Real consequences of the necessity of digitalization in rural Mexico

Lucie Crespo Stupková[1]

Abstract: The export of agricultural products is currently Mexico's most important source of foreign exchange, exceeding revenues from oil exports and tourism. Historically, agricultural export chains have been formed since colonial times, e.g. tobacco, coffee, bananas, cocoa or cotton. Avocados, berries and fresh vegetables, as well as alcoholic beverages (beer and tequila) are at the forefront currently. The target country is primarily the United States of America. Today's rural Mexico faces new challenges because it must comply with obligations derived from the T-MEC agreement, which was signed on July 1, 2020. It was preceded in 1994 by the North American Free Trade Agreement (NAFTA) between the United States, Mexico and Canada, which created the largest free trade region in the world. One of the main points of the agreement is to support the digitization of international trade and strengthen consumer protection with complete data at every stage of the production chain. An important point for agricultural workers is also the commitment to strengthen and expand the protection of workers' rights. The fulfillment of these obligations can be translated as greater supervision of companies will be able to meet such demands? Does the agreement ultimately lead to a greater concentration of access to water and land in the hands of large firms with foreign capital? Are SMEs (small and medium enterprises) still able to export? What challenges does the rural labor market face?

Keywords: agriculture, value chains, certification, georeferencing
JEL Classification: Q17, F15, F18

1 Introduction

The primary sector is the predominant one in the state of Michoacán and is of utmost importance, since it extends over an extensive space, requires a huge amount of natural resources (especially water) and the work of hundreds of thousands of inhabitants. In the case of Michoacán, agricultural production presents a surplus in several crops, that is, the food produced in the state covers the demand of the inhabitants and also supplies the national and international markets.

The transformations of the Michoacán countryside are framed in processes of globalization, competition, openness, flexibility of labor, but also unequal access to land and water, and discriminatory agricultural policies for the majority of farmers. The current Michoacán countryside has two faces: one of powerful businessmen and agro-exports that blowup after the signing of trade agreements to facilitate international exchange, such as NAFTA and the T-MEC, and another of small producers and farmers who resist practicing traditional agriculture. If on the one hand Michoacán is the first producer of avocado, strawberries, blackberries and lemon and second in raspberries, it is also the first national place in lentil cultivation, third place in rice, fourth place in sorghum and wheat and the fifth most important in production of corn. The first products require a complex organization in long value chains and are aimed at the foreign market (mostly United States), while the second contribute to the food self-sufficiency of the Mexican population.

Agricultural products require specific agro-climatic conditions, financial investments, knowledge, technologies and organizational-business capacity. Because the harvest is done manually, these crops are very demanding in terms of labor from agricultural laborers. The productive practices of protected agriculture with a high consumption of plastics and agrochemicals necessarily involve the banking sector that promotes access to capital.

[1] CONAHCyT-Centro de Estudios Rurales, El Colegio de Michoacán, Zamora, Mexico, lcrespo@colmich.edu.mx

2 Methods

Mainly mathematical-statistical methods were used to analyze secondary, official data from the following sources: INEGI (National System of Stastical and Geographical Information, SIAP (Agri-food and Fishing Information Service), ITC (International Trade Center) – TradeMap. Own research was also carried out in the area of northwestern Michoacán, which included semi-structured interviews, observations and ethnographic methods.

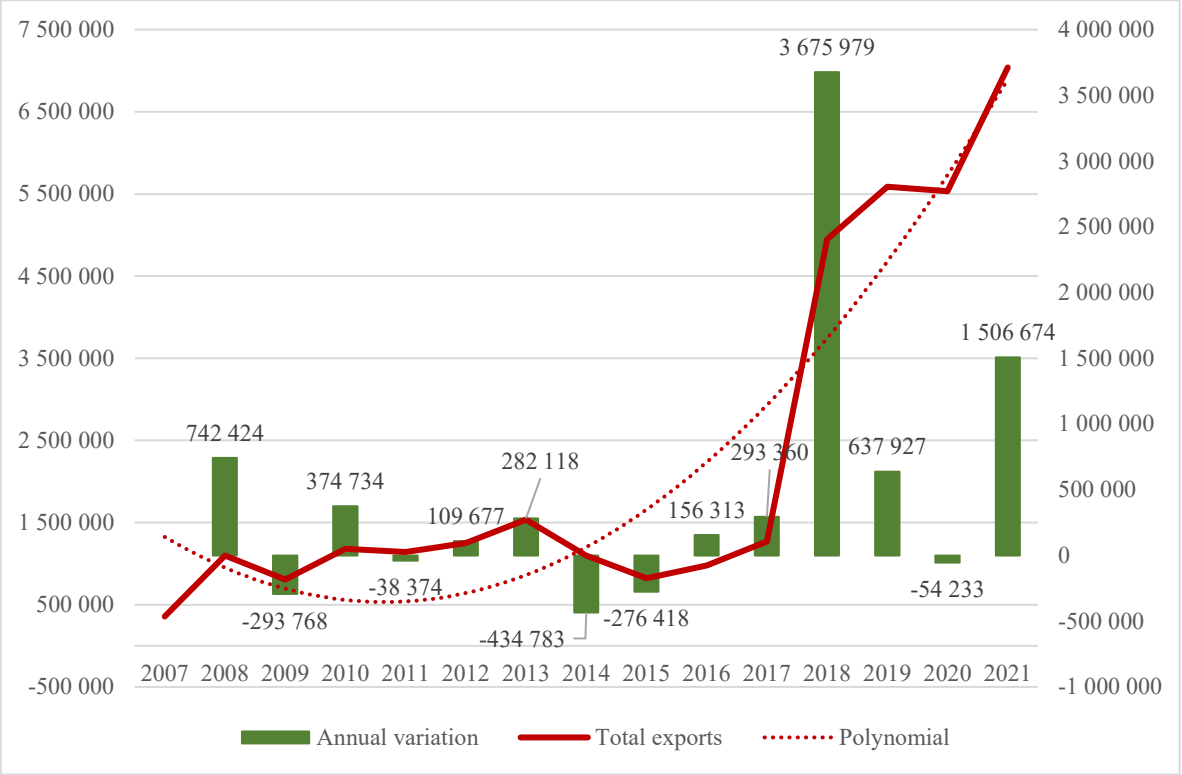
3 Research results

The main Michoacán agro-export chains have demonstrated their continuity and competitiveness in the last 15 years when production has remained in the first national places. In the economic history of Michoacán we can detect the emergence of new very relevant crops such as blackberries, blueberries or raspberries that, far from being traditional Mexican crops, have become established, consolidated and are generating new competitive exports. In these cases, these are local learning processes that, although initially reserved for a small group of entrepreneurs, spread and stimulate other new actors to join the boom.

The particularity of Michoacán is that exports originate mainly in rural areas, since neither the metropolitan area of Morelia nor the other two metropolitan areas (La Piedad-Santa Ana, Gto. and Zamora-Jacona) have industries that exceed the agricultural production. Only 22 subsectors have relevant exports, of these 20 are within the primary sector (fruits, vegetables, wood) or closely linked to it (fruit juices, preserves, frozen foods).

The United States is the main trading partner of Mexican agricultural exports, with a concentration in the destination of 86 %. The concentration in the product is also very high: 68 % of total foreign sales derived from only 20 food products, among which are beer, avocado, berries, tomatoes and tequila (Cairó and Cortés, 2022). The growth of Michoacán exports in the form of a polynomial function that practically copies the demand function for avocados by US consumers (see Figure 1). According to the University of Texas (Reuters, 2022) they amount to 4 billion dollars (2022), while two years ago they were 2.5 billion dollars. The average annual per capita consumption of Mexican avocados is over 4 kg (in 1990 it was 450 grams). Although previously the largest consumers of avocado have been Hispanics, today the fruit is appreciated by Americans of all origins.

Figure 1 Exports, Michoacán (USD)



Source: INEGI

The huge increase in exports in 2018 was due to a combination of factors such as an increase in US demand and poor agro-climatic conditions in California and the subsequent low harvest, which had to be replaced by imports from Mexico. The advantage of this export structure is that it is not affected as much by global crises, such as the financial crisis in 2008-2009 or the 2020-2021 pandemic (a slight reduction in the first half of 2020 was due to the initial shock of export chains in response to Covid and exchange rate instability, but demand and volume of exports increased). In 2021, Michoacán had record exports, with an increase of 27% and 7 billion dollars in economic benefits (Mexicoxport, 2022). Agricultural exports then become very important sources of foreign currency at the national level, while tourism income in these periods suffered dramatic falls and the oil sector experienced high volatility.

In the case of Michoacán crops there is a bipolarity between *commodity* and *specialty*. On the one hand, the exported products (berries, avocados, vegetables) must satisfy the requirements of quality and the global palate, on the other hand, the traditional crops of Michoacán land are the basis of the regional culinary culture that excels nationally and globally: it was declared an intangible heritage of humanity by UNESCO in 2010. In general, and for all crops, a frightful varietal narrowing is observed, when the genetic material is provided by transnational companies and often developed outside of Mexico (in the case of berries, maize and some vegetables) or when the majority of the production is concentrated on a single variety (Hass avocado or blue Weber agave). This affects not only genetic agrobiodiversity, but also the diversity of techniques and local know-how that characterizes small production. The decline of varieties thus also means social losses and loss of farmers' autonomy.

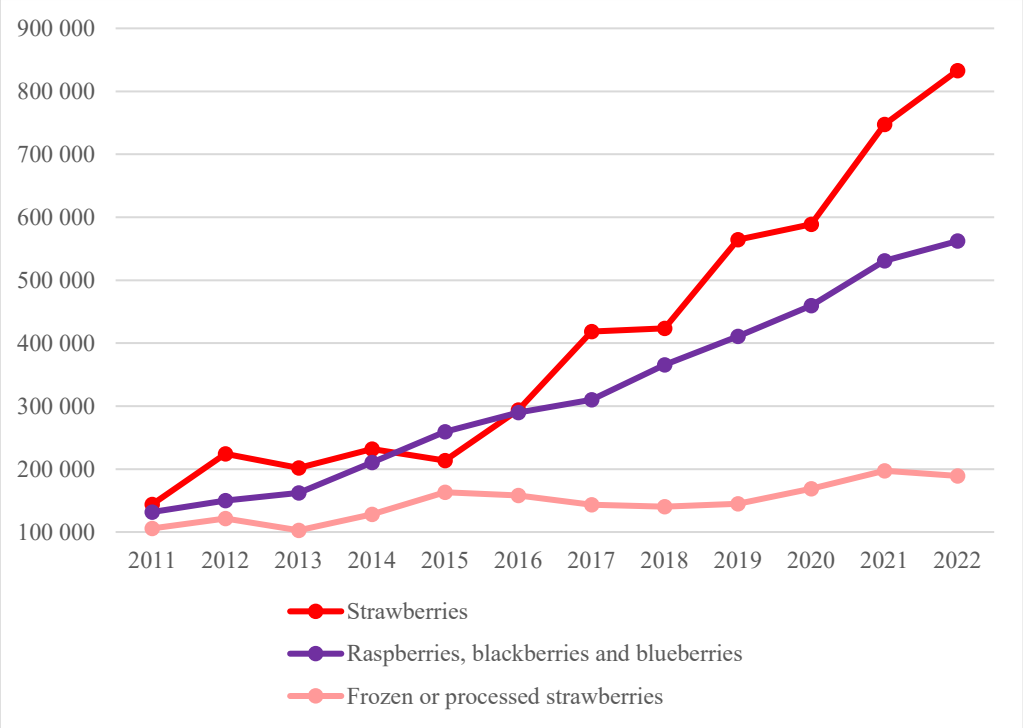
The agricultural sector of perennial crops and fruits yields the highest profits because production is paid in dollars. It is also the most demanding in terms of safety and quality. Products such as avocados or berries cannot present defects, since this would cause very significant discounts from packers and exporters. Thus, the demands of the commercial link are transferred down the chain, imposing the standardization of numerous practices, forcing small and medium-sized producers to apply a technological package prescribed by the foreign company. Likewise, there are requirements for minimum volumes, strict parameters of sensory quality (color, smell, flavor) and fruit size, storage and packaging conditions.

For small farms these standards are difficult to meet and their harvest is frequently rejected or depreciated. Another pressing issue is the difficulty of hiring sufficient labor at the exact moment of maturity, a problem that has already been

observed before the pandemic but that became more acute with it. All these obstacles lead to higher concentration of land and water in a few large export firms, which mostly gain access to land and water concessions through leases (sometimes even entire *ejidos*).

Economically, the greatest weight is given to the avocado and berry crops (see figure 2). The value of avocado exports was 34 billion pesos and 5.5 billion for blackberries. The total spillover of the two products, calculated based on the export multiplier, would be 44.4 million pesos. The economic benefit generated by avocado exports was greater than the GDP of the entire Michoacán industrial sector in 2016 (Crespo-Stupkova, 2018). Although we can point to these agricultural sectors as the engines of regional and state economic dynamism, the greatest economic benefits are for a few companies, mostly multinational or with foreign capital.

Figure 2 Exports of strawberries and other berries (thousands of USD)



Source: ITC, Trademap

Avocado is the emblematic fruit of Michoacán, the state remains the first national producer since the 80s of the last century. Mexico supplied more than 80% of avocados consumed in the U.S. Since 2003, the tariff for Mexican agricultural exports to the USA has been canceled. Another boost to exports has been the marketing that positioned avocado as a food consumed during the Super Bowl. The socioeconomic effects are not minor: foreign exchange earnings for thousands of producers and employment for tens of thousands of day laborers.

At the same time, this tree is controversial due to the environmental effects of its uncontrolled expansion. Deforestation, decrease in aquifers and contamination by agrochemicals are some of the negative externalities with which this production leaves its mark on the territory. Despite warnings from biologists, ecologists and forestry engineers, the area planted with avocado has grown steadily in the last decade. Another problem linked to the production of "green gold" is the attraction that the economic benefits have for organized crime groups (whose members extort producers) and consequently a serious situation of insecurity in the state.

SMEs avocado o berry farmers cannot export their production directly; they must be part of the APEAM or Aneberries. APEAM, A.C. is the Association of Avocado Producers and Packers Exporters of Mexico. It was founded in 1997 and represents 34,857 producers and 84 packers. It is the only Mexican cooperating partner in the United States, as well as with USDA-APHIS (U.S. Department of Agriculture-Animal and Plant Health Inspection Service) for the export of avocados from Mexico. It is also responsible for promoting the fruit in other countries, always under the "Avocados from Mexico" brand (APEAM, 2023). Previously, only Michoacán had certification to export to the USA, that changed in June 2022 and the state of Jalisco was also included. 46% of avocado exports from Mexico are packed by subsidiaries of U.S.

companies (Opportimes, 2020). Aneberries was founded in 2009 and represents Mexico's berry growing sector, including strawberries, blackberries, blueberries and raspberries. States that berry sector generates 470 thousand jobs and brings together the 28 most important producers and exporters, for example: Driscolls, Giddings, Sunopta, California Giant, Agrana Fruit, Berries Paradise, Berrymex, Confrusa, Expoberries, Fall Creek, Gold Fruit Farm, Fresh Kampo, Naturberry, Latin Berry Plants, Hortifrut, Planasa, Splendor (Aneberries, 2023).

The most important certificates in the field of berries and avocados are: GlobalGAP (Good Agricultural Practices), National Organic Program NOP EU, Primus GFS, SMETA (SEDEX), DEALTI (Distinctive Agricultural Company Free of Child Labor), ESR distinctive, USDA Organic and KMD México (Kosher). Obtaining them is very financially and procedurally demanding for SMEs farmers: checks are frequent and based on details such as the maximum height of grass in avocado orchards or the complete absence of wild fauna. From the point of view of environmental responsibility, the emphasis is mainly on zero deforestation and low greenhouse gas production. Social responsibility includes the necessity of health insurance for workers and zero tolerance of child labor (limit 15 years).

Digitalization is present throughout the agri-food system, from the production stage, distribution and marketing, to consumption. For example, geotraceability (combining geographical information with conventional traceability data), an essential process to track each product from the orchard where it was grown in Mexico to its final destination. The public policy instruments in the digitalization of the agricultural sector were implemented mainly by the Mexican Ministry of Agriculture and Rural Development, which has developed technological systems at the service of producers such as the Computer System for Traceability of Agricultural, Aquaculture and Fishing Goods; georeferenced field work with GPS systems, geospatial analysis with Geographic Information Systems (GIS), and satellite analysis with high spatial resolution images. Digitalization includes precision agriculture systems, robotics, and decision-making by artificial intelligence supported by devices to process enormous volumes of data generated by sensors on climate, crops, soil and water (p. e. temperature, humidity, conductivity, weather conditions, hydrogen potential, pH, pests or diseases). However, it is used by a small percentage of highly capitalized farmers, primarily exporters of lucrative crops, while only 5.5 percent of Mexican farmers used a computer and 7.8 percent used the Internet (INEGI, National Agricultural Survey, 2019). Thus, the possibilities of most small and medium-sized farmers for obtaining certificates necessary for exports are fundamentally limited.

4 Conclusions

The state of Michoacán is called "the giant agricultural exporter." Nonetheless, the path to success has not been an evolutionary process and is far from being a progressive and linear development. Rather, it has been characterized by a series of vicissitudes that successively hindered and relaunched it. The agricultural-export sector has to face high risks of different kinds, such as climatic, pest and disease, as well as market risks (and the last one is the most complicated). The enormous increase in input prices (especially fertilizers, plastics and energy) and the fact that the current socio-productive paradigm requires strict logistical and standardization requirements, deepens the tension in agro-export chains. Alliances between transnational agribusinesses with large Mexican producers have generated spectacular fortunes but only for a handful of the strongest players. Small and medium-sized farmers face serious difficulties in integrating into a profitable agri-food model.

Critical voices warn that the rural space will become a "cheap back garden" of the United States (cheap if the generated environmental footprint is not taken into account). Apart from the more "classic" difficulties of family agricultural farms such as the lack of generational replacement, increasing migration, unequal access to water and land and insufficient capital that are also present.

Acknowledgement

The article has been prepared as a part of State Program for Territorial Planning and Urban Development of the State of Michoacán and with support of the Grant FORDECYT-PRONACES/265208/2020 'Agro-food systems, local knowledge and forms of adaptation to changing scenarios in north-western Michoacán'

References

Aneberries (2023), Inicio, [online].[October 2023]. Avalaible at https://www.aneberries.mx/

APEAM (2023), www.apeamc.com [online].[October 2023]. Avalaible at https://www.apeamac.com/que-es-apeam/?lang=es

Crespo-Stupková, Lucie (2018). Aguacate y Zarzamora ¿Motor del Desarrollo de Michoacán?, Serie Poscosecha y Comercialización, 15, *Artículos Técnicos de INTAGRI*. México. 7 p.

Cairó G., Cortés I (2022). Semiperiferia y cadenas de valor globales: el caso del sector agroalimentario mexicano. *El Trimestre Económico*, 355, 795-828

INEGI (2019), National Agricultural Survey [online].[October 2023]. Avalaible at https://www.inegi.org.mx/programas/ena/2019/

INEGI (2023), Annual exports by federal entity. Total exports. Absolute values (Thousands of Dollars), Michoacán de Ocampo [online].[October 2023]. Avalaible at https://www.inegi.org.mx/app/indicadores/?ind=6207095719&?ag=16&tm=6#D6207095719#D6207095692#D6207095719

Mexicoxport (2022). Michoacán tuvo récord de exportaciones en 2021; alcanzó repunte de 27 % y 7 mil mdd en derrama (La Voz de Michoacán), [online].[February 2023]. Avalaible at https://mexicoxport.com/michoacan-tuvo-record-de-exportaciones-en-2021-alcanzo-repunte-de-27-y-7-mil-mdd-en-derrama/, consultado el 10 de septiembre, 2022

Opportimes (2019), Mexico´s avocado exports increase 29.4 % [online].[October 2023]. Avalaible at https://www.opportimes.com/mexicos-avocado-exports-increase-29-4/

Reuters (2022). Aguacates mexicanos, apreciados en EU, alimentan un mercado multimillonario, [online].[February 2023]. Avalaible at https://www.forbes.com.mx/aguacates-mexicanos-apreciados-en-eu-alimentan-un-mercado-multimillonario/, consultado el 17 de octubre 2022

Trademap (2023), Product exported by Mexico in 2022, Product: 0810 Fresh strawberries, raspberries, blackberries and blueberries [online].[October 2023].
Avalaible at https://www.trademap.org/Country_SelProductCountry.aspx?nvpm=1%7c484%7c%7c%7c%7c0810%7c%7c%7c4%7c1%7c1%7c2%7c1%7c1%7c2%7c1%7c1%7c1