AN ANALYSIS OF THE IMPACT OF SOME SOCIO-ECONOMIC VARIABLES IN REGULATING THE CULTIVATION AND MARKETING OF THE RICE CROP IN IRAQ

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ABSTRACT

This research was aimed to study the results of the application of agricultural legislation and the variables affecting compliance with such legislation, as well as knowing the role of agricultural legislation in supporting the agricultural policy steps in Iraq. The results showed that the variable of providing loans increases the probability of farmers' commitment to the governmental agricultural plan to a large extent, amounting to about (28.7), and the variable of the sale price of the crop to the state has an impact on the probability of commitment to the plan at a degree of (1.02) greater than the chances of non-compliance with the agricultural plan, as well as the variable value of the returns achieved under The existence of government support to a degree or a fixed rate of (1) in favor of adhering to the agricultural plan. As for the farmers' decision to market their crops to the state, it was found that the most influential variables were the commitment to the agricultural plan, almost six times (6.25), which will increase the probability of marketing the crop to the state compared to the commercial one. The other variable was the provision of loans with a double degree of about (2.72). The research concluded that paying attention to the aspect of financing and providing agricultural loans to farmers will lead to farmers getting rid of the financial restrictions imposed on them by the private sector. Also, the continuation of providing support will lead to an improvement in the level of farm income for farmers and not to search for other means to obtain income and thus adhere to the government legislation drawn up. The research recommended the need to provide government support and use modern technologies to increase production rates and achieve greater returns for farmers, and the presence of a supervisory body working to ensure that farmers do not violate the imposed government legislation.

Keywords: Agricultural legislation, logistic regression, subsidy policy
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تحليل اثر بعض المتغيرات الاقتصادية – الاجتماعية في تنظيم زراعة وتسويق محصول الزر في العراق

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المستخلص

استهدف البحث دراسة نتائج تطبيق التشريعات الزراعية والمتغيرات المؤثرة في الالتزام بتلك التشريعات فضلاً عن معرفة دور التشريعات الزراعية في دعم خطوات السياسة الزراعية في العراق. أظهرت النتائج ان متغير توفير القروض يزيد من احتمالية التزام المزارعين بالخطة الزراعية الحكومية بدرجة كبيرة بلغت نحو (28.7)، ومتغير سعر بيع المحصول للدولة له تأثير باحتمالية الالتزام بالخطة بدرجة (1.02) اكبر من فرص عدم الالتزام بالخطة الزراعية وكذلك متغير قيمة العوائد المتحققة في ظل وجود الدعم الحكومي بدرجة او بمعدل ثابت مقداره (1) لصالح الالتزام بالخطة الزراعية. اما بالنسبة لقرار المزارعين بتسويق محاصيلهم الى الدولة فقد وجد ان اكثر المتغيرات تأثيرا كان الالتزام بالخطة الزراعية بدرجة تقريبا ستة اضعاف (6.25) والذي سيزيد من احتمالية تسويق المحصول الى الدولة مقارنة بالتجاري. والمتغير الاخر تمثل بتوفير القروض بدرجة مضاعفة بلغت نحو (2.72). واستنتج البحث ان الاهتمام بجانب التمويل وتوفير القروض الزراعية للمزارعين سيؤدي الى تخلص المزارعين من القيود المالية المفروضة عليهم من القطاع الخاص. وكذلك فان استمرار تقديم الدعم سيؤدي الى تحسين مستوى الدخل المزرعي للمزارعين وعدم البحث عن وسائل اخرى للحصول على الدخل وبالتالي الالتزام بالتشريعات الحكومية المرسومة. واوصى البحث بضرورة توفير الدعم الحكومي واستخدام التقنيات الحديثة لزيادة معدلات الانتاج وتحقيق عوائد اكبر للمزارعين، ووجود جهة رقابية تعمل على ضمان عدم مخالفة المزارعين للتشريعات الحكومية المفروضة.

الكلمات المفتاحية: التشريعات الزراعية، الانحدار اللوجستي، سياسة الدعم
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INTRODUCTION

Agricultural legislation plays a key role in regulating agricultural activity and determining the rules of agricultural relations between the state and farmers or agricultural workers, and this involves defining the relationship between government agencies at the central and local levels and between farmers as well as between these farmers each other. As long as these legislations are the focus of agricultural activity in the state, they must be realistic, straight and clear in order for them to be effective and feasible, and thus become a effective management of agricultural policy planning and programs and easy to implement efficiently and in the targeted manner for which the state issues them. Numerous legislations have been issued covering various aspects of agricultural production, and as the years progress, it is necessary to conduct a comprehensive review of them in order for the state to determine the extent of its smoothness, effectiveness, and compliance with the economic and social changes that society is going through until it becomes fully compatible with the needs of society and a positive means to advance development and raise the level of agricultural production. The agricultural sector and modern agriculture are also a decisive factor in achieving food security, which ensures that people get what they need from the food they need, especially the grain production sector. The green revolution that occurs is mainly due to the introduction of new varieties with high specifications for a number of crops, including the rice crop(5). The problem of the research is that some agricultural legislation remains captive to some of the conditions that accompanied it, which made it ineffective, as well as the inherited agricultural relations that prevailed at the time. There are also some negative effects of the legislation when applied to the reality of farmers on the production and marketing sides. The research assumed the existence of a set of socio-economic variables that have a direct and indirect impact on farmers' response to government legislation and laws that regulate the production and marketing of the rice crop in Iraq. The research aimed to know the suitability of legislation issued in the agricultural sector with the environmental, economic and social conditions of rice farmers and the extent to which farmers have incentives to adhere to and implement them to achieve some sustainable development goals. The rice crop was targeted as it is one of the most important crops that are directly affected by most of the governmental legislation and laws that pertain to the agricultural sector, such as defining the agricultural plan and the mechanisms for receiving and marketing the crop. The rice crop is also one of the important food crops in Iraq, as it ranks third in terms of strategic grain crops, wheat and barley, and first among the summer crops in terms of area and production (11). One of the most important determinants of cultivating this crop, on which most agricultural policies and legislation are drawn up, is water quotas, because the rice crop is one of the crops with high water requirements. Studies have confirmed that the percentage of irrigated lands has reached nearly 20% of the cultivated areas in the world, despite the smallness of this percentage, but it contributes about 40% of the world food, so water has become a determining factor for the productivity of both summer and winter field crops, especially in light of the decreasing water resources in the Tigris and Euphrates rivers. On the other hand, rice is the largest consumer of water (3).

MATERIALS AND METHODS

The data of a questionnaire was used and distributed to a group of rice farmers in Najaf Governorate, their number reached about (179). For the purpose of achieving the objectives of the research, the method of logistic regression analysis was relied on for the purpose of analyzing data and extracting results, because it is the best method to reach a clear picture of the impact of the studied variables on farmers' response to legislation and government laws. Logistic regression analysis is defined as a statistical method used to examine and reconcile the relationship between a two-valued dependent variable and one or more independent variables of any kind (6). Therefore, logistic regression is one of the statistical methods used to examine the relationship between the dependent variable of a nominal level and one or more independent variables, which are sometimes called

accompanying variables or explanatory variables so that those independent variables are of any kind of measurement levels (4). And that the main purpose of using logistic models is to predict the occurrence or non-occurrence of a specific event or to estimate the model that represents the relationship between variables for use in statistical forecasting (2). Accordingly, the regression method is used to reach a mathematical model that shows the quantitative relationship between the dependent variable whose value is to be predicted and the explanatory variables (9). The logistic regression model is based on a basic assumption that the dependent variable Y that we are interested in studying is a binary variable that takes the value (1) with a probability ((P) and the value (0) with a probability (P - 1), that is, the occurrence of the response and its non-occurrence(13). Therefore, the importance of this regression when compared to other statistical methods is that logistic regression is a more powerful tool because it provides a test for the significance of the coefficients (17). It also gives the researcher an idea of the proportion of the influence of the independent variable on the qualitative two-valued dependent variable, as well as it arranges the effect of the independent variables, which allows the conclusion that a variable is stronger than the other variable in understanding the emergence of the desired result, as well as a statement of the impact of the interaction between the independent variables on the variable binary value function (1). One of the advantages of logistic regression is that it is less sensitive to deviations from the normal distribution of the study variables, compared to other statistical methods such as linear regression, as it can bypass many of the restrictive assumptions of using the OLS method in linear regression, which ultimately makes regression analysis Logistic is the best method in the case of the two-valued categorical dependent variable (19). The problem of Collinearity has been studied by Habshah, M, this problem appears in linear relationships and their overlap in the logistic regression model, and reached the importance of eliminating this problem by increasing the sample size, especially since the logistic model deals with cross-sectional samples and not time series(8). Also, One of the uses of logistic regression is to classify or predict a discrete categorical variable from among the two continuous and/or discrete predicted variables(12). The study of (Lian) also reviewed the international literature of empirical educational research to examine the application of logistic regression. The aim is to examine common practices for reporting and interpretation of logistic regression results, and to discuss implications for educational research(10).

Binary logistic regression model

In linear regression in which the independent variables and the dependent variable take continuous values, the model that links the variables is as in following equation (14):

$$Y = b_0 + b_1 x + e \ldots\ldots\ldots\ldots\ldots (1)$$

Whereas: Y: the dependent variable, which represents the response variable that we are interested in studying, and it is a binary variable that follows the Bernoulli distribution, that is, it takes the value (1) with a probability (P) and the value (0) with a probability (q = (1-P), meaning that the response occurs or not its occurrence. Assuming that the mean of the observed values (y) at a given value of the variable (x) is E (y) and that the variable (e) represents the error, The model can be written as follows, as in following equation (20).

$$E(y/x) = b_0 + b_1 x \ldots\ldots\ldots\ldots\ldots (2)$$

It is known in simple linear regression the dependent variable (y) for these models takes values from $(-\infty)$ to $(\infty +)$, but when we have two variables, one of which is the binary dependent variable, the simple linear regression is not appropriate, so the value of the dependent variable takes the two values either zero or one, so the model is not applicable from the point of view of simple linear regression (15), and one of the ways to solve this problem is to insert an appropriate mathematical transformation on the dependent variable (y). It is known that ($0 \leq P \leq 1$), hence, the ratio $\frac{p}{1-p}$ is a positive value between ($\infty \leq p/(1-p) \leq 0$), and by taking the natural logarithm of the expression $\frac{p}{1-p}$ the amount becomes confined between $(-\infty \leq ln\frac{p}{1-p} \leq \infty$, thus, the regression model is in the case of

one variable as in following equation (15):

$$Ln\left(\frac{p}{1-p}\right) = b_0 + b_1 x \text{.....(3)}$$

If we have more than one independent variable, the model takes the form as in equation (4):

$$Ln\left(\frac{p}{1-p}\right) = b_0 + \sum_j^k b_j x_{ij} \text{.....(4)}$$

Where: j=1,2,.....,k , i=1,2,.....,n This model is called logistic regression model.

RESULTS AND DISSCUSSION

First: Analyzing the farmers' response to the agricultural plan

The agricultural plan represents one of the legislation and laws set by the competent authorities in the country, which is to determine the agricultural areas allocated for each crop by the Ministries of Agriculture and Water Resources based on the volume of water imports from the Tigris and Euphrates rivers annually. The government draws up its agricultural policies related to support, marketing and others according to the size of the plan. However, there are a number of factors that encourage farmers not to adhere to the established agricultural plan and to exceed it with areas that exceed what they are allowed to plant. From the analysis of these factors, it becomes clear to what extent the farmers are committed to the agricultural legislation set by the state and what are the reasons that prompted the farmers to bypass the agricultural plan and not comply with it, in order to treat it in the future and avoid the negative effects resulting from it. Through the results of the analysis shown below, the following is found:

Prob (event) = *Prob* (Y; 1: implemented agricultural plan and 0: not implemented agricultural plan)

So: (*Prob* (event): the probability of the event occurring,

Suppose X): represents a set of criteria that includes socio-economic, technical, institutional and environmental factors and the peculiarities of farmers that influence the decision to implement the agricultural plan. (p_i) indicates the probability of the farmer's commitment to the agricultural plan and (1-Pi) is the probability that (Yi) equals (0) and represents the probability of not commitment to the agricultural plan. The weighting coefficient (Y = 1 versus Y = 0) can be defined as the ratio of the probability that the farmer adheres to the agricultural plan (p_i) to the probability of not adhering to the agricultural plan (*1-pi*), (Nominal weighting factor $\frac{pi}{1-pi}$) , and by taking the natural logarithm, we get the prediction equation for the individual farmer:

$$\ln(\frac{pi}{1-pi}) = B_0 + \sum_{i=1}^{n} BiXki \text{ ..... (5)}$$

Table (1) shows a description of the variables included in the logistic regression model, which were represented by the dependent variable of the agricultural plan (Y) with a two-valued (0,1), which affects a group of explanatory variables, numbering (8) variables, including quantitative and qualitative variables. These variables were identified as influential variables in the model through their expected impact on the farmer's commitment to the agricultural plan. The results showed the significance of some variables and their conformity to the logic of economic theory and the insignificance of others. Obtaining some intangible results may be attributed to the problem of data collection, especially those related to the returns obtained by farmers, which often resort to reducing the real values of returns to evade taxes or other social factors. Also, these proven returns by farmers are not commensurate with what is expected to be obtained, especially since the announced prices are very encouraging and motivating to them. On the other hand, some of them may resort to inflating costs, which negatively affects the achieved results, and this is what appeared in the proven results and there is no other explanation, especially since the research has completed the analysis of the model by examining it and passing the statistical tests as much as possible.

Table 1. Describe the variables identified in a logistic regression model

Variable	Description	Variable type
Y	agricultural plan	Qualitative (1: committed to plan, 0: not (committed to plan
X_1	The total area	Quantitative(Donum)
X_2	Selling price to the government	Quantitative(ID/ kg)
X_3	commercial sale price	Quantitative(ID/ kg)
X_4	water availability	Qualitative (1: water availability, 0: lack of (water
X_5	Delayed receipt of marketing funds	(Qualitative (1: Yes, 0: No)
X_6	provide loans	(Qualitative (1: Yes, 0: No)
X_7	Return supported	(Quantitative (ID/Ton)
X_8	Unsupported return	(Quantitative (ID/Ton)

Source: Based on the concept of the binary logistic regression

The coefficients of the binary logistic regression model were estimated using the Maximum Likelihood (ML) method using the SPSS program (20). The quality of the model fit was tested using the Hosmer and Lemeshow statistic which is similar to (R^2), which is calculated from the Chi-Square distribution with degrees of freedom (d.f=8), and it is one of the most reliable tests for the fit of the logistic regression model (16). The test showed that the P-value amounted to (0.972), which indicates that the null hypothesis was not rejected, which states that there is no difference between the observed values and the estimated values of the dependent variable, which means that the model estimates fit the data very well. As the results of the overall percentage of right prediction test results of the model showed that the total percentage of correct predictions was (91.5%), meaning that the model succeeded in predicting the probabilities at a very high rate, as shown in table (2). As for the interpretation of the logistic regression coefficients, the logit coefficient was used, which is called (the non-standard logistic regression coefficient), and symbolized by the symbol (b), and it is used in the logistic regression to estimate the logarithm of the weighting coefficient (log odds), that the dependent variable is equal to (1) for each unit of change in the independent variable, knowing that logistic regression calculates the amount of change in the logarithm of the weighting coefficient of the dependent variable and not the change in the dependent variable itself (7). It is clear that the estimated logistic regression model agrees with the economic logic, that is, the logic of the estimated transactions in terms of sign and size. The column *Exp(B)* in table (2) shows the power of the expected value of *B*)), which was raised to the value of the logistic regression coefficient, which is the expected change in the probabilities of increasing the probabilities of adoption as a result of changing the explanatory variable by one unit. Table (2) showed that all the eight variables proved their significance at the level of (1% and 5%), and the logistic regression equation can be expressed in light of the mentioned variables as in the following equation:

$$Y = -1.123 - 0.262x1 + 0.028x2 - 0.026x3 - 3.509x4 - 2.109x5 + 3.357x6 - 0.0004x7 + 0.0016x8$$

These estimates provide information about the relationship between the explanatory variables and the dependent variable (y), as the dependent variable is on the Logit scale.

Table 2 . The logistical equation estimated by the method of the Maximum Likelihood (ML)

Variables	B	S.E.	Wald	Sig.	Exp(B)
The total area	-.262	.072	13.194	.000	.769
Selling price to the government	.028	.013	4.915	.027	1.028
commercial sale price	-.026	.011	5.827	.016	.974
water availability	-3.509	.926	14.373	.000	.030
Delayed receipt of marketing funds	-2.109	.772	7.458	.006	.121
provide loans	3.357	.825	16.564	.000	28.714
Return supported	.000	.000	10.158	.001	1.000
Unsupported return	.001	.000	14.131	.000	1.001
Constant	-1.123	4.855	.054	.817	.325
Hosmer and Lemeshow Test: Chi-Square2.268, d.f, 8; sing, 0. 972. -2log likelihood, 65.683(a); Cox & Snell R2, 0.614; Nagelkerke R2, 0.828; overall percentage of right prediction, 91.5%.					

Source: Prepared by researchers based on the results of the SPSS program (20) depending on farmers answers

Table (2) shows the dependent variable and the independent variables included in the logistic regression model, which can be defined and their results explained as follows:

First: The dependent variable: Y: The agricultural plan variable (referring to the dependent variable Y) was defined as a two-valued variable (1: committed to the agricultural plan and 0: not committed to the agricultural plan).

Second: Explanatory (independent) variables: There is a set of variables that affect the process of implementing the agricultural plan by farmers, represented by technical, economic, social, institutional and environmental factors. The model included (8) illustrative variables represented by the mentioned factors that are supposed to affect the process of implementing the agricultural plan in the study area. These variables are:

Total area: It is a quantitative variable that shows us the size of the agricultural area owned by the farmer and its impact on the farmer's decision to adhere to the agricultural plan, and it came with a negative sign that may seem illogical at first glance, but the fact of the matter is that the farmer who owns a large area but part of it is outside the agricultural plan specified for him The availability of the requirements for growing the crop and the financial and technical capabilities, so he believes that it is better for him to plant the entire area to obtain greater returns compared to the exit of large parts of his land from the production process, That is, the greater the agricultural areas, the lower the probability of implementing the agricultural plan by the farmers, and this was proven by the value of Exp(B) as it reached about (0.76), meaning that there is a decrease in the probability of adhering to the agricultural plan by (0.24) as the cultivated area increased by one and showed The results were significant for this variable at the level of significance (1%).

The selling price to the government: It is a quantitative variable that reflects the government price set for buying the crop from farmers, and the effect of this variable is reflected by the fact that the state does not receive the crop at this subsidized price unless it results from the area included in the agricultural plan. The results of the logistic regression analysis showed the significance of the price variable at the (5%) level, and it appeared with a positive sign that conforms to the logic of the economic theory, and corresponds to the value of Exp(B) which amounted to about (1.02) and indicates that the increase in the government price leads to an increase in the probability of adhering to the agricultural plan by 1.02. Previous studies and all the agricultural policy literature have indicated that the state's encouraging prices offered to farmers when they follow the policy of (Price Floor) are high and superior to local prices (at traders), and this constitutes a great incentive for farmers to market their products to the state through adherence to the agricultural plan.

Commercial sale price: It is a quantitative variable that shows the selling prices of the crop to traders in the local markets. It is expected that this variable will have a negative impact on the commitment to the agricultural plan if those prices rise above the prescribed government prices. It appeared with a negative sign that is consistent with the logic of economic theory, and is compatible with the

value of Exp(B), which amounted to about (0.97), as it indicates that increasing the commercial price by one unit reduces the chances of farmers' commitment to the agricultural plan, and the significance of this variable has been proven at the level of (5%).=

Water availability: It is a qualitative variable that reflects the extent of water availability for farmers and the extent of proximity or distance from the source of irrigation water. It is expected that this variable will have a significant impact on the farmer's decision to adhere to the agricultural plan or not, because the availability of water is the basis for determining the agricultural areas of the rice crop, as it is one of the crops with many water requirements. The sign of this variable was negative, which indicates that the more abundant there is in water, the less likely it is to adhere to the agricultural plan. The results showed the significance of this variable at the level of significance (1%). In this regard, the result obtained clearly indicates that the farmer will not be dependent on the state, meaning that he will not adhere to the agricultural plan, as long as he has the main requirements for rice cultivation, foremost of which is irrigation water. We note that the value of *(EXP(B) = 0.03)* means that the chance of the farmer's commitment to the agricultural plan when water is available is very low, and vice versa. This matter constitutes an important point for those in charge of planning and implementing agricultural plans to take into account that the farmer should, when water is available, remain committed to the agricultural plan because in other years he may be exposed to a decrease in this important resource, meaning that he adheres to the plan in the absence of water and will not It is adhered to in the case of the opposite, and this is not true, especially as it is related to an important strategic crop, which is rice. We also call on those in charge of agricultural policy to set strict conditions for farmers who do not abide by the agricultural plan.

Delayed receipt of marketing amounts: It is a qualitative variable that reflects the routine and government procedures and the time required to pay the dues of farmers marketing their production to the state. This variable is expected to affect the farmer's commitment to the agricultural plan, and it has been clear that the delay in receiving marketing funds will reduce the chance of the farmer's commitment to his agricultural plan, and this is clear from the value of (EXP(B) = 0.121), in the sense that the chance of the farmer's commitment to the plan will be greatly reduced, reaching (0.88) or, on the contrary, his commitment to the plan will be 0.12. To think not to market their products to the state and resort to the local market, which may often pay lower amounts, but the farmer is forced to accept them, provided that he bears the trouble of the long wait from the state. It came with a negative sign indicating that whenever there is a delay and complexity in the procedures for paying the marketing amounts to farmers, the less likely it is to adhere to the agricultural plan, and the significance of this variable has been proven at the level (1%).

Availability of loans: It is a qualitative variable. With regard to the variable represented (the availability of loans), a positive sign came and it conforms to the logic of the economic theory that the availability of loans will prompt farmers to adhere to the agricultural plan. When referring to the value of *(Exp(B) = 28.714*), the chances of the farmer's commitment the agricultural plan will increase by (28.714), which is considered a very large probability and reflects the impact of this variable on the farmer and gives him a great incentive to adhere to the agricultural plan because of his firm belief in the state's assistance to him, which is reflected positively on the agricultural output in general and this is what is expected from the impact of the variable. The significance of this variable was confirmed at the level (1%).

Return supported: a quantitative variable, indicating the effect of government support on the farmer's decision to adhere to the agricultural plan or not, through the reflection of this support on the returns achieved for rice farmers, which include both sides support for production requirements and the price of the final product, as the farmer's failure to adhere to the plan agriculture will lead to depriving him of access to this support. Thus, the size of the returns to the farmer from this support, the greater the return without the support, motivating that farmer to adhere to the

agricultural plan. And it came with a positive sign that matches the economic logic, and the significance of this variable was proven at the level (1%).

Unsupported return: A quantitative variable that indicates the return achieved from the farmer's dependence on commercial markets in marketing his production, and the impact of this return on adherence to the agricultural plan or not. The impact of this variable is expected to be negative on the farmer's decision to adhere to the agricultural plan, and this can be attributed to the fact that if the farmer is able to achieve profitable returns without the need to resort to the government in marketing his production, there will be no justification for his commitment to the agricultural plan if the conditions are available to him and the capabilities necessary for the production process, with areas exceeding the areas specified in the agricultural plan, However, despite the violation of this variable's reference to economic logic, its morale was high. One of the reasons for obtaining this result may be what was previously mentioned in the problem of data collection, especially those related to the returns obtained by farmers. It should also be noted that farmers have two options, either marketing to the state or commercial, but this matter is governed by certain conditions that are summarized in the following:

With regard to the (Amber variety), if the farmer markets it to the state without converting it into muddy rice(Paddy), he will have less costs involved in liquidating the variety, but if the farmer clears the Paddy and turns it into rice and markets it to the commercial market, he will get greater returns than if he markets it to the government in its initial state, this does not apply to the (jasmine variety) due to its low commercial price and higher productivity per unit area compared to the amber variety. In light of all these reasons, we believe that the results we obtained regarding the unsubsidized return signal may be affected by the above, especially since farmers often prefer to obtain large returns by marketing their crops to the local market, ignoring the privileges they obtain from the state. If they are marketed to it.

Second: Analysis of farmers' response to government marketing

The binary logistic regression method was used to analyze the data and describe the model, as it represents the optimal method to reflect the impact of the selected factors and variables on the farmers' decision to choose the outlet for marketing the rice crop, if it is (for the government or for commercial markets). The first step is to describe the model and determine the nature of the dependent variable and the independent variables included in the model, as shown below:

Prob (Event) = Prob(Y; 1: marketing for the government & 0: trade marketing)

(Prob(Event): the probability of the event happening, Y=1: marketing to the government, Y=0: commercial marketing

Table (3) shows a description of the variables that were included in the model, which are believed to have a tangible impact on the farmer's decision to choose the entity to which he will market his rice production. It was first represented by defining the marketing as dependent variable (Y) and it is a binary variable (0,1), which affects a group of explanatory variables numbering (7) variables, including quantitative and qualitative variables. These variables were identified as influential variables in the model through their expected impact on the marketing process, and the results showed the significance of some variables and their conformity to the logic of economic theory and the insignificance of others. Both, and this makes its significance in influencing the marketing of the government is largely unclear compared to commercial marketing.

Table 3. Describe the variables identified in a logistic regression model

variable	Description	Variable type
Y	Marketing	Qualitative (1: government marketer, 0: (commercial marketer
X1	Plan	Qualitative (1: committed to the plan, 0: not committed to the plan
X2	Selling price to the government	Quantitative (ID/Kg)
X3	commercial sale price	Quantitative (ID/Kg)
X4	Depts	(Qualitative (1: not debited, 0: debited
X5	Receipt procedures	Qualitative (1: complex, 0: soft)
X6	Provide loans	Qualitative (1: yes, 0: no
X7	Production	Quantitative(Kg)

Source: Based on the concept of the binary logistic regression

The results showed that using the Hosmer and Lemeshow test, the P-value amounted to (0.477) indicating that we do not reject the null hypothesis (the null hypothesis) that there is no difference between the observed values and the estimated values of the dependent variable. The results also showed the appropriateness of the model as a whole, as the total percentage of predictions is correct, which indicates the reconciliation of the model in predicting a proportion of (85.2) of the expectations for the variables included within the model in terms of their impact on the dependent variable (the probability of marketing to the government or the possibility of commercial marketing). The logistic regression equation for the mentioned variables can be expressed as in the following equation:

$$Y = -9.374 + 1.833x1 + 0.028x2 - 0.021x3 - 2.917x4 - 0.070x5 + 1.003x6 + 0.009x7$$

These estimates provide information about the relationship between the explanatory variables and the dependent variable (y), as the dependent variable is on the logit scale.

Table 4. The logistical equation estimated by the method of the maximum Likelihood (ML)

Variables	B	S.E.	Wald	Sig.	Exp(B)
Plan	1.833	.586	9.784	.002	6.256
Selling price to the government	.028	.008	12.150	.000	1.028
commercial sale price	-.021	.006	14.152	.000	.979
Depts	-2.917	.517	31.819	.000	.054
Receipt procedures	-.070	.492	.020	.887	.933
Provide loans	1.003	.511	3.856	.050	2.727
Production	.009	.005	3.507	.061	1.009
Constant	-9.374	3.391	7.642	.006	.000
Hosmer and Lemeshow Test: Chi-Square7.561, d.f, 8; sing, 0.477. -2log likelihood, 120.623(a); Cox & Snell R^2, 0.472; Nagelkerke R^2, 0. 637 ; overall percentage of right prediction, 85.2%.					

Source: Prepared by researchers based on the results of the SPSS program (20)

The table above shows the results of the logistic regression analysis and the percentage of the influence of the independent variables included in the model on the dependent variable, which was as follows.

First, the dependent variable

Y: The dependent variable represented by the marketer was defined as a two-valued variable (1: government marketing and 0: commercial marketing). It reflects the possibility of farmers choosing the marketing destination, either for the government, or for marketing the production to the local commercial markets.

Second: Explanatory (independent) variables: There are a set of variables that affect the farmer's decision to choose the marketing agency for the Production, represented by technical, economic, social, institutional and environmental factors. The model included (7) illustrative variables represented by the mentioned factors that are supposed to affect the marketing process in the study area. These variables are:

The agricultural plan: it is a qualitative variable, the agricultural plan is the most important variable that affects the farmers'

decision to market their production to the government, because the area not included in the agricultural plan cannot market its production to the government and the farmer will buy his production to commercial markets. As for the areas included in the plan, farmers are not obliged to market their production to the government, but they are free to choose the marketing destination that suits them. This variable was positive in accordance with the logic of the economic theory, and the expected value Exp(B) indicates that the increased commitment to the agricultural plan will increase the probability of farmers marketing their products to the government by (6.25), which constitutes an incentive for farmers to adhere to the agricultural plan to benefit from the advantages offered by the government (that is, the government's marketing opportunity will double by 6.25). For the areas included in the agricultural plan in terms of support for the final product and production requirements, the significance of this variable appeared at the level of significance (1%).

The selling price to the government: It is a quantitative variable that reflects the price of selling the rice crop to the government, which is often pre-determined by the government, and that price is supported at levels higher than international prices, this constitutes an incentive for farmers to move towards marketing their production to the government to achieve the highest possible revenue. The results of the logistic regression analysis showed the significance of the price variable at the level (1%), and it appeared with a positive sign, in accordance with the logic of the economic theory, and this was confirmed by the value of Exp(B) which amounted to about (1.02) indicating that an increase in the price of the crop by one unit will lead to an increase in the possibility of marketing to the state by (1.2)(That is, it increases by more than one). This amount reflects the extent of the state's interest in rice production and the size of the incentives provided to rice producers to encourage them to improve and develop rice production per unit area to achieve profitable returns in light of the subsidized prices.

Commercial selling price: It is a quantitative variable that reflects the selling prices of the rice crop in the local commercial markets, and it appeared with a negative sign in accordance with the logic of the economic theory, as the value of Exp(B) which amounted to about (0.97) indicates that the decrease in the commercial price of the rice crop by one unit It will lead to a decrease in the probability of farmers marketing their produce to commercial markets by (0.03), and the probability of farmers marketing their production to the government increases.

Debt: It is a qualitative variable, this variable reflects the financial constraints that farmers suffer from, as some farmers who do not have the financial means to cultivate their lands resort to borrowing from others or purchasing production requirements such as seeds, fertilizers, pesticides and other agricultural offices on credit in return for to market their production to those parties, thus, this variable affects the farmer's decision to market his produce to the party he desires. The debt variable appeared with a negative sign confirming the value of Exp(B) which amounted to (0.05), indicating that the higher the debts of the farmer, the greater the probability of marketing his production to the commercial markets by (0.95), which is a large percentage indicating that financial constraints are among the most important variables that prevent farmers from marketing their produce to government agencies. The significance of this variable also appeared at the level of significance (1%).

Procedures for receiving the crop: It is a qualitative variable, which reflects the nature of the routine procedures pursued by government marketing outlets and the procedures followed in receiving the crop. It is expected that this variable will have a significant impact on the farmers' decision to choose the marketer of their production, the farmer always wants to take the shortest way and the simplest of procedures, especially for farmers with small holdings and limited production. The sign of this variable is negative, consistent with the value of Exp(B) of about (0.93) and indicates that the greater the complexity of the procedures for receiving the crop, the chances of farmers marketing their production to the government will decrease by (0.17) and the probability of

marketing the production to the commercial markets increases by the same percentage, but the model showed the non-significance of this variable.

Availability of loans (Provide Loans) : It is a qualitative variable that reflects the availability of government loans and their availability to farmers, and it is expected that this variable will have a positive impact on the process of marketing the crop to the state, as providing loans will improve the financial situation of farmers, which contributes to encouraging them to search for methods and techniques that increase Production and improvement of crop yield per unit area, as well as freeing farmers from the restrictions imposed on them by the private sector as a result of their financial obligations. The sign of this variable was positive, confirming the achieved Exp(B) value of about (2.72), which indicates that with loans, the chances of marketing production to the state increase by (2.72) (That is, it will increase by more than 2). which is a good probability ratio that reflects the importance of this variable in influencing the decision to choose the marketing entity. The analysis showed the significance of this variable at the level of (5%).

Production: It is a quantitative variable that shows the amount of total production of the rice crop that is produced by the farmer. The effect of this variable on the farmer's decision to choose the marketing destination is that the higher the quantity of production, the more the farmer is willing to bear the burdens resulting from the marketing process of the government in return. Obtaining the highest price for his crop, which increases the revenue earned from that production, as for small farmers whose production quantities are limited, their motive is to bear the burden of waiting and the routine used in receiving the crop, as well as the cost of transportation is lower compared to the first category. The sign of this variable was positive, commensurate with the value of Exp(B) of about (1.009), which indicates that an increase in production by one unit increases the probability of marketing the crop to the state by (1.009)(more than 1 by 0.009). This result reflects the need to pay attention to large-scale production and to search for means to achieve this in light of water scarcity and adherence to agricultural areas for the rice crop. From the foregoing, the research concluded that the interest in the aspect of financing and providing agricultural loans to farmers will lead to farmers getting rid of the financial constraints imposed on them by the private sector and thus increasing the possibility of their commitment to implementing agricultural legislation. Also, the continued provision of government support, especially in the aspect of outputs, will lead to an improvement in the level of farm income for farmers, which makes them needless to search for other means to obtain income and thus adhere to the government legislation. The large size of the agricultural holdings with the farmers' lack of awareness of the danger of violating the established plan will lead to the expansion of the cultivated areas at the expense of the share of other farmers, and this affects the fair distribution of the areas allocated for growing the crop. In addition, the research concluded that prices have a significant impact on the possibility of adhering to the agricultural plan. If government prices exceed commercial prices in light of the subsidy policy and reach levels that meet the farmers' ambitions, their incentive to exceed the areas allocated to them and their commitment to the agricultural plan in order to ensure obtaining those prices will disappear. Also, the state's delay in paying farmers' dues will push them to abandon the idea of marketing the crop to the state, which one of its conditions is commitment to the agricultural plan, which makes farmers not interested in adhering to the agricultural plan, as they market their crop to commercial markets, as well as their goal to achieve higher production to cover the price difference between the government and commercial. The subsidy is also of great importance in guiding farmers to adhere to the agricultural plan, and raising this subsidy will increase the farmers' non-compliance with the government legislation related to the agricultural plan. As for the marketing side, the research conclude that the agricultural plan was the main determinant of influencing the farmer's decision to market his production to the state(government) or to commercial markets, and that non-compliance with the agricultural

plan does not enable him to market his production to the state according to the instructions and decisions established for commercial markets. This is because most farmers who suffer from financial hardship depend on the private sector to provide production requirements by way of deferred payment, and this is in return for the farmer's commitment to sell his production to the party that financed him and who has debts to this farmer, so he is forced to sell to commercial markets even if the return is less than marketing to the state. The research recommended, the need to work on improving the reality of agricultural crop production by providing government support for the use of modern technologies to increase production rates per unit area and achieve greater returns for rice farmers. Also, there is an honest supervisory body that works to ensure that farmers do not violate the imposed government legislation in order to regulate production and develop the agricultural sector, and spreading awareness among farmers of the importance of government legislation, its role in regulating agricultural work, and the effects of non-compliance with it. This will be through activating the role of agricultural extension in this area. Providing soft loans to farmers and facilitating the mechanisms for obtaining them. And facilitating the procedures for receiving the yield by increasing marketing outlets, reducing routine administrative procedures, and preventing middlemen and speculators from exploiting farmers and obstructing the marketing process. Finally, Continuing to support the prices of production requirements and the final product in line with covering the high costs of producing the targeted agricultural crops, providing a rewarding return for farmers, making them feel the state's interest in them and providing an incentive for them to abide by the enacted laws and decisions to ensure that they are in the interest of the farmer.

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