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WOMEN'S PARTICIPATION IN THE AGRICULTURE AND LIVESTOCK SECTOR IN MEXICO

Alma Elizabeth **Miranda-Quiñones**[1], Luis Miguel **Cruz-Lázaro**[2], Ivett **Vásquez-Lagunas**[1], Humberto **Banda-Ortiz**[*2], Omar **Bautista-Hernández**[2]

[1]Tecnológico Nacional de México/ Tecnológico de Tlalnepantla. Av. Instituto Tecnológico s/n, Col: La Comunidad, Tlalnepantla de Baz, Estado de México, 54070.
[2]Universidad Autónoma de Querétaro. Facultad de Contaduría y Administración. Centro Universitario, Cerro de las Campanas s/n, Querétaro, Qro., México. 76010.
*Corresponding author: humberto.banda@gmail.com

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ABSTRACT

The objective of this study is to establish the impact of the agriculture and livestock policy of governments in Mexico of the years 2006, 2012 and 2018, on the female employed population in Mexico's agriculture sector. The research hypothesis set out is that the female employed population in Mexico's agriculture sector was affected by the governments in Mexico of the years 2006, 2012 and 2018. Therefore, 36 structural analysis tests were conducted, using dichotomous variables, and equations were estimated before and after the structural change to quantify the changes. The results indicate that, in 2013, there was a structural change in the total employed population of the Mexican agriculture sector. In addition, in 2013 and 2019, there was a structural change in the male employed population of the agriculture sector. Finally, in 2007, 2013 and 2019, there was a structural change in the female employed population of the agriculture sector, which presented an increase. The conclusion is that the research objective was fulfilled, and the research hypothesis is accepted. Likewise, that although the female employed population of the Mexican agriculture sector experienced structural changes in 2006, 2012 and 2018, these changes were not sufficient to cause a structural change in the total employed population of the agriculture sector.

Keywords: employed population in the agriculture sector, government programs, occupational segregation, women in the agriculture sector.

INTRODUCTION

The impact of women in contemporary societies is undeniable and multifaceted. Their leadership and participation in various sectors are essential to achieve inclusive and sustainable economic development. Their participation in agriculture globally includes a broad range of activities, from food production to processing. Unfortunately, they face significant barriers, such as limited access to land, financial resources and technical assistance (Mora and Anderson, 2022), because of cultural and societal norms, and gender inequality (Leyva-Trinidad, 2019).

In addition, the COVID-19 pandemic had an impact on their exit from the workforce, due to the additional load of unpaid work (Güezmes, 2021), which,

at the same time, caused a loss of income (Mora and Anderson, 2022). Women are also disproportionately affected by the lack of participation in decision making (Balbuena-Ramírez *et al.*, 2018). Despite these barriers, women have proven their ability in increasing harvests by 20 to 30% (Leyva-Trinidad, 2019) and in taking actions to transform agriculture, making it more resilient and sustainable (Banco Mundial, 2023).

Specifically, in Mexico, there has been a transformation in terms of the level of academic preparation of women during the 20th century. In this sense, women went from having a low academic preparation level, to being half of the students enrolled in universities in Mexico during the first decade of the 21st century. Despite this, women have not managed to make working conditions equal to men's. Something to add is that women are not in the same situation in every sector in Mexico, since there are sectors where women have made more progress in equalizing work conditions to men's. In this sense, progress has not been as significant in Mexico's agriculture sector compared to other sectors (López and Molina, 2019).

Part of the limited progress in women's labor participation in the agriculture sector is because of conditions in this sector and its subsectors worldwide; for example, in Mexico's agricultural sector, where an important part of the production continues to be rainfed. This has an influence when the demand for workers is high, which is when there is openness to women in this sector; however, when the labor demand is low, the first to be laid off are women. This has an impact on women having worse labor conditions than men (López and Molina, 2019). In this regard, López and Molina (2019) indicate that, between 2006 and 2007, half of the population that worked in the agriculture and livestock sector in the states of Michoacán, Guanajuato, Jalisco, Guerrero, Oaxaca and Puebla were women. Among these, Puebla, Oaxaca and Guerrero are the ones with the highest concentration of female labor. Something that the authors add is that, in these states, it is unpaid labor.

Despite the above, López and Molina (2018) point out that between 2008 and 2016, women's participation in the agricultural sector has increased and evidence has been found that the working conditions have improved, citing as example that, at the beginning of the study period, from the total of women who work in the primary sector, 52.76% were unpaid and, at the end, this percentage had decreased to 40.1%. However, if compared to men, there are still significant differences.

Therefore, there are still challenges such as discrimination and gender stereotypes, which have obstructed women's visibility within the agriculture sector. This has happened even when international organizations have promoted inclusion policies. For example, the Bienestar Program informed that, in 2024, support was provided to 653,204 women who are small- and

medium- scale crop producers in the country, which represented 36.4% of the total support granted by the Ministry of Agriculture and Rural Development (SADER, 2024 a). Another example is the Fertilizers program for the Bienestar Program, which has the objective of delivering fertilizers to producers of food crops, benefitting 252,607 women, that is, 37% of the total (SADER, 2024 b).

The research objective was to establish the impact of the agriculture and livestock policy of governments in Mexico of the years 2006, 2012 and 2018, on the female employed population in Mexico's agriculture sector. Likewise, the research hypothesis proposed is that the female employed population of the agriculture sector in Mexico was affected by the governments in Mexico of the years 2006, 2012 and 2018.

THEORETICAL FRAMEWORK

The incorporation of women into the productive areas of the country has advanced in recent decades; however, there are still areas of opportunity. One of the sectors that takes on relevance in this incorporation is the agriculture sector, which is a priority in the world because it is an economic sector that is interconnected to other sectors, and it is where foods demanded by the citizens of a country come from (Restrepo, 2024; Martínez and Baeza, 2017).

Part of the progress of women's participation in the tasks of the agriculture sector is due to cultural changes that have occurred in this sector, and because new productive areas have been created, the diversity of income sources has increased, and there have been technological advantages. This is why women have been incorporated into new productive areas of the agriculture sector, such as agrotourism and ecological agriculture. Something to add is that globalization has contributed to women's incorporation into the agriculture sector (Esteban *et al.*, 2012; Perona, 2012; Majoral and Sánchez, 2000).

Among the advantages that have been highlighted of incorporating women into the agriculture sector, there are that it helps decrease unemployment among women, helps reduce the employment gap between men and women, and contributes to increase the productivity of the sector. These points are especially relevant in some countries, where the female population exceeds fifty percent of the population. These advantages take on relevance in the production of the agriculture sector, since they contribute to combating problems such as hunger. Likewise, it is a sector that generates economic resources for the families that work in this sector or live in rural areas (López and Molina, 2018, 2019; Martínez and Baeza, 2017).

Therefore, by incorporating women into the agriculture sector, there is a contribution to increasing production in this sector and to raising the income of families who work in this sector. However, despite this, women's work has not been recognized in the agriculture sector and can cause women's participation

in this sector to be low (Restrepo, 2024). Something to highlight is that their participation in the agriculture sector takes on relevance in countries where there is migration, because in the presence of a decrease in the male population, women are in the position of occupying those spaces and substituting the workforce. This phenomenon has already started to be experienced in regions of Latin America. It is important to point out that women who work in this sector do not leave aside their domestic labors, which has caused them to add to their workload and have labor stress (Mingo, 2011).

Thus, the importance of incorporating women into the agriculture sector should not be questioned, and, therefore, various governments have created special programs and international institutions and have promoted their incorporation. Among the organizations that have promoted women's participation, the Food and Agriculture Organization of the United Nations (FAO) stands out; this organization has pointed out that the incorporation of women into the agriculture sector would have a positive effect on food production. In turn, the Economic Commission for Latin America (ECLAC) mentions that there are important gaps between men and women, which must be addressed (Esteban *et al.,* 2012).

Something to highlight is that the study of women's participation in labor markets has its background in the 1980s; before that, studies of the labor market were carried out in general and there was no separation between men and women. Thus, women's participation in labor markets takes on importance, where something to emphasize is that there is little or no participation in certain sectors; this leads to inequality in working conditions, and one of the main axes is salary (López and Molina, 2018; Mingo, 2011). Therefore, there is shortage of studies about occupational segregation in some economic sectors, such as agriculture and livestock production. About this, Ibáñez *et al.* (2022) mention that there is a social gender barrier, in which mechanisms are analyzed that prevent the access of women to predominantly male occupations.

The agriculture sector and women's labor participation

Something to highlight is that the agriculture sector has been characterized by having a traditional patriarchal structure, where women are not integrated into certain productive areas of the agriculture and livestock sector, such as agriculture, since they are not taken into account within the productive organization and have less access to certain elements that are required to operate in these sectors, such as services and institutions. Likewise, traditionally, when they have been given access, it is only to delegate them to specific areas, such as product elaboration and conservation. These are considered perfect because of the characteristics that are attributed to women, from the patriarchal vision (Esteban *et al.,* 2012; Majoral and Sánchez, 2000).

In certain countries, when women are incorporated into the labor market of the agriculture sector, some aspects that are attributed to the female sex are considered, which evidences the *machista* bias of the agriculture sector. This has caused them to be assigned work in the agriculture sector based on their qualities, in such a way that their tasks are pigeonholed to their qualities, affecting their labor opportunities (Benítez *et al.,* 2021). This makes their integration into this sector difficult, because it relegates them to domestic tasks or limits the areas which they can join in the agriculture sector. It should be added that in the cases where openness to women has taken place, they continue having to fulfill their domestic tasks, which complicates their labor performance (Perona, 2012; Majoral and Sánchez, 2000).

In this sense, women are at a disadvantage in accessing the agriculture sector compared to men; among the disadvantages are having a smaller percentage of land, lower average schooling, and having to carry out more domestic labor, in addition to working. To the above, something to add is the *machista* customs that promote women in the rural sector having lower salaries than men. This has caused for women to suffer scarcity and labor stress (Restrepo, 2024).

Part of these problems have their origins in the traditional social division of labor, where women's participation was relegated to domestic activities and they were left out of productive areas (Mingo, 2011). In this sense, there are elements that are key in the normalization of roles and labor assignments between men and women, something that is observed in the agriculture sector. This is because sociocultural norms do not support the incorporation of women into agriculture, since their role in the agricultural production unit is different from that of men in some communities. In this context, education and training are factors that allow breaking gender stereotypes. There is also the existence of initiatives that foster women's leadership and participation in community organizations and agricultural cooperatives, which contributes to their incorporation in decision making of resource management (Gómez-Bañuelos *et al.,* 2017).

In agriculture, this can mean that women are concentrated in specific areas that are less valued and remunerated, face barriers to gain access to land, credit and technology, and struggle to balance domestic and agricultural responsibilities (Analuisa-Aroca *et al.,* 2022), highlighting occupational segregation. About this situation, the Sustainable Development Goals (SDGs), particularly SDG 2, seek to eradicate hunger and malnutrition by the year 2030, emphasizing that women have the potential to become key agents of change in agriculture, and promoting the inclusion of women in the agricultural sector (Naciones Unidas, 2023).

In turn, FAO and ECLAC have promoted policies to reduce gender inequalities in access to agricultural resources. Countries like Mexico have sought to

maintain a participation in the implementation of Agenda 2030, although they face challenges that must be addressed through inclusive policies and specific programs (Naciones Unidas México, 2021). In this sense, government policies impact the incorporation of women into the agricultural sector. This is why government programs become important for women to be incorporated into the agriculture sector. These programs could adopt, as a tactic, designing strategies focused on training, so that women can join the agriculture sector (Benítez *et al.,* 2021; Martínez and Baeza, 2017). A program that seeks to incorporate women into the rural sector was the one created by FAO, which supported Bolivia's government in implementing a program where courses were offered to train people in food processing, health and basic nutrition. In addition, the program offered credit to women who were participants in the agriculture sector (Restrepo, 2024). Another example is the *Proyecto de Innovación Agropecuaria Local*, which was implemented in Cuba (Benítez *et al.,* 2021).

METHODOLOGY

The methodology seeks to reach the study's objective, which consists in establishing the impact of the agriculture and livestock policy of governments in Mexico of the years 2006, 2012 and 2018, on the employed female population in Mexico's agriculture sector. And to prove the research hypothesis, which suggests that the employed female population of the agriculture sector in Mexico was affected by governments in Mexico of the years 2006, 2012 and 2018. For this purpose, 36 structural analysis tests with dichotomous variables were conducted. The databases used included the total employed population of the agriculture sector in Mexico, as well as data disaggregated by men and women. These three databases are from the National Institute of Statistics and Geography (*Instituto Nacional de Estadística y Geografía*, INEGI, 2024) and the Agriculture and Livestock Census. They cover the period included between the first trimester of 2005 and the second trimester of 2024. Each database contains a total of 78 data.

The analysis sought to determine if women's participation in the agriculture sector in Mexico suffered a structural change during the governments of 2006, 2012 and 2018, and in the case there was, to quantify the effect of such structural change. To this end, according to Gujarati and Porter (2010), the pertinent econometric instrument is the structural analysis with dichotomous variables. This is because through this tool, it is possible to determine if the government change (2006, 2012 and 2018) caused a change in the trend or in the intercept derived from the government policies. In this sense, there are four possible results from the structural analysis with dichotomous variables, which are: concurrent (there is no structural change), parallel (change only in

the intercept), concurrent (change in trend) and dissymbolic (change in the intercept and the slope).

The decision was made not to add control variables, that is, covariants. This is because the presence of covariants in structural analysis tests with dichotomous variables would affect the quantification of change on the slope, that is, it would not allow quantifying the change on the slope caused by the structural change. The periods of 2006, 2012 and 2018 were analyzed, because they represent three changes in government, that is, three changes in terms of the Federal Government administration in Mexico, which suggests changes in the way of addressing the theme of women's inclusion in the agriculture sector.

In turn, the theoretical framework is derived from the fact that international organizations, such as the United Nations declaration (2023), emphasize in the SDGs that women have the potential of being key agents of change in the agriculture sector, and for this, it is necessary to promote their inclusion. Likewise, as the Ministry of Rural Development (*Secretaría de Desarrollo Rural*, SADER, 2024a) points out, in Mexico there have been programs directed at promoting women's participation in the agriculture sector and have had a significant impact.

However, these initiatives from international and national agencies may have no effect because occupational segregation in the agriculture sector continues to exist. In this sense, occupational segregation can mean that women are concentrated in specific tasks that are less valued and remunerated, because they face barriers to access land, credit and technology, or because they have difficulties to reconcile domestic responsibilities with agricultural activities (Analuisa-Aroca *et al.*, 2022).

Structural analysis tests

To perform the 36 structural analysis tests with dichotomous variables, the methodology presented by Gujarati and Porter (2010) was used. This approach was used to determine if governments of the years 2006, 2012 and 2018 caused a structural change in the total employed population of men and women in the agriculture sector in Mexico, and whether this change was produced on the ordinate at the origin, on the slope or on both. In these tests, the first four trimesters of the administrations of the governments of 2006, 2012 and 2018 were analyzed. This allowed examining if those changes happened during the first year of government, considering possible delays.

Specifically, for the 2006 administration, the four trimesters from 2007 were analyzed; for the 2012 administration, four trimesters from 2013; and for the 2018 administration, four trimesters from 2019 were considered. In these years, databases separated into women and men were used.

Therefore, according to Gujarati and Porter (2010), once the cutoff dates were established, the next step was performing a regression with dichotomous variables for each cutting point, as presented in Equation 1.

$$Y = \alpha_1 + \alpha_2 D_t + B_1 T + B_2 \left(D_t T \right) + \mu_1 \quad (1)$$

where Y: one of the three databases of the employed population (total, men and women) in the agriculture sector in Mexico; α_1: value of the intercept; α_2: value of the differential intercept; D_t: dichotomous variable, where 0 corresponds to observations before the cutoff point, and 1 to observations after the cutoff point; B_1: Beta value for time; T: time; B_2: differential slope; μ_1: stochastic error.

The p values of the 36 tests were analyzed, as well as the p values of the differential intersection (α_2) and the differential slope (B_2). In this sense, if the p value of the differential intercept (α_2) is less than 0.05, it is inferred that a structural change was produced on the intercept; meanwhile, if the p value of the differential slope (B_2) is less than 0.05, it is inferred that there is a structural change on the slope; in turn, if both p values are lower than 0.05, it is inferred that the structural change was on the slope and on the intercept; lastly, if both p values are higher than 0.05, it is inferred that there was not a structural change on the slope or on the intercept.

RESULTS

Table 1 presents the results of the structural analysis tests with dichotomous variables according to the methodology, for the database of total employed population in the Mexican agriculture sector. It was found that, in 2007, no structural change happened on the intercept, or on the slope, during any trimester of the year 2007, since the p values of the intercept and the differential slope are higher than 0.05 in every case.

Table 1. Structural analysis tests of the total employed population in the agriculture sector in Mexico.

	2007 Trimester				2013 Trimester				2019 Trimester			
	1	2	3	4	1	2	3	4	1	2	3	4
Intercept	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Differential intercept	0.27	0.228	0.257	0.314	0.008	0.006	0.007	0.011	0.206	0.230	0.529	0.889
Time	0.58	0.391	0.427	0.587	0.037	0.022	0.008	0.002	0.000	0.000	0.000	0.000
Differential slope	0.39	0.227	0.231	0.314	0.166	0.110	0.066	0.041	0.103	0.125	0.315	0.601

Source: prepared by the authors.

On the other hand, in the year 2013, a structural change happened in the differential intercept in every trimester of the year 2013 and in the fourth trimester of 2013 on the differential slope, since the *p* values are lower than 0.05. Finally, in 2019, there is no evidence of a structural change on the intercept or the differential slope, because the *p* values of the intercept and the differential slope are higher than 0.05 in every case.

These results indicate that the total employed population in the agriculture sector in Mexico suffered a structural change in the year 2013, which only happened on the intercept. Meanwhile, in the fourth trimester of 2013, there was structural change on the slope, which means that the trend of the total employed population in the agriculture sector in Mexico did not change until the fourth trimester of 2013.

Table 2 shows that, in 2007, there were no structural changes in any of the trimesters analyzed, since the *p* values of the intercept and the differential slope are higher than 0.05 in every case.

However, in the years 2013 and 2019, there is evidence of structural changes in every trimester of these years, both on the slope and on the differential intercept, since the *p* values of the intercept and the differential slope are lower than 0.05 in every case.

The results from Table 2 indicate that the employed population of men in the agriculture sector in Mexico suffered a structural change in the years 2013 and 2019, which happened on the slope and on the intercept. This means that, in these years, the slope changed; that is, the trend of the employed population of men in the agriculture sector in Mexico changed its trend. On the other hand, Table 3 presents the results from the structural analysis tests with dichotomous variables, for the databases of the employed population of women in the agriculture and livestock sector in Mexico.

Table 3 presents the results from the structural analysis tests with dichotomous variables, from the databases of the employed population of women in the agriculture sector in Mexico. It is observed that, in 2007, there is evidence of

Table 2. Structural analysis tests of the employed population of men in the agriculture sector in Mexico.

	2007 Trimester				2013 Trimester			2019 Trimester			
	1	2	3	4	2	3	4	1	2	3	4
Intercept	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Differential intercept	0.658	0.671	0.786	0.952	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Time	0.458	0.312	0.297	0.346	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Differential slope	0.329	0.204	0.183	0.208	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: prepared by the authors.

Table 3. Structural analysis tests of the employed population of women of the agriculture sector in Mexico.

	2007 Trimester				2013 Trimester				2019 Trimester			
	1	2	3	4	1	2	3	4	1	2	3	4
Intercept	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Differential intercept	0.03	0.013	0.007	0.003	0.000	0.000	0.000	0.000	0.002	0.008	0.009	0.011
Time	0.82	1.000	0.810	0.457	0.148	0.126	0.157	0.266	0.344	0.428	0.723	0.961
Differential slope	0.90	0.675	0.777	0.943	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001

Source: prepared by the authors.

a structural change in all the trimesters analyzed, but only on the differential intercept, since the *p* values of the differential intercept are lower than 0.05 in every case. On the other hand, in the years 2013 and 2019, there is a structural change in every trimester of those years, both on the slope and the differential intercept, because the *p* values for the intercept and the differential slope are lower than 0.05 in every case.

These results indicate that the employed population of women in the agriculture sector in Mexico suffered a structural change in the year 2007, which only happened on the intercept, and in the years 2013 and 2019, there were structural changes on the slope and on the intercept. This means that, in the years 2007, 2013 and 2019, the slope changed; that is, the trend of the employed population of women in the agriculture sector in Mexico changed its trend.

Now, Table 4 presents the equation before and after the structural change for the databases of the total employed population in the agriculture sector in Mexico, during the periods when structural change was found on the slope and on the differential intercept.

Table 4 shows that there was structural change in trimester 4, both on the slope and on the intercept, in the total employed population of the agriculture sector in Mexico. It shows that the slope, that is, the trend, decreased from 11,565 to 1,951. This implies that the growth of the total employed population of the agriculture sector in Mexico decreased after the structural change. Now, Table

Table 4. Equations before and after the structural change for the database of the total employed population in the agriculture and livestock sector in Mexico.

	Intercept	Slope	Trimester	Year
Before	5’983,576.90	11,565.04	4	2013
After	6’469,420.77	1,951.22		

Source: prepared by the authors.

5 shows the equations before and after the structural change for the database of the employed population of men in the agriculture sector in Mexico, in the periods when a structural change was found on the slope and on the differential intercept.

Table 5 shows there was structural change in every trimester of 2013 and 2019, both on the slope and on the intercept of the employed population of men in the agriculture sector in Mexico. The results indicate that in every trimester of the years 2013 and 2014, the slope of the employed population of men in the agriculture sector in Mexico went from positive to negative; that is, the growth of the employed population of men in the agriculture sector in Mexico went from positive to negative in the years 2013 and 2014.

Now, Table 6 shows the equations before and after the structural change for the database of the employed population of women in the agriculture sector in Mexico, in the periods where a structural change was found on the slope and on the differential intercept.

Table 6 shows that, in the case of the employed population of women in the agriculture sector in Mexico, there was a structural change on the slope and on the intercept in the years 2013 and 2014. In this sense, in all the trimesters of 2013 and in the first, second and third trimester of 2019, the slope of the employed population of women in the agriculture sector in Mexico, went from negative to positive, which indicates that the growth of the employed population of women in the agriculture sector in Mexico increased in the

Table 5. Equations before and after the structural change for the database of the employed population of men in the agriculture sector in Mexico.

	Intercept	Slope	Trimester	Year
Before	5’270,003.80	105,44.42	1	2013
After	6’076,666.57	-4,874.42		
Before	5’264,851.86	10,986.01	2	
After	6’116,005.12	-5,492.31		
Before	5’253,998.62	11,890.45	3	
After	6’133,967.73	-5,772.97		
Before	5’242,609.56	12,813.89	4	
After	6’142,728.43	-5,909.15		
Before	5’246,775.41	12,917.58	1	2019
After	6’933,887.39	-17,534.03		
Before	5’252,283.24	12,637.52	2	
After	7’025,144.07	-18,807.38		
Before	5’251,295.58	12,686.90	3	
After	6’884,270.99	-16,850.81		
Before	5’253,820.97	12,562.70	4	
After	6’794,172.39	-15,605.21		

Source: prepared by the authors.

Table 6. Equations before and after the structural change for the database of the employed population of women in the agriculture sector in Mexico.

	Intercept	Slope	Trimester	Year
Before	749,281.26	-1,928.56	1	2013
After	379,119.43	7,378.82		
Before	749,500.86	-1,947.38	2	
After	369,028.77	7,537.31		
Before	746,559.40	-1,702.26	3	
After	347,769.84	7,869.48		
Before	740,967.34	-1,248.85	4	
After	313,055.87	8,409.08		
Before	727,476.35	-523.78	1	2019
After	183,314.44	10,398.74		
Before	725,585.22	-427.62	2	
After	222,355.64	9,853.98		
Before	720,837.54	-190.24	3	
After	176,033.83	10,497.34		
Before	716,443.89	25.84	4	
After	125,884.50	11,190.65		

Source: prepared by the authors.

year 2013 and the first, second and third trimester of 2019. Meanwhile, in the fourth trimester of the year 2019, the slope increased; that is, the growth of the employed population of women in the agriculture sector in Mexico increased. These results indicate that the participation of women in the agriculture sector increased during these years.

DISCUSSION

In this study, it was found that there were no structural changes in 2007 or in 2019 for the total employed population of the agriculture sector in Mexico, but there was structural change in 2013. On the other hand, in the database of the employed population of men in the agriculture sector in Mexico, no structural change was observed in 2007, although structural changes were found in every trimester of 2013 and 2019. Finally, the database of the employed population of women in the agriculture sector in Mexico revealed evidence of structural changes in 2007, 2013 and 2019.

In the case of the employed population of women in the agriculture sector in Mexico, the years 2013 and 2019 —when structural changes were observed on the slope and on the intercept—, also showed an increase in women's participation. This suggests that the programs implemented by SADER (2024 a, b) have managed to increase the female participation in the agriculture sector.

This also means that there progress has been made in the incorporation of women into the agriculture sector, which can be attributed to the programs

implemented by the government, described by authors such as Restrepo (2024), Benítez *et al.* (2021), and Martínez and Baeza (2017). These programs are the ones that SADER (2024 a, b) has implemented.

However, it can also be due to other factors, such as those described by Esteban *et al.* (2012), Perona (2012), and Majoral and Sánchez (2000), who indicate that women have been able to join the labor market of the agriculture sector because of the following: there have been cultural changes, new productive areas have been created, the diversity of sources of income has increased, there have been technological advances, and because of globalization.

Something to emphasize is that Mexico is a country where migration takes place. In this sense, authors like Restrepo (2024), Martínez and Baeza (2017), and Mingo (2011), indicate that migration fosters the incorporation of women into the labor market of the agriculture sector. The latter can be another factor that helped to incorporate women into the agriculture sector.

Something to add is that despite the structural changes observed for women in the three years analyzed (with an increase in participation in 2013 and 2019), and for men in 2013 and 2019, the total employed population only experienced structural change in 2013. This indicates that even if the structural changes in female employment are evident in the three years analyzed, their impact on the total employed population is insufficient to produce a structural change at the aggregate level. This discrepancy can be attributed to the fact that women's participation in the employed population continues to be lower than men's. This highlights the need for more specific programs to increase the participation of women in the agricultural sector.

In this sense, the lack of impact from the growth in employed population of women in the agriculture sector in Mexico on the total employed population of the sector can be attributed to what was described by authors like Martínez and Baeza (2017), Esteban *et al.* (2012), Perona (2012), and Majoral and Sánchez (2000). These authors indicate that the agriculture sector is characterized by having a traditional patriarchal structure, which causes women to be relegated to certain areas when they are given access to the sector, such as product elaboration and conservation, for which they are considered perfect due to the characteristics that are attributed to women from the patriarchal view.

On the other hand, the findings also show that the different administrations have had different impacts on the employed population of women in the agriculture sector in Mexico. This reflects the efforts made by governments to address occupational segregation, which, as described by Ibáñez *et al.* (2022), is related with the social isolation by gender and the mechanisms that restrict women's access to predominantly male occupations. For women, the programs identified by SADER (2024 a, b) have had some positive effects, but they have not been sufficient to influence the sector in its entirety.

This evidence shows that the programs implemented have not been sufficient to reduce occupational segregation. The effects observed on women are not reflected in the total employed population of the agriculture sector in Mexico. This could be attributed to factors highlighted by Analuisa-Aroca *et al.* (2022), who point out that women tend to be concentrated in specific tasks that are less valued and remunerated. They also face barriers to accessing land, credit and technology, as well as difficulties reconciling domestic responsibilities with agricultural activities.

Finally, policies should be implemented that foster the participation of women in the agriculture sector. As the UN (2023) states in its SDGs, women have the potential of being key agents of change in the agriculture sector, which reinforces the need for initiatives that support this effort.

CONCLUSIONS

The objective of this article was to establish the impact of the agriculture and livestock policy of governments in Mexico in the years 2006, 2012 and 2018, on the female employed population of the agriculture sector in Mexico. Likewise, the research hypothesis was that the female employed population of the agriculture sector in Mexico was affected by the governments in Mexico of the years 2006, 2012 and 2018. For this purpose, 36 structural analysis tests with dichotomous variables were conducted. The databases used included the total employed population of the agriculture sector, as well as the men and women separately. These data sets, from the National Institute of Statistics and Geography (*Instituto Nacional de Estadística y Geografía*, INEGI, 2024) and the Agriculture and Livestock Census, covered the period included between the first trimester of 2005 and the second trimester of 2024. Each data set included 78 data points. The results indicate that, for the case of the female employed population in the agriculture sector in Mexico in the years 2006, 2012 and 2018, there is structural change. In the male employed population in the agriculture sector in Mexico, there is evidence of structural change only in the years 2013 and 2019; while in the total employed population of the agriculture sector in Mexico, there was evidence of structural change only in the year 2013. In addition, it was seen that the slope increased for women in 2013 and 2019, which means an increase in women's participation in the agriculture sector.

However, although structural changes were observed in the female employed population in the agriculture sector in Mexico in the years 2006, 2012 and 2018, they were not enough to generate a structural change in the total employed population in the agriculture sector. This can be attributed to the fact that women's participation in the employed population is lower than men's. This highlights the opportunities for the government to implement initiatives directed at increasing the participation of women in the agriculture sector in Mexico.

Based on these findings, the conclusion is that the study's objective was reached. Regarding the hypothesis, it is accepted, since it was determined that the female employed population in the agriculture sector in Mexico was affected by the governments of Mexico in the years 2006, 2012 and 2018. However, the study presents several limitations. It did not characterize the participation of women in the agriculture sector, the individual subsectors within the agricultural sector were not analyzed, and the government programs were not evaluated. Future research should explore women's participation in specific subsectors of the agriculture sector and examine the impact of government programs.

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