

The Role of Cognitive Extension Needs in Managing the Dissemination of Modern Agricultural Technologies among Agricultural Employees in Tikrit District / Salah al-Din Governorate

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Abstract

The study aimed to identify the cognitive extension needs in managing the process of disseminating modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, and to determine these needs within the fields of planning, implementation, and evaluation. In addition, the study sought to reveal the correlation between the level of cognitive extension needs and a number of personal variables of the respondents. The descriptive method was adopted due to its suitability for the nature of the study. The study population consisted of all agricultural employees working at the headquarters of the Salah al-Din Directorate of Agriculture, the Tikrit Agriculture Division, and the Agricultural Extension Center, totaling (98) employees. A simple random sample representing (45%) of the population was selected, amounting to (44) respondents. Data were collected using a questionnaire prepared for this purpose, which included personal variables and three main fields related to managing the dissemination of agricultural technologies (planning, implementation, and evaluation). The results showed that the level of cognitive extension needs among the respondents was moderate with a tendency toward high, indicating a clear cognitive deficiency in managing agricultural technology dissemination programs. The evaluation field ranked first in terms of the level of need, followed by planning and then implementation. The results also revealed no statistically significant correlation between the level of cognitive extension needs and age or gender, while a statistically significant negative correlation was found with educational attainment, specialization, number of years of extension work, participation in training courses, and communication with information sources. It recommended intensifying specialized training, focusing on evaluation skills, and conducting similar national-level studies to improve agricultural technology dissemination in Iraq.

Keywords: Technology dissemination, agricultural employees, agricultural extension

Introduction and Research Problem

Constitutes the agricultural sector is considered a fundamental pillar of the national economy in many countries, and agricultural development represents one of the main foundations of economic and social development. Its importance is even greater

in developing countries. In its simplest sense, agricultural development means the transition from traditional and primitive agricultural production methods to modern scientific production methods, that is, bringing about technological change based on the results and recommendations of agricultural scientific research. This

contributes to improving farmers' incomes, achieving food security, and reducing poverty, challenges that Iraq and many other countries of the world still face (Lafta et al., 2008: 344; Food and Agriculture Organization of the United Nations, 2011: 1).

The rapid development of science and technology during the twentieth century, along with the advanced technological breakthroughs witnessed in the twenty-first century, has contributed to the development of modern agricultural technologies and their introduction into agricultural practice. This has been the result of in-depth scientific research covering various scientific fields (Arab Organization for Agricultural Development, 2000: 46). Agricultural technology is defined as the translation and application of scientific laws in the form of machinery, equipment, information, and innovative methods to achieve tangible objectives in rural communities. These technologies pass through a series of stages beginning with scientific research, followed by transfer to farmers, adoption, application, and dissemination (Lafta et al., 2008: 344). The process of disseminating agricultural technologies is an organized developmental activity that includes research, extension, and supply plans and activities. It aims to introduce farmers to agricultural technologies, persuade them of their importance, and provide them with the knowledge and skills necessary to apply them (Al-Taie, 2005: 16). This process also represents an integrated system consisting of inputs, processes, and outputs, whose results are reflected in the spread and adoption of technology and the achievement of the intended economic and productive feasibility (Miller, 2006: 1–5). Agricultural technology transfer programs are considered

effective means of increasing the productivity of plant and animal farming systems by disseminating appropriate agricultural innovations and persuading farmers to adopt them (Al-Taie, 2005: 2).

Agricultural extension plays a central role in transferring agricultural technologies from research sources to farmers through its various organizational structures, in cooperation with relevant governmental and non-governmental institutions (Murad, 2002: 89). The transfer of technologies does not occur randomly; rather, it is governed by a set of determinants and factors that influence its efficiency and effectiveness, foremost among them being the management and organization of technology dissemination programs, which are considered among the most important requirements for success (Al-Taie, 2005: 3). Agricultural development does not depend solely on researchers' efforts but relies heavily on the efficiency of agricultural extension workers and their level of performance in disseminating agricultural technologies (Qashta, 2012: 11).

The success of agricultural technology dissemination programs presupposes that those working in them possess diverse knowledge and skills covering the stages of planning, implementation, follow-up, and evaluation (Al-Shadaideh, 2000: 17–19). Modern agricultural technologies do not have a real impact on improving productivity unless they are disseminated among farmers and farmers are trained in their application (Ali et al., 2017: 310). However, reality indicates that the level of adoption of newly introduced agricultural technologies remains below the required level, despite the availability of many such technologies, due to the presence of multiple obstacles in the process of transfer and

dissemination. This suggests that the problem lies not in the number of available technologies but rather in the mechanisms of managing and disseminating them (Ayed, 2013: 2). The weakness of agricultural technology dissemination programs is attributed to several factors, foremost among them weak program management, poor coordination between research, extension, and supply aspects, incomplete implementation stages—particularly follow-up and evaluation—and insufficient qualification of workers managing these programs (Al-Taie, 2009: 244). This has been reflected in reduced agricultural productivity and a decline in the level of agricultural development, leading to economic losses, an increased gap between agricultural production in Iraq and neighboring countries, and the continued problem of failing to achieve self-sufficiency (Al-Saad, 2020: 5). Based on the foregoing, the importance of studying the cognitive extension needs of those working in managing agricultural technology dissemination programs becomes evident, particularly in Salah al-Din Governorate and especially in Tikrit District, which is considered one of the important agricultural areas despite suffering from the same problems. Accordingly, the current study seeks to answer the following questions:

1. What is the level of cognitive extension needs among agricultural employees in managing agricultural technology dissemination programs?
2. What is the nature of the relationship between the level of cognitive extension needs and some personal and professional variables of agricultural employees?

Research Objectives

The present study aims to achieve the following objectives:

1. To identify the cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, in general.
2. To determine the cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, within each field of the study (planning, implementation, and evaluation).
3. To identify the correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, and the following independent variables: age, gender, educational attainment, specialization, number of years of work in agricultural extension, participation in training courses, and communication with information sources.

Significance of the Study

The importance of this study stems from its focus on one of the vital axes in the development of the agricultural sector, namely the management of the dissemination process of modern agricultural technologies. Its significance can be summarized as follows:

1. The study contributes to supporting efforts to develop and improve the management of agricultural

technology dissemination programs in Iraq in general, and in Salah al-Din Governorate in particular, in line with the requirements of modern agricultural development.

2. It identifies the cognitive extension needs of workers involved in managing the dissemination of agricultural technologies, thereby helping to diagnose their knowledge and skill gaps.
3. The study provides scientific results and indicators that can be utilized by decision-makers in the Iraqi Ministry of Agriculture when formulating policies and plans related to the management and dissemination of modern agricultural technologies.
4. It helps to reveal strengths and weaknesses in managing the dissemination process of agricultural technologies, which contributes to improving the efficiency and effectiveness of extension programs.
5. It constitutes a scientific reference that may benefit researchers and scholars in the future, as it includes field data and information that can serve as a basis for subsequent studies.

Research Hypotheses

1. There is no statistically significant correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, and age.
2. There is no statistically significant correlation between cognitive extension needs in managing the dissemination process of agricultural technologies among agricultural

employees and educational attainment.

3. There is no statistically significant correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, and the number of years of extension service.
4. There is no statistically significant correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, and the number of training courses attended.
5. There is no statistically significant correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, and specialization.
6. There is no statistically significant correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, and gender.
7. There is no statistically significant correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District, Salah al-Din Governorate, and sources of information.

Definitions

1. **Cognitive Extension Needs:** The degree of deficiency in information and knowledge related to managing the dissemination process of agricultural technologies experienced by agricultural employees, as measured according to the scale adopted in the current study.
2. **Agricultural Technologies:** A set of innovative modern agricultural methods, techniques, and inputs aimed at reducing the effort and losses incurred by farmers, improving the quality of agricultural production, and increasing its quantity.
3. **Management of the Dissemination Process of Agricultural Technologies:** An organized developmental administrative activity that includes the preparation, implementation, follow-up, and evaluation of research, extension, and supply plans and activities. It aims to disseminate agricultural technologies by introducing them, persuading farmers of the importance of adopting them, and providing them with the knowledge and skills necessary for their application, thereby contributing to the integration of technology into the agricultural system and its successful diffusion within the target area.
4. **Agricultural Employees:** Workers who are graduates of agricultural secondary schools, institutes, or colleges and who are affiliated with the headquarters of the Salah al-Din Directorate of Agriculture, the Tikrit Agriculture Division, and the Agricultural Extension and Training Center, and who are included in the population of the current study.

Research Methodology

The descriptive method was employed to collect the data for the current study, as it is considered the most appropriate approach for this type of research. This method is suitable for obtaining detailed facts and data about the research topic, classifying and analyzing these data, extracting their implications, and reaching precise and comprehensive results and generalizations about the phenomenon under investigation. It is also characterized by its ability to observe reality in a way that helps, in the future, to change the conditions governing that reality (Al-Fadhil, 2010: 103).

Study Area

Tikrit District, which belongs to Salah al-Din Governorate, was selected as the study area because it is considered one of the important agricultural districts in the governorate. It employs staff involved in, and which is a core task of agricultural extension.

Study Community and Sample

The study included all agricultural employees working in Tikrit District, represented by the headquarters of the Salah al-Din Directorate of Agriculture, the Tikrit Agriculture Division, and the Agricultural Extension Center. Their total number was (98) employees. A simple random sample representing (45%) of the study population was drawn, resulting in a sample size of (44) respondents.

Data Collection Instrument

A questionnaire was prepared as the data collection instrument to determine the level of cognitive extension needs in managing the dissemination process of agricultural technologies among the respondents. The questionnaire consisted of two parts. The first part included questions related to the independent personal variables, namely: age, gender, educational attainment, specialization, number of years of work in agricultural extension, participation in training courses, and communication with

information sources. The second part comprised three fields related to managing the dissemination process of agricultural technologies: planning, implementation, and evaluation. A five-point graded scale was placed in front of the items of each field, with the following levels: *very high need*, *high need*, *moderate need*, *low need*, and *very low need*. These levels were assigned the numerical values (1, 2, 3, 4, 5), respectively, as shown in Table (1).

Table (1). Study Fields and Number of Items in Each Field

Theoretical Range	Number of Items	Field
(10–50)	10	Field One: Planning
(8–40)	8	Field Two: Implementation
(10–50)	10	Field Three: Evaluation
(28–140)	28	Total

Measurement of Independent Variables

The independent personal variables included in the questionnaire were measured as follows:

1. **Age:** Measured by the respondent's age in years at the time of data collection.
2. **Gender:** Measured according to the following levels (male, female), assigned the numerical values (2, 1), respectively.
3. **Educational Attainment:** Measured according to the following levels (secondary school, institute, bachelor's degree, postgraduate studies), assigned the numerical values (1, 2, 3, 4), respectively.
4. **Specialization:** Measured according to the following levels (specialized in agricultural extension, not specialized in agricultural extension), assigned the numerical values (2, 1), respectively.
5. **Number of Years of Work in Agricultural Extension:** Measured by the number of years of professional service in extension work.
6. **Participation in Training Courses:** Measured according to the following levels (participated in training courses, did not participate in training courses), assigned the numerical values (2, 1), respectively.
7. **Communication with Information Sources:** Measured by identifying

six information sources from which respondents obtain information about the dissemination of modern agricultural technologies. A scale was placed in front of each source

with the following levels: *always*, *sometimes*, *rarely*, assigned the numerical values (3, 2, 1), respectively.

Validity and Reliability

To ensure both face validity and content validity of the measurement instrument, the questionnaire in its initial form was presented to specialists in the Department of Agricultural Extension at Tikrit University. The experts' comments regarding wording and content were taken into account, and the necessary modifications were made accordingly. A pilot test was then conducted on a random sample of (10) respondents to examine the reliability and suitability of the scale. Cronbach's alpha method was used to calculate reliability, yielding a coefficient of (0.79), while the validity coefficient reached (0.88). These values indicate that the

questionnaire possessed acceptable reliability and validity and was suitable for collecting data from the respondents. Data collection was completed in October 2025. The data were then coded into special data-entry tables and categorized in order to extract their meanings and implications.

Statistical Methods

The Statistical Package for the Social Sciences (SPSS) was used to analyze the data, as it is appropriate for research adopting the descriptive methodology.

Results and Discussion

First Objective: Identifying Cognitive Extension Needs in Managing the Dissemination of Modern Agricultural Technologies among Agricultural Employees in Tikrit District / Salah al-Din Governorate (Directorate of Agriculture of Salah al-Din) in General.

respondents in managing the dissemination process of agricultural technologies in general was (139), while the lowest numerical value was (29), with an overall mean need of (96.2). The respondents were divided into three categories using the range method, as shown in Table (2).

The results showed that the highest numerical value of need obtained by the

Table (2). Distribution of Respondents According to Levels of Need in Managing the Dissemination Process of Agricultural Technologies (Overall)

Categories	Number	%	Mean Need of Categories	Overall Mean of Need
29–65 (Low)	8	18.19	51.4	96.2
66–102 (Moderate)	26	59.09	82.3	S.D
103 and above (High)	10	22.72	120.9	8.16
Total	44	100%		

Table (2) indicates that 59.09% of the respondents fall within the moderate-need category, followed by the high-need category at 22.72%. Accordingly, the level of cognitive extension needs can be described as moderate with a tendency toward high. This indicates the presence of a cognitive need and a lack of information among agricultural employees regarding the management of the dissemination process of agricultural technologies. This may be attributed to weaknesses in the respondents' cognitive and skill-based preparation, as well as the limited number of training programs that provide them with theoretical and practical knowledge and experience related to managing the dissemination of agricultural technologies. Since the dissemination process is based on the development, updating, and transfer of technologies, it requires seminars and workshops aimed at developing the

capacities of those responsible for its implementation.

Second Objective: Identifying Cognitive Extension Needs in Managing the Dissemination of Modern Agricultural Technologies among Agricultural Employees in Tikrit District / Salah al-Din Governorate According to Each Field of the Study

First: Planning Field

The results showed that the highest numerical value of need obtained by the respondents in the planning field of agricultural technology dissemination programs was (50), while the lowest value was (14), with an overall mean need of (33.5). The respondents were divided into three categories using the range method, as shown in Table (3).

Table (3). Distribution of Respondents According to Levels of Need in the Planning Field

Categories	Number	%	Mean Need of Categories	Overall Mean of Field
14–25 (Low)	10	22.73	20.31	33.5
26–37 (Moderate)	20	45.46	33.16	S.D
38 and above (High)	14	31.81	43.12	4.76
Total	44	100%		

Table (3) shows that 45.46% of the respondents fall within the moderate-need category, followed by the high-need category at 31.81%. Accordingly, the level of cognitive extension needs in the planning field can be described as moderate with a tendency toward high. This indicates the presence of a cognitive need and a lack of information among respondents regarding planning for the dissemination process of agricultural technologies. This may be due to weaknesses in the respondents' cognitive preparation or the limited number of specialists in agricultural extension, as this field requires numerous processes and skills that may be difficult for extension workers

Table (4). Distribution of Respondents According to Levels of Need in the Implementation Field

Categories	Number	%	Mean Need of Categories	Overall Mean of Field
8–17 (Low)	10	22.73	15.8	28.32
18–27 (Moderate)	24	54.54	24.7	S.D
28 and above (High)	10	22.73	31.9	3.11
Total	44	100%		

Table (4) indicates that 54.54% of the respondents fall within the moderate-need category, while both the low- and high-need categories accounted for equal proportions (22.73%). These results show that more than

to perform without adequate academic and cognitive qualification enabling them to prepare effective plans.

Second: Implementation Field

The results showed that the highest numerical value of need obtained by the respondents in the implementation field of agricultural technology dissemination programs was (38), while the lowest value was (8), with an overall mean need of (28.32). The respondents were divided into three categories using the range method, as shown in Table (4).

half of the respondents fall within the moderate-need category, indicating a moderate—not high—cognitive need in the implementation field. This may be attributed to the fact that implementation is a core task

of agricultural employees, as those responsible for executing technology dissemination programs are extension workers themselves. Consequently, they have accumulated relatively good implementation skills, which explains why the level of need in this field was moderate.

Third: Evaluation Field

The results showed that the highest numerical value of need obtained by the respondents in the field of evaluating agricultural technology dissemination programs was (49), while the lowest value was (10), with an overall mean need of (37.19). The respondents were divided into three categories using the range method, as shown in Table (5).

Table (5). Distribution of Respondents According to Levels of Need in the Evaluation Field

Categories	Number	%	Mean Need of Categories	Overall Mean of Field
10–22 (Low)	5	11.37	19.3	37.19
23–35 (Moderate)	10	22.73	32.10	S.D
36 and above (High)	29	65.90	42.32	3.78
Total	44	100%		

Table (5) shows that 65.90% of the respondents fall within the high-need category, while the moderate-need category accounted for 22.73%. Accordingly, the level of cognitive extension needs in the evaluation field can be described as high, as more than half of the respondents belong to the high-need category. This indicates a substantial cognitive need in this field. This may be attributed to the fact that evaluation, as a process, requires specialized knowledge and expertise and is sometimes conducted by evaluators external to the extension program. Consequently, agricultural employees do not practice the evaluation process continuously, which explains the high level of need observed in this field.

Third Objective: Identifying the Relationship Between Cognitive Extension Needs in Managing the Dissemination of Modern Agricultural Technologies among Agricultural Employees in Tikrit District / Salah al-Din Governorate and Selected Personal Variables (Age, Gender, Educational Attainment, Specialization, Number of Years of Work in Agricultural Extension, Participation in Training Courses, and Information Sources)

To determine the correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District / Salah al-Din Governorate and the independent personal variables, Pearson's correlation coefficient was used for quantitative variables, while Spearman's rank correlation coefficient was applied for

categorical variables. The *t*-test was also used to determine the significance of the

correlation coefficients, as shown in Table (6).

Table (6). Correlation Between the Level of Cognitive Extension Needs and the Independent Variables of the Respondents

Significance	R Value	Mean Need	%	Number	Categories	Variable
		87.21	20.45	9	24–35	Age
Not significant	0.131	102.1	56.82	25	36–47	
		95.2	22.73	10	48–59	
			100%	44	Total	
Not significant	-0.112	88.21	68.19	30	Male	Gender
		105.1	31.81	14	Female	
			100%	44	Total	
		127.4	18.20	8	Secondary	Educational Attainment
Significant*	-0.28	105.17	15.91	7	Institute	
		87.35	54.55	24	College	
		56.82	11.40	5	Postgraduate	
			100%	44	Total	
Significant**	-0.48	96.11	79.55	35	Non-extension	Specialization
		55.41	20.45	9	Extension specialist	
			100%	44	Total	
		123.4	45.46	20	3–14	Years of Work in Agricultural Extension
Significant*	-0.28	102.3	31.82	14	15–26	

		68.22	22.72	10	27–38	
			100%	44	Total	
Significant**	-0.38	108.1	68.18	30	Not participated	Participation in Training Courses
		76.9	31.82	14	Participated	
			100%	44	Total	
		117.2	56.82	25	6–9	Communication with Information Sources
Significant**	-0.39	92.14	29.55	13	10–13	
		63.71	13.63	6	14 and above	
			100%	44	Total	

*Significant at (0.05) **Significant at (0.01)

Table (6) shows the correlation relationship between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District / Salah Al-Din Governorate and the independent variables listed below:

1. **Age:**

The results showed that the middle-age group (36–47 years), which constituted 56.82%, represented the highest proportion of the respondents. To determine the correlation between the level of cognitive extension needs in managing the process of disseminating agricultural technologies and age, Pearson's correlation coefficient was used, yielding a value of (0.131), which is not statistically significant at the probability level (0.05). Accordingly, the null hypothesis is accepted. This relationship indicates that the respondents' age has no association with the level of needs. This may be attributed to the fact that managing the dissemination of agricultural technologies requires a set of experiences, skills, and knowledge that cannot be acquired merely through age unless the respondent participates in training courses, workshops, and qualification programs related to this subject.

2. **Gender:**

The results indicated that male respondents constituted the highest proportion at 68.19%. To determine the correlation between the level of cognitive extension needs in managing the dissemination of agricultural technologies and gender, Spearman's rank correlation coefficient was used, with a value of (-0.112), which is not statistically significant at the probability level (0.05). Thus, the null hypothesis is accepted. This relationship shows that the

respondent's gender has no association with the level of needs. This may be due to the fact that managing the dissemination of agricultural technologies requires a set of skills, experiences, and knowledge in which gender plays no role. If equal opportunities are provided to males and females to acquire these skills and experiences, both have equal chances to achieve the objectives of agricultural technology dissemination programs.

3. **Educational attainment:** The results showed that respondents holding a bachelor's degree constituted 54.55%, representing the highest proportion of the total respondents. To determine the correlation between the level of cognitive extension needs in managing the dissemination of agricultural technologies and educational attainment, Spearman's rank correlation coefficient was used, yielding a value of (-0.28). This represents a statistically significant negative relationship at the probability level (0.05). Accordingly, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that there is a correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District / Salah Al-Din Governorate and educational attainment. This relationship indicates that the respondent's educational attainment is inversely related to the level of needs. This may be attributed to the fact that higher educational attainment enables respondents to possess academic knowledge and expertise that allow them to manage the dissemination of agricultural technologies effectively across all fields.

4. **Specialization:**

The results indicated that respondents

who were not specialized in agricultural extension constituted the vast majority, accounting for 79.55% of the total respondents. To determine the correlation between the level of cognitive extension needs in managing the dissemination of agricultural technologies and specialization, Spearman's rank correlation coefficient was used, yielding a value of (-0.48). This represents a statistically significant negative relationship at the probability level (0.01). Accordingly, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that there is a correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District / Salah Al-Din Governorate and specialization. This relationship indicates that academic specialization in agricultural extension is inversely related to the level of needs. This may be attributed to the fact that agricultural extension specialists possess comprehensive academic knowledge acquired during their studies regarding agricultural technology dissemination programs, from the program design stage to the evaluation stage; therefore, specialized employees have a lower level of need.

5. **Years of work in agricultural extension:** The results showed that the low category of years of extension work (3–14 years) constituted 45.46%, which is the highest proportion among respondents. To determine the correlation between the level of cognitive extension needs in managing the dissemination of agricultural technologies and years of work in agricultural extension, Spearman's rank correlation coefficient was used, yielding a value of (-0.28). This

represents a statistically significant negative relationship at the probability level (0.05). Accordingly, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that there is a correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District / Salah Al-Din Governorate and years of work. This relationship indicates that years of work in agricultural extension are inversely related to the level of needs. This may be due to the fact that increased years of extension work provide employees with greater knowledge and information, and that frequent practice enhances skills and accumulates experience, thereby reducing the level of need compared with others.

6. **Participation in training courses:** The results showed that 68.18% of the respondents had not participated in any training course related to agricultural technology dissemination programs. To determine the correlation between the level of cognitive extension needs in managing the dissemination of agricultural technologies and participation in training courses, Spearman's rank correlation coefficient was used, yielding a value of (-0.28). This represents a statistically significant negative relationship at the probability level (0.05). Accordingly, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that there is a correlation between cognitive extension needs in managing the dissemination of modern agricultural technologies among agricultural employees in Tikrit District / Salah Al-Din Governorate and participation in training courses. This relationship indicates that

participation in training courses is inversely related to the level of needs. This may be attributed to the fact that training courses provide participants with knowledge, experience, and skills related to the dissemination of agricultural technologies, thereby reducing the level of cognitive need among participants compared with non-participants, as they possess more information than their peers.

7. **Contact with information sources:** The results showed that the low category of contact with information sources (6–9) constituted 56.82%, which is the highest proportion among the categories. To determine the correlation between the level of cognitive extension needs in managing the dissemination of agricultural technologies and contact with information sources, Spearman's rank correlation coefficient was used,

Conclusions:

Based on the results of the study, the following conclusions were reached:

1. The level of cognitive extension needs in managing the process of disseminating agricultural technologies was moderate tending toward high. This indicates that agricultural employees are in need of activities and training courses to provide them with the necessary information and expertise to raise the level of their knowledge and skills in managing agricultural technology dissemination programs.
2. The results showed that the level of needs across all fields was relatively high, as the lowest level of needs was found to be moderate. This indicates that agricultural employees lack information and experience in all areas related to managing the process of disseminating agricultural technologies.
3. A high level of need appeared primarily in the field of evaluation, which indicates a severe and clear cognitive deficiency in this area.
4. The results showed no correlation between the level of cognitive extension needs and the following variables: age and gender. This indicates that these factors have no relationship with the level of needs.
5. The results showed a statistically significant negative correlation between the level of cognitive extension needs and the following variables: educational attainment, specialization, number of years of work in agricultural extension, participation in training courses, and contact with information sources. This indicates the importance of these factors and that they have an inverse effect on the level of cognitive extension needs.

Recommendations:

Based on the research findings of this study, the researchers recommend the following:

1. The Agricultural Extension Training Center in Salah Al-Din should prepare training activities for agricultural employees to provide them with the necessary expertise and skills to increase their level of skills and knowledge in managing agricultural technology dissemination programs.
2. Greater emphasis should be placed on the field of evaluation when preparing any training content, as this field ranked highest in terms of the level of needs.
3. Conducting a similar study on the process of disseminating agricultural technologies at the national level in order to advance and improve the agricultural sector.

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