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ANALYSIS OF AGRICULTURAL POLICY IN MEXICO: PROFITABILITY, COMPETITIVENESS AND FOOD SELF-SUFFICIENCY IN BASIC GRAINS

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ABSTRACT

Mexico's entry into the Free Trade Agreement led to the application of contingency measures in the agricultural sector, such as the Direct Support Program for the Countryside (PROCAMPO). This program was designed to promote profitability, competitiveness, and comparative advantages for basic crops. In this regard, this study focused on analyzing the impact of PROCAMPO on rice, bean, maize, and wheat crops in Mexico in 2018, by applying a Policy Analysis Matrix (PAM). Our hypothesis was that PROCAMPO did not generate sufficient comparative advantages; competitiveness and profitability were not promoted to adequately maintain or increase food self-sufficiency in basic grains. In order to corroborate this hypothesis, we applied the PAM; a microeconomic analysis tool that reveals comparative advantages, competitiveness, profitability, and the impact of policies, in terms of market failures related to social and private prices. Results indicate that comparative advantages, competitiveness and profitability exist for crops under irrigation schemes, but in the case of rainfed crops, profitability and competitiveness remained very low and comparative advantages were minimal. We thus conclude that PROCAMPO did not contribute significantly to food self-sufficiency and comparative advantages, although it did prevent farmers from abandoning the production of basic grains. This study highlights the need for more effective policies to improve competitiveness and comparative advantages, especially in the case of rainfed crops.

Keywords: comparative advantages, policy Analysis Matrix, private and social prices, public policies.

INTRODUCTION

Within the framework of the Sustainable Rural Development Law, established by the Congress of the Union (2022), rice, beans, maize and wheat are identified as basic products in the Mexican agricultural system, where the promotion of their production is considered essential, in order to reduce dependence on imports.

Data from the Agri-Food and Fisheries Information Service (2023) show that between 1983 and 2018, significant changes were observed in the production of basic grains. In the case of rice, a 32.6% decrease in its production was observed, and for beans, it was 6.5%. Regarding maize production, there was

perceived improvement; increasing to 106.03%. Finally, with regard to wheat, a 15% decrease in its production was observed, over the same time period.

Staple grain crops now represent net imports. The Food and Agriculture Organization of the United Nations (FAOSTAT, 2023) mentions that the average imports from 1982 to 2018 were: rice: 443,474.39 tons, beans: 87,157.47 tons, maize: 5,910,277.5 tons and wheat: 2,089,866.61 tons. Faced with this situation and according to Valencia *et al*. (2019), Mexico has to depend on imports to cover domestic consumption, which negatively affects food sovereignty and self-sufficiency.

According to De Luis *et al*. (2023), the food self-sufficiency rates for these basic grains during this period were as follows: rice reached 43.7%, beans 92.69%, maize reached 76.64%, and wheat 63.59%. These data indicate that both rice and wheat failed to meet the food self-sufficiency standards established by the FAO; this discrepancy underscores the importance of analyzing and addressing the challenges that Mexico faces in its quest for food self-sufficiency.

For their part, Piñera *et al*. (2016) mention that the Direct Support Program for the Countryside (PROCAMPO) emerged as a response to the transformations derived from the Free Trade Agreement (NAFTA), which altered the agricultural panorama and eventually led to the development of a specific policy. According to the Ministry of Agriculture and Rural Development (2018), PROCAMPO was established as a compensation mechanism for farmers, with the intention of promoting comparative advantages, to facilitate competition with farmers in the United States. This measure attempted to level the playing field between these two countries and provide financial incentives and direct support to increase agricultural production; this measure represented an effort on the part of the Mexican government to safeguard food self-sufficiency.

This study is significant because it emphasizes the need to understand the consequences and results of PROCAMPO on basic grain crops, given that they are essential products for the Mexican diet and represent one of the objectives of the Sustainable Rural Development Law, designed to significantly strengthen food self-sufficiency and agricultural markets.

The implementation of PROCAMPO and the agricultural situation of declining production, zero export capacity and a significant increase in imports of basic grains, evidenced low agricultural productivity, scarce presence in the international market and the growing dependence on imports of basic grains. The premise is that, despite the implementation of "PROCAMPO", no significant change is apparent concerning basic grain production, which suggests that the program failed to adequately address basic grain requirements in Mexico.

The objective of this study was to analyze how PROCAMPO influenced the role of comparative advantages, competitiveness, profitability, and food

self-sufficiency in basic grain crops in Mexico during 2018 with the hypothesis: PROCAMPO did not manage to generate significant comparative advantages, neither did it boost competitiveness or profitability and nor did it contribute effectively to becoming self-sufficient in food.

This hypothesis is based on the lack of previous studies that demonstrate the positive impact of PROCAMPO and the negative trend manifested in agricultural production and imports of basic grains.

THEORETICAL DISCUSSION

Food self-sufficiency

According to Soria *et al.* (2015), food self-sufficiency is defined as a country's plan for covering the food needs of a population by domestic food production, with the aim of minimizing dependence on imports. This approach seeks to strengthen and guarantee the availability of food.

The importance of food self-sufficiency implies strengthening national production and the ability to react to possible food crises, in order to contribute to economic and social progress by stimulating employment in the agricultural sector. Martínez (2016) argues that food self-sufficiency plays a fundamental role in the Mexican agri-food system by strengthening food availability and ensuring that the country is able to meet the food needs of its population, and connotes the responsibility of a country to create appropriate policies for food production.

The Center for Studies on Sustainable Rural Development and Food Sovereignty (CEDRSSA, 2019) suggests that for a country to achieve food self-sufficiency, it must be able to produce at least 75% of the food it consumes. Following the guidelines established by the Food and Agriculture Organization of the United Nations (FAO), this strategy not only seeks to increase domestic production capacity, but also to strengthen food sovereignty and reduce dependence on imports.

From 1983 to 2018, Mexico's agricultural production of basic grains was below the recommendations established by the FAO.

According to Espinosa (2022), in 1983, the Mexican government adopted free market policies to boost competitiveness and take advantage of comparative advantages to integrate into the global economy. This resulted in the selection of certain crops, benefiting some, whereas others, such as rice, beans, maize and wheat, were impaired. For their part, Mexican governments argued that, in a globalized world, self-sufficiency was no longer relevant, emphasizing instead the importance of boosting competitiveness and taking advantage of comparative advantages to strengthen the agricultural sector. However, FAO (1999) points out that the concept of food self-sufficiency is related to a global perspective on food production, with a vision of development that does

not exclude international specialization, competitiveness and comparative advantages, as for this objective to be realized, it is necessary that the policies of each state consolidate both comparative advantages and local production within their agricultural systems.

Competitive and comparative advantages

Trade liberalization is a process that occurred at an international level and, in the context of Mexico, was materialized through the FTA, signed in 1994 between Mexico, the United States and Canada. This agreement brought about changes in public policies related to the agricultural sector, especially with regard to basic grain crops, which generated significant repercussions on the food production system and the implementation of food self-sufficiency. Comparative advantages, according to Ricardo's theory (2003), refer to the salient characteristics concerning the yields of a country's products, evidencing greater efficiency, profitability and, above all, competitiveness in its production costs, compared to other countries. These advantages provide the foundation for the promotion of free trade.

Moreover, Porter (1990) argues that competitiveness and comparative advantage within a nation require specialization, meaning that comparative advantage advocates new, constructive and practical roles to ensure competitiveness and prosperity, which means striving to create an environment that will boost increased productivity, which implies state intervention. One way to assess competitiveness and comparative advantages, according to Monke & Pearson (1989), is through the Policy Analysis Matrix. This tool allows for the analysis of comparative advantages, profitability, competitiveness and the effects of the implementation of public policies, by comparing private and social prices. As mentioned by Velázquez *et al*. (2020), in order to promote and strengthen competitiveness and comparative advantages, it is essential to implement public policies. These policies should focus on supporting, promoting and guiding competitiveness in the different sectors of the economy, in order to achieve optimal capacity in agricultural markets.

Public policies

Public policy design, as proposed by CEDRSSA (2016), must primarily benefit society. These policies, implemented by the public administration, are executed through a procedural plan, as tools specifically designed to address and solve the problems that affect society as a whole.

In the context of the Mexican agricultural sector, the public policy, PROCAMPO was established in 1993, to replace the Guaranteed Prices program. According to research conducted by Piñera *et al.* (2016), this aimed to provide economic support to farmers producing nine different crops, including basic grains.

Piñera *et al*. (2016) emphasize that both monetary subsidies in the agricultural sector and the number of beneficiaries have shown a downward trend in recent years. They also conclude that PROCAMPO is not satisfactorily fulfilling its objective of assisting farmers to increase crop production. It is imperative to understand the effects of PROCAMPO in the agricultural sector in order to determine whether there was an increase or decrease in profitability, competitiveness and comparative advantages, as well as to evaluate its influence on food self-sufficiency.

METHODOLOGY

The analysis of public policy, specifically (PROCAMPO), was carried out using the Policy Analysis Matrix (PAM), with the aim of defining the existence of profitability, competitiveness and comparative advantages contributing to food self-sufficiency in the agricultural sector, during the year 2018.

Based on the methodology explained by Salcedo (2013), the FAO manual establishes that the Policy Analysis Matrix (PAM) is a microeconomic quantitative analysis tool, which given the difficulty of representing various complex and heterogeneous analyses relating to the agricultural sector, is organized into information referring to private and social budgets. The PAM intends to compare the impacts and consequences of policies, as well as to identify possible market failures for tradable inputs, production factors and agricultural products, in order to determine comparative advantages, profitability and competitiveness.

The PAM developed for this study included rice, beans, maize and wheat crops, considering both temporary and irrigated crop systems. Data on production costs, labor and inputs, as well as social and private prices corresponding to the year 2018 were collected. This enabled us to understand the impact of the PROCAMPO public policy on the agricultural sector during this period.

The data used in this study were obtained from various sources, which are explained in Table 1.

These data were used to study the production of basic grain crops (Rice, Beans, Maize and Wheat) in Mexico during 2018.

The PAM was prepared using Microsoft Excel, divided into five spreadsheets. The first presented the quantities of inputs, including fertilizers, seeds, labor, and capital, used for the cultivation of one hectare. The second presented the private prices of fertilizers and seeds, as well as the wages of day laborers and the percentage of capital invested in that hectare. The third presented the multiplication of data from the first sheet with that from the second sheet. The fourth presented the social prices of fertilizers and seeds, the wages of day laborers, and the percentage of capital used. Finally, the fifth sheet calculated the product of the first sheet multiplied by the fourth sheet.

Table1. Obtaining of data used for the methodology.

Source or Data Base	Information amassed
(SIAP) of Information and Statistics related to the Agri-Food and Fisheries System (SIACON)	Production; value of production; area planted; yields obtained.
World Bank	Capital for each agricultural sector; Exchange rate.
National Institute of Statistics and Geography (INEGI)	Agricultural workforce by crop; indices for agricultural labor productivity.
FAOSTAT	Total production of basic grains; Seed prices; Agricultural land use.
National Commission on Minimum Wages (CONASAMI)	Agricultural day laborer wages.
Market Information and Integration System (SNIIM)	National and international fertilizer prices
World Index	International prices for basic grain crops; transportation costs
FAO manuals	Quantities in Kg of fertilizers/Hectare per crop; quantities in Kg of seed, for sowing per crop
Manuals of the National Institute of Forestry, Agricultural and Livestock Research (INIFAP)	Amount of Kgs of fertilizers/Hectares per crop
The operating rules of the Procampo program	Subsidies granted to farmers

Source: self-elaborated.

This tool provided an organized structure for recording and calculating inputs, costs and prices, both private and social, which facilitated the comparison and evaluation of results. The use of separate spreadsheets for each aspect of the research ensured greater clarity and coherence, thus contributing to the accuracy and reliability of the analyses carried out.

Using the data obtained from the PAM, the following coefficients were calculated, in order to determine the impact of public policies on food self-sufficiency, profitability, competitiveness and comparative advantages of basic grains, as described by the FAO.

Nominal Protection Coefficient (NPC), defined as the difference between private prices of goods and social prices, making it possible to compare the impact of government policy on selected crops.

The Nominal Protection Coefficient is calculated in order to determine the modifications that exist within the agricultural market for basic grain crops in Mexico, arising from marketing deficiencies and public policy interventions, in this case, the PROCAMPO program.

The formula for calculating the NPC for tradable products is the following:

$$NPC_{PC} = \frac{\text{Input at private price levels}}{\text{Input at social price levels}}$$

The results from this coefficient indicate the effect of the PROCAMPO public policy on basic grains and should be interpreted as follows:
If the result <1, it means that the market price of basic grains is below the social price, which sug-gests that the products are not receiving a subsidy.
If the result >1, it indicates that the market price of basic grains exceeds the social price, which implies that the agricultural producer is receiving a subsidy through the established program.
The formula to calculate the Nominal Protection Coefficient (NPC) for Inputs is the following:

$$NPC_{Ins} = \frac{\text{Cost of commercial inputs at market prices}}{\text{Cost of commercial inputs at social prices}}$$

The results of this coefficient indicate the effect of the PROCAMPO public policy on basic grains and should be interpreted as follows:
If the result <1, it indicates that prices in the agricultural market for basic grains are lower than the prices that would exist without the intervention of the PROCAMPO public policy.
If the result >1, it indicates that prices in the agricultural market for basic grains are higher than social prices.
The coefficient of effective protection (CEP) is defined as the ratio between the added value at market prices and the added value at social prices. The formula to calculate the CEP is as follows:

$$CEP = \frac{\text{Income} - \text{Cost of Tradable Inputs at Private Prices}}{\text{Income} - \text{Cost of Tradable Inputs at Social Prices}}$$

If the result <1, it means that the effect is of negative incentive, which may indicate taxes on producers.
If the result >1, it means that positive policy incentives exist, which suggesting that there are subsidies for producers.
The coefficient for the cost of production factors (CPF) measures the existence of comparative advantages for the cultivation of basic grains.
The formula to calculate the CPF of basic grains is as follows:

$$CPF = \frac{\text{Cost of Labor} + \text{Cost of Capital}}{\text{Income} - \text{Cost of Marketable Inputs}}$$

Results will be positive as long as the social added value of the production of a crop is not negative.
If the result is >1, it indicates that the value of the production factors is greater than the added value at social prices.
If the result is >1, it indicates that the value of the production factors is greater than the value added at social prices.
For a crop within a country to have a comparative advantage in the production of basic grains, the result must be <1, that is, the closer the result is to 0, the greater the comparative advantages of basic grains, and the closer it is to 1, the less comparative advantages there are.
To determine the percentage of comparative advantages of each staple grain crop, an additional calculation is performed based on the coefficient for the cost of the production factors (CPF).
If the value of 1 is subtracted from the CPF and the result is multiplied by one hundred, this operation represents the surplus of income over the costs of the production factors, which indicates the presence of comparative advantages in basic grains.

RESULTS

The results concerning profitability and competitiveness of basic grain crops, both with and without support from PROCAMPO were calculated using Nominal Protection, Affective Protection and Comparative Advantages. This evaluation was based on the Policy Analysis Matrix (PAM) methodology, with data obtained from 2018 in Mexico, to determine the impact of PROCAMPO on the self-sufficiency of basic grains.
The staple grain crops of rice, beans, maize and wheat were divided into two production groups: rainfed and irrigated. Each was evaluated independently to obtain comparative results. The differences found when comparing rainfed to irrigated crops revealed significant impacts, both in terms of profitability and competitiveness.
Significant differences are apparent in the net profit and competitiveness between the irrigation and rainfed schemes for basic grains, in the 2018 Budget for the Production of Basic Grains in Mexico (Table 2), at private prices, supported by PROCAMPO. Data indicate that the profitability and competitiveness index of crops under the rainfed scheme is consistently lower than that of crops under the irrigation scheme.
In terms of competitiveness of crops under the rainfed scheme, this variable shows positive but low indices, indicating a disadvantage for farmers in terms of income. This means that, for each peso invested in rice, beans, maize and wheat crops, profits of 42, 29, 18 and 26 cents were generated respectively, indicating the need to apply additional measures to improve the profitability in this sector.

Table 2. 2018 Budget for Basic Grain Production systems in Mexico, at Private Prices with PROCAMPO.

Cultivation of Basic grains	Net Profit	Competitivity
Seasonal Rice	6,431.41	1.42
Irrigated Rice	13,190.04	1.70
Seasonal Beans	1,731.83	1.29
Irrigated Beans	14,249.41	2.49
Seasonal Maize	1,694.51	1.18
Irrigated Maize	21,745.75	2.77
Seasonal Wheat	1,809.13	1.26
Irrigated Wheat	12,925.09	1.94

Source: self-elaborated.

Contrastingly, crops under the irrigation scheme show higher indices of competitiveness, thus motivating farmers to continue production under this scheme. In the case of rice and wheat crops, for each peso invested, profits of 70 and 94 cents were obtained respectively, whereas for bean and maize crops, profits were 1.49 and 1.77 pesos, respectively, for each peso invested. This reinforces the idea that competitiveness and profitability are greater for irrigated crops, whereas PROCAMPO was crucial to improve the circumstances of rainfed farmers. Despite the fact that the subsidies granted by PROCAMPO amounted to $1,500 for farmers, it is clear that these subsidies were not sufficient to generate competitiveness in rainfed crops. However, PROCAMPO does not seem to significantly influence irrigated crops, which are already profitable and competitive.

The following Table 3 presents the results obtained from the PAM, but without the effect of the PROCAMPO program, on the cultivation of basic grains, both for the rainfed and irrigated schemes. This table shows an expected decrease

Table 3. 2018 Budget for Basic Grain Production Systems in Mexico at Private Prices, without PROCAMPO.

Cultivation of Basic grains	Net profit	Competitivity
Seasonal Rice	4,981.41	1.33
Irrigated Rice	11,765.04	1.63
Seasonal Beans	281.83	1.05
Irrigated Beans	12,824.41	2.36
Seasonal Maize	244.51	1.03
Irrigated Maize	20,320.75	2.66
Seasonal Wheat	359.13	1.05
Irrigated Wheat	11,500.09	1.84

Source: self-elaborated.

in profitability and competitiveness, due to the elimination of PROCAMPO, in the analysis of these results.

This analysis demonstrates the significant difficulties faced by basic grain crops with no support from PROCAMPO, particularly crops grown under the rainfed scheme.

Although PROCAMPO did not instigate a notable increase in the profitability or competitiveness of these crops, its influence was fundamental in preventing profitability from falling to critical levels. Contrarily, irrigated crops showed stability in their profitability and competitiveness, both with and without the support of PROCAMPO. For example, irrigated maize maintained high profitability, even without the support of PROCAMPO. However, it is important to emphasize that this stability may obscure possible future challenges, such as changes in weather conditions or market prices, which may affect profitability and competitiveness in the long term.

Likewise, it is crucial to highlight that one of the most significant expenses in agricultural production at private prices relates to marketable inputs, specifically fertilizers, as this expense exerts direct influence on the overall profitability of the production process. It is essential to note that the cost of fertilizers exceeds the amounts received as a subsidy from PROCAMPO. This financial disparity further exacerbates the economic burden on agricultural producers, resulting in a significant decrease in their profitability, ultimately affecting the viability of their agricultural operations.

This analysis suggests that there has been no progress towards food self-sufficiency, as one of its key objectives is to strengthen the national agricultural economy by promoting sustainable agricultural practices; however, the data offers no evidence to demonstrate that positive results relate to the implementation of these practices. The Table 4 presents the results derived from the implementation of the Policy Analysis Matrix, enabling us to understand more precisely the direct effect that this policy had on basic grain crops in Mexico during 2018.

Results from the nominal protection coefficients for basic grain products reveal a somewhat positive impact on the part of PROCAMPO. All results show that the market price exceeds the social price, which indicates that the subsidy granted by PROCAMPO has been effective for all the crops analyzed. However, when examining the coefficients, significant variation is apparent in terms of the program's degree of impact on different crops.

Rainfed and irrigated rice crops appear to show minimal effect on the part of Pro-campo. Although the market price exceeds the social price, the coefficients are close to one, indicating that the subsidy has had minimal positive effect. In contrast, the rainfed crops of beans, maize and wheat show coefficients that indicate a more effective contribution provided by the subsidy, even though

Table 4. Results from the Policy Analysis Matrix Coefficients.

	Nominal protection coefficient		Effective protection coefficient	Costs of production factors
	Product	Input		
Seasonal Rice	1.075	1.129	1.069	0.670
Irrigated Rice	1.049	1.196	1.033	0.535
Seasonal Beans	1.239	1.169	1.257	0.724
Irrigated Beans	1.067	1.128	1.061	0.335
Seasonal Maize	1.156	1.097	1.164	0.827
Irrigated Maize	1.046	1.169	1.034	0.290
Seasonal Wheat	1.208	1.200	1.210	0.755
Irrigated Wheat	1.060	1.228	1.041	0.454

Source: Self-elaborated.

the coefficients are not far from one, suggesting that the support provided by PROCAMPO is more significant.

In contrast, irrigated crops show coefficients close to one, suggesting that PROCAMPO has had an insignificant impact in these cases. This may indicate that irrigated crops are intrinsically profitable and competitive, independently of PROCAMPO support.

The results from the nominal protection coefficient concerning basic grain inputs reflect the influence of PROCAMPO on the agricultural market. For example, the coefficients for rainfed and irrigated wheat indicate that prices are higher than social prices. In contrast, for other crops, market prices are almost equal to social prices, suggesting that PROCAMPO had little significant impact in these cases. This lack of significant impact on the part of PROCAMPO on agricultural market prices of basic grains also has negative implications for food self-sufficiency. By affecting input prices, it may result in greater dependence on imports, raising doubts about the effectiveness of this public policy.

The results from the coefficients of affective protection show that all crops under the irrigation system show coefficients close to one, meaning that PROCAMPO did not have significant impact in these cases. Contrarily, the crops that benefited and showed positive impacts from the implementation of PROCAMPO were crops under the rainfed system of maize, beans and wheat; and one again it is apparent that neither rainfed nor irrigated rice manifest positive effects.

The analysis of production factor costs reveals a consistent trend: all coefficients are less than one. This observation indicates the presence of comparative advantages among these basic grain crops; however, it is essential to emphasize that the importance of these comparative advantages lies in the

proximity of the results to zero, whereas coefficients close to one indicate less pronounced comparative advantages. For a more detailed understanding, we converted these indicators into percentages, so one was subtracted from the value obtained from the costs of the production factors and multiplied by one hundred, in order to arrive at the percentage of comparative advantages and based on these results, the basic grain crops were classified into two categories: those that manifest comparative advantages and those that do not.

According to FAO, comparative advantages are required to consolidate food self-sufficiency, and according to the results obtained from the PAM, the only basic grain crop that manifests comparative advantages is irrigated maize, at 71%, whereas the other crops, both seasonal and irrigated, do not manifest comparative advantages, presenting the following percentages: seasonal rice (33%), irrigated rice (46%), seasonal beans (27%), irrigated beans (66%), seasonal maize (17%), seasonal wheat (24%) and irrigated wheat (54%).

DISCUSSION

The results from Valencia *et al*. (2019) indicate that imports of basic grains have increased, which has had significant impact on food self-sufficiency. In line with these findings, our results suggest that food self-sufficiency is affected not only by imports, but also by low profitability, poor competitiveness and minimal comparative advantages, in the domestic agricultural market. This combination of factors prevents farmers from competing with international prices and ultimately limits their ability to meet domestic demand.

Our study contrasts with the results from Torres & Rojas (2020), who emphasize that Mexico has a deficit in its productive structure and low productivity, which has led to the loss of food self-sufficiency. We propose that in order to promote agricultural production, it is necessary to differentiate between agricultural production schemes: rainfed and irrigated. Contrary to Torres & Rojas' proposal (2020), to distribute agricultural credits and subsidies to all farmers, our findings indicate that credits should be granted to farmers who use irrigation systems, whereas rainfed farmers should receive greater subsidies. Likewise, it was evident that an effective distribution of fertilizers is crucial to increase competitiveness, as this input has a significant impact on farmers' income. Other studies on this subject, such as that by Piñera *et al*. (2016) concede that PROCAMPO did not represent an adequate public policy and that its elimination did not harm the crops it benefited.

Likewise, Velázquez *et al.* (2020) criticize the public policies applied and state that they are not effective because the system has imposed a decreasing price. They consider that the solution lies in the fact that these policies which attempt to compensate prices should be suspended, proposing that they should be changed to policies that provide added value. One of the main

policies implemented after PROCAMPO was that of Guaranteed Prices, which according to Guerrero *et al.* (2023), was a program that succeeded in persuading not to decrease production, resulting in higher income due to the increased price of the product.

Among the alternatives recommended by some authors and implemented by the Federal Government, following PROCAMPO, is the public policy known as Guaranteed Prices, which is still preliminary in terms of evaluating its impact on the competitiveness, profitability and food self-sufficiency of basic grains. In this sense, we propose using the PAM, over a horizon period of 10 years, to determine the degree that its objectives are fulfilled.

CONCLUSIONS

In order to achieve self-sufficiency in basic grains, farmers must ensure profitability on income, to enable their total income to exceed expenses and allow them to live with dignity. Despite its implementation, PROCAMPO did not manage to boost competitiveness, profitability, or comparative advantages in basic grains under the rainfed scheme, which in turn did not contribute significantly to food self-sufficiency. However, we recognize that to some extent PROCAMPO did contribute to preventing many farmers from abandoning basic grain crops.

PROCAMPO was not a determining factor in promoting competitiveness, profitability or comparative advantages in basic grain crops in the irrigation system, because farmers using irrigation have the capacity to be competitive and profitable, without the participation of PROCAMPO. Therefore, PROCAMPO did not contribute to promoting competitiveness or to achieving profitability and was not a determining factor in creating comparative advantages. One of the main perceived challenges lies in the importation of most agricultural inputs, such as fertilizers, where the unfavorable exchange rate has resulted in increased costs for farmers, when converting input prices from dollars to Mexican pesos.

This has generated large expenses that impact farmers' income, thus reducing the comparative advantages, profitability and competitiveness of basic grain agricultural production. The findings of the study highlight the disparity in comparative advantages between basic grain crops under irrigated and rainfed systems. This divergence highlights the need to design more equitable public policies adapted to different agricultural realities. In this sense, it is imperative that future agricultural policies focus on addressing existing gaps and promoting more inclusive and sustainable agricultural development. This implies not only increasing farmers' income through well-targeted subsidies and financial support programs, but also reducing the cost of agricultural inputs, such as fertilizers, through direct and subsidized delivery to farmers.

In addition, it is necessary to establish more effective agricultural price control mechanisms that guarantee certain profitability for farmers.

The results from this study underline the need for a comprehensive and differentiated strategy in agricultural policies to address the disparities between different types of agriculture. It is essential that state subsidies focus on supporting small farmers who depend on rainfed systems, providing them with access to adequate resources and technologies thus enabling them to improve their productivity. In effect, credit programs and financial support should be directed primarily at farmers who use irrigation, as they usually have greater investment capacity and can benefit from this support.

The relationship between PAM and PROCAMPO, in the study of basic grains, made it possible to obtain solid results that reveal comparative advantages, competitiveness, profitability and food self-sufficiency. This shows that the methodology used was adequate to obtain the necessary results, so that the effectiveness of public policies in the agricultural sector of basic grains could be evaluated.

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