and Boca del Río in Veracruz, 154 companies responded in the first stage and 178 during the second stage. This was achieved due to a promotion and convocation campaign applied over five months that included: promotion on some local radio stations, the sending of 5 823 emails from denue-inegi, and the support of business organizations linked

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to the Cristóbal Colón University in Veracruz. In all cases, initial submission and at least one reminder were considered. In addition, dissemination was carried out on social networks such as Facebook, LinkedIn, and WhatsApp.

As a proportion of the establishments where the survey was conducted, according to the National Directory of Economic Units (DENUE), there are approximately 46 770 companies in Tuxtepec, Oaxaca and Veracruz, and Boca del Río. The sample of 154 and 178 companies (from the first and second phases) has a statistical validity with a confidence level of 95% and a margin of error of 7.88% and 6%, respectively, at the level of the considered region. For sub-samples of municipalities or types of activity, there are different error measures. Estimates are not presented in this article in cases where they are not representative. The information collection period ranged from May 1 to 30, 2020 (first stage) and from September 1 to 30, 2020 (second stage).

Results

In the first phase of the study, 154 company managers answered the online questionnaire, of these 65% are located in Veracruz and Boca del Río, and the rest in Tuxtepec, Oaxaca. In the second phase, the total number of participants was 178 companies; located in Veracruz and Boca del Río (88%) and Tuxtepec, Oaxaca (12.4%).

In each of the research phases, services predominate in similar proportions: commercial services (25% and 24.7%, for phases 1 and 2 respectively), tourist services (10.4% and 15.1%), and professional services (28.6% and 28.7%). In the first and second periods of the research, both manufacturing and agricultural companies lowered their participation from 6.5% to 4.5% and from 7.8% to 2.2%, respectively.

Regarding the size of the companies, 95% corresponds to micro, small, and medium (MSMEs); for the second phase of research, 96.7% were MSMEs. The rest is made up of large companies in both field operations.

Companies affectation index

The global impact index is constructed to describe the affectation level in companies concerning the levels of job loss, hours worked, and income levels. This indicator allows the answers to nine questions of the questionnaire to be integrated into a single variable, according to the level presented by the index. A color is assigned where green means “minor affectation”, yellow “intermediate affectation” and red “severe affectation”. In general, green does not mean an absence of affectation, but rather that it is less concerning than in the other two cases. The global impact index was made up of the first stage of the research ′s questions (May 2020). Figure 1 shows the logical sequence of the survey to assign the different global impact indices (colors).

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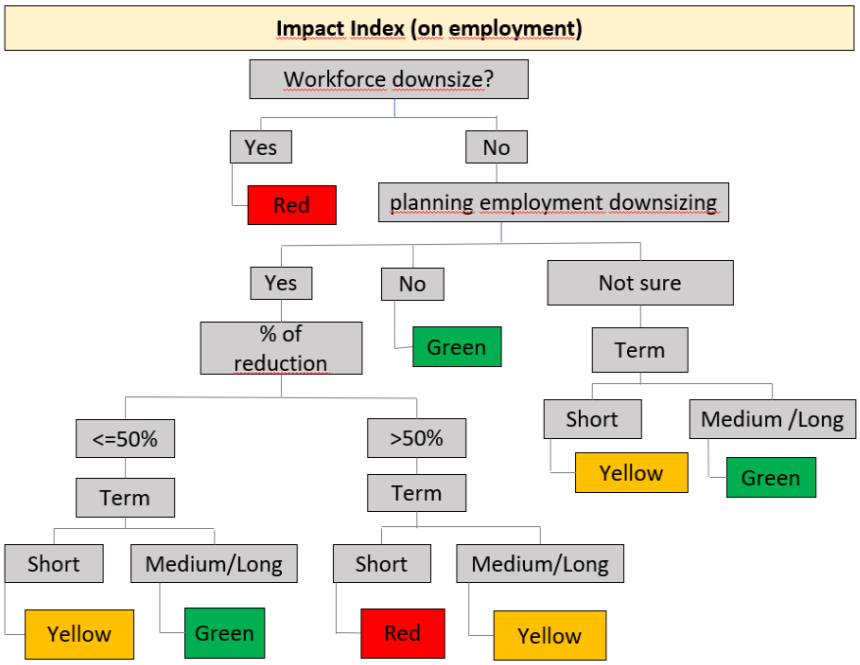

FIGURE 1.
Global Impact Index
Source: GIDI (2020).

Regarding this indicator, the first thing that stands out is that, at the beginning of the contingency measures between March and May 2020, only a third of the companies registered major affectations (31%). As a reference, in the northern states of Baja California, 50% of companies registered major affectations and this percentage in Sonora reached 40%. This indicates that the economic impact of the pandemic had a "wave effect" that first reached the northern states in Mexico owing to the border closure with the United States; but advanced towards the south as social contingency measures were prolonged.

Figures 2 to 5 show the distribution of this global affectation index in companies from the sample constructed from the impacts on employment, hours worked, and income. Said/Such index is distributed along the following lines: municipalities, sectors, a subsector of activity and companies size.

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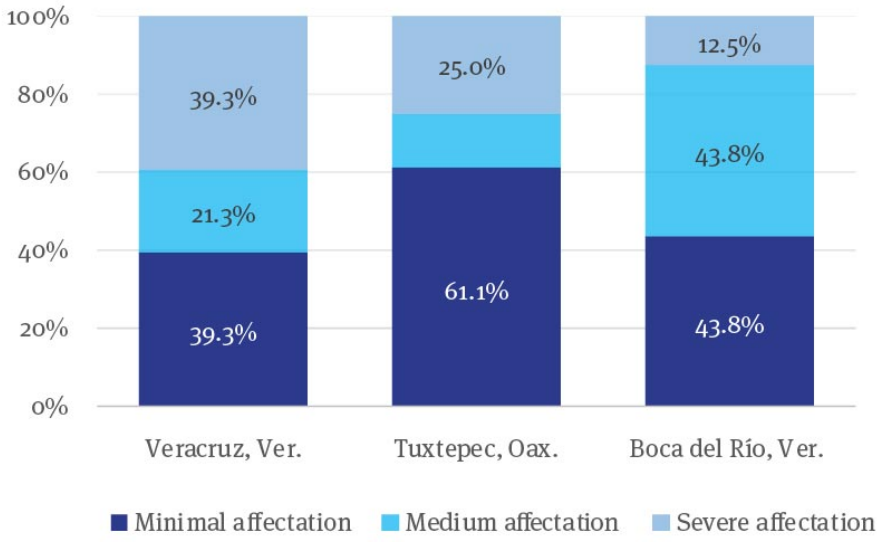

FIGURE 2.
Companies' affectation index in cities studied in the research derived from the health contingency, by municipalities
Source: GIDI (2020)

Although practically all the companies considered in the research had some degree of affectation, figure 2 shows that Veracruz was the most affected with 40%; while Boca del Río was the least affected (12.5%). Also, Tuxtepec, Oaxaca registered a severe affectation, but intermediate between both municipalities.

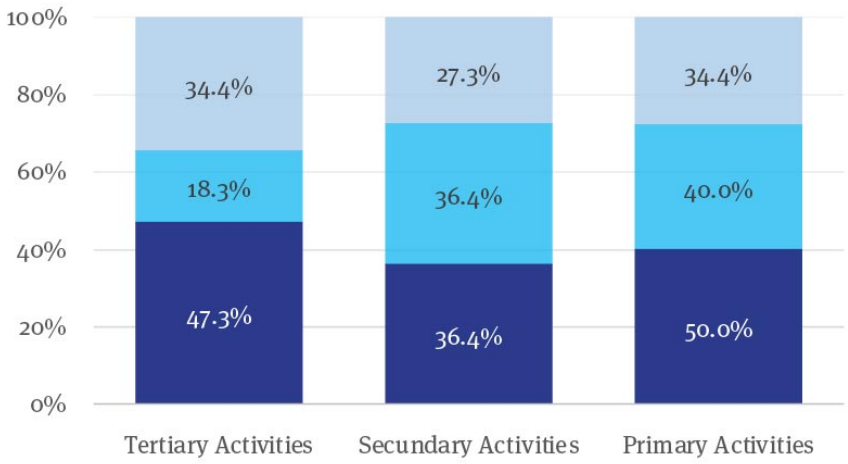

FIGURE 3.
Companies' affectation index in cities studied in the research derived from the health contingency, by sector of activity
Source: GIDI (2020).

About the sector, figure 3 shows that the tertiary and primary sectors were the most affected (34.4%, respectively) and, to a lesser extent, the secondary (27.3%), but at the subsector level (figure 4) specific tendencies are observed. Contrary to what was expected due to the tourist activity in the studied area, tourist services had a severe but intermediate impact (33.3%). Among those most affected are professional services at 43.8% and the least severely affected agricultural companies at 10%.

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Support activities ranked second in the severe impact level, which corresponds to what was expected, given the degree of specialization that port and transportation activities have in the studied area. In the case of manufacturing, this had an intermediate impact.

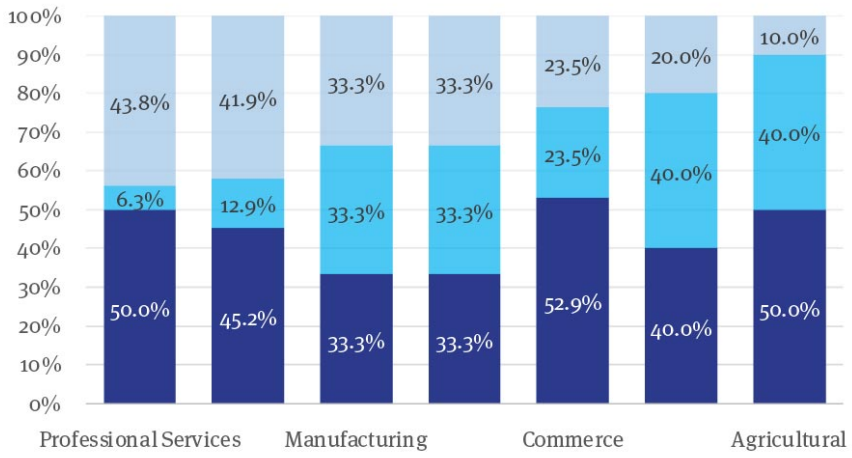

FIGURE 4.
Companies' affectation index in cities studied in the research derived from the health contingency, by subsector of activity
Source: GIDI (2020).

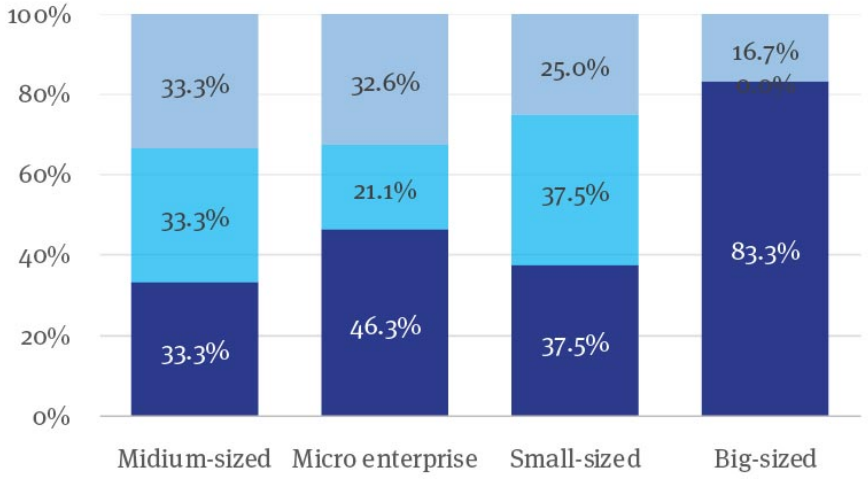

FIGURE 5.
Companies' affectation index in cities studied in the research derived from the health contingency, by company size
Source: GIDI (2020).

Regarding the affectation level according to the size of the company, figure 5 shows that a third of those that had severe affectations were medium, while the least affected were large companies. Notably, in the first part of the pandemic, micro and small companies had minor affectations in a greater proportion than medium-sized companies. As containment measures were prolonged, this situation changed. It will be observed in greater detail in the insured jobs section.

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Company actions to survive the crisis generated by Covid-19

Regarding the operation of the companies, between the months of March and May there was a reduction in their working hours, and customer visits to the business were limited (43.5%, in both measures). They also began to offer home services (18.8 %); while only 10% of the companies consulted had closed permanently. For the months of August-September (the second phase of research), reduced working hours and temporary work were maintained (48% and 44%, respectively); but measures began to be implemented that affected the workers' income. Measures such as salary and bonus reductions (38%), piecework or project payments (28.6%), and staff furloughs without pay (22%), became the most used measures to survive the extension of social containment measures.

In the first phase of the research, the adjustment focused on the search for financial savings (reduction of spending in non-essential areas, local and foreign purchases, and suspension of expansions or acquisitions). But between August and September, the measures focused on activities related to the change in the business model: search for new customer segments, implementation of internet sales, change of distribution and delivery schemes, as well as change of direction. These measures were the most used to adapt to the uncertainty generated by the pandemic prolongation.

Derived from the application of the change of direction, companies' main opportunities were linked to improvement in decision-making, coordination of activities with the staff, reduction of operating costs, and the implementation of new technologies for sale and distribution. It is noteworthy that almost 90% of the companies faced a period of high uncertainty because of not knowing the requirements to design a contingency plan for the potential worsening of the pandemic. It was evident during this period, that communication within companies played an important role. Implementing a contingency plan was more effective for companies that had a well-structured communication plan (Bozas *et al.*, 2021).

In general, the characteristics of the workers who have lost their jobs (between March and December 2020) were the following: *a)* workers with low and high salary ranges (between 0 and 5 minimum salaries and between 15 and 20 minimum salaries); *b)* age group with less than or equal to 25 years and greater than or equal to 65; *c)* those who work in medium and large companies; *d)* in the agriculture, construction and tourism sectors (percentage concentrated in Tuxtepec, Oaxaca and Veracruz). Most of them were workers from Tuxtepec, Veracruz and Boca del Río.

Conclusions

The results of this research provide an approximate of what happened in companies from Veracruz, Boca del Río, and Tuxtepec, Oaxaca during the implementation of sanitary measures to contain Covid-19. These cannot be conclusive, since it is a snapshot of what happened between March and December 2020. The pandemic generated uncertainty because the horizon of the long-awaited return to the "new normality" was not clear.

Coinciding with Paunovic and Aničić (2021), Veracruz and Oaxaca companies focused in the first stage of the crisis on the search for financial savings to survive the crisis. The results of this research provide evidence to conclude that Veracruz and Oaxaca companies implemented strategies according to Wenzel, Stanske, and Lieberman (2020) with activities related to the change in the business model: search for new customer segments, implementation of internet sales, change of distribution and delivery schemes, as well as change of direction. According to Jasso (2021), these measures were the most used to adapt to the uncertainty generated by the pandemic prolongation.

The situation has also generated new business opportunities for companies capable of combining the internal adjustment of their costs and the search for new business models; that take advantage of

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digital technologies to produce and market their products and services. A renaissance of adjustment and anticipation of customer needs, in addition to higher inventory margins to avoid dependence on a single supplier, are seen as practices that are here to stay in the "new normality" scenario.

However, there are signs of structural weakness in Veracruz and Oaxaca's economies that are limiting their recovery. On the one hand, Veracruz and Oaxaca are entities where more than two-thirds of their companies operate informally (70% and 78%, respectively), closely linked to their local internal market. This situation means that employment linked to exporting companies is lower compared, for example, to the northern states in Mexico (2.7% and 1% against 43.1% in Chihuahua, 37% in Baja California, and 21% in Sonora).

Results show, that during these first months of the pandemic, the most affected sectors in Veracruz and Oaxaca were tertiary and primary. Coinciding with Harel (2021) the secondary sector had the least impact, although subsectors had specific tendencies. Results also show that in the first part of the pandemic, micro and small companies had minor affectations in a greater proportion than medium-sized companies. This could be explained by the flexibility that Juergensen, Guimón and Narula (2020) pointed out about flexibility in small companies.

The study's main limitation is related to its geographic coverage in both states. For reasons of time and resources, it was not possible to obtain information from other important cities such as Oaxaca (capital), Salina Cruz, Huatulco, and Puerto Escondido in Oaxaca and Xalapa (capital), Tuxpan and the oil zone of Minatitlán-Coatzacoalcos in Veracruz.

This research demonstrates that even though some companies had a greater capacity to find a market opportunity to adapt and respond to the pandemic conditions, others had serious problems dealing with Covid-19 government restrictions and the uncertainty derived from the pandemic. The creation of an indicator of business resilience remains for further investigation. An indicator that shows different moments in the processes of companies' capacities construction as a response to critical situations.

Another relevant aspect to analyze in this crisis is the impact that interruptions in the supply chain had on companies' operations. Finally, it would be important to analyze the role that digitization processes are playing on the production and commercialization of Veracruz and Oaxaca companies.

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