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Agricultural Extension and Its Role in the Transfer, Adaptation, Dissemination and Adoption of Modern Agricultural Technology

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Abstract: **This study deals with the concept of the agricultural extension and its role in the transfer, adaptation, dissemination and adoption of modern agricultural technology. It aims to identify the nature of the agricultural extension, its characteristics and importance, and to identify the success factors of the agricultural extension in the transfer, adaptation, adoption and dissemination of modern agricultural technology as well as to know the most prominent and the most important obstacles for adaptation and dissemination and adoption of advanced modern developed agricultural technology. Also to identify the optimal options and appropriate procedures and provision of recommendations and proposals aimed for improving and developing agricultural extension services in the process of introducing modern technology to achieve the nominal objective of increasing and improving Agricultural production. In order to arrive at honest and expressive results, the analytical descriptive method for historical and scientific facts derived from specialized scientific studies and references which is relevant to the same subject has been adopted by describing the literatures of the concept and role of agricultural extension in this field and its importance and its obstacles in order to reach results that can be used in future. And to provide a number of recommendations that can be implemented on the ground, in view of the importance of the subject of transfer, adaptation and adoption of modern agricultural technology and the importance and role of agricultural extension in this aspect. Therefore, the most important recommendations of the study were the need to activate the role of agricultural extension in order to increase the awareness among the farmers to enforce the desired change. Consequently, the transfer and adapt of modern agricultural technology and new practices from their sources, to train their cadres and to give them greater autonomy and freedom to participate in decision-making and in solution problems encountering the transfer and their adaptation to suit the local conditions and resources. Thus, the sound technological policy must utilize the national resources and skills to achieve their highest goals under the social, economic and environmental conditions.**

Keywords: **Agricultural extension, transfer, adaptation, dissemination and adoption of technology.**

1. INTRODUCTION

The scientific and technological progress witnessed by the world nowadays dictates on the nations many duties, and drives them to the initiative to use the maximum possible scientific methods and modern technological innovations. Thus, to develop the methods of education so as to get rid of the old traditional systems in order to keep pace with the development and keeping pace with openness of knowledge and scientific technological progress, which is the pillar of the progress and prosperity of nations, as it is one of the most important means of advancing the progress of agricultural development in the developing countries, including our country Libya. The technology has accumulatively evolved in quantity and quality through the ages and through gathering of experience and knowledge. The technology has also played in its turn to improve the development variables in all the fields, including the agricultural sector.

In order for technology transferred from industrialized countries to be applied in developing countries not to be ineffective and or of few influence their national economies, the transfer, adaptation, deployment and adoption process must be put within a comprehensive development strategy in technological conditions and environments. It must be originally adapted/prepared to deal with the modern agricultural technology transferred to be well absorbed and then adapted and developed according to the conditions of the local environment of those countries, and in favor of the process of comprehensive agricultural development within that environment and by extrapolating the current situation of developing countries; as the process of transfer, adaptation and dissemination of modern agricultural technology is at the forefront, for the time being. This is reflected in the concerns and activities of all countries and their regional organizations as well as international organizations concerned with agriculture. This paper deals with the transfer of agricultural technology as well as the conditions for its success in developing countries.

Undoubtedly, the process of technology transfer is not a temporary goal that ends after the importation of modern devices and methods. It is an ongoing process to introduce methods and modern innovations and to develop national cadres for creativity and creative response to the needs of society and the national economy (Zahlan, 1984).

2. SOME CONCEPTS AND DEFINITIONS RELATED TO THE STUDY

Technology*:*

It is a Greek word originally composed of two syllables; the first is techno, meaning a craft, skill, or art; the second: is loggia, meaning a science or study. Hence, the word ***technology*** refers to the science of performance, art and application....

Transportation of Technology:

The transfer of methodological knowledge required to manufacture a commodity or to apply a means or to perform a service, including management and marketing technique.

Adaptatida Technology:

The Adaptation, modification or making appropriate, it is an intermediate technology in the sense that it is limited in imitating or replicating the existing technology, whether transferred from developed countries or already available in the local environment.

Knowledge Technology*:*

It is the development and application of tools and the introduction of automated machinery, materials and processes that help to solve human problems resulting from human error. Namely, the use of tools and capacities available to increase the human productivity and improve its performance.

Agricultural Technology*:*

It means , the development of new methods, systems, skills and knowledge, whether plant and animal, as well as access to more suitable formulas for synthesizing the products of industrial technology used in agriculture depending on the interaction between man and land (Al-Abaid 1989, p.25).

Adoption of Technology:

It is the mental process experienced by the individual hearing the new idea for the first time until its final adoption.

3. AGRICULTURAL EXTENSION

The word "extension" refers to "stretching" and "connection" and its meaning in Arabic (guidance towards good and right, so it means implicitly communicating, disseminating, or directing the agricultural sciences towards the right.

Zaki et al. (1987) also defined the agricultural extension as an informal educational service outside the school to train farmers and influence upon them and their families. This regulatory process aims to develop agricultural production techniques to increase the productive efficiency of resources on an economic basis in order to raise the standard of living of the targeted persons therein.

The concept of agricultural extension and its relation to modern agricultural technology:

The following is a brief explanation of the concept and basics of agricultural extension and its importance and its role in the transfer and adaptation of modern agricultural technology:

First: The concept of agricultural extension:

Most of the leading references in agricultural extension dealt with its concept and what follows are the most important definitions and the concepts:

• (**Brad Field**) defined it as an informal educational process aimed at to educate the rural people how to improve their standard of living through their own effort by wise exploitation of the natural resources available to them in the form of agricultural machinery and household management works for the individual, the family, the community and the state.

• (**Chang**) also defined it as an informal educational service that works outside the school boundaries to train farmers and their families and influence them to adopt improved practices in plant and animal production, farm management, soil conservation and marketing.

• (**Kelsey & Herne**) describe agricultural extension as a non-formal educational system in which adults and young people learn by practice.

• **(ADSSON)** also defines it as a system that transfers the results of science and knowledge from institutes and universities to farmers to help them so as to help themselves.

Second: The importance of agricultural extension and its role in the transfer and adaptation of technology

The agricultural extension help to increase the agricultural production by both the vegetative and the animal parts, through creating an economic renaissance by exploiting all human and natural resources and possibilities, and educating and aware the farmers through developing their own abilities and improving their skills so that they can fully benefit from the advanced technology in agriculture, living and raising them for decent living.

The following is an explanation of the importance of agricultural extension by highlighting some of the roles that it performs as follows***:***

• The agricultural extension works to transfer the problems and difficulties faced by the farmer in his field to the agricultural research centers to find effective solutions to them, and on the other hand, the transfer of the results of research and agricultural laboratories after it simplifies them to become at the level of understanding of farmers to apply same.

• The Agricultural Extension, as mentioned above, plays the role of educating and awareness the farmers and providing them with advice and guidance to develop the latest technologies and technological innovations (such as the use of advanced agricultural machinery and equipment, fertilizers, pesticides, seeds & improved seeds, etc.).

• To convince farmers through their awareness to respect laws such as the law of environmental protection and the protection of agricultural land and other laws and legislations, as well as implementation of policies adopted by the state to maintain agricultural production and increase in quantity and quality and not waste them.

• The Agricultural Extension plays an important role in raising agricultural productivity and reducing the costs by supporting and providing inputs from sources at reasonable prices, as well as helping farmers to market their agricultural production.

• Agricultural extension is also concerned with rural women in order to enable them to play their role within the rural family efficiently and effectively.

• Agricultural extension works to transfer and adapt appropriate modern agricultural technology, to put it into practical application on the farm, achieve agricultural economic success, achieve a better life for farmers and increase in the gross domestic product of the state.

Adaptation of marginal agricultural technology:

Adaptation is the subjection, modification or accommodating of the technology used in the agricultural field of a State, namely, the imitation in replication of existing technology, whether transferred from developed countries or already available in the local environment, or using other advanced technology. (Al-Obeidi, 1989).

Not all types of modern technology are compatible with the local environment (such as some advanced machines that cannot be maintained locally when they are disrupted or difficult to operate etc.), and on the other hand, the process of adaptation or subjection requires special skills to follow continuously the modification and the change. The transfer and adaptation process requires a governmental concern as this is an important and necessary matter; where environmentally friendly technology and locally applicable technology should be used, as well as giving priority to technology that does not waste energy and which is easy to supply and easy to operate besides, the other advantages that must be taken into consideration when introducing modern technology.

Dissemination and adoption of modern agricultural technology:

The stages of the adoption and dissemination of agricultural innovations vary in terms of the number of stages of this process as well as the naming of the process itself.

However, there are five stages of dissemination and adoption, which we specify below: (Tanoubi, 1998, p. 632)

• **Feel needs stage** for people seeking guidance. This stage they are ready to adopt the new.

• **Interest Stage-** This interest is the ultimate outcome of feeling and perception.

• **Evaluation stage** - the stage of mental differentiation conducted by the people seeking guidance.

• **Trail Stage** - The people seeking guidance try to apply the innovative application on a limited scale to ensure its suitability and validity.

• **Adoption stage** - the stage of actual application of the idea or the new method.

Elements of transfer and technology adaptation:

Three elements must be available for technology transfer and adaptation:

• Scientific knowledge.

• Mastering the application of this knowledge.

• Provide application requirements in the hands of their beneficiaries.

Stages of technology transfer and adaptation

The process of transfer, adaptation, deployment and adoption of modern agricultural technology involves three phases, which are listed below:

• The stage of transfer and adaptation of modern agricultural technology, such as the introduction of improved seed varieties, fertilizers, pesticides, modern irrigation systems, and advanced agricultural mechanization.

• The stage of dissemination of this technology to the beneficiaries (the farmers) including the information, knowledge and skills needed to apply this technology to modernize the agricultural production.

• The stage of monitoring the use of technology and evaluating the impact of its application in the agricultural field to achieve its purpose.

The impact of agricultural technology in increasing productivity;

The Technology has a positive effect on the function of agricultural production. It is more production with the same quantity of input from the production elements, which give a greater total output than can be produced by inputs of production elements used with technological innovations or with the same quantity of total production in lower resources as the basic goal of using technology is to maximize the output while reducing the quantity costs used to produce the same quantity.

Impediments to the transfer, adaptation, deployment and adoption of modern agricultural technology.

There is no doubt that the process of transport, adaptation, deployment and adoption of modern technology is accompanied by a number of obstacles, problems and difficulties. The most important of these obstacles can be summarized as follows:

• The Lack of technological knowledge in developing countries, as well as lack of accurate understanding of modern agricultural systems associated with the recent technological development, caused in hindrance, obstruction, transfer, adaptation and subjection of technology. In addition that most of experimental stations and agricultural researches ignored and disregarded the extent to which peoples seeking guidance can absorb modern agricultural technology. It is obvious of what is stated earlier that the study of agricultural systems within the geographical boundaries of a given community is very necessary when developing new technology.

• Inadequate interrelationships between the three main components (agricultural scientific research centers, extension guides and farmers), i.e., contact, communication and reverse contact for the production, development, adaptation, transfer, dissemination, early adoption and evaluation of technology from its sources to the actual application of farmers in their farms.

• Lack of full and accurate understanding of the environmental conditions of the economic, social and cultural factors of society. Therefore, the development and transfer of technology must be adapted to the topographic conditions of agricultural land and the prevailing climate as well as the availability of irrigation water. This is so-called the Agricultural Climate Zone.

The Agricultural and Non-Agricultural employment opportunities in the region should also be taken into account upon transfer and adaptation of modern agricultural technology in order to obtain desirable and targeted input and output.

• The difficulty of transferring and adapting modern agricultural technology under field conditions, which requires close cooperation between the teaching staff and research specialists and farmers. On the other hand, the lack of desire and the physical and mental readiness of the cadres and researchers to test, evaluate and evaluate the transferred technology have a negative impact.

Problem and questions of study:

The problem of this study is to highlight the transfer, adaptation, adoption of modern agricultural technology. There is a potentiality to transform the results of scientific research into the field of application to meet the needs of the community. These include technical processes, human expertise, machinery and economic resources. This requires the development of the internal capacities in order to adapt and resettle them, so that to make them more compatible with the prevailing social and economic conditions so as to suit more the objective conditions and to reduce the technological gap between us and the developed countries in terms of agricultural and industrial technology.

The problem of research is to know the role of agricultural extension in the transfer, adaptation, dissemination and adoption of modern agricultural technology.

The research problem can be shaped by the following question:

1. What is the concept of agricultural extension? What is its importance? What is its role in the transfer, adaptation, dissemination and adoption of modern agricultural technology?

Objectives of the study:

This study aims to achieve the following objectives:

1- To know the nature of agricultural extension, its characteristics and importance.

2 - Identify the factors of the success of agricultural extension in the transfer, adaptation, dissemination and adoption of modern agricultural technology developed.

3 - Identify the most important and prominent obstacles to the transfer, adaptation, dissemination and adoption of modern developed agricultural technology.

4. Identify ideal options and appropriate procedures and make recommendations and proposals aimed at improving and developing agricultural extension services in the process of introducing modern technology to achieve the nominal objective of increasing and improving agricultural production.

The importance of the study*:*

The importance of this study stems from the importance and the role of agricultural extension in the transfer, adaptation, dissemination and adoption of modern agricultural technology, as it is responsible for the transfer and simplification of

the latest scientific innovations in the field of agriculture, besides it is the link between scientific research centers and producers of technological knowledge producers and among the farmer in his field to take advantage of them on the ground and thus the desired benefit prevails behind the introduction of the latest scientific innovations at stake.

4. METHODOLOGY OF THE STUDY

This research paper was based mainly on descriptive analytical method of historical and scientific facts derived from specialized scientific studies and references related to the same subject by describing the literature of the concept and role of agricultural extension in this field and its importance and obstacles in order to reach results that can be used in the future and to provide a number of recommendations that can be implemented on the ground.

The limits of the study:

The limits of the study are determined within its substantive limits on the subject of the study, namely, the concept and role of agricultural extension in the transfer, adaptation, dissemination and adoption of modern agricultural technology.

Study content*:*

This study was divided into three parts as follows:

• Part I: It is related to the definitions dealing with the concept of technology as well as the concept of agricultural extension.

• Part II: Importance and characteristics of technology transferred in the process of agricultural production, both vegetable and animal.

• Part III: Obstacles facing the transfer, adaptation, deployment and adoption of modern agricultural technology in the field.

5. RESULTS AND DISCUSSION

1. We conclude from this study that the transfer, adaptation, deployment and adoption of modern agricultural technology plays a crucial role in increasing agricultural productivity and thus achieving development goals.

2- Increasing the level of service provided by the agricultural extension to farmers contributes to the introduction and adaptation of technology and means of solving the problems facing the farmer in his field.

3 - The study talked about the need to develop policies and plans in the field of transfer and adaptation of technology, and then to know the most important problems and constraints faced and bring up the appropriate solutions to overcome them.

4- The study concluded that it is necessary to change the concepts of traditional farmers and provide them with modern and new skills through their education and adoption of programs related to transfer and adaptation of modern agricultural technology to identify the best ways to spread and disseminate modern technologies.

5 - The study also concluded the need to create physical and moral incentives to reduce the brain drain and scientific and technical capabilities that carry scientific and technical expertise and technology outside the country.

6. RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

1. Establishing a scientific base and a local technical infrastructure that identifies the types of technology that can be transferred, through modernization and upgrading the education system.

2. Adapting and assimilating the imported technology and optimizing the technology in the country.

3. Evaluate and select the appropriate technologies and study a set of technology documents to assess the validity, cost and conditions of its components, and negotiate the best conditions.

4 - Developing education and work to achieve a qualitative leap in curricula and teaching methods that contribute to the preparation of new generations of scientists and researchers who are able to deal efficiently with the latest science and technology.

5 - Strengthening the practical relationship and continuous communication between agricultural research centers and agricultural extension.

6 - Paying attention to the studies related to the transfer and adaptation of modern agricultural technology suitable for the local environment of the state.

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