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THE ROLE OF AGRICULTURAL EXTENSION IN ENABLING VEGETABLE FARMERS TO FACE CLIMATE CHANGE IN IRAQ/ CASE STUDY IN BAGHDAD AND BABYLON GOVERNORATES

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ABSTRACT

The aim of the research is to identify the role of agricultural extension in enabling vegetable farmers to face climate change in Iraq in general, and in each of the following research roles : (The planning role, The role of capacity development and improvement includes:{ agricultural extension workers, vegetable farmers}, the media role, The role of coordination and partnership, The role of encouraging innovation, The role of disseminating modern technologies, The role of organizing farmers, The role of follow-up and evaluation), To achieve the objectives of the study, a questionnaire consisting of (72) paragraphs distributed over (8) areas was designed , and then its design procedures were completed in terms of honesty and consistency, the study included all the employees of the guidance institutions in the governorates of Baghdad and Babylon, numbering (267) workers, from whom a random sample was drawn stratified proportionate by (50%) amounting to (123) respondents, after the respondents were excluded from the Guidance Center in Abu gharq as a survey sample, numbering (22) respondents, the data was collected and then analyzed using the social statistical analysis software (SPSS). The research results have shown that the role of agricultural extension in enabling vegetable farmers to face climate changes at an average level with a weighted average of (2.40) degrees, and a percentage weight of (49.32%), and the research results also showed that the roles of workers in the above eight agricultural extension have received weighted circles ranging between (2.57) degrees and(2.33) degrees, which is less than the hypothetical average of the scale of (3) degrees, we conclude from this that the role of agricultural extension growing vegetables to cope with climate change on average overall in the study area, The research recommended the need to strengthen and intensify agricultural extension work, as well as the need to coordinate with all relevant institutions to face the emerging climate changes in Iraq.

Keywords: Capacity improvement, Planning, Agricultural innovation, Follow-up and Evaluation.

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دور الإرشاد الزراعي في تمكين زراع الخضر لمواجهة التغيرات المناخية في العراق/ دراسة حالة في محافظتي بغداد وبابل

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الخلاصة

هدف البحث الى التعرف على دور الإرشاد الزراعي في تمكين زراع الخضر لمواجهة التغيرات المناخية في العراق بشكل عام، وفي كل دور من ادوار البحث الأتية :(الدور التخطيطي، دور تنمية وتحسين القدرات ويشمل:{العاملين بالإرشاد الزراعي، زراع الخضر}، الدور الاعلامي، دور التنسيق والشراكة، دور تشجيع الابتكار، دور نشر التقنيات الحديثة، دور تنظيم الزراع، دور المتابعة والتقويم)، ولتحقيق اهداف الدراسة تم تصميم استبانة مكونة من (72) فقرة موزعة على (8) مجالات، وبعد ذلك تم استكمال اجراءات تصميمها من حيث الصدق والثبات، شملت الدراسة جميع العاملين بالمؤسسات الارشادية في محافظتي بغداد وبابل البالغ عددهم (267) عاملا, سُحبت منهم عينة عشوائية طبقية تناسبية بنسبة(50 %) بلغت (123) مبحوثا، بعد ما تم استبعاد المبحوثين من المركز الارشادي في ابي غرق كعينة استطلاعية والبالغ عددهم (22) مبحوثا، وتم جمع البيانات ومن ثم تحليلها باستخدام برنامج التحليل الاحصائي الاجتماعي (SPSS), وقد أظهرت نتائج البحث أن دور الارشاد الزراعي في تمكين زراع الخضر لمواجهة التغيرات المناخية بمستوى متوسط بوسط مرجح اجمالي بلغ (2.40) درجة، ووزن مئوي بلغ (49.32%)، كما بينت نتائج البحث أن ادوار العاملين في الارشاد الزراعي الثمانية اعلاه قد حصلت على اوساط مرجحة تراوحت بين (2.57) درجة و (2.33) درجة وهي اقل من الوسط الفرضي للمقياس والبالغ (3) درجة، نستنتج من ذلك ان دور الارشاد الزراعي لتمكين زراع الخضر لمواجهة التغيرات المناخية متوسط بشكل عام في منطقة الدراسة، وقد اوصى البحث بضرورة تعزيز وتكثيف العمل الارشادي الزراعي، فضلا عن ضرورة التنسيق مع جميع المؤسسات ذات العلاقة لمواجهة التغيرات المناخية المستجدة في العراق.

الكلمات المفتاحية: تحسين القدرات، التخطيط، الابتكار الزراعي، المتابعة والتقويم.

INTRODUCTION

The agricultural sector in Iraq faces great challenges in providing agricultural products and achieving food security **(Muhamad,2015)**. The high demand for food resulting from increased human consumption and the food industry has led extension organizations to modernize their systems and methods in addition to resorting to alternative strategies and policies in providing extension services in order to achieve food security and economic development in general. Within the framework of the commitment of states to allocate the maximum amount of available resources for food production **(Al-Saadi & Al-Badri, 2022).**

Agricultural extension is the first tool adopted by those interested in agricultural affairs and decision-makers to improve and develop this vital and important sector, which is related to ensuring food security for countries and communities, through various activities through which knowledge, information and advisory services are provided requested by farmers and other actors in agri-food systems and Rural Development, which include technical, organizational, commercial and administrative skills and practices that improve livelihoods and well-being in rural areas, and facilitate their access to knowledge, information and technology and their interaction with partners in agricultural scientific research and other institutions related to help them develop their technical, organizational and administrative skills and practices **(Qamar, 2005).**

Agricultural extension is an applied science that takes its information from scientific research and field experiences and transmits it to farmers in order to increase their knowledge and skills in order to raise their standard of living by adopting recommended new agricultural

practices that contribute to raising production and productivity in their agricultural fields **(Al-bukhati, 2022)**.

The role of agricultural extension consists in disseminating agricultural innovations, techniques and practices, institutional partnership, activating the mutual relationship between agricultural extension and agricultural research, building extension programs and supporting the concept of participation in building extension programs and collective agricultural work instead of individual, encouraging farmers to agricultural innovation, activating the role of peasant organizations and associations and the role of Agricultural Media in building extension, As well as dealing with agricultural challenges by developing the capacities of farmers and enabling them to withstand these challenges, most notably the challenge of climate change, which has become the most prominent threat to agriculture in the world in general and Iraqi agriculture in particular**(Karim & Salman,2016).**

Empowerment is a person's ability to get what he wants, the ability to influence others in feeling and acting in ways that promote the interests of the individual, the ability to control and influence decisions that affect the individual's life space for his own benefit, expand freedom of choice and Action, increase one's power and control over resources and decisions that affect his life. It is an iterative process of gaining such strength **(Ginige & Richards, 2014).**

Farmer empowerment has previously been defined as the process of improving the capacities of farmers and enabling them to make appropriate choices, influence collective decisions and actions, and achieve the desired results based on those choices **(Hussein, 2023).**
The term climate change refers to changes that are directly or indirectly due to human activity, leading to the observed change in the composition of the global atmosphere, as well as the natural variability of the climate over similar periods of time (**Qurba, 2015**).

All this has led to serious damage to terrestrial ecosystems, fresh water, the cry sphere, coastal and open oceans and the lack of opportunities for achieving food security and water security, which hampered efforts to achieve the Sustainable Development Goals despite the increase in overall agricultural productivity, climate change has slowed this growth over the past fifty years globally **(Allen & shabaland, 2022).**
(Al-sayed, 2019) reported that climate changes occur due to volcanic eruptions, solar phenomena (sunspots), cosmic rays as a result of the explosion of some stars, dust storms in dry and semi-dry areas, factory and automobile emissions, and as a result of some agricultural activities and wastewater.
Although there are natural causes in climate change that have nothing to do with humans, such as changes in the solar cycle and changes in the water cycle in the oceans and seas **(Naama, 2023)**.

The impact of climate change on the cultivation of vegetable crops has been reflected in a decrease in crop yield and nutritional quality, due to drought, overheating and flooding, as well as an increase in pests and plant diseases, as the degree of greenhouse gas emissions caused by humans reached the highest levels in history **(Suleiman, 2019),** which requires there to be new roles exercised by the Agricultural Extension System commensurate with the size of this challenge, represented by changing its methods, approaches, methods and goals, finding new partnerships and guidance intervention in all value chains that agricultural systems go through in order to increase the capabilities of farmers, especially vegetable farmers to withstand these changes by providing the necessary knowledge and skills on how farmers deal with their in this regard, activating the supervisory role on warehouses and markets **(Al-**

Kubaisy & Lafta, 2021), as vegetable crops are one of the basic economic activities in which they constitute large components of agricultural production in the world, they represent an economic source for many farmers and their families, and are an important source to ensure their income, provide them with food, and achieve sustainable food security **(Al-Hafiz &Al-Taie, 2022).**

The Agricultural Extension System should study the main causes that may lead to agricultural risks and focus on the necessary solutions to address them, prepare appropriate extension programs to meet the challenges facing farmers in their agricultural activities, and train and qualify extension workers in the field of managing the problems they face in their agricultural activities **(Salman, 2020).**

This can be achieved only through comprehensive monitoring of agricultural extension activities and identification of extension and advisory services in the scope of addressing and countering climate changes and diagnosing their strengths and weaknesses in order to improve them , considering that farmers, especially vegetable growers, are the first line of resistance to these changes and are the protectors of our natural resources (soil, water, ecosystems) **(Al-Taie& Ridha, 2022),** The reason for the slow development of Iraqi agriculture is due to the inability of the Agricultural Extension System to absorb family innovations and new ideas **(Challob *et al.*, 2020).**

Therefore, it is assumed that the Agricultural Extension Service in Iraq will intensify its efforts by increasing the number of workers and diversifying extension activities for all categories of rural society in the field of agricultural and family activity to enable them to perform their role in this field with high efficiency **(Ridha& Ali, 2020**).

In order to improve the performance and effectiveness of the agricultural extension organization and the agricultural system for rural families in Iraq, it is necessary to spread and develop awareness of the importance of applying special modern technologies in achieving the Sustainable Development Goals, and the principle of specialization in extension work for agricultural workers must be taken into account because its absence or any other principle of organizing extension work leads to poor performance of the organization or the agricultural system and its effectiveness due to their interdependence and complementarity with others**(Naji & Taha, 2022)**.

Therefore, identifying the roles played by the Agricultural Extension System in light of climate changes ,evaluating them, and determining the extent of their quality and efficiency in increasing the capacity of farmers, especially vegetable farmers, has become an imperative necessity, gaining its importance from the importance of facing the challenges facing farmers, especially family farmers, as they constitute the majority of farmers on the one hand, and on the other hand, they rely mainly on their local resources, and therefore they are the most affected by these changes **(Lafta, 2009).**

The research problem

Iraq ranks fifth globally in terms of vulnerability to climate change, as food security in Iraq is affected today by the phenomenon of environmental stress and climate change of human origin , and the temperature is increasing at a rate of (2-7) times faster than the world record degrees, and these phenomena will lead to profound changes in the country's economy and its geographical and demographic composition during the current century, so the rise in temperatures in Iraq will lead to a decrease in agricultural production, The research seeks to identify the extension efforts exerted in enabling vegetable farmers to face the threat of climate

change in the governorates of Baghdad and Babylon, and on this basis, the research problem focuses on answering the following question: What is the role of agricultural extension in enabling vegetable farmers to face climate change in the governorates of Baghdad and Babylon..

MATERIALS AND METHODS

The descriptive approach was used in conducting the study, which is based on describing the real reality by collecting specific data related to the subject of the study, then analyzing it, announcing the results, and coming up with a set of scientific conclusions and recommendations that can be taken by decision makers and targets mainly to improve ways to confront climate change in indicative terms and thus improve the agricultural reality in Iraq **(Al-jadri, 2018)**.

Research objectives

1- Identify the role of agricultural extension in enabling vegetable farmers to face climate changes in Iraq in general.
2- Identify the roles of agricultural extension in enabling vegetable farmers to face climate change in Iraq for each role individually, as follows:

First: The role of follow-up and evaluation.
Second: The role of capacity development and development, including.
A-developing and developing the capabilities of agricultural extension workers.
B-development and development of the capabilities of vegetable farmers.
Third: The media and awareness role.
Fourth: The role of coordination and partnership.
Fifth: The role of encouraging family agricultural innovation.
Sixth: The role of organizing and managing vegetable farmers.
Seventh: publishing houses and adoption of modern technologies.
Eighth: The planning role.

Search area

The research included the governorates of Baghdad and Babylon, as these two governorates were chosen for several reasons, including, Baghdad governorate includes the main guidance institutions represented by the Ministry of Agriculture, the Agricultural Extension and training department, the Training Guidance Center - Baghdad, its extension farms, the training and Rehabilitation Center - Baghdad and two directorates of agriculture, as for Babylon governorate, it organizes the Training Guidance Center in Babylon and the highest number of guidance farms among the governorates of Iraq, and these two governorates are famous for growing vegetables and are greatly affected by climate change.

Community and sample research

The research community included all agricultural extension workers in the governorates of Baghdad and Babylon who are present in various extension and agricultural institutions there, and a random sample of the relative stratification of agricultural extension workers in these two governorates was drawn by (50 %) and (123) research, as in Table No. (1).

Table (1): Research sample for agricultural extension workers in Baghdad and Babylon governorates.

Governorate	Name Of The District	Total Number	50%
Baghdad	The headquarters of the Agricultural Extension and Training Department	76	38
	Training Extension Center-Baghdad and its extension farms	16	8
	Training and Rehabilitation Center-Baghdad	5	3
	Directorate of Agriculture of Baghdad and its agricultural divisions Directorate	38	19
Babylon	The Directorate of Agriculture of Babylon and its agricultural divisions	80	40
	Training extension center-Babylon and its extension farms	30	15
	Total	245	123

Search tool

A questionnaire was prepared and adopted in data collection as a research tool, as the questionnaire is a common and important means of collecting data and obtaining information and facts related to the research, the questionnaire was prepared by reviewing scientific sources, studies and research related to the subject and consulting specialists on the subject from researchers and university professors, and the questionnaire went through several procedures to ensure that it achieves the research objectives, including the procedures of honesty and consistency, as the questionnaire was presented to a group of experts in the fields of Agricultural Extension, Horticulture, soil and water, the coefficient of honesty of the 2/5/2023) by presenting it to a survey sample from outside the research sample consisting of (22) researchers, and the value of the alpha cronbach coefficient reached (0.84), which is a high value, and The questionnaire consisted of (72) paragraphs distributed over (8) areas and was presented to the respondents through a five-tiered scale consisting of five levels according to importance (always, sometimes , to some extent, rarely, there is none) and weights were given to him (1 , 2 , 3 , 4 ,5) respectively, the highest score of the scale reached (5) and the lowest score (1), and the scale scores ranged between (72 - 360) degree, the weighted mean was adopted to find out the level of the role and in comparison with the hypothetical mean of (3) degree, dated (2/6/2023) and until (4/7/2/2023), data and information were collected from the 123 respondents, and the results of the first and second objectives of the study were obtained by using the above five-point scale, then these data were analyzed using manual analysis and the SPSS statistical program .

RESULTS AND DISCUSSION

The first objective/ Identify the role of agricultural extension in enabling vegetable farmers to face climate change in general

The results of the research showed that the roles played by agricultural extension in the field of enabling vegetable farmers to face climate changes, the number of (8) roles obtained by weighted departments decreased between (2.57-2.33), which is lower than the default average of (3) degrees and a weight ratio between (51.4 - 46.6) degrees, which indicates that the roles of Agricultural Extension are average, as in Table (2):

Table (2): The roles of agricultural extension in the field of enabling vegetable farmers to face climate changes according to the weighted mean and percentage weight.

paragraphs	rank by importance	median weighted	Percentage weight
The role of follow-up and evaluation	1	2.57	51.4
The role of capacity development and development	2	2.56	51.2
Media and awareness role	3	2.55	51
The role of coordination and partnership	4	2.47	49.4
The role of encouraging family agricultural innovation	5.5	2.43	48.6
The role of organizing and managing vegetable farmers	5.5	2.43	48.6
Publishing houses and adoption of modern technologies	7	2.39	47.8
The planning role	8	2.33	46.6
Weighted average shares		2.46	49.32

Table no. (2) indicates that the respondents emphasized the importance of the role of follow-up and evaluation, and this is also reinforced by obtaining the first place in terms of importance or approval from the respondents, achieving a weighted average of (2.57) score and a weight ratio of (51.4%) score. The reason for this may be due to the interest of agricultural extension workers in determining the success of the programs, means and guidance methods they use in achieving their guidance goals and their impact on the goals, determining success or failure in performing the guidance role assigned to them, and providing evidence to the higher funding bodies on the correctness of disbursing funds allocated for extension activities.

As for the role of planning, it ranked last in terms of importance or approval by respondents, achieving a weighted average of (2.33) score and a weight ratio of (46.6%) score, this may be due to the interest of those responsible for the planning process in the extension organization in other issues of Greater indicative importance for them, for example, planning to direct agricultural extension efforts towards the development of strategic crop cultivation such as wheat cultivation, This finding is consistent with the findings of a study **(Al-Sagheer, 2022).**

The second objective/ Identify the roles of agricultural extension in enabling vegetable farmers to face climate change in Iraq for each role individually and as follows:

First: The planning role

The results of the study related to the knowledge of the role of planning to enable vegetable farmers to face climate change showed that the paragraph that came in first place in the field of planning role is (preparation of guidance programs to enable vegetable farmers to face climate change), with a weighted average of (2.47) degrees, with a percentage weight of (49.4%). In the last place came the paragraph (identifying farmers, rural leaders, government institutions, agricultural companies and peasant organizations to participate in the construction and implementation of indicative plans and programs to address climate change), as its weighted average reached (2.13) degrees, and percentage weight (42.6%), as in Table (3):

Table (3): arrange the paragraphs of the schematic role field in descending order according to their weighted mean.

paragraphs	rank	median weighted	percentage weight
Preparation of extension programs to enable vegetable farmers to face climate change	1	2.47	49.4
Identify the possible causes of climate change and enable vegetable farmers to diagnose them	2.5	2.40	48
Develop realistic, comprehensive and Integrated Strategic and operational plans and formulate implementation policies to enable vegetable farmers to face climate change	2.5	2.40	48
Diagnosis of current and future problems	4	2.39	47.8
Allocate the necessary financial resources to implement the indicative plans and programs	5	2.31	46.2
Forming specialized committees to coordinate efforts, not to conflict with plans, manage climate changes and work to reduce their impact on vegetable farmers	6	2.30	46
Holding agricultural extension meetings to develop comprehensive plans to enable them to face climate change	7	2.26	45.2
Identify farmers and rural leaders to participate in the construction and implementation of extension plans	8	2.13	42.6
weighted average shares		2.33	46.65

Table No. (3) indicates that all the paragraphs of the role of the planning field have received weighted circles less than the hypothetical average of the scale of (3) degree, and at an average level, and this may be due to the failure of the guidance administration in the agricultural extension authority in Iraq to pay the required attention in terms of adopting objective planning to prepare guidance programs to enable vegetable farmers to face climate change, and focus on the preparation of other guidance programs .

Second: The role of capacity development and development :

A-development and development of the capabilities of agricultural extension workers

The results of the study related to the knowledge of the role of developing and developing the capacities of agricultural extension workers showed that the paragraph that came in first place in this field is (developing the capacities of the extension organization (informatively ,humanly ,materially) to enable vegetable farmers to face climate changes), where its weighted average reached (2.82) degrees, and with a percentage weight of (56.4%). In the last place came the paragraph (developing the capacities of agricultural guides on how to document the connection of vegetable farmers with sources of knowledge and information and encouraging them to adopt innovations), with a weighted average of (2.41) degrees, and a percentage weight (48.2%), as in Table (4):

Table (5): Ranking the paragraphs of the development role and improving the capabilities of agricultural extension workers by weighted average and percentage weight.

paragraphs	rank	median weighted	percentage weight
Developing the organization's extension capabilities (information ally, humanly, financially) to enable vegetable farmers to face climate change	1	2.82	56.4
Strengthening and providing the Agricultural Extension System with young scientific expertise that can be used to face climate change	2	2.73	54.6
Training agricultural guides on the preparation of indicative plans and programs to enable vegetable farmers to face climate change	3	2.65	53
Training agricultural guides not to acquire new knowledge and skills (abilities) in risk management	4	2.53	50.6
Develop the capacities of agricultural guides in the process and integration of sustainable agricultural technologies to face climate change	5	2.52	50.4
Training agricultural guides to use new approaches to guide vegetable farmers and empower them to face climate change, such as farmers ' field schools FFS	6.5	2.48	49.6
Provide various sources of information related to empowering vegetable farmers to face climate change	6.5	2.48	49.6
Introduction of agricultural manuals for the entrances of modern agriculture such as climate-smart agriculture	8	2.43	48.6
Develop the capacities of agricultural guides to provide vegetable farmers with sources of knowledge and information and encourage them to adopt innovations	9	2.41	48.2
weighted average shares		2.56	51.22

Table No. (4) indicates that all the paragraphs of the role of developing the capabilities of agricultural extension workers have received weighted circles less than the hypothetical average of the scale of (3) degree, and at an average level, and this may be due to the failure of the guidance department in the agricultural extension apparatus in Iraq to pay the required attention to the development of the capabilities of agricultural extension workers and not to establish adequate developmental courses and not follow up the results of the training process.

B-development and development of the capacities of vegetable farmers.

The results of the study related to the knowledge of the role of developing and developing the capacities of vegetable farmers showed that the paragraph that came in first place in this field is (advising vegetable farmers on the risks of climate changes and ways to adapt to them and develop their capabilities to face them), with a weighted average of (2.88) degrees, and a percentage weight of (57.6%). In the last place came the paragraph (development of training programs to develop the capabilities of vegetable farmers and according to the priority of needs related to confronting climate change), as its weighted average reached (2.56) degrees, and percentage weight (44.8%), as in Table No. (5)

Table (5): Ranking the paragraphs of the field of the role of development and capacity development of vegetable farmers by weighted average and percentage weight.

paragraphs	rank	median weighted*	Percentage weight
Advising vegetable farmers on the risks of climate change and ways to adapt to them and develop their capabilities to face them	1.5	2.88	57.6
Introducing and guiding vegetable farmers to sustainable agriculture practices related to climate change	1.5	2.88	57.6
Improve the capabilities of vegetable farmers to analyze their agricultural systems for adaptation to climate change	3	2.68	53.6
Involve farmers in identifying the problems they face in the field of countering climate change and developing appropriate solutions to them	4	2.59	51.8
Training courses and orientation meetings were held intensively to raise awareness of vegetable farmers and develop their capabilities to face climate change	5	2.56	51.2
Developing the capacities of vegetable farmers to invest in the local environment to invent appropriate solutions to face climate change	6	2.40	48
A farmer-to-farmer (FTF) approach to extension work to enable vegetable farmers to face climate change	7	2.34	46.8
Develop training programs to develop the capacities of vegetable farmers and prioritize the needs associated with facing climate change	8	2.24	44.8
weighted average shares		2.57	51.57

Table No. (5) indicates that all the paragraphs of the role of developing and developing the capacities of vegetable farmers have received weighted circles less than the hypothetical average of the scale value of (3) degree, and at an average level, and this may be due to the lack of extension activities represented by training courses dedicated to the development of the capacities of vegetable farmers to face climate change, and the lack of participation of farmers in training courses related to the phenomenon of climate change.

Third: The media and awareness role.

The results of the study related to the knowledge of the media and awareness role showed that the paragraph that came in first place in this field is (spreading awareness of the risks of climate change among vegetable farmers through media and information networks, their effects and ways to adapt to them), with a weighted average of (2.93) degrees, and a percentage weight of (58.6%). In the last place came the paragraph (activation of electronic guidance and the establishment of digital platforms to provide climate information to educate farmers to face climate changes), with a weighted average of (2.33) degrees, and a percentage weight (46.6%), as in Table No. (6).

Table (6): Arrange the paragraphs of the field of media and awareness role in descending order according to the weighted medium and percentage weight.

paragraphs	rank	median weighted	percentage weight
Spreading awareness of the risks of climate change among vegetable farmers through media and information networks, their effects and ways to adapt to them	1	2.93	58.6
Providing guidance publications that raise awareness among vegetable farmers about the risks of climate change and how to face them and disseminate their technologies	2	2.66	53.2
The use of information technologies in teaching vegetable farmers the measures used to mitigate and adapt to the effects of climate change	3	2.60	52
Using ICT to create awareness about the risks of climate change and how to address them	4	2.51	50.2
Creating websites and pages through social media programs and using a mobile phone to increase the awareness of vegetable farmers about facing climate change	5	2.45	49
Organizing seminars and guidance meetings on empowering vegetable farmers to face climate change	6	2.40	48
Activating electronic guidance and establishing digital platforms to provide climate information to raise farmers ' awareness to face climate changes	7	2.33	46.6
weighted average shares		2.55	51.08

Table No. (6) above indicates that all paragraphs of the media and awareness role have received weighted circles less than the hypothetical average of the scale value of (3) degree, and at an average level, this may be due to the failure of the guidance management to realize the importance of the media field in its work, not encouraging employees working in Agricultural Media to excel, and not employing Agricultural Media properly to sensitize targets to the risks of climate change.

Fourth: The role of coordination and partnership.

The results of the study on the role of coordination and Partnership showed that the paragraph that came in first place in this field is (coordination and partnership with water resources management institutions to enable vegetable farmers to face climate change), with a weighted average of (2.83) degrees, and a percentage weight of (56.6%). In the last place came the paragraph (cooperation with research centers that are interested in studying climate changes and their effects on vegetable farmers and ways to face them), with a weighted average of (2.08) degrees, and a percentage weight (41.6%), as in Table No. (7).

Table (7): Arrange the paragraphs of the field of the role of coordination and partnership in descending order according to the weighted medium and percentage weight.

paragraphs	rank	median weighted	percentage weight
Coordination and partnership with water resources management institutions to enable vegetable farmers	1	2.83	56.6
Coordination and cooperation with agricultural organizations in the preparation and implementation of integrated extension programs to solve agricultural problems	2	2.59	51.8
Coordination between the government guidance agencies in the governorate and the meteorological authority to provide data and information on climate changes	3	2.56	51.2
Coordination and partnership with the private sector (companies and private agricultural offices) to equip and guide and implement programs	4	2.53	50.6
Coordinate with the competent legal authorities to take action to prevent people who deliberately commit practices that contribute to climate change, such as burning, bulldozing and	5	2.51	50.2
Providing Rai leaders with the necessary technical information to help and empower vegetable farmers to face climate change	6	2.47	49.4
Coordination, linking and cooperation with research bodies and specialists in the development of appropriate solutions to address climate change	7	2.46	49.2
Coordinating with international organizations to enable vegetable farmers to face climate change	8	2.42	48.4
Show the spirit of cooperation and coordination with the targets (vegetable farmers) to face climate change	9	2.24	44.8
Cooperation with research centers that are interested in studying climate change and its effects on vegetable farmers and ways to cope with them	10	2.08	41.6
weighted average shares		2.47	49.38

Table No. (7) indicates that all the paragraphs of the role of coordination and partnership have received weighted circles less than the hypothetical average of the scale of (3) degree, at an average level, this may be due to the existence of a significant weakness in the coordination and partnership processes between the Agricultural Extension System and institutions operating in the research area represented by cooperative societies, scientific research centers at universities, the meteorological authority, international organizations, opinion leaders and farmers, and this negatively reflects on the success of extension work specialized in empowering vegetable farmers to face the effects of climate change .

Fifth: The role of encouraging family agricultural innovation.

The results of the study on the role of encouraging family agricultural innovation showed that the paragraph that came in first place in this area is (the trend towards adopting and promoting the need for a family agricultural innovation system in Iraq), with a weighted average of (2.83) degrees, and a percentage weight of (56.6%). In the last place came the paragraph (motivating and encouraging farmers to acquire and deploy modern innovations to face climate change (irrigation techniques, varieties and hybrids, mechanization and equipment, agricultural methods and systems) and providing them), as its weighted average reached (2.42) degrees, and percentage weight (48.4%), as in Table No. (8).

Table (8): Ranking the paragraphs of the field of the role of encouraging family agricultural innovation by weighted average and percentage weight.

paragraphs	rank	median weighted	percentage weight
The trend towards adopting and strengthening the need for a family agricultural innovation system in Iraq	1	2.83	56.6
Develop a general framework for promoting and disseminating agricultural and household innovation (philosophy, goals, policies, legislation) to address climate change.	2	2.59	51.8
Creating and organizing a supportive environment for innovators and providing them with material and moral support and working to disseminate their innovations to enable vegetable farmers to face climate change	3	2.56	51.2
Participation and support in conducting research experiments in farmers ' fields to encourage them and develop their abilities to adopt innovations	4	2.53	50.6
Identify and encourage innovative farmers, support and disseminate local innovation to meet climate change	5	2.51	50.2
Follow-up of the application of family innovations among vegetable farmers	6	2.47	49.4
Transfer of household innovations to research institutions for their development, adaptation and dissemination locally	7	2.46	49.2
Stimulate and encourage farmers to acquire and disseminate modern innovations to cope with climate change (irrigation technologies, varieties and hybrids ,mechanization and equipment, agricultural methods and systems) and provide	8	2.42	48.4
weighted average shares		2.43	48.57

Table No. (8) indicates that all paragraphs of the role of encouraging family agricultural innovation have received weighted circles below the default average of the scale (3), at an average level, due to the lack of a specialized family agricultural innovation system in Iraq that works to encourage and disseminate agricultural innovations to address climate change, and the lack of follow-up and encouragement before the Agricultural Extension System in the search for family agricultural innovations and encourage other farmers to adopt them.

Sixth: Publishing houses and adoption of modern technologies.

The results of the study related to the knowledge of publishing houses and the adoption of modern technologies showed that the paragraph that came in first place in this field is (diagnosis and treatment of problems that arise during the application of agricultural techniques to combat climate change), with a weighted average of (2.83) degrees, and a percentage weight of (56.6%). In the last place came the paragraph (evaluation of programs for the dissemination of agricultural technologies to combat climate change and communicate the results of the evaluation to decision makers and decision makers), with a weighted average of (2.46) degrees, and a percentage weight (49.2%), as in Table No. (9).

Table (9): Ranking the paragraphs of the field of publishing houses and the adoption of modern technologies by weighted average and percentage weight.

paragraphs	rank	median weighted	percentage weight
Diagnosis and treatment of problems that arise during the application of agricultural technologies to cope with climate	1	2.83	56.6
Introducing vegetable farmers to modern agricultural techniques that reduce the effects of climate change	2	2.59	51.8
Convince farmers to adopt the best practices and special agricultural techniques to reduce the risks of climate change (drought-tolerant varieties, early production, greenhouses, irrigation systems)	3	2.56	51.2
Providing and equipping modern agricultural techniques to enable vegetable farmers to cope with climate change	4	2.53	50.6
Follow-up of farmers ' application of modern technologies to combat climate change	5	2.51	50.2
Educating vegetable farmers about modern agricultural techniques that contribute to reducing the risks of climate	6	2.47	49.4
Evaluation of programs for the dissemination of agricultural technologies to combat climate change and the delivery of evaluation results to decision makers and decision makers	7	2.46	49.2
weighted average shares		2.39	47.71

Table No. (9) indicates that all the paragraphs of publishing houses and the adoption of modern technologies have received weighted circles below the default average of the value scale of (3) degree, and at an average level, due to the lack of a guiding plan for the dissemination and processing of modern irrigation technologies at the moment, the weak level of partnership between agricultural extension and agricultural.

Seventh: The role of organizing and managing vegetable farmers

The results of the study related to the knowledge of the role of organizing and managing vegetable farmers showed that the paragraph that came in first place in this area is (raising awareness and encouraging vegetable farmers to establish specialized agricultural associations to confront climate changes and introduce them to its importance), with a weighted average of (2.53) degrees, with a percentage weight of (50.6%). In the last place came the paragraph (providing various sources of information to vegetable farmers and their organizations to obtain the latest updates on climate change), as its weighted average reached (2.31) degrees, and percentage weight (46.2%), as in Table No. (10):

Table (10): Arrange the paragraphs of the field of the role of organizing and managing vegetable farmers by weighted average, weight ratio and weighted average.

paragraphs	rank	median weighted	percentage weight
Raising awareness and encouraging vegetable farmers to establish specialized agricultural associations	1	2.53	50.6
Morally empower specialized vegetable farmers associations by involving them in extension work to face climate changes	2	2.48	49.6
Involve rural organizations in the planning of programs for the cultivation of vegetable varieties that are resistant to climate	3	2.44	48.8
Developing the morale of farmers to join the associations for the cultivation of vegetables	4	2.43	48.6
Discovering effective rural leaders in the field of vegetable growing and empowering them to serve extension work in the face of climate change	5	2.40	48
Providing various sources of information to vegetable farmers and their organizations to get the latest updates on climate change	6	2.31	46.2
weighted average shares		2.43	48.63

Table No. (10) indicates that all paragraphs of the role of organizing and managing vegetable farmers have received weighted circles below the default average of the value scale (3) grade, and at an average level, this may be due to the lack of awareness among farmers of the importance of organizing and cooperative work and weak agricultural extension activity.

Eighth: The role of follow-up and evaluation.

The results of the study related to the knowledge of the role of follow-up and evaluation showed that the paragraph that came in first place in this field is (adoption of realistic indicators when conducting the follow-up and evaluation process), where its weighted average reached (2.80) degrees, with a percentage weight of (56%). In the last place came the paragraph (using the results of follow-up in making relevant decisions in solving the problems facing the implementation of extension activities that enable vegetable farmers to face climate change), with a weighted average of (2.27) degrees, and a percentage weight (45.4%), as in Table No. (11).

Table (11): Arrange the paragraphs of the field of the role of follow-up and evaluation in descending order according to the weighted.

paragraphs	rank	median weighted	percentage weight
Adopting realistic indicators when conducting the follow-up and evaluation process	1	2.80	56
Achieve a role for vegetable farmers and the desirability of extension activities and programs to empower farmers	2	2.75	55
The existence of a organization whose task is to supervise and follow up the implementation of extension activities	3	2.72	54.4
Collecting the necessary data and evidence on the reality of the implementation of activities and extension programs	4	2.58	51.6
Comparison of evidence or data with established criteria	5	2.56	51.2
Involve the relevant authorities in the follow-up and evaluation process	6	2.55	51
Identify the appropriate tools and metrics that are used in the evaluation process	7	2.44	48.8
Adopting transparency in making judgments and presenting results in light of comparison with standards	8	2.43	48.6
using results of follow-up in making decisions to solve problems facing the implementation of extension activities	9	2.27	45.4
weighted average shares		2.57	51.33

Table No. (11) indicates that all paragraphs of the monitoring and evaluation role have received weighted circles below the default average of the scale (3) grade, and at an average level, this may be due to the lack of an effective monitoring and evaluation system in the Agricultural Extension System due to the lack of continuous improvement of this system, and the lack of comprehensiveness of all elements of the system, their activities and results .

CONCLUSIONS

1. The failure of the agricultural extension authority to give priority in its activities and extension programs to the issue of empowering vegetable farmers to face climate change and focus on other areas such as the development of wheat cultivation.
2. The weakness of the material, human and informational capabilities of the agricultural extension authority in the study area to play its role in enabling vegetable farmers to face climate changes.
3. The lack of an integrated system of agricultural innovation that coordinates and cooperates with all parties to enable vegetable farmers to face climate change.

RECOMMENDATIONS

1- The agricultural extension agency in the study area should intensify extension activities to enable vegetable farmers to face climate changes.

2- The agricultural extension agency in the study area should coordinate and partner with other actors (scientific research, processing institutions, local organizations) in order to unify efforts to enable farmers to face climate change.

3- Focusing on smallholder farmers in providing agricultural extension services in the field of countering climate change because they constitute the majority of vegetable farmers on the one hand, and they have limited material resources on the other.

REFERENCES

1. Al-bukhati, H. I. (2022). *A proposal to improve the capabilities of agricultural extension workers in the field of transferring agricultural technologies in the Republic of Iraq*. Ph.D. Thesis- Faculty of Agriculture-Ain Shams University- Arab Republic of Egypt.
2. Al-Hafiz, F. S.& Al-Taie, H. K. (2022) A proposed conception of the quality of some elements of the extension service for vegetable farmers from their point of view in Baghdad governorate. *Journal of Iraqi Agricultural Sciences*, 5 (53),1203-1211.
3. Al-jadri, A. H. (2018) *Mentor In The Preparation And Writing Of Theses And Dissertations*, Al-Warraq Publishing And Distribution Foundation, First Edition, Jordan, 56-58.
4. Al-Kubaisy, M. & Lafta, A. (2021). Productive obstacles in the process of marketing agricultural vegetables in Fallujah district. *Annals of the Romanian Society for Cell Biology*,25(4), 14124-14134 .
5. Allen, G. & shabaland, G. (2022). *Successive climate risks and options for enhancing resilience and adaptation In the Middle East and North Africa*. Study at the European Center for development policy management (ECDPM)in Brussels, Belgium. www. u. cascades.
6. Al-Saadi, A. A. H. & Al-Badri, A. A. Z. (2022). Reality of the extension services provided to workers in vegetable production on farms belonging to the two holy shrines of Husseiniyya and Abbasiyya in the Holy province of Karbala, *Journal of Iraqi Agricultural Sciences*, 53(3) ,685-711.
7. Al-Sagheer, H. M. M. (2022). Areas of organizational change and their impact on the strategic marketing planning process, I*raqi Journal of Market Research and Consumer Protection*, 14(2), 50-64.
8. Al-sayed, M. S. (2019). Comparative study of the living adaptation of a rural family: the shadow of climate changes in a new local community with reclaimed land and a traditional local community in Minya governorate, *Journal of Mansoura University of Agricultural Sciences***,** 10 (2), 10-21.
9. Al-Taie, R. H. & Ridha, B. A. (2022). Suggested proposal for developing the agricultural extension agents capacities in the field of agricultural risks management for plastic panel in middle governorates of Iraq, *Indian Journal of Ecology*, 49(1),134-138.

10. Challob, M., Lafta, A.H. & Ridha, B. (2020). Study on major constraints and problems in transfer of technology by agricultural extension organization. *Indian Journal of Ecology*, 47 (Special Issues), (12), 373-375.
11. Ginige, T. & Richards, D. (2014). *A Model for Enhancing Empowerment in Farmers using Mobile Based Information System*, Australasian Conference on Information Systems 23, 3-5 Dec 2012, Geelong, Australia.
12. Hussein, T. M. A. (2023). Determinants of socio-economic and political empowerment of rural youth in the New Valley governorate, Egypt, *Journal of agricultural economics and Social Sciences*, 14 (7), 371-381.
13. Karim, N. H. & Salman, M.A. (2016). The role of the agricultural guide Department for knowledge of agricultural developments in improving field guidance activities in Governorates of the central region of Iraq. *Journal of Iraqi Agricultural Sciences*, 47 (5), 1254-1263.
14. Lafta, A.H. (2009). Constraints to technology transfer as viewed by extension farmers. *Iraqi Journal of Agricultural Sciences*, 40 (4), 86-91 .
15. Muhamad, J.A. (2015). The food problem in Iraq. challenges and effects, I*raqi Journal of Market Research and Consumer Protection*, 8(1), 206-230.
16. Naama, N.H. (2023). Management of climate changes. Challenges and confrontation, *Al Riyada Journal of Finance and Business*, 4 (3),1-2.
17. Naji, A. A. R. & Taha, M. S. (2022). Calendar of convenience of transferring the method of smart agriculture in Iraqi Agricultural Systems, *Journal of Iraqi Agricultural Sciences*, 51, (special issue), 132-137.
18. Qamar, K. (2005). *Modernizing national agricultural extension systems*: practical guide for policy-makers of developing countries, research extension and training division sustainable, development department food and agriculture organization of the united nations. Rome, Italy, by Information Division, FAO, Viale delle Termedi Caracalla, 00100 Rome, Italy or by e-mail to copyright@fao.org.
19. Qurba, M. (2015). Climate change: a critical analytical study between reality and scientific fact, *Egyptian Journal of environmental change*, 7 (2), 20-31.
20. Ridha, B. J. & Ali, N. S.(2020). Impact of Activities Offered by Agricultural Extension and Training Office for Rural Women in Iraq, *Indian Journal of Ecology*, 47 (special issue) , 381-384.
21. Salman, M. A. (2020). The role of agricultural extension in addressing the challenges facing farmers within their agricultural activities, *plant archive*, 20 (2) , 2996-3001.
22. Suleiman, S. A. (2019). Climate smart agriculture in the face of the impact of climate change on Egyptian food security. *Egyptian Journal of agricultural economics*.29(4), 1868-1870.