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The Role of agricultural extension in overcoming environmental changes in Nineveh governorate

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Abstract

The research was conducted in Nineveh Governorate and included all agricultural extension workers in the Directorate of Agriculture of Nineveh and its affiliated units. The study aimed to identify the role of agricultural extension in overcoming environmental changes in Nineveh Governorate. The research population consisted of all agricultural extension workers in Nineveh Governorate, totaling 280 agricultural researchers distributed among the Directorate of Agriculture of Nineveh, its agricultural divisions, the Agricultural Extension Center, and affiliated demonstration farms. Of these, 260 extension workers were specifically employed at the directorate and 31 agricultural divisions. A simple random sample of 25% was taken, resulting in a sample size of 70 respondents. A questionnaire was developed to collect the data, consisting of three parts: Part One: Measured the independent variables, of the agricultural extension workers. Part Two: Included a scale composed of 30 items to assess the role of agricultural extension in overcoming climate change in Nineveh Governorate. Part Three: Comprised a scale with 10 items measuring the challenges faced by agricultural extension workers in addressing climate change. Face validity was ensured by presenting the questionnaire to a group of experts and specialists in agricultural extension. Content validity was also verified through a review by a panel of experts in educational and psychological sciences at the College of Education for Human Sciences, University of Mosul. The reliability coefficient was calculated using Cronbach's Alpha method, and data for the pilot sample was collected through personal interviews with the extension workers. The reliability coefficient was found to be (0.96), indicating a high level of reliability. The results showed that the role of agricultural extension in addressing environmental changes is moderate, tending toward high. There is also a significant correlation between the role of agricultural extension and each of the variables (age, gender, and years of service).

Keywords: Agricultural extension, climate change, Nineveh governorate, environmental challenges, extension workers

Introduction

Agricultural production can be improved by developing agricultural work through the use of agricultural extension workers and targeted methods to raise farmers' awareness on how to use various media tools to reduce agricultural risks and ongoing climate change. The lesser the climatic impacts on agricultural production, the greater the expansion and quality of agricultural output, increasing the likelihood of achieving a high degree of self-sufficiency and contributing to the agricultural sector (Hameed, and Abd AlFaraje, 2024) ^[15]. Scientists believe that one of the most important duties of extension agencies and workers is to set extension policies through various programs that contribute to identifying priority problems that help reduce environmental and climatic risks, organize work relations between the extension apparatus and other institutions, as well as with the beneficiaries, and adapt to situations and crises, responding quickly through optimal selection of extension communication methods and modern technologies (Abu Al-Enein, 2019:196) ^[6]. Generally, the most important tasks of the extension system in confronting climate change and crises include providing the necessary information, tools, and aids required for planning, effective communication means, prioritizing targeted goals,

anticipating potential difficulties caused by climate changes, working to avoid them, and preparing to deal with problems and crises decisively when they occur (Abu Zaid, 2014:12) ^[7]. When the extension system attempts to study the climate change situation and potential agricultural damage, it must study the main causes that may lead to crises and risks, then focus on mechanisms to reduce the risks of climate change (Obaido, 2021) ^[11]. The key role of agricultural extension before the occurrence of climate change lies in the rapid evaluation of extension workers by choosing appropriate methods to understand the farmers' concepts and attitudes towards possible agricultural risks resulting from predicted scenarios. It also includes analyzing the necessary data and information to build strategies that reduce the consequences of these risks (Hanan, 2010:159) ^[8], preparing suitable extension programs, and training and qualifying agricultural extension personnel in using appropriate environmental awareness for crisis and risk management, reducing the impacts of climate change. It also involves raising farmers' awareness and interest in these crucial environmental issues and their expected effects on water and land resources, and the physical, chemical, and biological properties of soil. This aims to increase water and environmental awareness to maximize the use of soil and water resources at the field

level (Saleh, 2019).

Due to the severity of the expected sudden or long-term climate change impacts on the agricultural sector which directly affect crop productivity and therefore farmers' income it becomes necessary for agricultural extension to mitigate these effects by teaching farmers adaptation methods. These methods should be presented through simple programs that suit the largest number of farmers, regardless of their educational level (Mohammed, 2019) ^[10]. Climate change is one of the phenomena that has created a gap between developed and developing countries, resulting in many negative consequences for societies (Abdul Hamid, 2042:787) ^[12]. The agricultural extension system bears the greatest burden in achieving the goals of rural development, especially protecting the rural environment and conserving and developing its resources. It is considered one of the most important informal education systems in rural areas, and it targets rural women as one of the key groups. Rural women play a significant role both inside and outside the home and are mainly responsible for maintaining the elements of the rural environment, such as water, air, and soil (Sharshar, 2001:28) ^[2]. Environmental protection is one of the fields of extension work aimed at promoting environmental health through disseminating knowledge, proper practices, and skills (Al-Sayed, 2007:86) ^[3]. Since agricultural extension targets rural women as an essential group, it carries the responsibility of changing their negative attitudes towards the environment and reinforcing their positive ones. Rural women are significant due to their multiple roles, so they bear great responsibility in preserving rural environmental elements like water, air, and soil (Al-Milehi & Ramadan, 2010:13) ^[1]. The role of agricultural extension in this field cannot be ignored due to its ability to reach large numbers of farmers and raise their awareness of the most common crises and how to deal with them through various communication methods, whether individual or group-based (Al-Qaraali, 2006:16) ^[4]. When agricultural extension studies environmental crises, it must examine the main causes that lead to these crises and then focus on remedies. A successful crisis management strategy begins with planning, breaking down the plan into phases, and smoothly transitioning from the pre-crisis stage to the initial stage and then to the confrontation stage. It also involves identifying the necessary activities to implement each phase (Noufal, 2017:27) ^[9]. From the above, it is evident that the degradation of environmental resources in rural areas is fundamentally a behavioral problem. To restore the integrity, balance, and purity of environmental components, individuals must abandon their current harmful behaviors and excessive exploitation of natural resources. This includes pollution and tampering with environmental laws, regardless of motives such as investment, exploitation, wealth, or luxury. Therefore, it is necessary to reconsider how humans positively interact with the environment and plan the sustainable use of natural resources to restore balance among its components and solve problems that threaten human life (Abu Hadeed, 2020) ^[7].

Research Objectives

1. To identify the role of agricultural extension in overcoming environmental changes in Nineveh Governorate.

2. To identify the correlation between the role of agricultural extension in overcoming climate changes and the independent variables (age, gender, educational level, years of service, training courses on environmental changes).
3. To identify the constraints facing agricultural extension workers in overcoming climate changes.

Materials and Methods

The research was conducted in Nineveh Governorate and included all employees working in agricultural extension at the Nineveh Agriculture Directorate and its affiliated sub-units, as well as those in the Agricultural Extension Center and affiliated demonstration farms. The research population consisted of all agricultural extension workers in Nineveh Governorate, totaling 280 respondents. Of these, 260 workers were distributed across the directorate and its 31 affiliated sub-agricultural units. A simple random sample of 25% was taken, resulting in a sample size of 70 respondents. The researcher prepared a special questionnaire to measure the role of agricultural extension in overcoming climate changes in Nineveh Governorate. The questionnaire consisted of three parts:

- **Part One:** This part measured the independent variables and included personal and professional information of extension workers:
- **Age:** measured by asking respondents their age at the time of data collection.
- **Gender:** measured by asking respondents to indicate their gender (male = 1, female = 2).
- **Educational level:** measured by asking about the respondent's qualification (Agricultural High School = 4, Agricultural Institute = 3, College of Agriculture = 2, Postgraduate in Agriculture = 1).
- **Years of service:** measured by asking about the number of years spent in extension work.
- **Training courses in environmental changes:** measured by asking whether the respondent had undergone training (Yes = 1, No = 2).
- **Part Two:** This part included a scale composed of 30 items designed to identify the role of agricultural extension in overcoming climate changes in Nineveh. The scale was developed by reviewing prior studies on the topic.

Part Three: This part included a scale to measure the constraints facing extension workers in addressing climate change. It contained 10 items with response options (Severely constrains = 1, Moderately constrains = 2, Slightly constrains = 3, Not a constraint = 4). Face validity was determined by presenting the questionnaire to a group of experts and specialists in agricultural extension, including professors from the College of Agriculture and Forestry at the University of Mosul, as well as experts from the universities of Tikrit, Kirkuk, Baghdad, and Duhok. Their feedback was used to revise and improve the items. Content validity was verified by presenting the preliminary version of the questionnaire to experts in educational and psychological sciences at the College of Education for Humanities at the University of Mosul, and to specialists from the College of Media and the College of Environmental Sciences. Their feedback was also used to

refine the questionnaire. To test the reliability of the study, a random sample of 30 respondents was selected from the agricultural extension workers in Nineveh and its sub-agricultural units. The data were collected via personal interviews using the questionnaire, and the reliability coefficient was calculated using Cronbach's Alpha, yielding a value of 0.96. After collecting, sorting, and classifying the data, the distribution of the data was tested using the Shapiro-Wilk and Kolmogorov-Smirnov tests, which showed that the data were not normally distributed. Thus, non-parametric statistical methods were adopted in the analysis.

Results and Discussion

Identifying the Role of Agricultural Extension in Overcoming Environmental Changes in Nineveh Governorate.

The role of agricultural extension in mitigating the risks of climate change was measured by categorizing it into three levels based on the theoretical range of values between 75 and 375. The arithmetic mean was 2.225, with a standard deviation of 0.449. According to this analysis, the roles were classified as follows: a low level of role from 75 to 175, a medium level from 176 to 276, and a high level from 277 to 375, as shown in Table (1).

Table 1: The Role of Agricultural Extension in Overcoming Climate Change

Categories	Frq	%	M	ST.D
Low (40-65)	5	7.14	2.225	0.449
Moderate (66-91)	45	64.28		
High (92-117)	20	28.57		
Total	70	100%		

The results shown in Table (1) indicate that among the agricultural extension workers (a total of 5 respondents representing 7.14%), they fall under the category of having

a "low role." Meanwhile, 45 agricultural extension workers, representing 64.28%, fall under the "moderate role" category. As for 20 agricultural extension workers, representing 28.57%, they belong to the "high role" category. The mean score was (2.225) with a standard deviation of (0.449). The results also showed that the role of agricultural extension in reducing climate change risks was moderate, tending towards high, with a percentage of 97%. This is attributed to the fact that agricultural extension workers were continuously following various methods of raising agricultural environmental awareness related to all aspects of climate change. This agree with (Hameed, 2019)^[13]. They were also interested in how to transfer information regarding the reduction of climate change risks through these media channels to reach the largest possible number of extension clients in a way that suits their conditions and levels.

Identifying the correlation between the role of agricultural extension in overcoming climate change and independent variables

To achieve this objective, the Chi-square test was used to find the correlation between the role of agricultural extension in addressing climate change and a set of independent variables, which include.

Age

Age was divided into three categories based on range and class width. The highest recorded age value was 62 years, while the lowest was 28 years. It was found that agricultural extension workers in the younger age group (28-39 years) totaled 35 respondents, representing 50% of the total sample. Those in the middle age group (40-51 years) totaled 25 respondents, representing 35.71% of the total sample. Meanwhile, those in the older age group (52 years and above) totaled 10 respondents, representing 14.28% of the total sample, as shown in Table (2).

Table 2: Shows the correlation between the role of agricultural extension and age

Categories	Frq	%	Calculated Chi-Square Value	tabulated Chi-Square Value	D.F
(28-39) years	35	50.00	20.994	9.487	4
(40-51) year	25	35.71			
(more than 52)year	10	14.28			
Total	70	100			

The results of Table (2) showed that the statistical analysis revealed a significant correlation between the role of agricultural extension in reducing the risks of climate change and the variable of age. The calculated Chi-square value exceeded the tabulated value at a significance level of (0.05), indicating the rejection of the null hypothesis and the acceptance of the alternative hypothesis. This correlation can be explained by the fact that older individuals working in agricultural extension possess accumulated professional experience and a broader awareness of the importance of agricultural communication as an effective tool in addressing climate change. This enhances their ability to use

these methods more effectively to convey environmental information and extension to the target groups.

Gender: The respondents were divided according to the gender variable into two main categories: males and females. The number of male respondents was 104, representing 67.1% of the total study sample, while the number of female respondents was 51, constituting 32.9% of the total sample, as shown in Table (3). This distribution indicates that males form the majority of those working in agricultural extension within the studied sample.

Table 3: Shows the correlation between the role of agricultural extension and gender.

Categories	Frq	%	Calculated Chi-Square Value	Tabulated Chi-Square Value	D.F
Male	45	64.28	18.123	5.991	2
Female	25	35.71			
Total	70	100			

The results of Table (3) showed a significant correlation between the role of agricultural extension in reducing the risks of climate change and the gender variable. This indicates that both male and female workers in agricultural extension recognize the importance of agricultural environmental awareness and effectively use it in conveying measures related to confronting climate change.

Educational Qualification

The respondents were classified into four categories according to the educational qualification variable. The

results showed that the number of agricultural extension workers holding a diploma in agricultural preparatory school was (3), representing (4.28%) of the total percentage. Those holding a diploma from an agricultural institute numbered (4), representing (5.71%) of the total. The vast majority of respondents were graduates of the College of Agriculture, with (33) individuals representing (47.14%) of the total percentage. Meanwhile, those holding postgraduate degrees numbered (30), accounting for (42.85%) of the total percentage, as shown in Table (4).

Table 4: Show the correlation between the role of agricultural extension and educational qualification.

Categories	Frq	%	Calculated Chi-Square Value	tabulated Chi-Square Value	D.F
Agricultural Secondary School	3	4.28	84.252	12.591	6
Agricultural Institute	4	5.71			
College of Agriculture	33	47.14			
Postgraduate Degrees	30	42.85			
Total	70	100			

The results of Table (9) showed that there is a significant correlation between the role of agricultural extension in reducing the risks of climate change and the educational qualification. The calculated value of the Chi-square reached (84.252), which is greater than the tabulated Chi-square value at the 0.05 level of significance. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. This indicates a significant correlation between the role of agricultural extension in mitigating the risks of climate change and the educational qualification. The reason for this is that the educational qualification is considered one of the most important and vital variables. It plays a crucial role in helping agricultural extension workers select the most effective agricultural media methods to communicate necessary measures for mitigating climate change to their target audience. It also enhances their awareness of the importance of using modern media tools in the present time to overcome any climatic impacts. Based on their qualifications, they can determine

the appropriate time and type of media to use to address environmental and climatic challenges.

Job Service Duration

Respondents were classified based on their years of service into three categories using the theoretical range of service duration. The maximum length of service was 32 years, and the minimum was 1 year. The distribution showed that the category of respondents with medium service duration was the most represented, totaling 88 respondents, accounting for 56.8% of the total sample. This was followed by the category of respondents with short service duration, totaling 58 respondents, or 37.4% of the sample. This agree with (Talal *et al.*, 2025) ^[14]. The category with long service duration was the least represented, with only 9 respondents, making up 5.8%. This distribution was illustrated in Table (5).

Table 5: Shows the correlation between the role of agricultural extension and the years of job service.

Categories	Frq	%	Calculated Chi-Square Value	tabulated Chi-Square Value	D.F
(1-11) years	28	40.00	5.487	9.487	4
(12-22) year	40	57.14			
(More than 23)year	8	11.42			
Total	70	100			

The results of Table (5) showed that the statistical analysis indicated no significant correlation between the role of agricultural extension in reducing the risks of climate change and the variable of years of service. This suggests that the awareness of workers regarding the importance of agricultural media is not related to the length of their service, but rather reflects a general and shared understanding of the importance of these means in

confronting climate change.

Training Courses in the Field of Environmental Changes

The respondents were divided into two groups: trained and untrained. The first group, the trained individuals, included 38 respondents, representing 24.5% of the total number. The second group, the untrained individuals, included 117 respondents, representing 75.5% of the total number, as shown in Table (6).

Table 6: Show the correlation between the role of agricultural media and the training courses.

Categories	Frq.	%	Calculated Chi-Square Value	tabulated Chi-Square Value	D.F
Trainee	25	35.71	4.265	5.991	2
Non Trainee	45	64.28			
Total	70	100			

The results of Table (6) showed that the statistical analysis revealed no significant correlation between the role of agricultural extension in reducing the risks of climate change and the variable of training courses in the field of media. This indicates that the absence of training does not prevent workers from recognizing the importance of these tools, but it may affect their efficiency in using them effectively to convey awareness messages about climate change.

Identifying the obstacles faced by agricultural extension workers in addressing climate change

To achieve this objective, the arithmetic mean and percentage weight were calculated for each item related to the obstacles faced by agricultural extension workers when using agricultural environmental awareness to overcome climate change. These items were then ranked according to their importance, as shown in Table (7).

Table 7: Ranking of obstacles faced by agricultural extension workers in addressing climate change

Sequence	Obstacles	Average	%	Rank
1	Weak participation of the extension services in decision-making related to climate change.	3.28	0.820	1
3	Lack of training courses attended by agricultural extension workers on the importance of climate change adaptation.	3.19	0.797	2
2	Insufficient awareness among many workers about the risks of climate change.	3.17	0.792	3
4	Absence of a clear extension policy to mitigate the effects of climate change.	3.15	0.787	4
8	Limited number of radio and television programs related to environmental issues and concerns.	3.11	0.777	5
9	Limited reliance of farmers on agricultural extension to solve their agricultural problems.	3.08	0.770	6
10	Weak government support for media institutions that present topics related to climate change and ways to mitigate it.	3.04	0.760	7
5	Lack of agricultural extension publications outlining the key steps needed to reduce climate change impacts.	3.02	0.755	8
7	Absence of specialized agricultural media programs focusing on environmental issues.	2.99	0.747	9
6	Limited coverage by visual and audio media of the necessary measures to mitigate climate change.	2.95	0.737	10

The results of Table (7) showed that the item ranked first among the constraints facing agricultural extension workers in using agricultural environmental awareness to mitigate the risks of climate change was: "The weak involvement of the extension apparatus in decision-making related to climate change phenomena", with a mean score of (3.28) and a percentage weight of (82.0%). This may be due to the lack of specialized extension staff in agricultural environmental awareness, which represents one of the major constraints. Media tools require intensive study and specialists to use them effectively, given their significant role in influencing the agricultural audience. On the other hand, the item ranked last was: "The limited coverage by visual and audio media of the necessary procedures to reduce climate change", with a mean score of (3.05) and a percentage weight of (76.2%). This may be attributed to the emergence of the internet era, which shifted people's attention away from other media such as television and radio, resulting in radio and television programs becoming rarely viewed.

Conclusions

The study concludes that the role of agricultural extension in addressing climate change is moderate, tending toward high. It was found that the most important factor drawing the attention of workers in agricultural extension is their interest in agricultural environmental awareness, which contributes to mitigating climate change. This is due to the extension workers' awareness of the importance of the tools that can be used to transmit climate news and information. The study

also concludes that age, gender, educational qualification, and academic specialization have no relation to the role of agricultural media in reducing the risks of climate change. Regardless of these variables, they do not prevent individuals from using various media tools to mitigate the effects of climate change. Furthermore, the study indicates that years of service, training courses in the field of media, and the extent to which agricultural extension workers follow up on environmental awareness topics related to climate change play an important and effective role in using agricultural media to reduce climate change risks.

Recommendations

The need to conduct multiple training courses for agricultural extension workers in the field of agricultural environmental awareness. Providing opportunities for cooperation between media institutions and agricultural extension workers with environmental research centers to follow up on and take necessary measures regarding climate change and to reduce its effects. Planning schedules for delivering lectures to agricultural extension workers on the importance of understanding natural phenomena and how to deal with them. Providing a specialized extension team in the use of agricultural media and how to select the appropriate medium for each climate-related event.

References

1. Al-Melihi IB, Radi IB, Ahmed RM. Methods used by rural women to dispose of household and farm waste in some villages of Kafr El-Sheikh Governorate.

- Agricultural Journal, Kafr El-Sheikh University. 2010;12(36).
2. Sharshar AH. Activating the role of agricultural extension in the field of environmental protection. In: Fifth Conference on Pests and Challenges of Agricultural Extension in the Field of Environment. Cairo: Agricultural Research Center, Ministry of Agriculture and Land Reclamation; 2001.
3. El-Sayed MM. Adoption of rural women to practices of producing clean and safe food in some villages of Kafr El-Sheikh Governorate [PhD dissertation]. Cairo: Tanta University; 2007.
4. Al-Qurali HA. Extension planning to confront avian influenza. Ismailia: Media Support Center; 2006.
5. Abu Zaid AM. The role of agricultural extension programs in facing agricultural risks. In: Twelfth Conference of the Scientific Association for Agricultural Extension: The Role of Agricultural Extension in Facing the Risks Facing the Agricultural Sector. Cairo; 2014.
6. Abu El-Enein MA. Evaluation of the role of agricultural extension in facing agricultural risks from the perspective of farmers in Ismailia Governorate. *Journal of Agricultural Extension Research*. 2019;50(1):195-209.
7. Abu Hadeed AF. Climate change and its impact on the agricultural sector in Egypt and how to address it. Cairo: Climate Change Information Center, Agricultural Research Center, Ministry of Agriculture and Land Reclamation; 2020.
8. Hanan AK. The need for agricultural extension organizations to address crisis and disaster management in the agricultural environment. In: Conference on the Challenges of Agricultural Extension in the Field of Environment. Giza: Scientific Society for Agricultural Extension; 2010.
9. Noufel MN. The economics of climate change: impacts and policies. Kuwait: Arab Planning Institute, Development Studies Series; 2017.
10. Mohamed NN. The impact of climate change on the agriculture sector and food security. In: Seminar on Agricultural Extension and Food Security Challenges in Light of Expected Climate Changes. Cairo: Scientific Society for Agricultural Extension, Faculty of Agriculture, Cairo University; 2019.
11. Obeido MA. Measuring the extent of farmers' use of media and the effectiveness of extension activities for vegetable farmers in the Jableh area. *Syrian Journal for Agricultural Research Communication*. 2021;2(8):232-244.
12. Abdel Hamid J. Digital media's handling of climate change risks. *Egyptian Journal of World Research*. 2042;2(80):787-832.
13. Hameed TS. The reality of extension services provided for wheat crop farmers in Zammar region, Nineveh Governorate, Iraq. *Journal of Physics: Conference Series*. 2019;1294(9):092021.
14. Hameed T, Kadem R, Hameed A, Dadasiewicz A. Level application of farmers to scientific recommendations for the corn crop in Al-Hamdaniya District, Nineveh Governorate. *Mesopotamia Journal of Agriculture*. 2025;53(1):16-28.
15. Hameed TS, Abd AlFaraje DM. The reality of the extension services provided to vegetable growers in the field of agricultural pest control in Alqosh District, Nineveh Governorate. *Anbar Journal of Agricultural Sciences*. 2024;22(1):173-181.