

The Role of Agricultural Extension in the Transfer and Adoption of Agricultural Technologies

Ahmed Awad Talb Altalb^{1*}, Tadeusz Filipek², Piotr Skowron²

¹ Faculty of Agriculture and Forestry. University of Mosul. Mosul – Iraq.
(Faculty of Agro-bioengineering-Akademicka 15, 20-950 Lublin - Poland).

² Faculty of Agro-bioengineering. University of Life Science. Akademicka 15, 20-950 Lublin - Poland

*Corresponding author's email: [ibn_almosul \[AT\] yahoo.com](mailto:ibn_almosul@yahoo.com)

ABSTRACT---- *This article aims to identify the concept of agricultural extension, explain: the concept of the agricultural extension as service and as learning process for farmers. This research aims also to explain for process of transferring and adoption agricultural technology by farmers, the basic requirements that are reliable in choice of agricultural technology for small farmers, as well as to identify the cycle of agricultural technology transfer to farmers. Explain the adoption process of agricultural techniques among farmers, the stages of the adoption process. This article aims also to explain the role of Extension worker in agricultural technology transfer. The aims of this articles has been discussed by the use of scientific studies and references, also it has to take advantage of on the results of previous studies relating with agricultural extension in the process of discussing the goals of the research and writing.*

The results showed discuss the objectives of this research that the Agricultural Extension is an educational process for farmers aimed at the development of agricultural skills and knowledge, as well as to increase agricultural production in quantity and quality. Agricultural Extension and that is the basis of the transfer of agricultural technologies to farmers and to persuade farmers to adopt those agricultural techniques. The results showed that agricultural extension workers are playing a major role in the transfer of agricultural technologies to farmers.

Keywords---- agricultural extension, technology transfer, technology adoption.

1. INTRODUCTION

The technology transfers” is actually a structural process of learning. The key components of a transfer can be identified as knowledge, derives from real world experience together with human expertise capable of transforming that knowledge into action. Technology transfers include a range of formal and informal cooperation between technology developer and technology seekers. In addition, technology transfers involve the transfer of knowledge and technical-knowhow as well as physical devices and equipment.

The term "agricultural technology transfer” is used to describe the process of formally transferring new agricultural discoveries, improved practices or innovations that may result from research institutions into the agricultural sector. Agricultural extension is the process of carrying the technology of scientific agriculture to the farmers in order to enable the farmers to utilize the knowledge and a better economy. Agricultural extension services seek to impart the necessary skills to the farmers for undertaking improved agricultural operations, to make available to them timely information, improved practices in an easily understandable form suited to their level of literacy and awareness, and to create in them a favorable attitude for innovation and change [8].

Numerous research studies have been conducted regarding the process of the transfer of agricultural technologies in various countries around the world. Attempts have been made to promote the technologies among farmers and persuade them to adopt and apply them on the farms. The studies were conducted, inter alia, by the following researchers: [20, 29, 17, 14].

The studies confirmed that the adoption of agricultural technologies in the agricultural extension transfer process that be applied in the transfer of various technologies and innovations in the agricultural sector, modern agricultural ideas, agricultural mechanization, agricultural pesticides, fertilizers, and new varieties of crop seeds, new strains of livestock, the food industry. The transfer is done from agricultural research centres to farmers to convince the latter to adopt these agricultural techniques in order to evoke agricultural development and raise farmers’ economic

level. The profits are visible for the countries, too, because agricultural extension plays a great and important role in the course of agricultural and economic development.

One of the problems facing the agricultural extension work at the moment, is the lack of clarity and knowledge of the role of agricultural extension in the transfer of agricultural technologies. And lack of knowledge of the role of agricultural extension in helping farmers to adopt modern agricultural techniques. The work of Agricultural Extension is a large and complex work, which deals with all areas of agricultural work, agricultural techniques and deals with farmers, and offers a variety of services and assistance to farmers, agricultural extension has a big role in increasing agricultural production in quantity and quality. Through the transfer of all the modern technologies and means of agricultural production in all areas of agriculture, such as (methods of growing crops, new types of seeds, fertilizers, types of pesticides, types of modern agricultural mechanization, food industry, how to best use agricultural soil, crop rotations, as well as the development of information and skills of farmers by organizing them and their participation in training courses in various agricultural fields in order to develop their knowledge and their knowledge in agricultural fields.

The researcher in this article wanted to identify the concept of agricultural extension and the objectives of agricultural extension, explain for process of transferring and adoption agricultural technology by farmers, the basic requirements that are reliable in choice of agricultural technology for farmers, the role of extension worker in agricultural technology transfer.

2. RESULTS AND DISCUSSION

2.1. To identify the concept of agricultural extension and the objectives of agricultural extension

• The concept of agricultural extension:

The term "extension" tends to be associated with agriculture and rural development, cooperative extension, advisory services, technology transfer, as well as the transfer and exchange of practical information. The need for extension services became very necessary in order to provide farmers with development informations in order to solve widespread agricultural problems such as outbreaks of crop disease and adverse economic conditions affecting levels of production. Farmers should given assistance to overcome such difficulties or to adapt to circumstances [16].

Agricultural extension services are very important in the development of rural knowledge and innovative systems for farmers. These services are key in informing and influencing rural household decisions, especially in the developing countries which are generally more in need for such guidance services [2]. Agricultural extension activity is an important agrarian-and-political instrument of a state, which stimulates the development of agricultural production. Agricultural extension services must be designed to develop agricultural skills among farmers, teach them communicate efficiently with producers and stimulate them to acquire new knowledge [21].

Extension service in agriculture is indispensable and it offers more than just expert assistance in improvement of production and processing; it also enables a flow of information and transfer of knowledge and scientific findings. These activities are performed according to rules which regulate the establishment of organizations with functioning goals and fields of work, and ways to execute extension activities by an extension agent [31]. The major function of agriculture extension is to educate farmers and enable them to solve agricultural problems. Finding the best suitable solutions and the practical performance of these solutions is the functional objective of agriculture extension [24, 21].

Extension workers must have an extensive knowledge of various agricultural disciplines and they should have the ability to deal with farmers and persuade them to adopt modern agricultural techniques and ideas so as to use them on their farms [25].

The duties of agricultural extension workers include introducing farmers at agricultural training courses into training programs on various agricultural subjects in order to provide them with information and knowledge about methods and techniques of agriculture, and, consequently, increase their production and income efficiency, improve their living, and raise the social and educational standards of rural life. Agricultural extension takes care in the youth and women in rural areas and enables them to develop their knowledge of various subjects concerning agricultural and social issues. Agricultural extension focuses on two main facets, as follows [12]:

- It deals with the behaviour of rural people in terms of influencing them through education and the exchange of information. The aim is to assist the people in gaining a livelihood, improving the physical and psychological level of living of rural families and fostering rural community welfare.
- As a service, agricultural extension makes a government ministry, a university or a voluntary agency as useful as possible to the people who support it through taxes and donations.

Agricultural extension is a link between farmers and the centres of agricultural research that serves to transfer innovations and new technologies in agriculture to farmers as well as transfer the results of the use of agricultural techniques and farmers' problems to agricultural research centres in order to find solutions to them.

- **The objectives of agricultural extension:**

Agricultural extension has the goals basic, as following [19]:

- Group objectives: These refer to the purpose which a group wants to achieve. Such a group may include farmers' cooperative societies, farmers' councils and the like,
- Individual or family objectives: These are personal goals pursued in the production of a crop or in the improvement of a home; in pursuing individual or family objectives, the individual acts on his own, independent of the group,
- Long-term objectives are those set by an individual or group to be attained during a relatively long period of time,
- Short-term or immediate objectives are ones set and achievable within relatively short time (such as within a year),
- Broad objectives: - These are all inclusive objectives of a society; they are achieved with great difficulty mainly because progress is not as apparent as in the more specific objectives. Another difficulty in that the measurement of progress is not feasible.

There are certain levels of goals in agricultural extension, such as [30, 3]: Societal objectives, Programmers' objectives, Extension workers' objectives, and people's objective.

2.2. Explain for process of transferring and adoption agricultural technology and the basic requirements that are reliable in choice of agricultural technology for farmers

- **The process of transferring and adoption agricultural technology:**

Agricultural extension is aimed to transfer of agricultural technology and for persuading farmers to adopt and use these technology on their farms, because farmers need those new and modern technology to increase agricultural production in various types of agricultural crops and the quantities and qualities of consumer goods on the market [33, 4]. These agricultural innovations and new agricultural technologies must be good and superior to the old agricultural techniques used by farmers in order to be adopted [18, 31].

Process of agricultural technology transfer is done through two basic stages. The first one is the transfer and dissemination of agricultural technology to farmers and the second one is to convince farmers to adopt these technologies on their farms[32]. The process of transfer of agricultural technologies and of persuading farmers to apply them on farms needs to be done by specialists in agricultural extension who have practical experience in the dissemination of agricultural technologies and know how to deal with farmers. This is done through training courses in various areas of agricultural extension and communication. The process can be defined as a transfer of technologies integrating and interconnecting a series of sub-processes, which include [5]:

- a transfer or delivery of the new technology from the source to the target area,
- a process of localization or harmonization of technology, which is intended to make the technical fit with the environmental conditions in the target area and is compatible with the prevailing agricultural systems in the region through a test and confirmatory tests of the technique in the target and promotion of the region,
- persuading farmers to adopt new technology,
- enabling the targeted farmers to apply the technology in their farms and giving them the knowledge and skills necessary to do so,
- the provision of technical application requirements,
- a diagnosis and treatment of problems that may arise during the application and dissemination of the new technology; the new technologies do not have the impact on the increase of productivity or producers living in rural areas if is not published between producers and farmers and teach them how to use it.

Agricultural extension plays an important role in the transfer and dissemination of agricultural technologies among farmers and producers. Figure1. Explains the transfer cycle of agricultural technologies to farmers [9, 26]

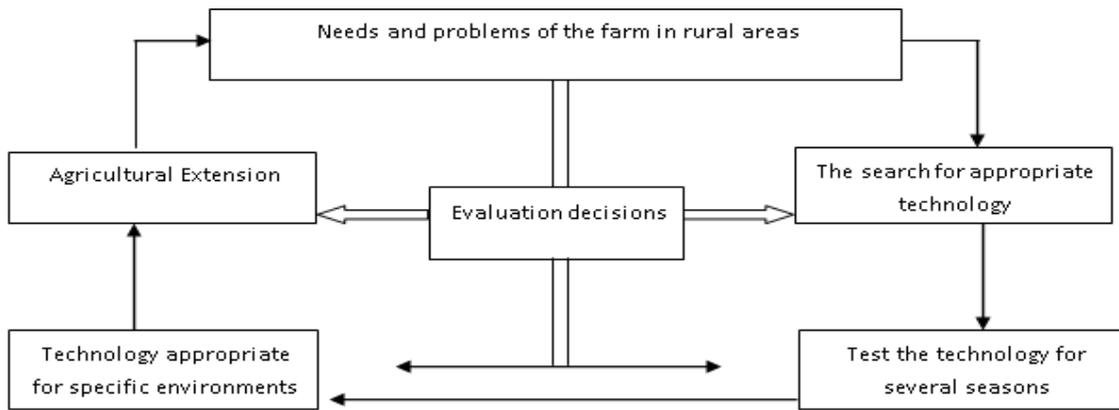


Figure 1. The transfer cycle of agricultural technologies.

After the transfer of agricultural technologies (agricultural technology) to farmers, which is based on their needs for those techniques, it becomes necessary to convince them to adopt these new agricultural techniques. It is the responsibility of people working in the agricultural extension to persuade farmers to embrace the new technology and agricultural technology processes. The adoption is a mental process which consists of several stages and relates to the farmer's decision to accept or reject a particular technique.

The adoption process as a mental process through which an individual, when hearing about the new idea for the first time, embraces and makes it a part of his behaviour, and thus the adoption process differs from the technology transfer process as the adoption process occurs within the individual thinking and adopting a special resolution of the individual, and the transfer process or deployment comes before adoption.

The adoption process, according to the results of research and studies conducted in this area, it can be divided into five stages (stage of awareness, stage of interest, stage of evaluation, stage of trial, stage of adoption) [23]. The five stages do not always occur in the same image and some of them may not take place such as the stage of experimentation. The stage of assessment going on more than being one of the five stages, in the face of this criticism he has found it best to use more general term (The innovation decision process) and defined it as the mental process by which an individual passes through from the initial idea to know the updated even taken the decision of the adoption or rejection then install or maintain this decision, This process has several components or stages and they are the following [6]:

- Stage of Knowledge: At the knowledge stage the farmer will receive information about the new technology because farmers tend to adopt those agricultural technologies that are compatible with their needs for agricultural techniques.
- Stage of persuasion: After the farmer gets sufficiently familiar with the new agricultural knowledge, a stage of Persuasion starts. It comprises an analysis and mental evaluation of the available information on the technology. If the results of the analysis are positive, the farmer will first use it on a small scale, and then expand its application. On the other hand, if the results of the mental evaluation are negative, the farmer will reject the new technology.
- Stage of decision: Stage of decision: At the decision stage, which means an individual's choice to adopt or reject the new idea or new agricultural technology, if the farmer has found the technique not useful, the farmer will reject the new technology and if the farmer has stated that the new technique is good at raising agricultural production, he will accept the new agricultural technology.
- Stage of confirmation: At the stage of confirmation, knowing that the decision is not the end of the adoption process, an individual tries to verify the choice he has made and obtain information whether it was a good decision.
- Stage of consequences: According to information obtained by the individual in the previous four stages in the individual phase consequences, he will make the decision whether to adopt the agricultural techniques for good, or reject them.

Not all farmers are equal in the adoption of agricultural technologies. They usually behave differently, and in this respect they are classified according to the way they use new agricultural techniques. Figure 2. Explains the categories of farmer adopters for modern agricultural techniques.

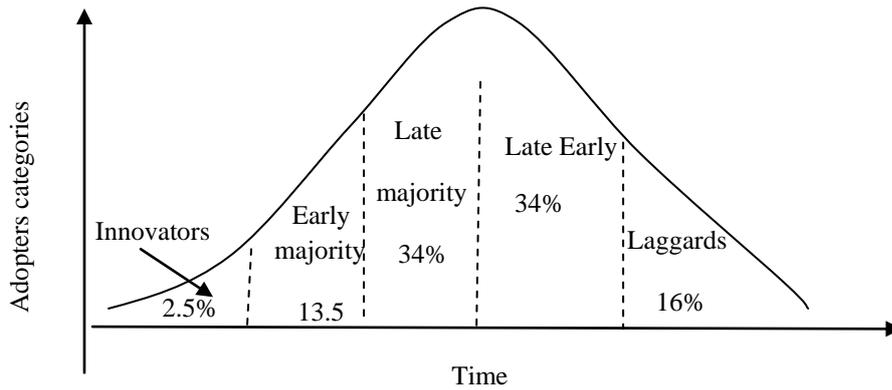


Figure 2. Categories of farmer adopters for modern agricultural techniques.

Adopters are divided into five categories [27, 28, 10, 9]:

- Innovators or adventurers: Innovators, they constitute Ratio 2.5% of individuals adopters of the idea in the social system. They has been observed that adventure is the key factor for innovators, as they are very eager to experiment with new ideas.
- Early adopters: The early adopters, constitute 13.5% of the group so they are an integral part of the social system. They usually depend on the opinion of a leader in most cases, as well as they seek for their peers in the social system to obtain advice and information on technology or new idea.
- Early majority: The third category of adopters of new agricultural techniques are the early majority who amount to 34% of the individual adopters of new technologies in the social system.
- Late majority: they constitute ratio 34% of the social system. Members of this category adopt agricultural ideas after they have been adopted by the members of the social system in order to get the greatest benefit.
- Laggards or late adopters: They constitute ratio 16 % of the members of the social system. Laggards accept agricultural techniques slowly because they are worried and fear for new agricultural techniques and ideas.

• The basic requirements that are reliable in choice of agricultural technology for farmers:

There are six basic requirements that must be satisfied in choice of agricultural technology for small farmers [1]:

- Technical feasibility, that is, capability to increase productivity given the technical elements and Trial ability that is the degree to which a technology may be tried out on a limited scale to determine its efficacy before final adopting it on a large scale.
- Economic feasibility or viability, that is the dependability and risk minimization potentials, conveniences, low initial cost, decreasing discomfort, psychological satisfaction or saving of time. A cheaper technology will be adopted faster than a more expensive one. Because farmers are eager to make money, extension workers must show them how a new technology will benefit them financially.
- Social acceptability, that is compatibility with community structure norms and beliefs. Technologies that compatible with existing farm practices encourage a positive attitude toward change, improve the agent's credibility, and may be adopted faster.
- Infrastructural compatibility, that is capability of being accommodated by the present level of infrastructure.
- Complexity, is the degree to which a technology is perceived to be relatively difficult to understand and use. Technologies that are more complex to understand and use have lower rates of adoption.
- Visibility or observability is the degree to which the results of a new technology are visible or observable.

2. 3. The role of extension worker in agricultural technology transfer

The extension workers' role is to teach the farmers about how to use new technologies. Knowledge and application of extension education principles, the extension workers help a lot in determining the needs constraints, priorities and opportunities for farmers. They also helps in teaching farmers the value of improved agriculture, recommending suitable crops, encouraging adopting of appropriate technologies, and evaluating farmers' reaction and attitudes toward development projects. Extension workers are also help in encouraging farmers in involvement in project identification, planning, implementation, and evaluation as well as support viable development projects [1]. The role of extension workers in agricultural technology transfer [1]:

- Extension worker create awareness of innovation, something new or perceived to be un known before to his clients.
- Persuasion of the usefulness or importance of the new technology.

- Reinforcement of continued use of technology that is created. The interest to continue to practice the new idea that was introduced is sustained through supporting services like input.
- Intermediary between the researchers and farmers. This is done by creating awareness to the farmers, and also taking of farmer's problem to the researchers.
- Diagnose problems by telling them the way out.
- Extension workers stabilize change and attempts to prevent discontinuance, individuals tend to seek confirming information for the decision they may make.
- Extension workers can effectively stabilize new behaviour by directing, and reinforcing messages to those clients who have adopted innovation.
- Extension workers act as catalyst to speed up the rate at which his clients accept changes or innovation.
- Extension worker is a solution provider that is he or she has an idea about effective solution to farmers problems
- Extension worker play a role of resource linker that is linking them with necessary a agricultural inputs, to locate source of finance for their farms.
- Strengthening and supporting farmer organization.

3. CONCLUSIONS

We conclude from this article that the work of agricultural extension is the basis for the development of the agricultural sector, and without agricultural extension, it does not have any benefit from modern agricultural techniques and modern agricultural information. Agricultural Extension and is responsible for the transfer of agricultural technologies to farmers, and to convince farmers to adopt modern agricultural techniques. The transfer of agricultural technologies be through many stages. As well as we conclude from this article that agricultural extension is the bridge that connects farmers with agricultural research centers in order to transfer all agricultural techniques to farmers and teach them how to use them in their farms. Also, the Agricultural Extension works on transportation the problems and needs of farmers to agricultural research centers in order to find solutions to them. As well as we conclude, that the agricultural extension workers have an effective and important role in helping farmers solve agricultural problems.

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