

**Extensionism in Mexico and its impact on changes in agricultural production yields****El extensionismo en México y su impacto en los cambios de rendimientos de producción agropecuaria**

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**Abstract**

Extensionism in Mexico emerged as a system of assistance and education to improve production efficiency in the agricultural sector. Initially small groups were instructed in low-income regions to mainly traditional crops such as corn and beans and in minor proportion to livestock species. Subsequently, extension programs were structured to promote productive techniques and methods that improved the efficiency and income of producers. In addition, institutions are involved with the participation of field professionals oriented to the transfer of technology without considering a specific model of evaluation of the dissemination program, product of the involvement of several institutions such as Secretary of Agriculture, Bank, The Agricultural Insurance and others. From the above, it can be deduced that the program had high expectations however; the expected results were not given due to lack of institutional coordination.

**Production, Extension, Economic and social welfare, Marginalized areas**

**Resumen**

El extensionismo en México surge como un sistema de asistencia y educación para mejorar la eficiencia productiva en el sector agropecuario, inicialmente se instruyó a pequeños grupos en las regiones de bajo ingreso y principalmente a los cultivos tradicionales como es el maíz y el frijol y en menor proporción a especies ganaderas. Posteriormente se estructura programas de extensionismo que promovía técnicas y métodos productivos para mejorar la eficiencia y el ingreso de los productores. Además, se involucran las instituciones con la participación de profesionales del campo orientado a la transferencia de tecnología sin considerar un modelo específico de evaluación del programa de divulgación producto de la involucración de varias instituciones como era Secretaria de Agricultura, Banco, La Aseguradora Agrícola y otras. De lo anterior se deduce que el programa tenía altas expectativas, sin embargo, no se dieron los resultados esperados por falta de coordinación institucional.

**Producción, Extensionismo, Bienestar económico y social, Zonas marginadas**

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## Introduction

The objective of this study is to show if the programs established by the government had any impact on agricultural production, in a specific case: Extensionism. This program was implemented by the government in order to reach the main marginalized areas, with the opportunity to increase production yields to those producers with scarce resources and therefore little or no technology from their plots. According to IICA / sf, agricultural extension is defined as "the instruction and technical and practical guidance that is available to all farmers, with the aim of helping them to obtain better and greater harvests and as a consequence, to raise their standard of life ", with the special characteristic that in Mexico who gave the support of extension was the government through the corresponding institutions, while other countries was through the educational institutions.



This diagram shows how the investigations that were carried out were carried out in the first instance by the government (research centers), and later were made known by demonstration plots made by the extensionists (Rendon 2013) together with the producers, talks with a flipchart , as well as the delivery of brochures to these.

On many occasions, there was no adequate coordination because while the producer received technology he did not have the resources to apply it and had no way of expressing his dissatisfaction (Jansen and Ekanayake 2007) only focusing on his production. Subsequently, in order to offer better technical assistance to agricultural production, Inter-institutional work teams were created, such as the Federal Electricity Commission, the Secretary of Agriculture and Hydraulic Resources, the Agrarian Reform and the Rural Credit Bank, since it had been observed that technology was available to disclose but there was no financing for the application of this technology, and even fertilizer credit was started for their plots, and in many cases the use of credit was limited due to the lack of defined tenure. the earth what was a limitation for the use of technology. (Rodríguez 2007).

“In 1973, the Public Investment Program for Rural Development was created (PIDER), which ended its activities in 1983. Its orientation was to resolve social and productive lags in specific regions through the coordinated investment of various sectors and levels of government. which had been characterized by achieving duplication of resources and efforts.

The objective of PIDER was to achieve an integral rural development that allowed the rational use of natural resources and the roots of the population in their places of origin ", depended on the Presidency of the Republic together with the support of international organizations such as the World Bank and the Inter-American Development Bank and there should be an increase in both agricultural and livestock production, which should generate more employment and social infrastructure.

It can be said that the greatest achievement was the establishment of effective forms of coordination between the states and the federal government, which was carried out through its regional delegations COPRADES (Committees promoting socio-economic development).

These organizations depended on the Presidency of the Republic and had the support of international organizations such as the World Bank and the Inter-American Development Bank, it is worth mentioning that personnel (Agronomists, Veterinary Doctors, Agricultural Technicians and Social Workers) were hired to develop the work of Agricultural Extensionism.

It is worth mentioning that to meet the needs in Mexico, mainly in the most vulnerable places, some programs were developed during the seventies, such as the PIDER, the General Coordination of the National Plan for Depressed Areas and Marginalized Groups (COPLAMAR) and the Food System. Mexican (SAM), which were the main programs for the fight against poverty.

However, they did not reach the required importance due to the fact that the target population to which they were destined were not the priority groups in the governmental agenda of the time. (Palacios 2007).

In 1976 a decentralization of resources to the different states of the country was presented, and by 1980 the main objective of the PIDER was for the population to improve their health, nutrition, education and housing, however, the most significant was an improvement in planning regional level and its coordination, as well as the process of decentralization of public administration. In this period, technical assistance and application of subsidies was implemented, although it was not enough to combat poverty.

The purpose of COPLAMAR was to carry out actions that would help marginalized rural areas to organize themselves and obtain material elements so that there would be a more equitable participation of the national wealth. According to Cordera and Lomelí 2005, the objectives of COPLAMAR were: "a) to adequately take advantage of the productive potential of the marginalized groups and the areas where they were settled that would ensure a more abundant supply of goods such as food and services; b) promote the establishment of work sources and their diversification of zones through the channeling of public and private resources and the training of population centers; c) achieve a fair remuneration for the work and the products generated by self-consumption groups; d) promote respect for the groups' forms of organization.

Through this program, information was obtained regarding the basic needs of housing, nutrition, health and education, it can be said that the first measurement of poverty was made. Starting in 1980, in the face of an agricultural crisis, the MBRS program was established as a strategy for self-sufficiency in the production of basic grains. The main objectives were to increase the application of credits, the use of improved seeds, and the use of fertilizers, machinery and equipment, pest and disease control, and technical assistance.

## Background

In the particular case of Mexico, extensionism arose with the purpose of helping subsistence peasant families whose welfare was clearly public, in Mexico the extension program began in a few regions of the country given that there was no infrastructure or personnel to cover the rest of the country, it can be said that they were isolated programs (Freire 1973).

In the 1960s extension and dissemination programs emerged as a system of assistance and education to improve production efficiency in corn and bean producers, where they were trained in their plots or in their homes. From the 70s' economic policies to the agricultural sector are structured as a service or a system that promotes techniques and production methods to improve the efficiency and income of producers. Surge and development is developed based on the use of large volumes of complementary inputs for production such as fertilizers, herbicides, insecticides and economic resources (Aguilar 2005).

By the year 1980, the Institutions of the productive sector that participated in extension work were already considered as a professional intervention in the transfer of technology; it was tried to replace the model of increase in the use of inputs by high economic efficiency. The most important time of extension programs in the country, which predominated by state policies. It is worth mentioning that the Postgraduate College participated in specific extension programs with a whole development model in which it based its strategy on field research, dissemination, evaluation, producer organization, credit, Institutional participation and participation in temporary districts, this was mainly in the Mixteca Alta regions in Oaxaca, Chiautla de Tapia Region in the state of Puebla, arid zones in San Luis Potosí and in the case of the Humid Tropics the College trained technical teams; in the programs of temporary areas in the States of Durango, Chihuahua, Michoacán, Chiapas and Oaxaca (central valleys). (Vázquez 1984).

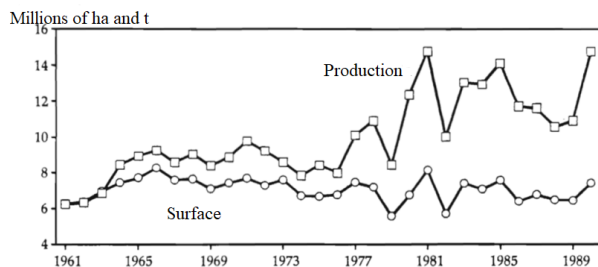
In the 1990s, the dissemination programs were an exchange of information and transfer of skills; Its essence was to facilitate interaction and dynamic generation in a system that includes educational training and agricultural research. In Mexico the research component is separated from the productive and the demonstrative.

## Evaluation system

During the bibliographic review of the state programs and their policy, none of the development plans found any way to measure the impacts or integral rural development as it should have been for the measurement of results such as performance and economic impact.

In the income, only the increase in yields per unit area was observed as well as the productivity in the particular case of corn, and statistics show that the area decreased but production increased.

#### Area and annual corn production, Mexico 1961-1990



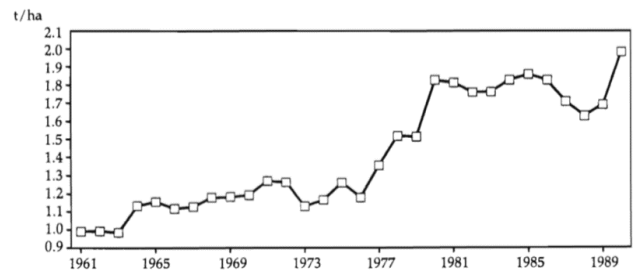
**Graph 1**

Source: Data obtained from FAO through SARH. 1961-1990

Table one and two are analyzed where the surface and yields are found, in which the following is indicated: the production of maize in Mexico increased with a rate of 2.1% in annual average between 1961 and 1990. This growth was due to an increase in yields that rose 2.3% annually in the same period, while the area harvested decreased at an annual rate of 0.2%. When these trends are analyzed in different subperiods; It is evident that the increase in harvested area reached its peak in the mid 60's and then declined continuously, particularly in the 70's, with a slower decline in the 80's.

In 1981, an exceptionally good year in terms of rainfall and the incentives given by economic policies to the sector, the harvested area expanded considerably from seven to eight million hectares in the previous year. Also in 1990, Mexico registered a significant increase in the area sown with corn. On the other hand, maize yields rose 2.3% per year between 1961 and 1970 and an impressive 3.9% per year between 1971 and 1980, as the use of fertilizers in seasonal maize spread. However, maize yields remain stagnant in 1981 and 1989. Average annual yields of corn, Mexico 1961-1990

#### Average annual yields of corn, Mexico 1961-1990

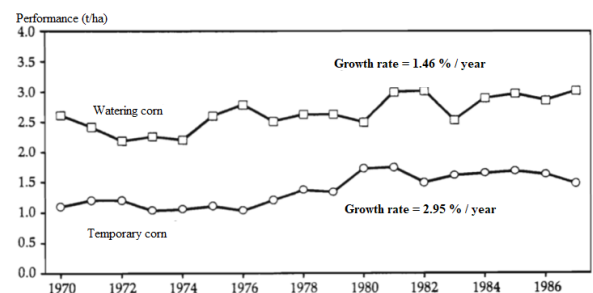


**Graph 2**

Source: Data obtained from FAO through SARH. 1961-1990

Figure 2 shows the average annual yields of corn, Mexico, 1961-1990. They start with an average yield of approximately one tonne to 1.1 ton / ha in 1975, and it is from this date that production is doubled to almost two tons per hectare due to the use of technology disseminated by extension agents.

#### Average yields / ha of temporary corn and irrigation, Mexico 1970-1987



**Graphic 3**

Source: Data obtained from FAO through SARH. 1970-1987

The production of irrigated and temporary maize (figure 3), was reduced to 89% in the years from 1970 to 1972, to 77%. In the period from 1985 to 1987 the surface area of seasonal maize decreased by 77%, increasing yields to 2.95% per year. In the case of irrigated maize, yields grew 1.46% per year. The difference in productivity between seasonal maize and irrigation has not been enough to induce producers to increase or even maintain the area irrigated with corn.

#### Materials and methods

The methodology used was a descriptive method, because documents were reviewed to know the origins and background of the program and its implementation of the agricultural extension of the Extensionism program in Mexico, as well as the institutions that participated in its operation.

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It was necessary to develop a survey with producers over 50 who have had experience related to technical assistance to their agricultural activities in the state of Jalisco through students of the Agronomist career of the University Center of Biological and Agricultural Sciences (CUCBA) from the University of Guadalajara, where heads of families were producers and could answer the issue of Extensionism.

The sample was of 23 people selected at random in different Municipalities of the State, in order to make a comparison of the social policy and the yields at the National level, in addition, the data was worked with the National Institute of Geography and Information Statistics (INEGI), where We compared data from the area of rainfed and irrigated land, corn and beans, machinery and equipment, as well as livestock and its existence from the period from the years 1970 to 1990, in order to perform a quantitative evaluation that allows us to evaluate results in general. In addition, growth rates were calculated in order to analyze results and impacts on performance.

This was done on the agricultural surface in the cultivation of corn and beans, in machinery equipment and in livestock species. It is worth mentioning that in the literature review it generated a model of technical assistance that would allow to evaluate the extension and in some cases if the evaluation was given in yields obtained by cycles, in other cases changes were found without follow-ups to develop a more solid quantitative evaluation. to the conclusions. In the bibliographic review it was found that the postgraduate school, generated a model of agricultural development at the regional level and was carried out in some places like the state of Oaxaca specifically in the Mixteca Alta de Oax. (Tlaxiaco), whose model is described below:

Its orientation was the economic and social improvement of the rural population, which promotes agricultural development, trying to attack the problems of the regional economy; food shortages and low incomes received by an important part of the rural population. Bearing in mind the problems of the national economy and that in some parts is intensified with greater intensity as is the case that was referred to in Tlaxiaco.

A part of the food production comes from small plots in temporary zones, where the family work force is an important resource for production. The Puebla Plan model promotes development and as a starting point is the technical dissemination to temporary regions where productive potential existed, but with technology support it was sought to increase production and improve their conditions in their agrosystems as dictated by the research, based on a strategy with a technical team and institutional coordination, as well as regional producers. The developed strategy: Research, dissemination, agricultural credit, agricultural insurance, agricultural inputs, the benefit / cost ratio (evaluation), market, producer organization and promoting small agricultural infrastructure works.

According to a bibliography review, INEGI statistics from the period 1970 to 1990, and reports of professional experience in the field, it was first reviewed that it was Extensionism and its application of these programs in Mexico, in these documents the antecedents of the concept which was in Europe and the same North American model to improve technology in the agricultural sector, in the particular case of Mexico, it is rethought and added for marginal areas that had not had the use of technology in the PIDER regions, it was continued with the Extensionism with the other programs after the PIDER. With these projects the credit and some works like the irrigation and edification in some communities are added

## Results

According to data from table 1, it is from the 60's, the construction of hydraulic infrastructure for the use of the hydrological basins in the country continues at a faster pace, causing an increase in the irrigation surface, raising the productivity of various crops; since in the 60's the surface of temporary was of 90% and the one of irrigation, arrived approximately at 10%. It is from the 70's that it diminishes a total surface of temporary to 84% and to irrigation increases to 16%. In the 1980s, the storm decreased to 74.3 and the risk rose to 25.7, that is, possibly the impact on production increases in this period was due to the use of agricultural inputs, extension and credit, including the irrigation surface almost rose by 10%.

According to the SIAP, from the summary 80'-2017, the hydraulic infrastructure in the construction of dams and irrigation canals has not grown, according to the latest data it states that only 28.14% of the total area cultivated under this system is irrigated. For the 1990s, rainfed lands decreased to 72.5% and irrigated land to 1.8%. In this period of analysis there was an impact of about 16.1% of the increase in irrigation in that period, that is, it is considered that the infrastructure greatly influenced the growth of agricultural production.

Harvested surface of Temporary and irrigation				
Year	Total area	Temporary surface	Percentage of participation in agriculture of rainfed	Percentage of participation in irrigation agriculture
70	15'128,700	1'271,298	84	16
80	17'824,243	13'238,896	74.3	25.7
90	17'974,637	13'031,194	72.5	27.5

**Table 1** 1950-1990. INEGI. Historical statistics of Mexico 1999

From INEGI. Mexico in the twentieth century and panorama. statistical ma Economic Transformation

In table number two corn and beans were included, since they are basic crops and that are planted in subsistence regions in most cases, finding the following results. In the case of beans, the yields per hectare went from 530 kg / ha to 615, that is, this represented 16% for this period of increase and, in terms of area, its growth rate increased by 20%, that is, the area increased more than the yield per hectare, which was caused by price control. In the case of corn, the area increased by 27% and in the case of yields per hectare, it increased by 67%, that is, corn was more productive than beans, as a result of economic support and agricultural inputs as well as extension. Making a comparison in terms of the period from 70' to 90', with relation to 90'al 2017 of the basic crops corn and beans

Basic crops						
Area planted with corn and beans of the 70-90 period						
Year	Bean Area	Surface growth rate	Yield per hectare	Corn Area	Growth rate	Yield per hectare
70	1'746,947		530	6'766,000		1,194
80	1'551,352	-11.19	603	7'339,000	8.46	1,829
90	2'090,000	34.72	615	8'639,000	17.71	1,994
2000	2'120692	2.94	590	8'444,793	-2.24	2,460
2010	2'068705	-2.45	710	7'860,705	-6.91	3,260
2017	1'755339	-15.1	690	7'761,216	-1.26	3,720

**Table 2** Area planted with beans and corn planted in Mexico in the period 70 - 90'

From INEGI. Mexico in the twentieth century and statistical panorama. Economic Transformation.

Results of the growth rate of beans and maize from the 70'-90' and from 90' to 2017.

Year	Bean Area	Surface growth rate	Yield per hectare	Growth rate per hectare
70	1'746,947		530	
80	1'551,352	-11.19	603	13.77
90	2'090,000	34.72	615	1.99
2000	2'120692	2.94	590	-4.06
2010	2'068705	-2.45	710	20.33
2017	1'755339	-15.1	690	-2.81
		X= .71		X= .62

**Table 3** Making a comparative analysis in the case of beans, it is observed that the surface from year 70 to 2017 did not have a great variation. Being in the 90' that had a growth rate of 34.72% and in other years there were minor and even negative values, for example from the 70's to 90', the surface grew by 2.3% and from 90' to 2017 only 2.03% and the total growth in the 47 years on average that covers this period of analysis 70-2017 annual growth rate was .71%. Regarding yield productivity per hectare, its annual growth was of .62%, the most significant year being 2010, which reached 20.33%, that is, productivity increased but area did not equal.

It should be noted that productivity is practically the same for productivity per hectare from 70 to 90 as well as 90 to 2017, despite bean prices that have increased substantially.

Year	Corn Area	Growth rate	Yield per hectare	Growth rate per hectare
70	6'766,000		1,194	
80	7'339,000	8.46	1,829	52.93
90	8'639,000	17.71	1,994	9.02
2000	8'444,793	-2.24	2,46	23.37
2010	7'860,705	-6.91	3,26	36.58
2017	7'761,216	-1.26	3,72	10.71
		x= .33		X= 2.82

**Table 4** In the case of corn compared to beans, in terms of the productivity performance of tons per hectare and the average of the total years, it was 2.82% in general average, being better the period from 90 to 2017, since it was 2.61 which is greater than the period from 70 to 90 which was 1.54%, although the average area only grew by .33%, that is, its productivity was more efficient despite the fact that they lost a lot of corn planting area or not It grew in the same proportion. If you had to make a comparison of the previous periods in terms of programs and policies of welfare to the agricultural sector, they are practically the same as for the first period the technology was known and for the 80s to the present there are better means communication, technology, communication channels, however, the prices paid to producers are much lower in relation to the sale of their products that are marketed in urban areas.

In table three, it has been observed for the case of tractors that their growth rate in the period 70-80', grew by 67.5%, and from the period of 80-90' it increased by 47.3%, that is to say almost fivefold tractors in Mexico for this period, which is possibly one of the factors to increase production and productivity per unit area, since the use of this equipment made better fallow, tracking and furrowing as well as the use of fertilization in planting take better advantage of soil moisture as well as the use of agrochemicals with the use of the tractor.

In the case of transportation for inputs and agricultural products for the period from 70 to 80'creció 39% subsequently 80 to 90'se increased 252.6%. that is why it is feasible that these two teams have been a factor of greater growth in agriculture in the country since nowadays they are essential to facilitate the technological changes and the transportation of their products to the markets, which possibly generated more production, but no greater gain, given that agricultural products to date have no added value that generate an excellent profit for producers

Machinery and equipment (technology)				
Year	Number of Tractors	Growth rate	Number of Trucks	Growth rate
70	54,537		40,411	
80	91,354	67.5	56,204	39.08
90	317,312	47.34	198,206	252.65

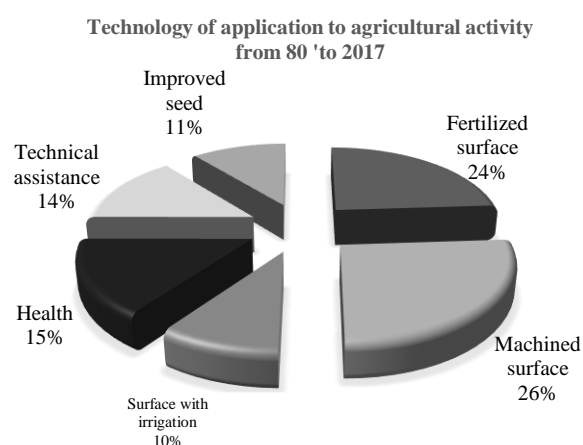
**Table 5** Inventory of machinery and equipment from period 70 - 90

From INEGI. Mexico in the twentieth century and statistical panorama. Economic Transformation

Table 4 includes a livestock inventory of the three main livestock activities in Mexico: cattle, pigs and poultry. There are other species that were not included because they are not representative at a National level, only at a Regional level.

In the case of bovines, its growth rate for the period 70-80 'increased by 29% and from 80-90 it grew by 4.68%, after this period, in some regions of the country this species increased significantly in the case of milk production, mainly in the region of the high lagoon of Jalisco and Queretaro. In the case of the porcine species, its growth rate for the period of 70 - 80'se increased its inventory by 58% and for the next period from 80 to 90'crecimiento in smaller magnitude that was only 11.8%.

Regarding poultry was the one that had a growth rate of greater magnitude, since for the periods of 70 to 80'se increased by 95.2% and in the period from 80 to 90'se raised 206.5%, ie , in this period a growth of intensive consumption of chicken begins due to its characteristics of being a product more fierce than red meats, more economical and faster to reproduce.



**Graphic 1**

Own elaboration from the statistics of the period from 1980 to 2017 of the SIAP. The SIAP, in one of its pages developed a summary regarding the technology of the period and the data that are counted here, the graph was developed on the basic technology of agricultural production and the significant data, it is considered that the fertilized surface , health and technical assistance, represents a little more than 53% considering that a package covers all the previous ones, which indicates that 50% of achieving complete coverage of basic technology is being achieved.

Cattle raising						
Year	Cattle	Growt h rate	Pigs	Growt h rate	Poultry	Growth rate
70	17'668,265		5'988,348		57'667,636	
80	22'798,003	29	9'461,952	58	112'611,888	95.27
90	23'865,899	4.6	10'581,242	11.8	232'560,043	106.51
2000	25'080,011	5.08	13'444,849	27.06	464'441,152	99
	*				*	
2010	30'267,511	20.68	15'448,859	14.9	506'255,626	9
2017	31'771,738	4.96	18'157,305	17.5	556'128,022	9.8

\*Estimated

**Table 6** Livestock inventory of the most significant species (cattle, pigs and poultry) of the period 70 - 90'

From INEGI. Mexico in the twentieth century and statistical panorama. Economic Transformation.SIAP 2017

In table 6, the species included here are the most significant percentage for their consumption, of these approximately 90% of the meat consumed. In the period from 70 to 90 their Growth Rate on average was 17% and for the period from 90 to 2017 their average was about 10%.



In the case of cattle tending to grow permanently, agriculture that had negative growth rates was not equal and only in the 1980s had a 29% Growth Rate and had another significant period in 2010 with an increase in 20.68% and this species on average had a growth of .80% in total of the 47 years and it is in the period from 90 to 2017 that the consumption of this species grew to 1.13% against the 38% that grew from the 70's at 90 '. As for the swine population this species, had two significant periods of growth in terms of its inventory ie; it grew by 58% and the other important period was in the year 2000 it was 27.06% and in the rest of the years it was 11.8 to 17.5%, for the case of the first period, its average growth was 3.39% and for the period from 90 to 2017 was 2.20% and its average growth rate was 2.84%, that is, its population grew 3.5 times more than the cattle population, possibly because it was more economical and its backyard production.

In the case of poultry, this species in the 80's, 90's and 2000 grew on average 100% and from 2010 to 2017 its average growth was 9.4%, that is, until the 80's, in Mexico consumed 9 to 10 kg of per capita annual consumption and today consumption is 30 kg per capita. Possibly because of the price of the product, because it is healthier and easier to cook, it also has an average growth of 7.22% of the school years.

The most common products and livestock that were handled in those periods are observed in the previous tables, but it would be important to include other horticultural and fruit products that also require a greater amount of equipment and machinery for their production and that have more objective and allow to make a more objective analysis of extensionism in Mexico and separate them by products to see if the programs that were generated in that period were profitable, as well as their investment and specifically develop an evaluation on the use and management of agricultural credit since a significant amount of this credit he went completely lost. In the period of 1970, a large number of service providers were hired in extension and this went to areas where the impact could be greater to other regions where technology, machinery and irrigation were already used so that these comparisons could yield results in investment, production and growth, in addition to including a single statistical source of information such as INEGI, who has a better record to develop information.

Reviewing the different extension programs, an assessment system and comparison parameters were not included, which in some way influences the results that did grow but could not be compared and possibly because the research focused on fertilization and utilization. of some agricultural products to combat pests, likewise other research variables were missing such as soil pH, improved seeds, agricultural practices, moisture conservation system among others.

## Discussion

With the purpose of making an analysis of the results obtained from dissemination or extensionism in Mexico, it is possible that strong impacts on production will not be found, for which reason it was necessary to apply questionnaires to 23 rural producers from different communities of Jalisco, some are small landowners and other ejidatarios, the assistance was in mass or group form through the demonstration plots, the disclosure was provided by the state through different programs or institutions. Regarding the current technical assistance, it is offered in a particular way by the companies and in specific cases the producer pays for the technical advice, and there is little governmental participation in the agricultural activity. The most outstanding results will be listed in terms of the qualitative part:

- Of the total survey of 23 producers, 35 percent were small landowners and 65% ejidatarios.
- In the case of the question: if your product has an added value? The answer was that only 39% had it and 61% of its product is sold directly without any process, it is worth mentioning that the value-added activity was not previously developed.
- In terms of disclosure, only nine percent say they have technical assistance from the government and 93 percent are private companies or commercial houses that are providing technical assistance, and some even say that they propose other crops than traditional ones such as red fruits or some other product (such as vegetables) as long as you have water, and are for export, highly profitable when formerly they were basic or traditional crops.



- As for agricultural credit for their crops, 61 percent said they had or had credit, and 39 percent said they did not have this economic resource. Those that were generally granted were for agricultural inputs.
- One of the questions that was asked is: If I had the conditions to leave or remain in the agricultural activity ?, the answer of the producers was: This question in period of 70 to 90, 60 percent would like to stay because there were some supports , and the other 40% looked for other expectations; Currently 57 percent of respondents would like to abandon agricultural activity, and 43 percent would continue because they do not know how to do anything else and would expect more government support or encouragement to improve their economic conditions.
- In the agricultural activity, 39 percent have irrigated crops or milk production and 61 percent are seasonal crops, mainly corn, previously were basic crops such as beans and corn.
- It is worth mentioning that in the state of Jalisco there is currently a significant amount of hectares of protected crops and irrigation such as red fruits, red pepper and tomato among others, as well as avocado and lemon orchards which have technical assistance and credits from the initiative. private, being the information difficult to obtain, in terms of volume of production and area, as well as export. That is to say, the state ceased to be operative since the 1990s to provide the dissemination and extension of the technologies that are now applied. This has caused that the prices of many products are elevated in great proportion, product of the costs of the technology for its production.
- It is important to point out that the state granted technical assistance to the producers, there were important impacts on production, mainly on livestock activity, and to a lesser extent on agricultural activity. It will be necessary for the State to generate the technologies and disseminate them through technical assistance programs, since, in the agricultural activity, there are still conditions of extreme poverty in this sector since it is difficult for producers to pay for technical assistance and technology. It was detected that not all the regions evaluated the technical assistance programs, or this was very general since there are no records. In the case of the Postgraduate College if there was an evaluation system, but only for some regions, mainly in the states of Puebla and Oaxaca.

### Conclusions

It is important that the government works with regional technology packages based on agrosystems, and technology dissemination programs at the regional level and where the increase in production and the technical and economic evaluation of the impact on production increases is significant. to your profitability.

The use of technology, requires financing to apply this technology so it is advisable to offer credits at preferential rates and agricultural insurance to prevent natural disasters.

It is necessary to promote other agricultural products that allow to add value to the products, in order to give a longer shelf life to the processed products, this also generates an agroindustrialization and the generation of jobs. In addition, to realize new forms and types of organizations among the producers to define well the areas of production, process and commercialization.

The extension must cover not only the technical disclosure, but also the most direct marketing channels to the final consumer, avoiding sudden changes in the final prices of the product.

The following observation is made for the two periods analyzed, in the case of the period from 70 'to 90', the disclosure model was through the extension model generated by the government and specifically for regions of extreme poverty, where the fundamental idea was to increase the production of their crops, small infrastructure works and demonstration plots; and it was found in terms of productivity that in this period was better than the period 90 'to 2017, since its yield per unit area was better in the first period and is feasible due to the impact of inputs, agricultural practices and the use of insecticides.

It is from the 80's that another dissemination model is generated, which are the "Temporary Districts", where the country is divided with the objective of increasing production and productivity, both agricultural and livestock, and based on the data obtained, the growth in the two periods have grown less than 1% in the agricultural part, and it is in the livestock sector where the yields are more significant than possibly due to per capita income, fixed employment and consumption habits.

According to the compilation of SIAP and SAGARPA 2011, it is estimated that there are currently 22,000 hectares of protected crops that produce around 3.5 million tons of various products per cycle. With an annual growth of 1,270 hectares per year, which are incorporated into this type of agriculture and four states concentrate the largest area of greenhouse crops which are: Sinaloa, Baja California, State of Mexico and Jalisco, with 65% of National production, and of these 70% corresponds to red tomatoes and other crops such as red pepper, cucumber, eggplant and chili. 60% of production is exported. The surface of protected crops that are around 22,000 hectares has replaced temporary agriculture in some areas, mainly in the aforementioned states.

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