Article **Journal-Financial Economy**
December 2021 Vol.5 No.9 28-38

Sectoral system of innovation and agricultural policy in export products. A case study of dried mango

Sistema sectorial de innovación y Política Agrícola en productos de exportación. Un estudio de caso del deshidratado de mango

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DOI: 10.35429/JFE.2021.9.5.28.38 Received July 25, 2021; Accepted December 30, 2021

Abstract

This document aims to analyze some of the challenges facing economic policy to promote and reactivate regional development in the face of an unprecedented crisis that has deepened the pre-existing problems in the agricultural sector and to reveal the fragility of neoliberal policy in the face of a contingency such as that caused by the COVID-19 pandemic. A change in current policy by promoting a strong share of public spending through programs to support producers to counteract the effects of the deterioration of private investment as a result of the pandemic becomes evident and essential. In this sense, it is pointed out the existence of a strong dependence that this sector keeps with the regional market of North America to activate the agricultural development and the Sectoral System of Innovation (SSI) in agricultural export industries from a case study in the production of dehydrated mango.

Public policy instruments, Sectoral innovation system, COVID-19 pandemic

Resumen

El presente documento tiene como objetivo analizar algunos de los retos que enfrenta la política económica para promover y reactivar el desarrollo regional ante una crisis sin precedentes que ha venido a profundizar los problemas preexistentes en el sector agrícola y a revelar la fragilidad de la política neoliberal ante una contingencia como la que ha provocado la pandemia por covid-19. Se vuelve evidente e imprescindible un cambio en la política actual promoviendo una fuerte participación del gasto público a través de programas de apoyo a los productores para contrarrestar los efectos del deterioro de la inversión privada como consecuencia de la pandemia. En este sentido, se señala la existencia de una fuerte dependencia que este sector guarda con el mercado regional de América del Norte para activar el desarrollo agrícola y del sistema sectorial de innovación en industrias agrícolas exportadoras a partir de un estudio de caso en la producción de mango deshidratado.

Sistema sectorial de innovación; política agrícola; pandemia por COVID-19

Citation: PAREDES-MEDINA, Reyna Myrna, MONTES-TORRES, María de Lourdes and LOPEZ-MONDRAGÓN, Ana Cecilia. Sectoral system of innovation and agricultural policy in export products. A case study of dried mango. RINOE Journal-Financial Economy. 2021. 5-9:28-38.

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Introduction

We are living through an unprecedented economic crisis. Never before has a health crisis impacted so much on the economic performance of the whole world and we are still in the middle of uncertainty, without knowing what will be the economic, social and political scope that this health crisis due to covid-19 has detonated for two years now. This situation has disrupted all areas mainly due to the great interconnection that currently exists between countries and the productive sectors, in the processes of production, technological development and in other areas of life. The COVID-19 pandemic has caused a great recession in all the economies of the world; it is evident that the impact and effects have been diverse in each country and even in each sector, due to the different degrees of interconnectivity and dependencies that the productive sectors have with the macro-regions of the world and the resources that each sector, region and country has to face this situation, which undoubtedly surprised the whole world. The COVID-19 pandemic highlighted the vulnerability[1] of the global food system, controlled from the countries with greater industrialization and articulating less development regions through various agri-food chains; made up of large chains that are articulated throughout the most industrialized countries and the regions articulated through them; disruptions in these supply chains and the increase in the price of agricultural products and all commodities in general have put food security at risk, especially in the most marginalized regions of the world[2].

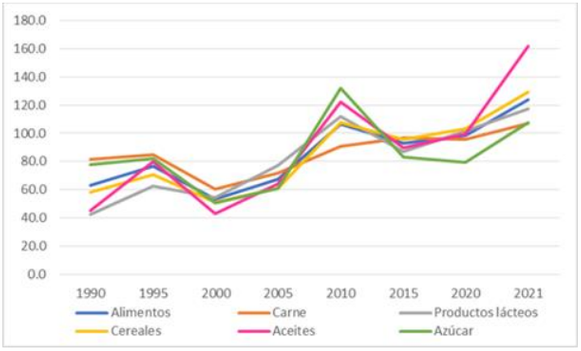

Figure 1 FAO Food Price index
Source: Food and Agriultura Organization of the United Naions. (november, 2021)

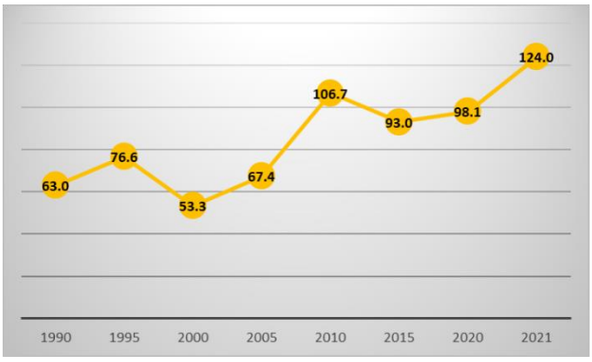

Figure 2 FAO Food Price Index
Source: Food and Agriculture Organization of the United Nations (november 2021)

While it is true that the COVID-19 pandemic revealed enormous failures of the economic system, the Mexican agricultural sector already presented serious problems such as a strong delay in its development, low productivity and a high technological and financing dependence on North America and the world, a high primary export specialization and derived from this specialization a great vulnerability with respect to food security.

[1] The vulnerability of the World Food System (WFS) refers not only to the production of food, but also to the availability of these, both processes are closely linked and conditioned by social (mainly economic and political) and environmental factors. But it also refers to the co-responsibility of organizations, institutions, and countries to carry out actions to face the risks and threats that loom with respect to the survival of humanity (González Chávez & Macías Macías, 2007).

[2] According to data from the Food and Agriculture Organization of the United Nations (FAO) (2021): "Conflicts, economic shocks – particularly due to COVID-19 and extreme weather – led at least 155 million people to acute food insecurity in 2020 (FAO. Mexico, 2021)"

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The COVID-19 pandemic came to accentuate some of these problems in some sectors mainly due to the confinement and the closure of borders that, as sanitary measures were taken by countries at different times, interrupting the flow of inputs and products and altering the continuity of Global Value Chains (GVCs); likewise, the confinement and the closure of borders generated, among other things, the decrease in the income of families and companies due to involuntary dismissals and stoppages. However, the COVID-19 pandemic has made the local and regional acquire greater relevance to maintain and promote economic development, contrary to the dynamics imposed by the neoliberal model in which the need to globalize prevails in order to be competitive.

This new panorama opens a window of opportunity for the Nayarit agricultural sector to promote local development from a more sustainable and endogenous perspective. That is a question of taking advantage internally of existing local resources and opportunities, as well as the opportunities of exogenous dynamism, elaborating a development "from below" that is sustainable and with the participation of territorial actors (Vázquez Barquero, 2007). In the case of the system that concerns us, there is the use of the agricultural resources of the territory, mango cultivation occurs using techniques that respect the environment, agrochemicals or any other product that affects the ecosystem are not used; in addition, there is the participation of local actors who carry out the process of dehydrating the mango in an organized way and taking advantage of the capacities that each of them has as well as the implementation of innovative techniques and machinery, on the other hand the external actors that participate mainly when carrying out the commercialization of the elaborated product that is usually for export. This represents a challenge for Nayarit agriculture that is characterized by being very heterogeneous, with self-consumption production units, poorly developed MSMEs that serve the domestic market but also exist, as enclaves, MSMEs that attend the international market[3] with a higher degree of technification of their productive processes, and higher degree of competitiveness contrasting with the rest of the enterprises of the region where they are allocated.

It is also a primary export economy which specialization pattern focuses on tropical fruits, vegetables and organic crops (Sandoval, 2010); strongly linked to the economic dynamics of the United States of America (USA) and its demand, its marketing channels and financing through Foreign Direct Investment (FDI) that represents greater accessibility to financing institutions within the country.

Although the companies that produce for export have a higher degree of technification and productivity than the rest of the production units in the region, they also face the same problems derived from the lack of institutional support that can integrate a system that is not only capable of articulating them to the region but also promotes sustained innovation processes that serve as an engine for that allows the agro-industrial sector to become self-sufficient, sustainable and diverse.

With this goal, the SSI approach makes it possible to analyze the structure of the sector and identify the main shortcomings that impair its development, as well as to elaborate sectoral policies that aim at the self-sufficiency of Mexican agriculture.

The present research was developed under the qualitative approach, with a descriptive and exploratory methodology, due to the fact that the processes for mango dehydration and the relationships that exist between the dehydrator and the different actors involved are described. It is addressed through the analysis of case study, based on what is cited by Simons (2011) which states that this type of studies aims to investigate the particularity of the singular case. In this sense, a dehydrator located in Las Varas, municipality of Compostela, Nayarit and its relationship with agricultural policy and the SSI are addressed in a particular way.

The collection of information was obtained from primary and secondary sources. Interviews were conducted with those in charge of the dehydrator, different bibliographic sources were reviewed and information from government and private institutions that are related to the subject of study was consulted.

[3] Basically, the US and Canada markets, been followed by European countries like Germany and Japan in Asia.

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The analysis of the research was carried out under the theory of sectoral innovation system, aimed at dehydrated mango in Nayarit, describing the different actors (business, government, research, market and finance) and the networks that are established among them to promote innovation in the region where the indicated dehydrator is located.

The tropical fruit dehydrator emerged as a necessity to try to solve not only individual problems but common problems in the region. This was done through the SSI, because finally the trajectory and development of the company presented here is conditioned by the processes that this model emphasizes, such as the basic knowledge of the industry, the technological capabilities, the interactions between the actors and the institutional framework that make up the specific SSI of this industry. Finally, these interactions are not only determined by the macro and microeconomic environment of the country and the sectoral policies implemented by government institutions in the face of the COVID-19 situation, but also with the international context determining and affecting both the competitiveness of companies of this type, and in the local environments where they are located.

Sectorial System of Innovation and Agricultural Policies in the face of the pandemic

In the mid-90's, with support from the federal government, the first dehydrators were established on the south coast of the state of Nayarit, dedicated to dehydrating mangoes for the export market, which led to the establishment of two more in Jalcocotán, where innovative elements that a migrant returning from the United States successfully applied. Thus, by 2010 the town had two of the five dehydrators it currently had. In this way, in just nine years, the number of facilities of this type went from 6 to 28 in the state, making presence in the municipality of San Blas with 18, 3 in Tepic and in Santiago Ixcuintla, 2 in Compostela, and Tecuala as much as Ruiz, with one of them each (Becerra y Montes, 2019).

The notorious growth process of this activity has only been possible from the sufficient supply of tropical fruits offered by the region, among the varieties that are grown and used for the dehydration process are Haden, Kent, Tommy Atkins, Keitt and Hardy, which characteristics are described below in Table 1.

Variety	Season	Features
ATAULFO	February-July	Yellow, Elongated Type, Length 12.5-14 cm., Width 5.5-6 cm., Weight 180-260gr. Fruit of excellent quality, resistant to handling and has no fibers.
HADEN	February-August	Red/Yellow, Round type, Length 10.5-14cm., Width 9-10.5cm., Weight 510-680gr. Its pulp is juicy with a little of fiber, it has good taste.
KENT	July-August	Red/Yellow, Round type, Length 12-14cm., Width 9.5-11cm., Weight 450-700gr. It contains very little fiber. It has the disadvantage of being very susceptible to anthracnose, because the harvest season coincides with the rainy season.
TOMMY ATKINS	February-August	Yellow/red color, Round type, Length 12-14.5cm., Width 10-13cm., Weight 450-700gr. The pulp is juicy with a little fiber content. It has the disadvantage that if it is not cut at its optimum maturity it presents problems in post-harvest management.
KEITT	April-September	Color Pink/Yellow, Round type, Length 13-15.5 cm., Width 9-11cm., Weight 510-2000gr. It has a very sweet pulp with a little fiber content.

Table 1 Mango varieties grown in the state of Nayarit, México
Surce: Adaptation from the Plan Rector del Sistema Nacional Mango (marzo, 2005)

The dehydrator, object of study, is located in the town of Las Varas in the municipality of Compostela Nayarit, is a Rural Production Company of Limited Liability (S.P.R. DE R.L.) self-managed and integrated by 10 partners, of which nine are men and one is a woman.

ISSN-On line: 2531-2995

This company aims to raise the standard of living of its associates and the inhabitants of the region from the production and marketing of dehydrated fruits among which the mango stands out, which is the fruit that by vocation is produced in the area of the south coast of the state of Nayarit more specifically of Las Varas, municipality of Compostela. Most of the partners are from the locality and are mango producers.

The company was founded in 2017, derived from the need to continue with the commercialization of mango adding value by introducing the dehydration process, this has allowed the association to have a greater possibility of obtaining better prices for the product, exporting it mainly to the United States. The Procesafrut San Vicente dehydrator has structured a production chain for the mango that is produced in the surroundings of the establishment because it integrates key links: the agroecological cultivation of the mango, cleaning, selection, transformation, packaging and marketing. These links are articulated from the cultivation of mango because part of the partners is also responsible for the cultivation and purchase and sale of it.

It should be noted that the mango that is dehydrated is already previously marketed since contracts are previously established with companies that are responsible for exporting it mainly to the United States. Belik (2021) state that the integration of global value chains is presented as a solution for the low income and marginality of small producers. The axis of coordination and command of the value chain of these products has been moving downstream, with greater power being exercised by traders and distributors.

This export process is carried out through a marketing company located in the state of Michoacán. 90% of its production is marketed through these large collection companies that are responsible for concentrating the dehydrated mango of several dehydrators in the state of Nayarit, and they are the ones who are responsible for marketing it with US companies. This implies a great dependence on these companies those that mediate negotiations between the dehydrated producer and the international market, which represents a disadvantage for this industry.

As can be seen, the dehydrator of Las Varas, Nayarit is set in an agri-food chain directed by US marketing companies and that also integrates national marketing companies, the dehydrator integrates primary links and has achieved an Up Grading in the chain and has now incorporated dehydration, thus adding value to its primary product. This company has orchards owned by some partners, but its general supply is covered by the advance purchase of orchards in the region.

Sectoral innovation system of dehydrated mango

From this approach, the dynamics of economic development are strongly linked to technological development and this to the innovation processes within the sectors, product of their own development dynamics. The concept of a sectoral innovation system (SSI) privileges the creation, use and dissemination of knowledge as a key factor in the processes of innovation and economic development. This concept is particularly useful when analyzing the dynamics of development of an industry as explained by Malerba and Nelson (2009) companies operate in a broader context of innovation systems to the national; in another sense, they also point out that innovation systems differ much more from one sector to another than the differences that can exist in the same sector anywhere in the world. Malerba (1999) (cited in Navarro, 2001) emphasizes that "the borders of sectoral innovation systems are endogenous, emerge from the specific conditions of each sector and are not necessarily national, even determining that in some cases the three dimensions coexist in a sector. Starting from the assumption that the borders of a nation or a region are not always adequate to examine the innovation dynamics of a sector, Malerba and Nelson (2009) coined and defined the concept of SSI as:

> A flexible tool that allows a broad or deep analysis of the sector, due to three qualities: first, the borders of a sector are not rigidly defined, these can be circumscribed in a local, national and / or globalized scope, in addition, the three levels coexist in these sectors that are export depending on what is intended to analyze. Second, an SSI can be examined extensively or closely, in the first case it allows us to identify all the interdependencies and links in the transformation of the sector and the second allows us to identify more deeply specific relationships.

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Finally, an SSI perspective is a broad and flexible framework capable of covering different elements and variables according to the approach of the analysis. However, the elements that guide the analysis will always be knowledge, capabilities, actors, interactions and institutions.

In this regard, Kuramoto (2007) points out that:

> This vision highlights the role of companies in the processes of technological innovation and even scientific advancement. [. . .] it is an interactive process between the different research institutions, companies and clients, in which each agent contributes its knowledge and needs, which constitute necessary inputs to define the final characteristics of innovation and in which the foundations can be laid to make scientific advances. At the same time, this constant interaction allows scientific and technological advances to spread, thus ensuring that less innovative companies have access to technological advances.

With this, the agro-industrial sector of mango dehydrated combines the three levels of participation that Malerba points out, the local, the national and the international; on the other hand, as will be explained later, the preponderant role of companies in innovation processes is also recognized, as Kuramoto (2007) points out and Solleiro and Castañon (2003) are the active actors that shape their technological and market environments, but they point out that the innovation process requires the existence of adequate macroeconomic conditions (a favorable environment) for the creation of a set of favorable externalities, given the regional specificity where they are inserted, and in accordance with the specific socio-economic needs and conditions of the place. Therefore, although companies play a determining role, they cannot do so alone, even less so in an environment where globalization conditions push companies to compete globally, that is, with the same sector but from other nations. It is clear that these companies need an institutional scaffolding that provides these conditions and that finally this institutional framework is not limited to the national level but also to the international one, which in this case are basically those of the US.

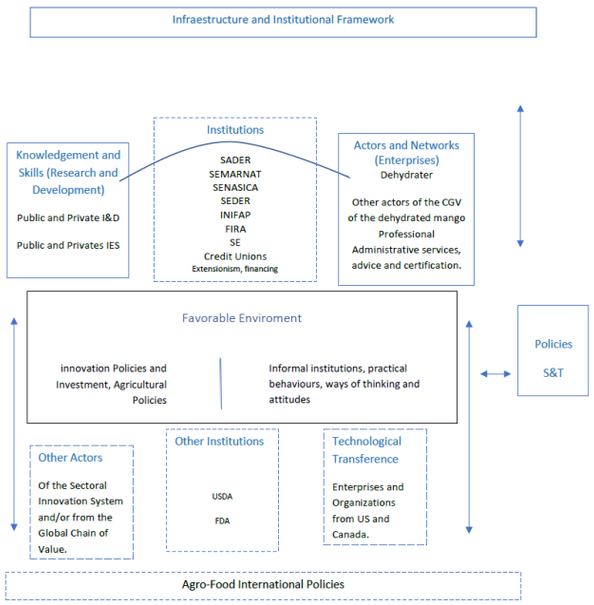

Figure 3 Sectoral Innovation System of the Mango in Nayarit
Source: adaptation from the Conceptual Diagram of an Innovation Agricultural System (SIA), Tropical Agriculture Platform

a) Technological Knowledge and Skills

Knowledge is a key factor with which it competes in any productive sector and this and the innovation processes that emerge from it are the engine of economic development. Following the proposal of Malerba (2009) under the approach of innovation systems, every productive sector has a knowledge base that is the Know How that it shares with the actors of the sector and that is capitalized in the innovation processes. Thus, the importance of the knowledge that the actors share in the dehydration process as a fundamental element for the creation of innovations is highlighted, in this sense, the capacities to learn and the processes that facilitate them become crucial in the search for the economic reactivation of the agricultural sector and the economic development of the region.

Technological capabilities can be defined as:

> "The provisions acquired through technological learning in a favourable social and cultural context. Technological capabilities imply the opportunity to enhance the opportunities and possibilities of the development of technological innovation, with the intention of strengthening individual and collective capacities to foster what people and societies want and can be" (Carvajal Villaplana, 2010).

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These capabilities when they refer to the development of technological innovations account for the possibilities that the mango dehydrating company has to absorb both knowledge and skills of use of new technologies, generally from abroad (mainly from the USA) and the ability to innovate given the knowledge acquired from Know-how and Learning by doing.

Continuing with Malerba (2009), the learning of companies is of great importance for this sector, although it is true that knowledge and technological skills are acquired through formal and informal channels; the emphasis is only on the latter. Learning by doing plays a decisive role in innovation processes, tacit knowledge is the characteristic of each sector, it is its human capital because it is acquired through experience and is characterized by being personal and contextual and requires interaction with other actors to be able to acquire, use and disseminate it. In the dehydrator of Las Varas Nayarit "the knowledge and techniques that have managed to evolve to the level of innovating in aspects such as the mechanization of the processes of peeling the fruits and other processes that have been mechanized such as the severing of the pulp have been installed." In this sense, the dehydrator has valuable capital, as can be seen by the innovations implemented in the short time of its existence (Becerra and Montes, 2019).

It is important to note that since its inception the dehydrator has promoted the training of its staff through a scheme based on sharing learning among themselves especially in the way in which to make the work easier in such a way that it has a higher productivity that benefits both the company and the workers, having higher returns and therefore better income. Similarly, at the beginning of each season, staff are trained in hygiene issues because it is one of the fundamental elements to be able to count on the certification of the company, courses granted by the Ministry of Agriculture and Rural Development (SADER), mainly in its safety programs and good agricultural practices, or other public and private institutions.

It is worth mentioning that, among other innovations, it has been possible to reduce the loss of the product since to produce a kilogram of dehydrated mango initially required 15 kg of fresh fruit, currently only 11 kg are required, which shows the improvement in the processes making the use of the raw material more efficient.

b) Actors and Networks

Closely linked to the knowledge factor are the interactions that the various actors carry out in the innovation processes. These interactions can be observed as networks that make up the various actors with the national or international institutional framework. During the period that society has been working, the link with private companies has been constant, it has worked with a private company for pest control, a private laboratory has carried out the study of soil and water bacteriology. The safety of the whole process has been very important, so training courses have been held for all the personnel working in the dehydrator, in the same way the administrative processes are very important and it has been trying to improve each of them, all the previous activities have been implemented in the framework to achieve the certification of the company, so it has been linking up with a private institution for that purpose.

Actors en the SSI	Characteristics	Function in the SSI
Mango growers	Local and national growers	Suppliers play an important role in process fluidity but have minimal or no participation in innovation processes.
Stuff suppliers	Suppliers (pesticides, fertilizers, tools, machinery, packing supplies).	
Colaborators	Transport, technical advice, certifiers, pest control, technicians.	These agents have an important participation in innovation processes, specially certifiers and technical advisors.
Workers	Peelers, cutters, sorters, packers, loaders.	They are important in the innovation process by having specialized knowledge and skills (know how).

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Other dehydrators	Other dehydrators.	They are the most important actors of the system, they are the ones that dynamize the system and therefore promote the development of the region where they are inserted.
Brokers	Economic agents who are intermediaries between dehydrators and companies Zamora, Michoacan Escuinapa, Sinaloa Capomal, Nayarit.	They are among the most important players in this system since both the sales levels of the dehydrating company and the distribution channels with the US market depend on them.
Financial institutions	FIRA, Commercial banking, Second floor banking, credit unions.	At the national level, these institutions do not have the capacity to meet the needs of the agro-industrial sector in question.
Support institutions	SADER, SENASICA, SE, SEDER, SEMARNAT, INIFAP.	These institutions fulfill in part their function of supporting the development of capacity in the sector, through extensionism.
Customers	Distributors	They are actors who set the rules of marketing and provide strategies to maintain the quality of the product.

Table 2 Actors in the sectoral system of innovation of the dehydrated mango
Source: Own elaboration according to the model of the SSI.

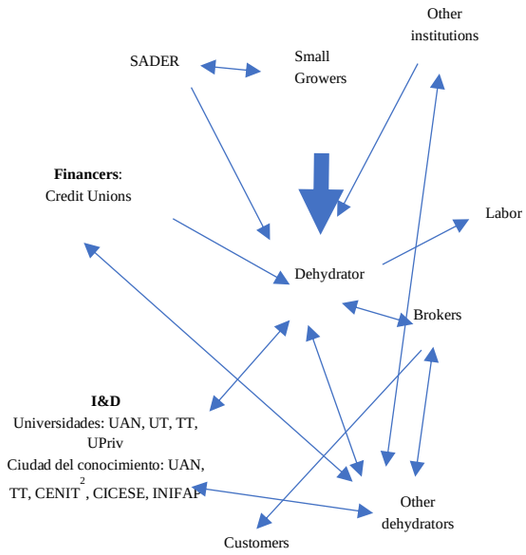

Figure 4 Actors and networks
Source: Own elaboration

c) Institutions and Institutional Framework

Finally, another important element within the SSI is the institutions and the legal or institutional framework that can build the necessary networks to support both production processes and innovation processes. To understand the role of these within the SSI it is necessary to know what we are talking about, North (1990, 1991) cited by Peraza Castañeda (2019), defines them from their main characteristics highlighting that: "-They are rules of the game in society that limit and model human interaction at the political, economic or social levels; they are both formal (constitutions, laws, property rights) and informal (sanctions, taboos, customs, traditions) and generate incentives influencing the evolution of societies over time and, therefore, are a conditioning factor of historical change".

The Mexican government has made some efforts to boost the systems approach to agricultural development; among the strategies that have had a certain scope can be mentioned the system-product program, implemented since the reform of the Law for Sustainable Rural Development in 2001, whose objective was to integrate and give impetus to the strategic productive chains of the Mexican countryside. According to the definition set out in the working document entitled Structuring the Strategic Program for Research and Technology Transfer in the Federal District, the product system is defined as:

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> "The integration of the agents and economic activities that intervene in a production process, from the primary activity to the offer to the final consumer, incorporating packaging, industrialization or transformation processes that are necessary, for its commercialization in internal and external markets. It also includes the supply of relevant supplies and equipment, as well as all services that significantly affect these activities, such as research, training and technical assistance, among others" (Master Plan of the National Mango System, 2005).

The case of mango is one of the agricultural products that has been tried to promote under the implementation of this system-product policy through SADER, in order to integrate the processes that are required from production to supply to the final consumer, as well as facilitate the interaction of the actors involved in these processes and / or links in the chain, creating even institutions that facilitate these processes and here fits the process of dehydration, however, it has not had the result that was expected, at least for this system-product. The dehydrator of Las Varas, Nayarit confirms it as follows:

> "To start with this company, we initially tried to approach some public entities in order to seek financing, a whole project was made and the process to achieve financing with Trusts Instituted in Relation to Agriculture (FIRA) however, unfortunately, although the project was approved the institution did not have an assigned budget for that year, so the support never came."

It is clear that, despite the efforts made, there are not the necessary resources to provide effective institutional support even when the institutions and programmes aimed at this purpose are in place.

> "It is important to comment that during the time that the dehydration plant has been in operation, approaches have been made to public institutions such as SADER among others, however, there has been no financial or any other type of support" (Montes, 2021).

Consequently, the partners, in addition to contributing cash and assets for the creation of this company, have had to request loans in other institutions, mainly with the Sierra de San Juan credit union, established in Xalisco, Nayarit; who, with the same project presented to FIRA, have been subject to the required financing, being their main source during the four years they have been operating.

Economic Policy and Pandemic

In recent decades, it has been seen that the paradigm of innovation systems has acquired importance in the orientation of economic development policies in our country. In this case, a National Plan for Science, Technology and Innovation has been developed and institutions have been created whose purpose is to strengthen this system and generate greater interaction between the participating agents, mainly the organizations and institutions that must support innovation processes in a sector. However, in Mexico, it has not been possible to consolidate an innovation system that is capable of generating a virtuous circle that allows science and technology to be put at the service of economic development (Arocena and Sutz, 2002).

As with any complex problem, so is the solution; it requires the participation of several actors and the combination of actions of various kinds, in addition to the coordination of the three levels of government to be able to give an exit to the situation that prevails in the world and that each nation has to face in the best way. In this globalized world, the answer will necessarily have to be in this area, so national efforts will have to be combined. However, the differences that arise in the dynamics of each sector require differentiated policies for each stratum of the agricultural sector, since they have different profiles and therefore different needs.

Agricultural policies must be in place to promote and strengthen these processes so that companies can consolidate an SSI and have an institutional framework that serves as a basis for being more competitive, causing economic development to be reactivated in the agricultural sector of the state of Nayarit and especially in the region where these systems are articulated, also impacting on the general economic reactivation of the country.

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Conclusions and proposals

The high dependence of the Nayarit agribusiness and in general, the national one, with the US economy in terms of financing and concentration of marketing channels represents an opportunity, but also an obstacle that conditions the development potential of the agricultural sector.

One of the greatest challenges in the current situation is to reduce the gaps in economic and technological development that characterize Mexican agriculture and that make it a mosaic of social inequalities with enormous asymmetries in economic and social development.

Correcting these inequalities generated by the neoliberal model of capitalist development requires a program of strong social significance that implies the development of specific sectoral and innovation policies for the strengthening of the sector.

Given the above, it can be seen that one of the main problems facing the agricultural sector in our country is the low capacity to offer financing for agro-industrial development, however, and despite this important lack, development in the productive sectors linked to the foreign market have sufficient incentives to independently pursue their development. It is not that this situation is bad, private investment is a source that has to be exploited in the development of a nation, however, we can´t leave the entire organization to the market because it generates the great asymmetries that we are experiencing; it is necessary to evaluate the development of the policies implemented for the achievement of a more homogeneous development model in the agro-industrial sector of Mexico.

Specifically, public and private investment is required to generate a favorable environment in which innovation processes are promoted and facilitated, that not only are the programs on paper, but that the agro-industrial sector can really count on them for the development of infrastructure, implement support programs for innovation and research and development for the Mexican countryside, promoting the interaction of the necessary actors for this achievement. Also, to resume strategies such as extensionism, which is a way of linking science with the productive sector based on institutional support.

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