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AN ANALYSIS OF THE MOST IMPORTANT FACTORS AFFECTING FARMERS' ADOPTION OF THE TECHNIQUES OF THE NATIONAL WHEAT GROWER DEVELOPMENT PROGRAM IN IRAQ

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ABSTRACT

Wheat crops are the most important staple grain crops in the world in general and the Iraqi table in particular, as the achievement of food security for any country depends on the production and provision of grains, which are the main source of food for the population, and must be provided under all conditions and seek self-sufficiency from them. From this point of view, the Ministry of Agriculture has established the national wheat growing development program in Iraq as one of the development projects aimed at achieving self-sufficiency in the wheat crop in Iraq, which led to the introduction and implementation of a range of modern agricultural technologies that are supposed to contribute to improving crop production and reaching the development goals set. The study aimed to analyze farmers' adoption of the package of modern agricultural technologies provided by the program and their long-term acceptability and spread. The results showed that the adoption of the program's technologies and their spread as wide as possible from farmers, who make up the (95%) of wheat farmers requires a period of time amounting to about 11 year, This period is acceptable to change the pattern of agriculture from traditional to modern agriculture, and one of the most important factors affecting the speed of adoption is Speed of acceptance and time The study came up with a set of recommendations, the most important of which was the need to pay attention to the technical aspect and modern agricultural innovations that would raise production quantities and agricultural productivity rates to levels of self-sufficiency and competition in the world markets.

Keywords: farmers' adoption, techniques, National Wheat Grower

Introduction

The national program for the development of wheat cultivation in Iraq has played an important role in increasing production and improving its quality through the effectiveness of the technologies provided by it, and these techniques are of great importance because they are a successful technical method by using production elements and by the quantity of production. Since its inception in 2001, the program has been in existence since its inception. The national program for the development of wheat cultivation in Iraq has played an important role in increasing production and improving its quality through the effectiveness of the technologies provided by it, and these techniques are of great importance because they are a successful technical method by using production elements and by the quantity of production. Since its inception in 2011, the program has achieved many achievements in the development and development of wheat cultivation through technologies selected at the experimental and actual level of farmers, these achievements have been reflected in increasing productivity in the unit of space and increasing the demand of farmers to adopt these techniques, as increasing productivity rates is an important indicator of the development of agricultural production. Al-Adly al-Ahab has known that it is the process that modern agricultural guidelines or recommendations go through from the time

they start from research sources until they reach the farms (Al- Adly, 1973). The adoption process knew her Swanson As a multi-stage mental process related to the farmer's decision to accept or reject a particular technique (Swanson, 1984). The proliferation process cannot be separated from the adoption process (Al-Khouly, 1984). There is an complementary relationship between the two concepts, publishing is the basis for adoption, the adoption process cannot be completed unless there is a process of publishing, two interrelated scientific concepts, adoption is about the individual, but publishing is at the level of society as a whole. The problem with research is that some of these techniques may not be compatible with the productive conditions of the country, whether environmental, technical, social or economic, resulting in a negative impact on the adoption and publishing process. Therefore, the economic assessment had to be carried out in simple and easy ways to determine whether the use of these techniques was economically feasible or not. The importance of the study stems from the importance of modern agricultural techniques used by the National Wheat Plant Development Program and its role in enhancing food security in Iraq by increasing wheat crop productivity in the areas where these techniques have been applied Structural analysis (SWOT) It is one of the most important means and tools used in the analysis of internal and external environments of agricultural projects and the use of modern technologies in agricultural production

and what affects them negatively and positively. The aim of the research is to measure the degree to which farmers adopt modern technologies and to predict the rates of adoption of these technologies in the future using the Adopt.

Materials and Methods

The program was used Adopt to know the percentage of adoption and the time it takes to adopt the techniques by farmers. It is an analytical program based on a set of targeted questions based on the intellectual philosophy and basic objectives of the sample farmers to obtain the final report resulting from the analysis of those questions and the interpretation of their answers regarding the expected percentage of adoption and the time needed to reach the top of adoption. As well as obtaining sensitivity analysis of the variables involved in the program and the extent to which they affect the ratio and duration required for adoption.

Adoption program use:

1. Predict the level of the peak of potential adoption for innovation and the time it is likely to reach that peak.
2. Provides an information base with decision makers and technicians on the importance of the impact of a range of socio-economic and technical factors on the adoption process of proposed modern technologies or modern methods applied in the agricultural sector.
3. Contributes to the development of scientific and institutional plans necessary for the dissemination of modern agricultural techniques and methods. With the availability of knowledge and basic considerations related to making the technology more transparent and clear.

Results and Discussion

Adoption concept and the mechanism for spreading modern technologies

The concept of adoption is linked to technical and technological development in all economic sectors, including the agricultural sector, as the development and development of the agricultural sector is the main goal of any country in the world, and developed countries have achieved high growth rates in the agricultural sector that can be attributed to recent innovations that have contributed to the allocation of work and the efficiency of the completion of agricultural operations with high accuracy, effort and less time. In light of this, most developing countries, including Iraq, have sought to use technological development and modern innovations in the agricultural field, as the dominant nature of Iraqi agriculture is characterized by traditional agriculture using old methods and methods in agricultural production, and since agricultural land is characterized by its fertility and suitability for the cultivation of many agricultural crops, it is expected that there will be qualitative breakthroughs in the aspect of increasing production and production rates if Iraqi agriculture is associated with technological and scientific development. The adoption of modern agricultural techniques in Iraq has begun in recent years, but it is being used on a small scale by farmers for many of the considerations related to Iraqi farms that will be addressed in this study. Adoption can be defined as using a new technique that is consistent with farmers' goals and other agricultural activities over a specified period of time after their conviction of the feasibility of using it is realized assuming that farmers have sufficient information about this

technology and its potential (Sidibe, 2005). This definition highlights the basic characteristics of adoption such as the speed of acceptance, the time that the farmer takes in application and the rational selection of technology, and for the purpose of understanding the mechanism of adoption and dissemination of techniques must be identified by studying the target community and the characteristics of its members to develop the right strategies and successful plans to reach the best results. Accordingly, Rogers has classified the adopted individuals of modern technology into five categories: innovators, early adopters, early majority, late and late majority (Rogers, 1995).

Innovators are described as adventurous individuals who keep up with the experience of new ideas and are willing to take risks, but the early adopters can be described as local opinion leaders in the system who work as role models and are quick to see the value of innovations, and the early majority is formed by the largest group and these people do not make a decision after being convinced of the advantages. The third group, which represents the late majority, are cautious and skeptical people who do not adopt until the vast majority do so. The last group of adopters are late, they question new innovations and changes, and they are usually poor and rarely risk. The innovation dissemination model contains many limitations as one of the main shortcomings of the model is that it is generally assumed that the most important variable is information and the willingness of the individual to change, but in fact it is noted that there is a range of other factors affecting the adoption of modern agricultural techniques by individuals, including the objectives of farmers, the level of resources available to individuals and access to those resources, as well as the available support system and the characteristics of the targeted technology. For example, restrictions on access to economic resources such as work and land can affect the adoption of technology by a limited number of members of the community, and the lack of available resources and the lack of information services and guidance systems may affect the spread of these technologies by targeting the early categories of innovators and adopters and ignoring other groups (Nguthi, 2008).

Stages of adoption Process

The adoption process is based on the results of the research and studies carried out in this field, a mental process that follows a chronology coupled with specific actions and that this process can be divided into five stages.

1. Stage of awareness
2. Stage of interest
3. Stage of evaluate
4. Stage of trial
5. Stage of adoption

ADOPT program and its role in the analysis of adoption and dissemination of technologies:

The innovation and use of modern technologies in agricultural fields aims to change the traditional pattern of crop production. This goal cannot be achieved in a short period of time and easily, but there are some factors and variables that must be taken into consideration to pave the way for these techniques to be published and adopted by as many farmers as possible, and to study these variables and their impact and predict the time needed to adopt and

disseminate these techniques, adopt adopted adopt editing program, which is a social analysis program, It was designed and prepared by a group of scientists and researchers from global research institutions at the Australian Centre for International Agricultural Research, Western Australia University, Future Agricultural Industries Company, West Asian Government - Department of Agriculture and Food, Commonwealth Scientific and Industrial Research Corporation, Grain Development and Research Corporation, Victorian State Government- Victoria Department of Primary Industries and Carls Stuart University. Together, these institutions worked to develop a socio-statistical program that aims to reach estimates and predictions about the success of adopting modern technologies and how they can be accepted and disseminated to producers. The program is based on the analysis of information and the expectation of results on four main themes aimed at the concept of adoption: the comparative advantage of technology, the comparative advantage of farmers and the characteristics of the technique and the educational characteristics of farmers. These themes include a set of questions or variables that are all about (22) A question on which the program is designed. The program provides specific possible answers to these questions by following the closed-door question method, and one specific answer is chosen for each question, which includes an explanation of why it is chosen to ensure the accuracy of the answer, and that this explanation is an increase in the extent to which this question or variable affects the adoption process. The program is based in design and data analysis on the use of Microsoft Excel program within a dedicated electronic window designed for the program, the window contains a set of basic steps starting the first step of registering the techniques under study as a new project, as well as adding information about the researchers in charge of this project and describing the modern techniques to be studied, and giving a brief overview of the characteristics of these techniques, as well as the target group to publish these techniques. This is followed by the second step of answering questions one by one and giving convincing explanations about the choice of specific answer. Because adoption and knowledge of technology are difficult to predict, the topic may have some difficulties in collecting data, and there are cross-borders between social, economic and behavioural aspects, so there is a constant need to make repeated estimates of the subject of adoption, so the need for a tool (a means) through which the results of adoption can be predicted and the dissemination of technology, and to inform users about the effects on those results and measure the level of progress (Kuehne,2011,3).

Using ADOPT to predict the results of the adoption and dissemination of modern technologies:

ADOPT analysis aims to activate the conceptual framework for rationally interpreting adoption theory and literature, as the tool provides the appropriate method for users and researchers to interact with ideas and concepts related to the adoption process (Feder & Umali, 1993). Represents the answers obtained from adopters with digital values from (1-8) They are used in equations and duper created in the custom model and through which the variables of the theoretical framework are linked together. This is done by taking into account the strength, direction and nature of the impact of these variables on the adoption process, as the outputs of the tool are evaluated over the years to achieve the

time needed to reach the adoption peak and its values are represented by a percentage reflecting the level of adoption, and the tool explains the expected characteristics of the dissemination of the technology by graphically representing it using an S curve which is consistent with those found in adoption literature (Marsh& other, 2000). This figure indicates that adoption begins slowly at the beginning, as most projects (establishments) are uncertain about modern innovation and consider it a serious investment, but after a period of time the technology proves successful and is commonly desired, which increases the speed of its spread, (Almimaey, 2010). There are many factors affecting the adoption of modern technologies applied to agricultural crops, the most important of which is (Mazid, 1994).

1. Personal factors: including the type of tenure, farm size, farm age, family size, employment type, farm experience level, educational level, etc.
2. Economic and institutional factors: which includes farm resources, ownership of machines, equipment, animals, etc.
3. Communication factors: Focusing on the source of information taking into account guidance and proximity.

Factors influencing the speed of adoption, new ideas can be determined as follows:

1. Social factors: Include the type of society that belongs to the individual, families and relatives, reference groups, membership of social and economic organizations, values and trends prevailing among individuals.
2. Personal factors: age, education, occupation
3. Economic factors: income, farm capacity, standard of living, type of farm possession
4. Factors related to the idea: the comparative advantage of the idea, the harmony of the idea, difficulties, experimentation, clarity of the idea
5. Factors related to the regulations that move the modern innovator to the application stage

Includes research and extension institutions and services and the organization is tasked with the future of new innovations (Al Samurai,1990)

The foundations of the style ADOPT:

In this part will describe why and how the theoretical framework was developed, as described in the chart (2), It is described how the variables chosen for the theoretical framework will affect adoption and the dissemination of technology, and that the challenge in designing the theoretical framework is to develop a model for adoption and dissemination of techniques, which has balanced the difficulty and the possibility of use and between reconciling the objectives of this tool, which means that not all fixed effects must be included in the framework, This lack of inclusion may sometimes cause an imbalance in consistency, which is very closely related to the variables that are mainly in the model, which may lead to inconsistencies in the relationship of these variables, Particularly with regard to data collection requirements, or the lack of strength in their impact on the adoption process, and the variables that are not included are age and educational level, age often appears in adoption studies with an inconsistent relationship, As for the educational level, which often has an impact on adoption, it often shows morale when collecting its data, and at least in the way that the target group distinguishes each other, and

since the theoretical framework can be explained graphically or in words, one of the main things studied are the key factors, whether concepts or variables, and that the supposed relationship between them will form the basis of this tool (Miles & Huberman,1994,18). The theoretical framework assumes an overlapping relationship between the effects on adoption and dissemination that have been seen in terms of the development of the target group and technology, and therefore is a way or method of thinking about the variables that interact to influence adoption and the dissemination of techniques. . It is expected that the presentation of the theoretical framework in a graphic form will increase the number of people who can easily understand the causality of this framework, and therefore it allows easy communication between experts and non-experts, and will increase the ability to find more effective contacts between economists, extension specialists and specialists of the agricultural system (agricultural) as they represent a development team that complements each other, and we will choose the most effective variables that have been defined by (Pannell & other, 2006). Associated with both networks, profit forecasts, ownership volume, short-term adoption costs, the impact of technology application on profits, impacts on production risk, complexity and technical difficulty. To ensure the preservation of the environment during the application of the technique, it may be possible to try it on a small (case) scale so that the effects can be easily observed, and adoption studies show that the effects on adoption can be established as concepts either because they are related to learning about

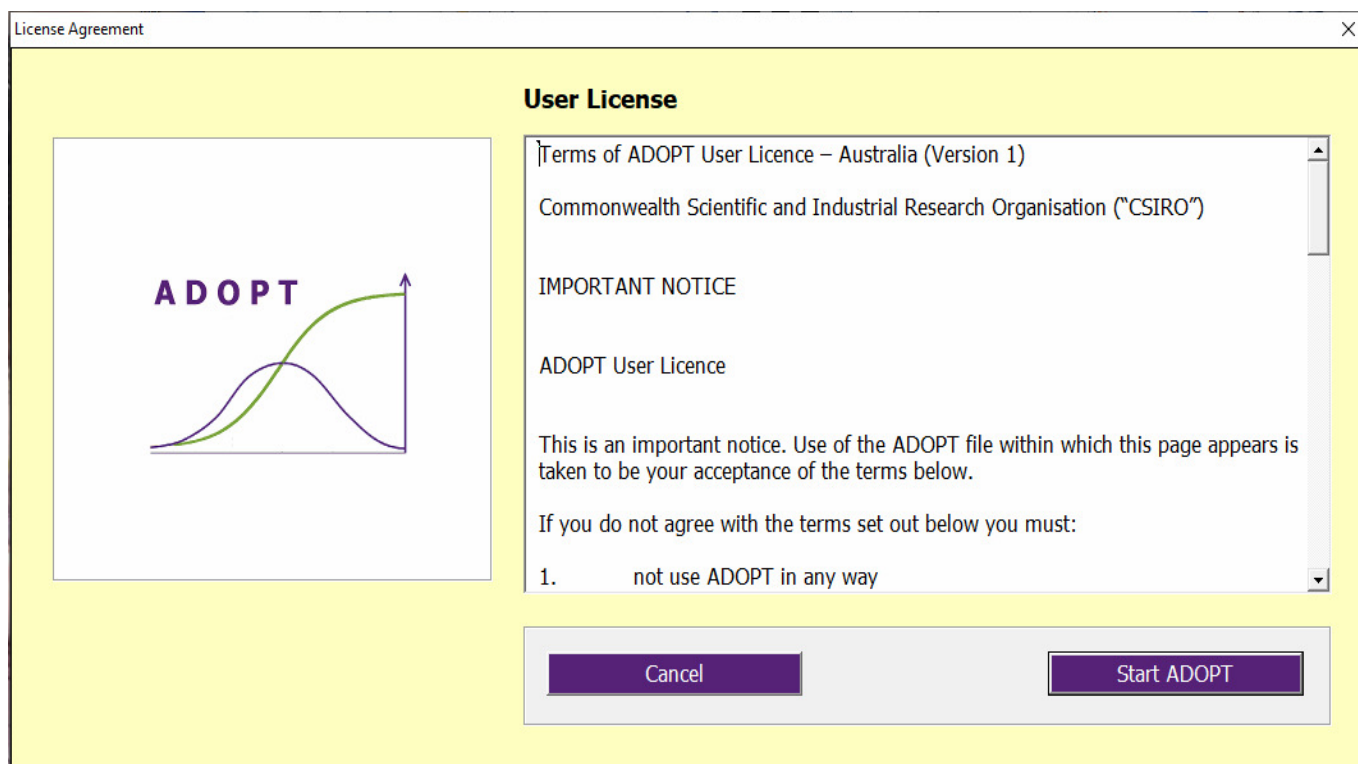
relative benefit, or the real relative benefit as noted from table (2). In the same way, each effect can be diagnosed on the basis of its association with the population (target sample) or technology, and the effects on adoption can be described using the quadrant, which contains four squares and as in the table below:

Table 1 : Determining the effects of adoption in a quarter (Quadrant):

1/ The qualitative impacts of the target group (farmers) on the possibility of learning innovation.	3/ The comparative advantage of farmers (target group).
2/ The characteristics of learning potential for innovation (modern technology).	4/ The comparative advantage of innovation (modern technology).

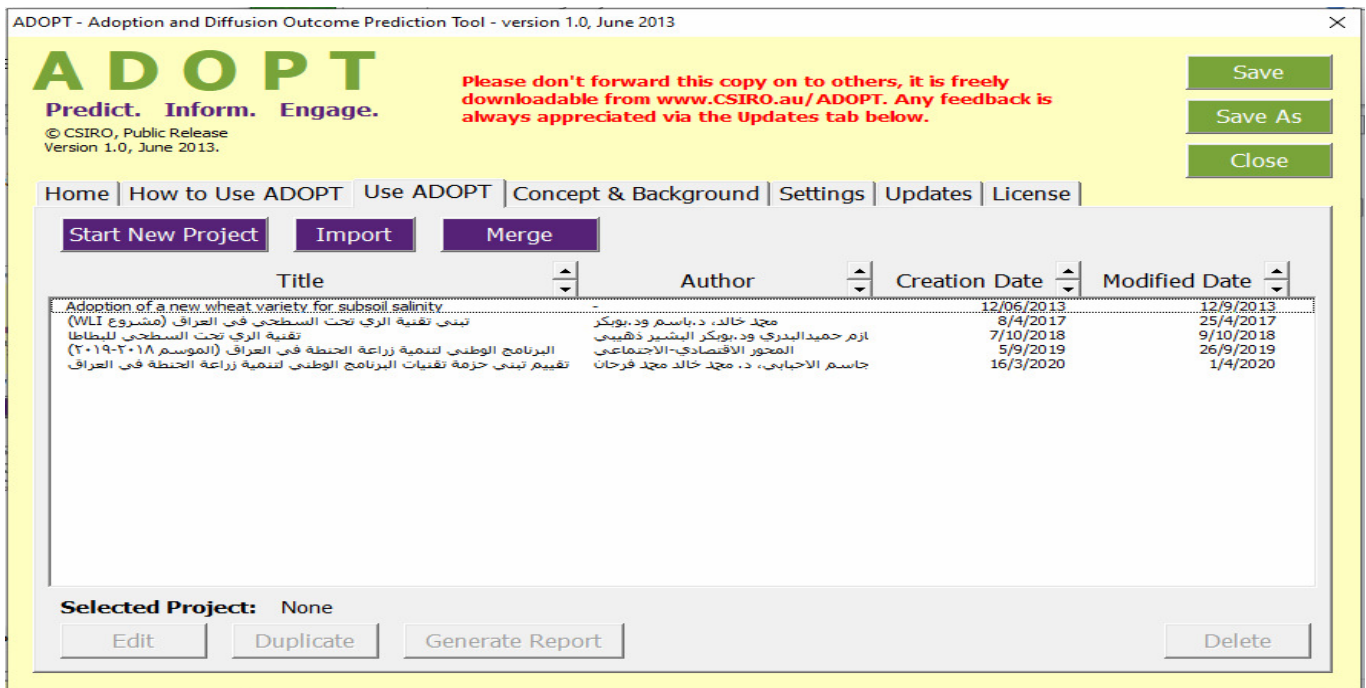
Source: Kuehne,2011,7

Depends on the basis of the program's work Adopt On the statistical program MS. Excel The main window starts with information on how to use User License After reading the instructions, you can press the Start ADOPT button To start analyzing as in slide number (1)



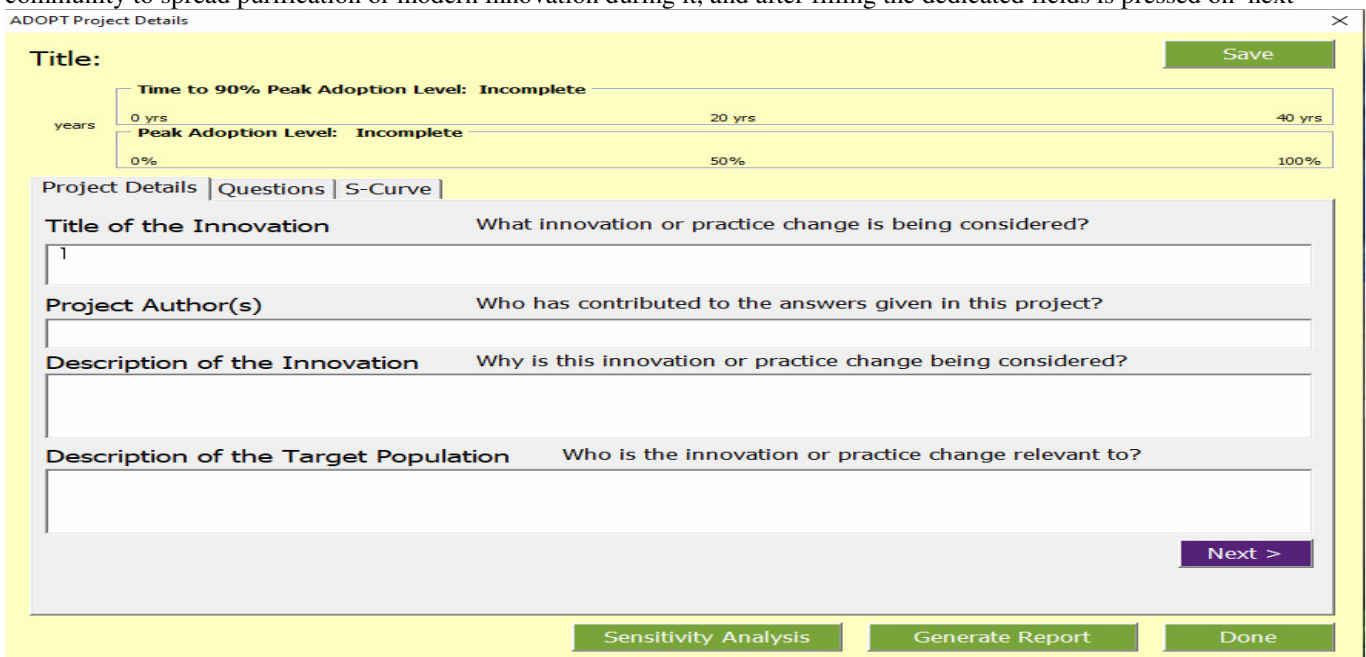
Slide 1 : Program run window Adopt

Then we see another list containing the projects that have been implemented previously as well as where the new project will be saved, and for the purpose of creating a new project the order is chosen Start New Project As in the slide (2)



Slide 2 : Create a new project

To be shown another dialogue window that includes the title of technology or modern innovation, the names of authors or researchers, a description of the technique or innovation intended to be studied, and finally a description of the target community to spread purification or modern innovation during it, and after filling the dedicated fields is pressed on next



Slid 3 : Description of the target community for the deployment of technology

To be followed to begin to enter the answers to the questions placed as well as the required explanations and when completed the introduction of the data is prepared a detailed report by the program on the results of the analysis process and tables and charts to predict the process of adoption and dissemination of targeted techniques.

Structural analysis of the use of laser leveling technology:

The method depends on the study of internal influences The strengths And weaknesses, As well as the study of external influences The opportunity Threats Which is derived from the name of the analysis SWOT This method uses these components together in a framework that describes these

factors in a quadrennial matrix that determines the relationship between internal and external factors in the design of a strategy that enables the enterprise to determine its orientation in achieving productive and economic efficiency (Marei, 2010). The types of structural analysis are based on the internal and external perspective and according to the strategic objectives of the institution and must take into account the following dimensions (Abdul Moneim, 2010).

1. after the external environment that focuses on what comes:
 - Investing opportunities in the external environment.
 - Dealing with external threats and risks with a view to reducing them.

- Meeting the needs of stakeholders dealing with the organization (technology).
 - Improving the image of technology in the external environment.
2. after the internal environment that focuses on what comes:
- Maximizing technical strengths through the resources and capabilities available to them.
 - Reducing vulnerabilities that represent the negative aspects of technology and working to reduce their effects.

- Developing internal factors that increase the competitiveness and continuous improvement of technology.

This previous classification of its components is what leads us to what is known as the overall strategic analysis of the internal and external environment analysis (SWOT) It is an important and useful tool in analyzing the overall situation of technology based on balancing the elements of strength and weakness in the internal environment and opportunities and threats in the external environment and explains the relationship between internal and external evaluators in the analysis

Table 2 : Analysis model SWOT

HELPFUL	HARMFUL	
Positive impacts to achieve the program's goal	Negative impacts on achieving the program's goal	
<p>Strength</p> <ol style="list-style-type: none"> 1. Laser leveling technology contributes to reducing voltage, costs and water consumption. 2. Laser leveling increases crop productivity in the area unit. 3. Laser leveling is suitable for all types of Iraqi soils. 4. Provides large spaces that help to use laser leveling. 5. Provide guidance services provided to farmers on the importance of laser leveling. 6. Farmers' conviction of the importance of laser settlement. 7. Provide specialists who can be used to manufacture and provide information on the laser leveling equipment. 8. Reducing risk and uncertainty in agricultural production. 	<p>Weaknesses</p> <ol style="list-style-type: none"> 1. Laser leveling takes a relatively long time per dunum. 2. The poor quality of the machine currently available and its accessories. 3. The machine is late due to its lack of availability. 4. The high cost of settling one dunum, the high cost of settling one dunum. 5. Lack of sufficient information on the importance of laser settlement. 6. Lack of spare materials for machinery, equipment and laser leveling machine 7. The difficulty of changing the traditional agricultural pattern in a short period of time 	INTERNAL
<p>Opportunities</p> <ol style="list-style-type: none"> 1- The possibility of observing its results through observations and field explanations in farmers. 2- The possibility of manufacturing the machine locally or can be imported and made available to farmers from its governmental and commercial exporters. 3- The use of the machine in agriculture is not expensive, and its recommendations are commensurate with the capabilities of farmers. 4- There are large numbers of farmers contracting with the program to provide them with the machine for use in their fields. 5- Provide modern mechanization and agricultural techniques that farmers can buy and include in their agricultural work from their governmental and commercial exporters. <p>Do not delay the amounts of marketing of the crop to the producers of seeds by the companies receiving their produce</p>	<p>Threats</p> <ol style="list-style-type: none"> 1. Most farmers do not comply with recommendations on how to use laser leveling. 2. The farmer, of course, tends to use simple and fast roads to complete his farm work and does not give much importance to the final results. 3. Only one or two machines are available in the best cases in each province and this is reflected in the difficulty of moving them from one place to another and from one farmer to another. 4. The distance of farms and their wide spread in the provinces makes it difficult to work participatorily using a limited number of machines 5. Weak support for the price and cost of productive resources, as well as weak support for the price of final output <p>Low water ration as well as</p>	EXTERNAL

Special strategies in the field of the adoption and deployment of laser leveling technology:

1. Expanding work on the dissemination of laser settlement technology to all provinces of Iraq, especially since it was adopted by some farmers in the provinces through what was seen when used as part of the activities of the National Wheat Development Program in Iraq.
2. Work to provide laser leveling machines and make them accessible to farmers easily and in sufficient numbers, to ensure that they are obtained at the right times for

agriculture, which has proven successful within the Iraqi environment.

3. Providing subsidized irrigation technologies to address water scarcity in Iraq.
4. Encourage wheat farmers to use an integrated pest control management system that reduces reliance on chemical pesticides and produces crops.
5. Encourage wheat farmers to work to improve soil fertility, using a number of options, which increase production in a sustainable manner and maximize the benefit of farm resources and agricultural inputs.

6. Preventing the indiscriminate import of poor wheat varieties spread among farmers that cause losses.
7. Seed producers are not included in the agricultural plan because of the most wheat seeds, as they are the mainstay of the permanence of wheat seeds.
8. Work to facilitate procedures for receiving wheat from producers, which encourage them to increase their production and introduce modern technologies to develop crop cultivation.
9. Activating the follow-up and evaluation system that helps to develop the technology and make it suitable for financial and environmental farm conditions.
10. Develop a research policy for the agricultural sector to provide alternatives to the continuous design of comprehensive production economics policies.
11. Increasing the role of agricultural extension being in the field and closest to farmers in order to spread modern technologies to the targets on the one hand, and to convey the problems of farmers for agricultural research on the other hand to develop their treatments.

Description of the technology package used:

A package of modern agricultural techniques has been implemented among the farmers participating in the national program, consisting of laser leveling techniques, fertilizer sourcing, niruguin fertilizer hashes, integrated control, agricultural cycle use, fertilization with micro-elements and finally the addition of potassium fertilizer. These techniques have been applied together or individually to farmers and positive results have been obtained, which have increased the yield rate and improved the final output in quantity and quality. However, these techniques are new to wheat farmers in Iraq, requiring the study and evaluation of future adoption rate by all crop farmers in Iraq.

Description of the target group

The target group for the adoption of the techniques of the national wheat development program is the group of wheat crop farmers in Iraq in general and in The Province of Babylon in particular, where the program aims to develop crop cultivation throughout Iraq extensively through the development of the best technologies and modern production methods that contribute to reaching the stage of self-sufficiency of this basic and important crop, which is directly related to the livelihood of the Iraqi citizen and improving the standard of living for the Iraqi citizen.

Analysis results

Based on the study sample's answers to variables adopt The final report of the results of the analysis was reached that the target technology package requires a period of time to be accepted by the largest percentage of wheat crop farmers in Iraq, as illustrated by the table (2) expected adoption levels, as the proportion of (95%) From crop farmers, the period of adoption of the program's technology package is expected to reach about 11 year, Although the period may seem at first glance long-lasting, after the passage of 5 Years, after its adoption for the first time, it is expected that the percentage of adopters of these technologies will reach nearly 68.4 %, of farmers, and after the passage of 6.5 year, From the beginning of its application, the percentage of adopters of this package of modern technologies may reach approximately 90% From the farmers. The percentage of (94.9) of farmers over a period of time up to (10) years, these

ratios are very suitable for the adoption and dissemination of modern technologies in a short period of time, and despite what is known and mentioned earlier that it is difficult to change the pattern of agriculture among traditional farmers only after a period of time during which their conviction in the techniques provided to them is realized, but the speed of dissemination of the technologies of the program can be attributed to the results of these techniques positive real-time and direct to farmers after their first use. Encourages them to quickly accept and adopt them within a record period of time.

Table 3 : Expected adoption levels

Adoption levels	Expectations
Number of years expected to reach the top of adoption	11
Expected peak level of adoption	95
The level of adoption expected after the first 5 years	68.4
The level of adoption expected after 6.5 years	90
The level of adoption expected after 10 years	94

Conclusions

1. The results of the ADOPTION analysis indicate that the modern technologies provided by the program are adopted by (95%) Of the wheat farmers in Iraq, which represents the highest adoption in a period of about 11 years, but after 5 years, the adoption rate is expected to be about (68%) From the crop farmers. We conclude from this that the adoption of modern technologies requires a period of time that is sufficient to change the traditional customs and methods used in the production of the crop and during which these techniques prove their economic and technical feasibility to be adopted by farmers, but in the case of modern technologies provided by the program note that the percentage of adoption in the early stages is high, due to the positive results achieved by the sample of farmers applied to these techniques during their period of work within the program.
2. It is not the personal, social, economic and communication factors that affect the adoption process or the farmers' failure to adopt modern agricultural techniques, but rather the external circumstances that the country is going through directly or indirectly affect the adoption process.

Recommendations

1. The need to support the guidance system and continuous communication between farmers and researchers through the agricultural guide to transfer information and expertise from the researcher to the farmer and to convey the problems of farmers and the obstacles they face to researchers to study them and find appropriate solutions to them.
2. The need to direct support and attention to the technical aspect and modern agricultural innovations that will raise the production quantities and agricultural production rates to levels of self-sufficiency and competition in the world markets.

3. The need to use modern agricultural techniques that lead to reduce time and effort, increase productivity and improve the incomes of farmers.
4. Attention to agricultural research, which contributes to the advancement of the agricultural sector and the promotion of the activity of the extension sector to transfer technologies at all levels.

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